PURI-PRO (Portuguese URinary Incontinence PROject) – SYMPTOM IMPACT AND eHEALTH INTERVENTION FOR MIDDE-AGED WOMEN WITH URINARY INCONTINENCE

Marta Monteiro da Silva Gonçalves Porto

Dissertation submitted in partial fulfilment of the requirements for the degree of Doctor in Psychology

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The stars we are given. The constellations we make. That is to say, stars exist in the cosmos, but constellations are the imaginary lines we draw between them, the readings we give the sky, the stories we tell.

— Rebecca Solnit, *Storming the Gates of Paradise: Landscapes for Politics*

Keywords:

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2300 Human Experimental Psychology

2340 Cognitive Processes

3300 Health & Mental Health Treatment & Prevention

3312 Behaviour Therapy & Behaviour Modification

3361 Behavioural & Psychological Treatment of Physical Illness

ABSTRACT

Urinary incontinence (UI) is highly prevalent yet frequently undertreated and underreported, imposing substantial biopsychosocial costs during midlife. Many women are socially active through defensive and hiding self-management coping strategies that provide short-term control but delay help-seeking. The PURI-PRO was designed as a sequential three-phase, mixed-methods investigation to understand the UI cognitive, emotional, and behavioural dimensions, and their interconnections through the lens of the Common-Sense Model (CSM); the role of beliefs and coping in UI psychosocial consequences; and to test an eHealth intervention. Participants were Portuguese women aged 40–65 years who were recruited online using snowball sampling and self-reported occasional and frequent UI. Phase 1 employed a qualitative, quantitative and cross-sectional design (Objective 1; n = 34) to explore illness representations, emotions, and coping, as well as their interconnectedness, through directed content and textual analysis. The Portuguese Brief Illness Perception Questionnaire (Brief IPQ) was validated (Objective 2; n = 1,511). Phase 2 consisted of cross-sectional studies (Objectives 3–8; n = 1,538–2,648) to validate the KHQ Symptom Severity Subscale (KHQ-SSS), develop the UI-Self-Management Coping Strategies Instrument (UI-SMCSI) and UI-Social Isolation Questionnaire (UI-SIQ), and test mediation (role of UI-SMC in the relationship between symptom severity and social isolation) and moderation (coping and beliefs buffering UI severity impact on sexual function/quality of life [QoL]). The impact of UI severity on workplace productivity was also explored. Structural Equation Modelling and measurement invariance were applied. Phase 3 was a 1:1 randomised controlled trial (Objectives 9–10; EG = 46, CG = 52) of an eight-week synchronous eHealth intervention grounded in the CSM, the Health Action Process Approach (HAPA), and Cognitive–Behavioural Therapy (CBT), using BCTTv1 behaviour change techniques. Outcomes were assessed at baseline, mid-intervention, post-intervention, and follow-up using Conditional Latent Growth Modelling, with mediation analyses testing the role of risk perception and intention in the relationship between symptom severity and primary outcomes at follow-up. Phase 1 (Objectives 1–2) identified two largely independent dimensions—cognitive illness representations and behavioural strategies—with peripherally-located emotions. An appraisal mechanism linked control and timeline beliefs to coping, suggesting an extension of the CSM. In Phase 2 (Objectives 3–8), coping buffered the effect of UI severity on sexual function, whereas beliefs did not. Severity, beliefs and coping strategies directly impacted QoL. Coping fully mediated the association between symptoms' severity and social isolation. Workplace productivity was also negatively impacted by UI severity. Phase 3 (Objectives 9–10) showed that the intervention reduced symptom severity, threatening illness representations, and defensive/hiding coping; improved condition-specific QoL and social isolation; and strengthened volitional self-regulation. Planning and action control mediated the pathway from early motivation to outcomes. In conclusion, PURI-PRO reframes UI as a multi-determined clinical and changeable condition in which beliefs set the context, appraisals channel beliefs into behaviour, coping functions as mediator and moderator of psychosocial outcomes, while volition counterbalances the adverse effects of risk perception and intention. Contributions include an extension of the CSM, the development of three brief condition-specific PROMs, and experimental evidence that combining physiotherapy with evidence-based Health Psychology models in multidisciplinary teams enhances UI care and condition-specific QoL.

RESUMO

A incontinência urinária (IU) é altamente prevalente, mas é frequentemente subnotificada e subtratada, acarretando custos biopsicossociais significativos para as mulheres na meia-idade. Muitas mulheres permanecem socialmente ativas através de estratégias de autogestão defensivas e de ocultação, que permitem o controlo a curto prazo, mas adiam a procura de ajuda. O PURI-PRO foi desenvolvido como um estudo sequencial em três fases, de métodos mistos, com o objetivo de compreender as dimensões cognitivas, emocionais e comportamentais da IU e as suas interligações tendo como base o Modelo do Senso Comum (MSC); analisar o papel das crenças e das estratégias de autogestão nas consequências psicossociais da IU; e testar uma intervenção em formato digital. As participantes foram mulheres portuguesas entre os 40 e os 65 anos, recrutadas online através da técnica de amostragem em bola de neve, que auto-reportaram episódios ocasionais ou frequentes de IU. Na Fase 1 (Objetivos 1–2), foi utilizado um desenho qualitativo, quantitativo e transversal (n = 34) para explorar representações da doença, emoções e estratégias de autogestão, assim como as suas interconexões, através de análise de conteúdo e análise textual dirigida. Paralelamente, foi validada a versão portuguesa do Brief Illness Perception Questionnaire (Brief IPQ; n = 1.511). A Fase 2 (Objetivos 3–8) consistiu em estudos transversais (n = 1.538–2.648) para validar a KHQ Symptom Severity Subscale (KHQ-SSS), desenvolver o UI-Self-Management Coping Strategies Instrument (UI-SMCSI) e o UI-Social Isolation Questionnaire (UI-SIQ), e em testar efeitos de mediação (papel da UI-SMC na relação entre a gravidade dos sintomas e o isolamento social) e de moderação (estratégias e crenças como fatores de proteção face ao impacto da gravidade da IU na função sexual e na qualidade de vida [QV]). O impacto da gravidade da IU na produtividade laboral também foi avaliado. Para tal, aplicou-se a Análise de Equações Estruturais e testes de invariância de medida. A Fase 3 (Objetivos 9–10) correspondeu a um ensaio clínico aleatorizado (1:1; GE = 46, GC = 52) de uma intervenção síncrona em formato digital, com a duração de oito semanas, assente no Modelo do Senso Comum (MSC), no Modelo HAPA e na Terapia Cognitivo-Comportamental (TCC), recorrendo a técnicas de mudança comportamental da taxonomia BCTTv1. Os resultados foram avaliados na linha de base, a meio da intervenção, pós-intervenção e no follow-up, através de Modelos de Crescimento Latente Condicionais. Foram ainda realizadas análises de mediação para testar o papel da perceção de risco e da intenção na relação entre a gravidade dos sintomas e os resultados primários em follow-up. Os resultados da Fase 1 revelaram duas dimensões maioritariamente independentes — representações cognitivas da doença e estratégias comportamentais — com as emoções a emergirem numa posição periférica. O mecanismo de appraisal ligou crenças de controlo e de duração às estratégias comportamentais, sugerindo uma extensão do CSM. Na Fase 2, as estratégias de autogestão mitigaram o impacto da gravidade da IU sobre a função sexual, enquanto as crenças não tiveram esse efeito. Gravidade, crenças e estratégias influenciaram diretamente a QV. As estratégias mediaram totalmente a associação entre a gravidade dos sintomas e o isolamento social. A produtividade laboral também foi negativamente afetada pela gravidade da IU. Os resultados da Fase 3 demonstraram que a intervenção reduziu a gravidade dos sintomas, as representações ameaçadoras da doença e as estratégias defensivas/de ocultação; melhorou a QV específica da condição e reduziu o isolamento social; e fortaleceu a autorregulação volitiva. O planeamento e o controlo da ação mediaram a transição da motivação inicial para os resultados obtidos. Em conclusão, o PURI-PRO conceptualiza a IU como uma condição clínica multideterminada e passível de modificação, em que as crenças estabelecem o enquadramento, as avaliações canalizam as crenças em comportamento, as estratégias de autorregulação atuam como mediador e moderador das

consequências psicossociais e a volição contrabalança os efeitos adversos da perceção de risco e da intenção. Entre os principais contributos destacam-se a extensão do CSM, o desenvolvimento de três instrumentos de autorrelato específicos para a IU e a evidência experimental de que as integrações da fisioterapia conservadora com modelos de Psicologia da Saúde baseados na evidência, em equipas multidisciplinares, melhoram os cuidados da IU e a QV específica à condição.

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Index of Abbreviations

α – Cronbach's alpha

ANOVA – Analysis of variance

BCT – Behaviour change technique

BCTs – Behaviour change techniques

β – Standardised regression coefficient

CBT – Cognitive-behavioural therapy

CFA – Confirmatory factor analysis

CFI – Comparative fit index

CG – Control group

CLGM – Conditional latent growth model

CSM – Common-sense model of self-regulation

df – degrees of freedom

EG – Experimental group

eHealth – Electronic health intervention

FIML – Full information maximum likelihood

HAPA – Health Action Process Approach

i – Intercept

ICIQ-UI SF – International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form

IPA – Interpretative phenomenological analysis

IRAMUTEQ – Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires

KHQ – King's Health Questionnaire

KHQ-SSS – King's Health Questionnaire-Symptom Severity Scale

Ku – Kurtosis

LGM – Latent growth model

LGCM – Latent growth curve model

MAR – Missing at random

M – Mean

MLR – Robust maximum-likelihood estimator

MD – Median

MUI – Mixed urinary incontinence

PFME – Pelvic floor muscle exercise

PIKQ-UI – Prolapse and Incontinence Knowledge Questionnaire

p – Probability value

PURI-PRO – Portuguese Urinary Incontinence Project

QCA – Qualitative content analysis

QoL – Quality of life

QUID – Questionnaire for Urinary Incontinence Diagnosis

RCT – Randomised controlled trial

RMSEA – Root mean square error of approximation

RSE – Rosenberg Self-Esteem Scale

s – Slope (in growth models)

SD – Standard deviation

SEM – Structural equation modelling

SI – Social isolation

Sk – Skewness

SRMR – Standardised root mean square residual

SUI – Stress urinary incontinence

T0 – Baseline questionnaire

T1 – Mid-intervention questionnaire

T2 – Post-intervention questionnaire

T3 – Three-month follow-up questionnaire

TLI – Tucker–Lewis index

UI – Urinary incontinence

UI-SIQ – Urinary Incontinence Social Isolation Questionnaire

UI-SMCSI – Urinary Incontinence Self-Management Coping Strategies Instrument

Var(i) – Variance estimate for intercept

Var(s) – Variance estimate for slope

WHO – World Health Organization

WHOQOL-BREF – World Health Organization Quality of Life-BREF

χ^2/df – Ratio of chi-square to degrees of freedom

Index of Acronyms

Full Term	Definition/Context
UI – Urinary Incontinence	Complaint of any involuntary leakage of urine
SUI – Stress Urinary Incontinence	Leakage associated with effort or exertion (e.g., coughing, sneezing)
MUI – Mixed Urinary Incontinence	Combination of stress and urgency incontinence symptoms
QoL – Quality of Life	Broad measure of general well-being
HRQoL – Health-Related Quality of Life	Health-specific quality of life outcomes
SF – Sexual Function	Multidimensional construct including desire, arousal, lubrication, and satisfaction
WP – Workplace Productivity	Capacity to perform effectively in occupational contexts
BMI – Body Mass Index	Ratio of weight to height, an indicator of body composition
EAU – European Association of Urology	Professional body issuing guidelines on urological care
ICS – International Continence Society	International society standardising terminology and guidelines in continence research
IUGA – International Urogynecological Association	International body focused on urogynecology and female pelvic floor disorders
CONSORT – Consolidated Standards of Reporting Trials	Guidelines for transparent reporting of randomised controlled trials
SPIRIT – Standard Protocol Items: Recommendations for Interventional Trials	Guidelines for designing and reporting trial protocols
CSM – Common-Sense Model (of Self-Regulation)	Theoretical model explaining how individuals perceive and respond to illness
HAPA – Health Action Process Approach	Socio-cognitive model describing motivation and volition in health behaviour change
CBT – Cognitive Behavioural Therapy	Psychological intervention targeting maladaptive thoughts and behaviours
Brief IPQ – Brief Illness Perception Questionnaire	Measure of illness representations (cognitive and emotional)
KHQ – King's Health Questionnaire	Condition-specific QoL measure for urinary incontinence

KHQ-SSS – King's Health Questionnaire-Symptom Severity Subscale	Symptom severity component of KHQ
ICIQ-UI SF – International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form	Standardised assessment of UI symptoms and impact
UI-SMCSI – Urinary Incontinence Self-Management Coping Strategies Instrument	PROM measuring defensive and hiding coping strategies
UI-SIQ – Urinary Incontinence-Specific Social Isolation Questionnaire	PROM assessing social isolation specific to UI
PROMs – Patient-Reported Outcome Measures	Instruments capturing patients' perceptions of symptoms, function, or well-being
FSFI-6 – Female Sexual Function Index-6 Item	Short form scale measuring sexual function
RCT – Randomised Controlled Trial	Gold-standard experimental design to assess intervention efficacy
QCA – Qualitative Content Analysis	Method for coding and interpreting qualitative data
DHC – Descending Hierarchical Classification	Text-mining technique clustering lexicon into classes
FCA – Factorial Correspondence Analysis	Statistical technique to explore lexical associations in discourse
CFA – Confirmatory Factor Analysis	Statistical method to test hypothesised factor structures
SEM – Structural Equation Modelling	Statistical method for testing complex relationships between latent variables
FIML – Full Information Maximum Likelihood	Estimation method handling missing data in SEM
MCID – Minimally Clinically Important Difference	Smallest change in score perceived as beneficial by patients
DIF – Differential Item Functioning	Test of whether items perform differently across groups
BCTTv1 – Behaviour Change Technique Taxonomy v1	Standard taxonomy for specifying intervention techniques
PFME – Pelvic Floor Muscle Exercises	First-line conservative therapy for UI
LUTS – Lower Urinary Tract Symptoms	Range of urinary symptoms including frequency, urgency, nocturia, and incontinence
STRAW – Stages of Reproductive Ageing Workshop	Criteria for classifying menopausal status

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Porto, M. G., Pimenta, F., Queiroz-Garcia, I., Uva, M., Patrone, M., Mascarenhas, T., & Marôco, J. (2025). *Measuring social isolation in women with urinary incontinence: Validation of the UI-SIQ* [Manuscript submitted for publication]

Porto, M. G., Pimenta, F., Queiroz-Garcia, I., Uva, M., Patrone, M., Mascarenhas, T., & Marôco, J. (*in press*). Psychometric properties of the KHQ Symptom Severity Scale among middle-aged women. In H. Pereira, G. Esgalhado, & P. Silva (Eds.), *Livro de Atas das 4as Conferências Internacionais em Psicologia Clínica e da Saúde*. Faculdade de Ciências Sociais e Humanas, Universidade da Beira Interior.

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Conference Presentations

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2024, September 27). *Preliminary efficacy analysis of the PURI-PRO randomised controlled trial* [Translation of the Portuguese title: Análise preliminar de eficácia do estudo aleatorizado controlado PURI-PRO]. Oral presentation at the XV Congresso da Associação Portuguesa de Neurourologia e Uroginecologia (APNUG), Portugal.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2024, February 3). *Dysfunctional urinary incontinence strategies – Mediation variable between UI symptoms and social isolation*. Oral presentation at the 15th National Congress of Health Psychology, Egas Moniz School of Health & Science, Caparica, Almada, Portugal.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2023). *Psychometric properties of the Brief IPQ in a sample of Portuguese women with incontinence* [Translation of the Portuguese title: Propriedades psicométricas do Brief IPQ numa amostra de mulheres

portuguesas com incontinência]. Oral presentation at the 2nd International Conferences in Clinical and Health Psychology, Portugal.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2023). *The Common-Sense Model applied to urinary incontinence: A qualitative analysis (PURI-PRO, Portuguese Urinary Incontinence Project)*. Oral presentation at the 37th Annual Conference of the European Health Psychology Society.

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Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2022, September 8). *Impact of urinary incontinence on quality of life and female sexual function* [Translation of the Portuguese title: Impacto da incontinência urinária na qualidade de vida e função sexual feminina]. Oral presentation at the 14th National Congress of Health Psychology, Madeira.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2022, September). *Predictive factors for family functioning during the first COVID-19 lockdown*. Oral presentation in Madeira.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2021, November 19). *Psychological characteristics and sexual correlates of the resolution experience*. Oral presentation at the 22nd World Meeting of the International Society for Sexual Medicine.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2021, September 9). *Does urinary incontinence predict sexual function, social isolation and productivity in middle-aged women?* Oral presentation at the 13th European Congress on Menopause and Andropause.

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2020, January 31). *Risk factors for stress urinary incontinence in women* [Translation of the Portuguese title: Fatores de risco da incontinência urinária de esforço feminina]. Oral presentation at the 13th National Congress of Health Psychology, Sociedade Portuguesa de Psicologia da Saúde, Covilhã, Portugal.

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Workshops

Menopausa e Promoção de Saúde: O que promover e como promover? (2022, September 7), in Universidade da Madeira (14.º Congresso Nacional de Psicologia da Saúde [CNPS]).

Desafios da Menopausa: Abordagens de Promoção da Saúde para a Gestão de Peso e Incontinência Urinária (2024, September 1), in Egas Moniz School of Health & Science (15.º Congresso Nacional de Psicologia da Saúde [CNPS]).

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Other Publications

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Rodrigues, I., Porto, M. G., Pimenta, F., Costa, R. M., & Passie, T. (2024). Development and validation of a measure of the resolution phase of the sexual response cycle: The Sexual Resolution Scale (SRS). *The Journal of Sex Research*, *61*(1), 1–10. https://doi.org/10.1080/00224499.2024.2424414

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Book Chapter

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Conference Abstracts (Published)

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Chapter 1

Introduction

According to the International Urogynecological Association (IUGA) and International Continence Society (ICS), Urinary incontinence (UI) (Abrams et al., 2003; Haylen et al., 2010) is defined as the complaint of any involuntary loss of urine, regardless of amount or type of leakage. It constitutes a clinical condition that represents a substantial and growing global public health issue, and may significantly impact health-related quality of life (QOL) (Abrams et al., 2015; Mendes et al., 2017).

UI affects individuals across the lifespan but disproportionately impacts women, particularly in midlife and older age (Bedretdinova et al., 2016; Coyne et al., 2009; Irwin et al., 2006). Although its prevalence increases with age, UI is not a normal or inevitable part of ageing. Population-based studies report wide-ranging prevalence estimates, typically ranging from 25% to 45%, depending on the diagnostic criteria, population demographics, and methodology (Bedretdinova et al., 2016; Coyne et al., 2009; Irwin et al., 2006). A marked peak of UI prevalence occurs in middle age, reaching 30% (Hannestad et al., 2000). In Portugal, the only nationally representative population-based study found a UI prevalence of 9.9%, with significant age-related increases, from 2.0% among women aged 18 to 39 years old to 28.9% in those aged 75 to 85 years old (Bedretdinova et al., 2016; Coyne et al., 2009; Irwin et al., 2006; Manso et al., 2023). The Portuguese Society of Urogynecology (2021) posits that up to 50% of the adult female population experiences some form of UI.

Although not life-threatening, UI may profoundly affect women's lives across multiple domains. Its consequences extend well beyond physical symptoms, encompassing significant psychological, sexual, sociocultural, occupational, and financial burdens (Abrams et al., 2015; Shaw, 2002; Subak et al., 2006). Psychologically, UI deeply affects well-being, causing emotional distress like fear, shame, and embarrassment because it challenges socially acceptable continence behaviour (Molinuevo & Batista-Miranda, 2012). Constant worry about urine loss in public, coupled with hypervigilance and self-imposed restrictions on activities and social life, often results in social isolation (Porto et al., 2024). These extensive repercussions may also lead to the adoption of various lifestyle changes and coping strategies, which can be either functional or dysfunctional, influenced by women's illness representations (Minassian et al., 2003; Waetjen et al., 2018).

Furthermore, UI imposes substantial economic burdens on individuals and society, including lost productivity due to absenteeism, work disruptions (Porto et al., 2025), and direct

costs for pads, incontinence briefs, and laundry (Subak et al., 2006). According to the *Urge to Act* report (European Association of Urology [EAU], 2023), UI-related costs in Europe reached €69.1 billion in 2023 and are projected to rise to €86.7 billion annually by 2030 without public health intervention—potentially accumulating to €320 billion. These figures account for more than half of diabetes-related medical expenses and rival those for cancer-related expenditures. Similar global trends include a 2020 UI burden of $82.6 billion in the U.S. In the UK, the cost of clinically significant urinary storage (i.e., nocturia, urgency, urgency UI) symptoms was estimated at £743 million in 2000 (approximately €1.2 billion in 2023). In Portugal, the annual cost associated with UI is currently estimated at approximately €1 billion (EAU, 2023).

However, the severity of leakage directly correlates with increased distress and greater restrictions on daily activities (Krhut et al., 2018). Among the different types, Urgency UI (characterised by involuntary urine loss accompanied by or immediately preceded by a strong sense of urgency, often due to detrusor overactivity) and Mixed UI (which combines symptoms of urgency UI and stress UI) are notably more distressing than pure Stress UI (defined as involuntary leakage on effort or physical exertion, such as coughing, sneezing, or exercising; Coyne et al., 2009).

The effective assessment of UI begins with a structured clinical evaluation—encompassing medical history, physical examination, urinalysis, bladder diaries, and, when indicated, urodynamic testing. By integrating objective findings with subjective experiences, including symptom burden and quality of life, clinicians and researchers can guide treatment planning in a way that aligns with the priorities and individual well-being (Dumoulin et al., 2016; Newman et al., 2018; Todhunter-Brown et al., 2022).

The first-line management of UI centres on conservative strategies, which are universally recommended due to their non-invasive nature, low cost, and low risk of side effects. These approaches are associated with high rates of symptom improvement and form the foundation of treatment across all UI subtypes: 1) Pelvic Floor Muscle Exercises (PFME) are considered the gold standard first-line intervention, being associated with symptom improvement rates between 50% and 70% (Bø, 2004; Da Roza et al., 2012; Dumoulin et al., 2016; Nambiar et al., 2018); 2) Bladder training is especially recommended for UUI and MUI (Dumoulin et al., 2016); and 3) Lifestyle modifications, namely weight reduction where indicated; dietary optimisation**;** adjusting fluid

intake throughout the day (space drinks evenly, avoid large single volumes, moderate bladder irritants, maintain adequate hydration to prevent dark urine/constipation, and taper intake 2–3 hours before bedtime to reduce nocturia)**;** bowel regulation to avoid constipation and straining; smoking cessation; and progressive increases in physical activity (Dumoulin et al., 2016; Nambiar et al., 2018).

Despite being a highly prevalent condition with well-established, clinically effective, non-invasive and cost-effective treatments, UI remains significantly underreported, undertreated, and inadequately addressed (Waetjen et al., 2018), with less than half of women with UI seeking medical care (Hägglund et al., 2003). Among those who delay care-seeking, they can take from 6 to 11 years to seek help from a health professional, according to large-scale studies (Bilgic et al., 2017).

UI conservative treatment remains under-utilised due to the interrelated psychosocial, cognitive factors and healthcare access/structural barriers that hinder help-seeking among women (Bush et al., 2001; Rashidi Fakari et al., 2021; Waetjen et al., 2018; Wu et al., 2015). Cognitive and emotional factors are critically intertwined in shaping the help-seeking behaviour of women experiencing UI. From a cognitive perspective, various dysfunctional beliefs—which may coexist or operate independently—can contribute to treatment delay. These include the perception that UI is not a medical condition, the belief that it is a natural and inevitable consequence of ageing or childbirth, or that it is manageable without professional support. Additionally, limited awareness of conservative treatment options and the view that surgical interventions are risky or unaffordable further hinder access to care. In parallel, emotional representations of UI, such as stigma and shame, function as affective barriers to help-seeking, limiting disclosure both within women's proximal social networks and in interactions with healthcare professionals (Mendes et al., 2017). Fear of public embarrassment—especially in social or professional settings—can lead to concealment and emotional distress.

As a result, many women adopt self-management strategies intended to reduce immediate discomfort or visibility of symptoms. However, when these coping strategies are enacted in the absence of medical consultation, they may become dysfunctional, ultimately delaying effective treatment and exacerbating the physical and psychosocial burden of the condition (Aoki et al., 2017).

Improving UI care requires addressing not only physical symptoms but also the cognitive and emotional barriers that hinder help-seeking. By targeting the cognitive and psychological mechanisms underlying treatment avoidance, interventions can improve treatment, seek and promote long-term adherence (Sussman et al., 2020).

Health Psychology offers essential theoretical and methodological frameworks to examine how illness representations, emotional responses, and coping strategies shape women's decisions to seek—or avoid—treatment for UI. It also investigates the often simultaneous and sometimes conflicting roles of emotion in shaping cognitive and physiological mechanisms that influence coping with and treatment of UI (DeSteno et al., 2013; Matarazzo, 1983). Beyond help-seeking, effective UI care requires psychological models that also explain treatment initiation, adherence, and sustained engagement with conservative multidisciplinary interventions (Davis et al., 2003; Dowd & Dowd, 2006). The Health Action Process Approach (HAPA; Schwarzer, 2008, 2016) is a socio-cognitive model of health behaviour change that delineates the motivational and volitional phases involved in translating intention into sustained action (see Figure 2). Importantly, HAPA model supports the structured use of BCTs to enhance intervention efficacy (Carey et al., 2019). In parallel, the Common-Sense Model of Self-Regulation (CSM) is a cognitive-emotional model of illness self-regulation that seeks to explain how individuals interpret and manage health threats.

Moreover, these theoretical models can be applied to eHealth interventions targeting UI to enhance their effectiveness. Such interventions have been shown to be scalable**,** cost-effective**,** and well-suited for the conservative management of UI (e.g., Firet et al., 2019; Wadensten et al., 2021).

Despite the availability of effective conservative interventions, continence care remains globally neglected—exacerbating individual suffering and contributing to long-term economic and systemic burdens.

In response, the PURI-PRO (Portuguese URinary Incontinence PROject): *Symptoms, Impact, and eHealth Intervention for Middle-Aged Women with Urinary Incontinence* was launched in 2020 at the William James Centre for Research (WJCR), funded by an individual doctoral fellowship from the Portuguese Foundation for Science and Technology.

This doctoral research, developed within PURI-PRO, seeks to understand, measure, and intervene in female urinary incontinence during midlife, with the aim of improving conservative treatment outcomes by facilitating timely help-seeking and supporting sustained adherence to

adaptive bladder-health self-management strategies. To this end, the project explores how and why women cope with urinary incontinence, examining the emotional, cognitive, and behavioural mechanisms underlying care-seeking, self-regulation, and psychosocial consequences, culminating in a randomised controlled trial (RCT).

The project is designed as a sequential, multi-phase investigation, in which each stage provides both a foundation and a bridge to the next. Across three interconnected phases, PURI-PRO unfolds as a coherent scientific narrative: moving from theoretical foundations to empirical evidence and ultimately to practical application. Each phase was strategically designed to address a general objective, further operationalised into specific objectives and corresponding empirical studies. Collectively, these phases integrate qualitative and quantitative methodologies, ensuring a comprehensive understanding of urinary incontinence in midlife and culminating in the development of a psychological intervention.

This dissertation comprises five chapters that follow a Health Psychology translational trajectory—from theory and the lived experience of UI, through measurement and exploratory modelling, to a theory-led eHealth intervention.

In Chapter 1, a biopsychosocial overview of UI in middle-aged women is presented, synthesising illness representations, affective responses, and self-regulatory hiding and defensive coping strategies and UI consequences. UI is situated within Health Psychology frameworks and conservative care pathways, and the PURI PRO programme is introduced (aims, research questions, design, procedures, and cross-phase analytic strategy).

In Chapter 2 (Phase 1), the CSM is operationalised to characterise cognition, emotion, and coping via directed qualitative content analysis and textual analysis. The internal structure of the Portuguese Brief IPQ is also examined, thereby clarifying what women think and feel about UI.

In Chapter 3 (Phase 2), brief PROMs are developed and validated—a reduced King's Health Questionnaire Symptom Severity Subscale (KHQ SSS), the UI Self Management Coping Strategies Instrument (UI SMCSI; Defensive/Hiding), and the UI Social Isolation Questionnaire (UI SIQ). In this chapter, the potential moderating role of beliefs and self-management strategies in quality of life and sexual function is tested, together with the mediation of social isolation by coping, and the impact of severity on workplace productivity, thereby providing the analytic bridge from qualitative insight to intervention targets.

In Chapter 4 (Phase 3), a two-arm longitudinal randomised controlled trial (PURI PRO: *The Bladder Control is Mine*) is designed, implemented, and evaluated. The trial is grounded in the CSM, the Health Action Process Approach, and CBT, and uses BCTTv1-mapped components (e.g., goal setting, action/coping planning, self-monitoring, feedback).

In Chapter 5, findings across studies are integrated and discussed, methodological limitations are critically appraised, and priorities for future research and implementation are outlined, underscoring Health Psychology's contribution to theory-informed, digitally deliverable, and scalable continence care for midlife women.

General Background

Urinary incontinence (UI) is a highly prevalent and increasingly urgent public health issue that imposes a profound and multifaceted burden on health-related quality of life (HRQoL; Abrams et al., 2015; Mendes et al., 2017). Its consequences extend well beyond the physical symptoms of involuntary leakage, disrupting psychological well-being, occupational and sexual functioning, financial stability, and broader sociocultural participation. The breadth of this impact—spanning physical, emotional, social, and economic domains—positions UI not merely as a urological disorder but as a complex biopsychosocial condition with far-reaching implications for both individual functioning and public health (Abrams et al., 2003; Haylen et al., 2010).

Despite its significant burden, UI remains markedly underreported, underdiagnosed, and undertreated, a pattern that reflects not only systemic inadequacies in healthcare delivery but also psychosocial barriers to care. These include the stigma associated with UI, the internalisation and normalisation of symptoms, and individual illness perceptions that may minimise urgency or legitimacy of the condition. Such factors contribute to delayed help-seeking and reduced engagement with medical or behavioural interventions.

The International Continence Society's (ICS) definition of UI has evolved in response to the need for greater clinical applicability, research comparability, and alignment with patient-centred perspectives. The original 1979 definition, "the involuntary loss of urine that is a social or hygienic problem and is objectively demonstrable", was criticised for its overly restrictive scope. By requiring objective demonstration and linking UI exclusively to socially or hygienically disruptive outcomes, it systematically excluded individuals whose leakage, although subjectively distressing, failed to meet the arbitrary thresholds of severity or observability, thereby minimising

the recognition of its psychosocial impact and potentially inflating prevalence estimates by including isolated or transient episodes of UI that may also impact QoL.

The 2002 revision shifted the definition to "the complaint of any involuntary leakage of urine" (Haylen et al., 2010). This definition emphasises individual-reported, prioritising an individual's appraisal of their symptoms and their perceived impact. As a result of this change, the ICS recommends the systematic integration of additional descriptors, such as frequency, severity, risk factors, impact on QoL assessed by grade A gold-standard measures (e.g., King's Health Questionnaire, ICIQ-SF), and healthcare-seeking behaviour, allowing for better differentiation between transient or mild leakage and clinically significant cases (Haylen et al., 2010).

Moreover, the ICS delineated three principal subtypes. Stress urinary incontinence (SUI) refers to the complaint of involuntary urine leakage occurring during physical effort, exertion, sneezing, or coughing. Urgency urinary incontinence (UUI) is defined as involuntary leakage accompanied by, or immediately preceded by, a sudden compelling urge to void that is difficult to defer. Mixed urinary incontinence (MUI) describes the complaint of involuntary leakage associated both with urgency and with exertional activities, such as effort, sneezing, or coughing (Haylen et al., 2010).

With respect to UI treatment, conservative management remains the endorsed first-line strategy owing to its non-invasive nature and cost-effectiveness. These conservative strategies demonstrate consistently high rates of symptom improvement across all UI subtypes and can be grouped into three primary approaches: 1) Pelvic Floor Muscle Exercises (PFME), widely recognised as the gold standard conservative treatment for UI (Bø, 2004; Da Roza et al., 2012; Dumoulin et al., 2016; Nambiar et al., 2018); 2) Bladder Training, particularly indicated for urge and mixed UI - this technique involves gradually extending the intervals between voiding to promote voluntary control over bladder function and to reduce frequency and urgency (Dumoulin et al., 2016); and 3) Lifestyle Modifications, such as weight loss, smoking cessation, and dietary adjustments as they address modifiable risk factors and may support effective long-term symptom management (Dumoulin et al., 2016; Nambiar et al., 2018).

Urinary Incontinence Care-Seeking Barriers and UI Beliefs

Despite its high prevalence and the availability of clinically effective, non-invasive, and cost-efficient treatments, UI remains largely underreported, undertreated, and insufficiently

addressed within healthcare systems (Waetjen et al., 2018). Among those who delay help-seeking, the interval before contacting a health professional ranges from 6 to 11 years (Bilgic et al., 2017). This persistent treatment gap underscores the complex interplay of cognitive, psychosocial, and structural barriers that hinder timely access to UI care. Although system-level barriers—such as limited healthcare access and institutional inequities—represent well-documented impediments to care, the current study centres on the equally salient psychological and illness perception-related factors that influence help-seeking in the context of UI. These include individuals' cognitive and emotional representations of their symptoms—such as beliefs about severity, stigma, controllability, and personal responsibility—which may contribute to avoidance behaviours and delayed care-seeking (Bush et al., 2001; Rashidi Fakari et al., 2021; Toye & Barker, 2020; Waetjen et al., 2018; Wu et al., 2015).

From a cognitive standpoint, several UI beliefs serve as potent barriers to engaging in UI care (Bush et al., 2001; Shaw et al., 2019; Toye & Barker, 2020; Wu et al., 2015). Many women perceive UI symptoms as non-disruptive or as a minor issue. This perception often reflects a lack of recognition of UI as a clinical condition, particularly when the perceived impact on daily functioning and QoL is minimal.

A key behavioural response that reinforces this perception is the routine use of absorbent products, which often functions as a form of *hiding*—that is, a discreet strategy to conceal symptoms. The use of absorbent pads provides a sense of safety and control, allowing women to maintain their daily routines while perceiving the condition as having little or no impact on their QoL. However, this practical strategy has a paradoxical effect. By reducing the salience and immediate discomfort of UI symptoms, offering a perception of safety, it diminishes women's motivation to engage in active self-management coping strategies (e.g., pelvic floor muscle training, seeking professional care, lifestyle modifications) that could effectively minimise symptom severity or progression. As such, reliance on absorbent products, rather than representing a solution, may contribute to the maintenance and further exacerbation of the condition over time (John et al., 2010).

Furthermore, UI is frequently normalised as an inevitable consequence of ageing or childbirth, diminishing the sense of urgency to seek medical help. Additionally, beliefs in the capacity to self-manage symptoms with no health-related professional help, combined with limited

awareness of the efficacy of conservative treatments, such as PFME, further reduce the likelihood of seeking formal care. Notably, Day et al. (2014) found widespread informational gaps across key domains, such as poor knowledge of UI risk factors (38.8%), prevention (40.5%), treatment options (39.4%), and management strategies (49.4%), among women with UI. Moreover, negative representations of treatment options, particularly surgery, are widespread and are often viewed as invasive, high-risk, or financially inaccessible, reinforcing resignation and avoidance (Hägglund et al., 2003).

In parallel, the emotional dimensions of UI have a profound influence on treatment avoidance. Stigma, shame, and embarrassment are pervasive, often preventing open discussion of symptoms with healthcare providers, particularly in interactions with male healthcare professionals or even within close personal relationships (Mendes et al., 2017). Fear of public exposure or visible leakage episodes can lead to concealment, activity restriction, and hypervigilance, all of which contribute to social withdrawal, loss in social support (both formal and informal) and emotional burden. Hence, these dynamics often result in the adoption of self-management coping strategies that, while aimed at preserving autonomy and dignity, may paradoxically become maladaptive in the absence of medical guidance. Driven by fear, stigma, or misbeliefs, such strategies delay care-seeking, perpetuate distress, and intensify the psychosocial burden of living with UI (Avery et al., 2013; Molinuevo & Batista-Miranda, 2012).

Women typically seek professional help for UI only when its functional or emotional impact, such as work disruption, interference with daily activities, or fear of a more serious underlying condition, outweighs the anticipated embarrassment of disclosure (Rashidi Fakari et al., 2023; Schreiber Pedersen et al., 2017). This decision threshold reflects the central role of subjective illness appraisals, whereby the perceived severity, consequences, and controllability of the condition influence help-seeking behaviour. Evidence further indicates that greater symptom severity (severe and very severe, the strongest predictor), longer symptom duration, prior contact with healthcare services (e.g., at least one physician visit in the past year), active information seeking about UI, belief that addressing UI during consultation is necessary, and willingness to undergo surgical treatment are all significant predictors of consultation (Schreiber Pedersen et al., 2018). Additional facilitators include emotional fatigue from persistent urine loss, perception of a strong and unpleasant urinary odour, and socially stigmatising consequences, particularly when

leakage is sufficiently noticeable to provoke embarrassment or concern that others may detect the odour (Hägglund et al., 2003).

These extensive repercussions often prompt women to adopt a range of coping strategies and lifestyle adaptations, which may be either functional (promoting autonomy and symptom management) or dysfunctional (exacerbating distress and limiting social participation). The nature of these responses is largely shaped by women's illness representations, that is, their personal beliefs about the cause, timeline, consequences, and controllability of UI (Minassian et al., 2003; Waetjen et al., 2018).

Importantly, the underutilisation of care and reliance on self-directed management, often informed by inaccurate or stigmatising beliefs, have serious implications for women's physical, emotional, and social well-being. The absence of timely intervention can trigger a series of physical, psychological, and social effects that gradually erode health and well-being. Physically, the condition often worsens over time, with increased frequency and volume of leakage, dermatological irritation, recurrent urinary tract infections, and nocturnal symptoms that disrupt sleep, leading to fatigue, reduced daily functioning, and impaired occupational performance (Felde et al., 2017). Psychologically, persistent UI is linked to heightened anxiety, depressive symptoms, diminished self-esteem, and sexual dysfunction, frequently culminating in the avoidance of intimacy and relationship strain (Felde et al., 2017). Socially, the fear of visible leakage or odour may drive withdrawal from social gatherings, community activities, and professional opportunities, reinforcing isolation and reducing quality of life (Watt & Konnert, 2020). From a healthcare perspective, delaying intervention in this age group increases the likelihood that the condition will progress to a stage where conservative measures, such as PFME, are no longer sufficient, leaving surgery as the only viable treatment. While surgical options can be effective in appropriately selected patients, they are inherently more invasive, carry procedural and recovery risks, and impose substantially greater direct and indirect costs than timely conservative management. This trajectory underscores the importance of early detection and intervention in middle-aged women, not only to alleviate symptoms, but also to prevent avoidable psychosocial burden and escalation in healthcare resource utilisation (Aoki et al., 2017).

This multidimensional impact reinforces the urgency of understanding the psychological and behavioural pathways that shape how women interpret, cope with, and respond to UI (Abrams

et al., 2015). Thus, improving care for UI requires addressing not only its physical manifestations, but also cognitive and emotional barriers, such as shame, misinformation, and the normalisation of symptoms associated with ageing or post-partum changes, which hinder help-seeking. Effective patient-centred interventions must empower women, dismantle stigma, and promote timely access to treatment (Alewijnse et al., 2002). By targeting the psychological mechanisms underlying avoidance, such as maladaptive coping and beliefs, these interventions can improve treatment adherence and reduce distress (Sussman et al., 2020).

Indeed, women's illness representations—their personal beliefs about the causes, duration, consequences, controllability, and nature of UI—may play a central role not only in help-seeking behaviour, but also in the perceived risk and emotional burden of the condition (Melville et al., 2009). However, current literature tends to focus narrowly on either the cognitive dimension of these representations (Bush et al., 2001) or their downstream consequences, neglecting the multifaceted psychological experience of living with UI (Abrams et al., 2015). This gap underscores the need for a more integrated perspective that captures how beliefs, emotions, and volitional responses shape women's adaptation and care decisions (Alewijnse et al., 2002).

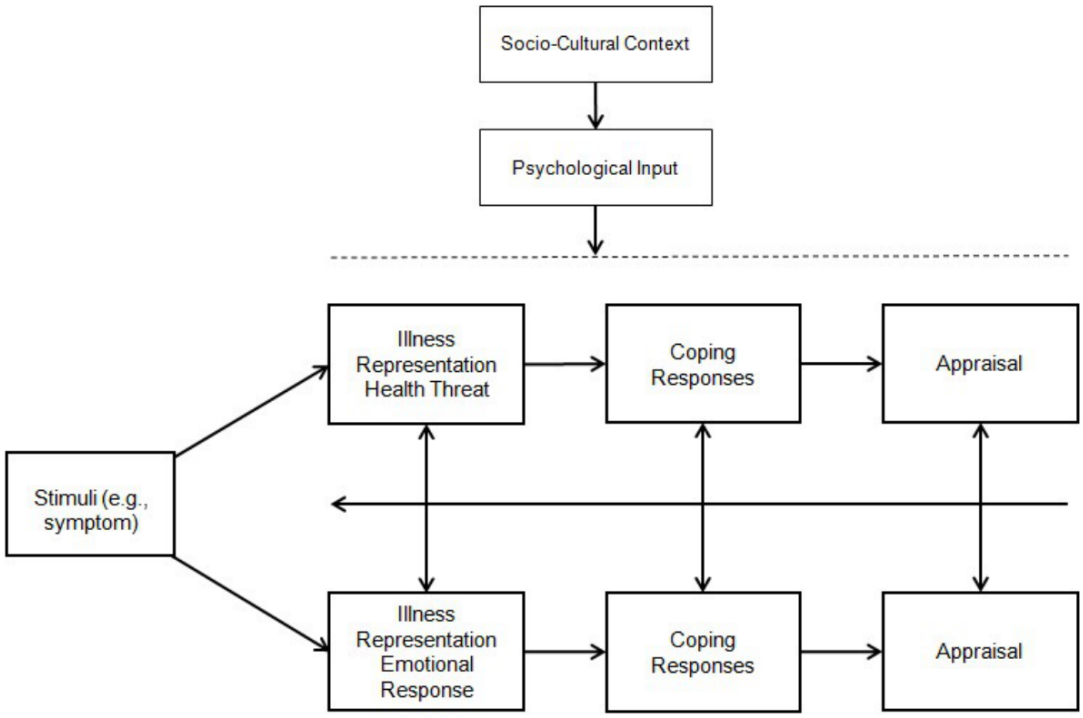
Health Psychology offers a robust theoretical and methodological foundation for addressing the multifaceted nature of UI and its impact on behaviour (Armitage & Conner, 2000; Hilton & Johnston, 2017; Matarazzo, 1983; Tovian et al., 1994). Specifically, it enables the examination of how individuals' illness beliefs, emotional responses, and coping strategies interact to shape decisions related to health-seeking, self-management, and adaptation to UI. Additionally, it considers the psychological pathway from symptom perception to treatment engagement, highlighting the cognitive, emotional, and volitional variables that influence behaviour. The identification of psychological mechanisms that are modifiable through targeted interventions, offering a foundation for developing person-centred, evidence-informed strategies to improve outcomes for women living with UI (Armitage & Conner, 2000; Hilton & Johnston, 2017; Matarazzo, 1983; Tovian et al., 1994).

The Common-Sense Model of Self-Regulation (CSM; see Figure 1) is a perceptual self-regulation model that offers a dynamic and cyclical framework for understanding how individuals perceive and manage health threats, particularly in the context of potentially chronic and often stigmatised conditions such as UI (Hagger & Orbell, 2022; Leventhal et al., 2016). When faced

with a health threat, the model posits that two interconnected processing systems are activated: a cognitive and an emotional system. These operate in parallel, are mutually influential, and together shape subsequent coping and self-management behaviours.

Figure 1

The Common-Sense Model of Self-Regulation (CSM): The Illness Response Process



Note. Adapted Generic Diagram of the Common-Sense Model of Illness Representations. Adapted from "The Common-Sense Model of Illness Representation: Theoretical and Practical Considerations", by M. A. Diefenbach & H. Leventhal, 1996, *Journal of Social Distress and the Homeless*, *5*(1). p. 21.

The cognitive system generates illness representations (i.e., structured beliefs about the identity, cause, timeline, consequences, and controllability of UI) informed by three principal sources of information (Leventhal et al., 2011, 2016). The first source derives from the individual's pre-existing reservoir of *lay* knowledge, accumulated through prior social communication and culturally embedded understandings of the illness. The second source encompasses input from the external social environment, including information provided by significant others or authoritative figures such as healthcare professionals or family members. The third source involves the

individual's *current experience* with the illness—namely, somatic and symptomatic perceptions interpreted in light of both present sensations and prior episodes of illness. This dimension also incorporates evaluations of the effectiveness of previously employed coping strategies. Furthermore, individual differences, such as personality traits and cultural background, may modulate the content, salience, and integration of information from these sources, thereby shaping the resultant illness representation (Leventhal et al., 2016). For example, in UI, symptoms are frequently interpreted as normal, inevitable outcomes of ageing or childbirth, reinforcing perceptions of low controllability and chronicity (Shaw et al., 2019). Such beliefs can reduce the perceived urgency to seek professional help, delay treatment engagement, and foster reliance on self-management (Rashidi Fakari et al., 2021; Shaw, 2002), simultaneously creates a cognitive and emotional representation of the illness or health threat.

Cognitive representations have five dimensions: identity (i.e., UI symptoms and signs), the timeline (i.e., duration of UI), causality (i.e., beliefs about the perceived cause of UI), consequences (i.e., beliefs about the consequences of UI) and curability/controllability (i.e., the beliefs about whether the UI can be cured or kept under control).

In parallel, the emotional system elicits affective responses such as shame, anxiety, or embarrassment—emotions that are especially salient because of the intimate and potentially socially compromising nature of UI. These affective states can intensify symptom perception, narrow attentional focus on potential negative outcomes, and drive the adoption of coping strategies aimed primarily at emotional relief rather than long-term functional improvement (Hagger et al., 2017; Leventhal et al., 2016).

Importantly, within the CSM framework, cognitive and emotional processes are not sequential but recursive: beliefs influence emotional responses, and emotions, in turn, shape subsequent beliefs. Together, these intertwined processes determine coping strategies, the outcomes of which are evaluated during the appraisal stage, completing the model's three-stage cycle of representation, coping, and appraisal.

The coping phase in the CSM refers to the implementation of strategies aimed at managing both the cognitive and emotional representations of UI. Notably, however, the CSM does not explicitly address the concrete strategies employed to confront specific health threats—such as urine loss—thereby overlooking the direct assessment of UI-related coping behaviours. Moreover,

its strict dichotomy between cognition and emotion may impose conceptual limitations on understanding coping processes (Postolica et al., 2017). This gap underscores the need to evaluate the full range of behaviours enacted in response to the perceived stressor (i.e., UI symptoms), prompting the exploration of a complementary dimension and a more nuanced examination of the model. Specifically, a tripartite framework was considered, encompassing cognitive, behavioural, and emotional coping strategies, along with their subsequent appraisal.

The appraisal phase involves an ongoing evaluation of the perceived effectiveness of coping strategies, with these evaluations recursively shaping both cognitive and emotional illness representations. For women living with UI, this evaluative process may involve monitoring symptom trajectories (e.g., *Has my bladder control improved?*) and attending to bodily signals (e.g., *Do I still experience leakage in certain contexts?*). Successful outcomes—such as symptom containment through the use of pads—may lead to the retention of certain strategies, even when they are maladaptive in the longer term. Conversely, perceived improvements following PFME can strengthen beliefs in personal control, thereby reinforcing continued engagement in health-promoting behaviours.

Appraisal is not a passive review but an active self-regulatory process. It can lead to iterative adjustments, including extending the duration of an intervention ("I need to persist with PFME before results are evident"), increasing its intensity ("I should perform PFME more frequently or with greater effort"), or refining its execution ("I may not be contracting the correct muscles, so I will adjust my technique") (Achstetter et al., 2019). When coping strategies are perceived as ineffective, individuals may reformulate their illness representations—modifying beliefs about identity, cause, consequences, or controllability—and adopt alternative strategies based on perceived feasibility, accessibility, and personal cost–benefit appraisals (Leventhal et al., 2016). This dynamic feedback loop highlights the inherently adaptive and cyclical nature of coping within the CSM, illustrating how beliefs, emotions, and behaviours continuously interact in shaping responses to UI.

The central strength of CSM is its recognition that illness perceptions are modifiable cognitive constructs. Interventions targeting these perceptions—by challenging the normalisation of UI, increasing perceived controllability, and reducing catastrophic thinking—can improve treatment preparedness, adherence, and health outcomes (Gehring et al., 2020; Huston & Houk,

2011). For middle-aged women, among whom UI incidence peaks and help-seeking is often delayed, the CSM provides a robust theoretical framework for understanding the interplay of beliefs, emotions, and coping, and for designing tailored interventions that disrupt maladaptive cycles and promote functional, sustainable self-management.

This theoretical lens is particularly valuable for understanding why many women do not seek professional help for UI despite the availability of effective, evidence-based treatments. Beliefs that UI is a normal or inevitable consequence of ageing or childbirth, when coupled with emotional discomfort such as shame or embarrassment, often lead to maladaptive coping strategies, including avoidance, normalisation, or concealment, ultimately reinforcing delays in care seeking (Alewijnse et al., 2002).

A thorough examination of how women interpret their condition—focusing on their beliefs about its causes, controllability, impact, and the degree to which they view UI as a legitimate health threat—alongside their emotional responses and management strategies, can yield clinically significant insights. It would also be important to investigate whether women perceive their coping strategies as effective and how these perceptions influence treatment delay and psychological adaptation. This integrated perspective, bridging cognitive, emotional, and behavioural dimensions, highlights a gap in the current UI literature, which often fails to address these components as interdependent processes (McAndrew et al., 2008).

Exploring UI living where complex biopsychosocial factors shape symptom perception, illness beliefs, and coping strategies, qualitative processes offer the methodological flexibility needed to identify patterns, contradictions, and latent themes that may inform both theory refinement and intervention development.

Moreover, when guided by a specific theoretical framework to analyse UI experience, the use of directed qualitative content analysis (QCA) would be especially appropriate due to its transparency, theoretical coherence, and methodological rigour. This analytical strategy allows for the systematic exploration of meaning within a robust theoretical framework while remaining sensitive to participants' voices and lived contexts, particularly influenced by both internal and external factors. DQCA has been shown to be particularly relevant in healthcare and psychological research (Elo & Kyngäs, 2008), making it a suitable tool for testing and refining theoretical models

and for supporting both the structured application and critical evaluation of the CSM in the context of UI.

Urinary Incontinence Multidimensional Consequences

Although not life-threatening, UI can profoundly affect women's lives across multiple domains. Beyond physical discomfort, UI is associated with substantial psychological distress, sexual dysfunction, sociocultural limitations, occupational disruption, and increased financial burden (Abrams et al., 2015; Shaw, 2002; Subak et al., 2006).

From a socio-economic standpoint, UI imposes a substantial and multifaceted burden on both individuals and the society. The economic impact encompasses both direct and indirect costs. Direct expenses include the recurrent purchase of protective products, such as absorbent pads, incontinence briefs, and additional laundry supplies, while indirect costs stem from occupational disruptions, such as absenteeism, presenteeism, and decreased productivity. The *Urge to Act* report, issued by the European Association of Urology (EAU, 2023), serves as both a scientific assessment and a political manifesto aimed at transforming the management of UI across Europe. Framed within a broader campaign to raise political awareness, it quantifies the health, socio-economic, and environmental costs of UI, estimating its total burden at €69.1 billion in 2023. Critically, the report projects a 25% escalation by 2030, potentially reaching €86.7 billion annually if effective public health strategies and interventions are not urgently implemented. This underscores the pressing need for policy-driven action to address a condition that remains both under-recognised and under-prioritised despite its profound individual and societal impact.

Cumulatively, the total cost of incontinence in Europe could escalate to €320 billion by the end of this decade. These figures are particularly concerning when contextualised: UI-related costs already exceed half of the total direct medical expenses attributed to diabetes (€149 billion in 2019) and represent at least two-thirds of cancer-related expenditures, ranging from €100 to €199 billion. Similar patterns were observed worldwide. In the United States, the estimated economic burden of UI was USD $82.6 billion in 2020 (approximately €88.4 billion in 2023), with additional burdens of $0.15 billion for neurogenic bladder complications. In the United Kingdom, the cost of clinically significant urinary storage symptoms (e.g., nocturia, urgency) symptoms was estimated to be £743 million in 2000, which is equivalent to €1.2 billion in 2023.

In addition to its financial implications, UI is associated with profound psychosocial consequences. It challenges norms surrounding continence, a socially sensitive and intimate function, and often elicits emotional distress, including shame, fear, embarrassment, and anxiety (Molinuevo & Batista-Miranda, 2012). Many individuals report hypervigilance and adopt self-restrictive behaviours, such as avoiding travel, exercise, or social engagement, to minimise the risk of public leakage, ultimately contributing to social withdrawal and isolation.

Moreover, the psychosocial toll is not uniformly distributed across the UI subtypes. Women with urge or mixed UI tend to report higher levels of psychological distress than those with stress UI (Botlero et al., 2009). Diminished sexual well-being, depressive symptoms, and reduced self-esteem are frequently observed, particularly when the condition interferes with intimacy or induces a sense of loss of body control.

In this sense, UI extends far beyond a medical condition and constitutes a social and psychological challenge. The inability to control one's excretory functions, which are typically kept private, can lead to acute embarrassment, a compromised sense of dignity, and a heightened sense of stigmatisation (Abrams et al., 2015). These dynamics underscore the need for an integrative biopsychosocial approach to UI that fully acknowledges its emotional and social dimensions.

The extensive psychosocial, physical, and economic repercussions of UI often compel individuals to adopt a range of lifestyle adaptations and coping strategies that may be functional, such as implementing behavioural modifications, engaging in PFME, actively seeking and adhering to treatment, whether already initiated or while awaiting medical intervention, or dysfunctional, including social withdrawal, symptom concealment, and avoidance of activities when treatment engagement is absent. Such patterns influence not only symptom progression and quality of life, but also the course of self-management and the likelihood of accessing appropriate care (Waetjen et al., 2007, 2018).

Notably, the severity of urine leakage is directly associated with heightened emotional distress and greater interference with daily functioning (Krhut et al., 2018). Among the various subtypes of UI, urgency and mixed UI are consistently reported to be more distressing than pure stress UI (Coyne et al., 2009). Women with more severe UI were also more likely to change their underclothes because of wetness, worried that they may smell, and were more likely to feel embarrassed. Consequently, women with more severe UI were more likely to be careful about the

volume of liquid they consumed, whereas women with UI of all severities generally wore some form of protection. Women with more severe UI were more likely to use pads frequently. Women with more severe UI are also more likely to use pads specifically designed for UI, as opposed to those designed for menstruation (Abrams et al., 2015).

Coital incontinence, reported in up to 56% of middle-aged women with urinary incontinence, is a particularly distressing manifestation of this condition. It reflects a direct physiological disruption of sexual activity and is associated with an increased risk for sexual dysfunction. This can result in decreased genital lubrication, diminished orgasmic capacity, and dyspareunia increase, which in turn may elicit anticipatory anxiety and heightened self-monitoring during sexual activity, thereby attenuating sexual desire and arousal. The sequelae, ranging from embarrassment and shame to relational anxiety, perceived sexual inadequacy, and a sense of loss of bodily control, can precipitate avoidance patterns, progressively eroding sexual engagement and intimacy (Serati et al., 2009; Shaw, 2002).

Women with stress UI frequently report reduced sexual desire, attenuated arousal, and lubrication deficits; however, orgasmic capacity is often preserved. This dissociation suggests that maladaptive sexual-related beliefs, fear of incontinence episodes, and relationship dissatisfaction may exert a stronger influence than purely neurophysiological impairment. In contrast, urgency UI is strongly associated with hypoactive sexual desire disorder and arousal dysfunction, frequently resulting in reduced frequency and satisfaction with sexual encounters. Dyspareunia is prevalent across both subtypes, although it is more common in stress UI, contributing to avoidance behaviours and reinforcing negative sex-related beliefs (Chu et al., 2015; Coyne et al., 2008).

Greater UI symptom severity can substantially impair work productivity (WP) through direct and indirect pathways. Physiologically, urgency episodes and the need for frequent bathroom breaks disrupt task flow and concentration, whereas symptom-related fatigue and discomfort reduce physical and cognitive performance. Psychosocially, UI may diminish professional self-efficacy, heighten workplace self-consciousness, and foster anticipatory anxiety about leakage or odour, leading to presenteeism, reduced engagement, and avoidance of work-related interactions (Fultz et al., 2005; Lin et al., 2018). These factors, compounded by interruptions in healthcare management and anxiety over workplace constraints, can contribute to increased absenteeism, voluntary job withdrawal, and career limitations. The resulting occupational impact reflects not

only the somatic burden of UI, but also the stigma, embarrassment, and social withdrawal that mediate its effects on professional environments (Coyne et al., 2008). However, research directly investigating this relationship remains scarce, especially among middle-aged women, a demographic where UI prevalence peaks, highlighting a critical gap in the literature that warrants focused investigation.

The literature highlights social isolation (SI) as a noteworthy consequence of UI. In middle-aged women, UI often precipitates substantial lifestyle modifications, with many reducing or avoiding daily and social activities because of the fear of public urine loss and/or pervasive feelings of inadequacy. While such strategies may serve as short-term protective measures against embarrassment, over time, they can erode social participation, gradually progressing to social isolation (SI), a state characterised by minimal engagement with others, reduced social contact, and diminished interpersonal support. SI is a well-recognised determinant of poor health and has been linked to a spectrum of adverse outcomes, including depression, generalised and social anxiety disorders, suicidal ideation, cognitive decline, impaired immune function, and elevated mortality risk (Manso et al., 2023). Understanding the emergence and maintenance of SI in this population requires a biopsychosocial perspective that captures the reciprocal interplay between maladaptive cognition, emotional distress, and behavioural avoidance (Dowd & Dowd, 2006; Funada et al., 2020; Garley & Unwin, 2006; Lam & Cheng, 2001).

From a cognitive standpoint, women may catastrophise the likelihood or consequences of public leakage, hold rigid beliefs about inevitable social rejection, or internalise negative self-schemas related to their perceived loss of bodily control. Emotionally, these cognitions fuel heightened anxiety, shame, and a persistent fear of emitting a noticeable urinary odour (Avery et al., 2013). Behaviourally, the most common coping response is avoidance, which restricts participation in social, occupational, or leisure activities to minimise perceived risk, thus perpetuating withdrawal and reinforcing maladaptive beliefs that drive it. This cognitive–emotional–behavioural cycle is consistent with the mechanisms outlined in Cognitive Behavioural Therapy (CBT) models, which emphasise the bidirectional influence of thoughts, feelings, and behaviours on distress maintenance. Applying CBT as a theoretical framework to UI-related SI provides a clinically relevant lens through which to identify intervention targets, such as cognitive restructuring to challenge catastrophic thinking, graded exposure to feared social contexts, and behavioural activation to rebuild valued social engagement. Thus, CBT-informed assessment and

intervention can disrupt the reinforcing loop that transforms UI-related anxiety into entrenched social isolation in middle-aged women.

This CBT-informed perspective highlights that SI in middle-aged women with UI is not merely a byproduct of symptom severity, but the outcome of a complex interplay between maladaptive cognitions, emotional distress, and avoidance behaviours (Dowd & Dowd, 2006; Garley & Unwin, 2006; Molinuevo & Batista-Miranda, 2012; Pintos-Díaz et al., 2019; Subak et al., 2006). Given the well-documented physical, psychological, and social consequences of SI and its potential to exacerbate the overall burden of UI, an accurate assessment of this construct is critical for research and clinical practice. Although generic patient-reported outcome measures (PROMs) may capture aspects of social functioning, they often lack the sensitivity to detect subtle condition-specific drivers and manifestations of SI in women with UI. Condition-specific PROMs offer clear advantages over generic tools, including greater responsiveness to meaningful clinical changes, higher construct validity, and the ability to reflect the nuanced psychosocial impact of a given condition (King et al., 2024). These strengths motivated the development of condition-specific instruments for UI. However, a notable gap remains: to date, no condition-specific PROM has directly measured SI in women with UI. This absence not only limits research precision but also hampers clinicians' ability to identify at-risk individuals, monitor intervention progress, and evaluate the effectiveness of psychosocial or rehabilitative strategies.

Hence, UI impact on QoL is profound, highlighting the need to improve UI treatment in middle-aged women, who often balance professional, family, and social roles. The cumulative impact of these physical, psychological, and social mechanisms can be particularly detrimental, underscoring the need for early intervention to preserve both functional independence and psychosocial well-being (Castro-Dias et al., 2023; EAU, 2023).

The imperative to preserve daily functioning emerges as a central motivator for women living with UI, prompting the adoption of self-management strategies aimed at maintaining routines and concealing symptoms from others (Anders, 2000; Bilgic et al., 2017; Hayder & Schnepp, 2010; John et al., 2010). This need is particularly pronounced among middle-aged women, who often navigate a convergence of demanding roles—professional responsibilities at the peak of their careers and caregiving for children or elderly relatives—within sociocultural contexts where continence is strongly associated with dignity and control (Hunskaar et al., 2005).

Urinary Incontinence Self-Management Coping Strategies

In this context, the unpredictable and stigmatising nature of UI poses a profound threat to women's autonomy, competence, and social identity. In response, many engage in behavioural and cognitive coping efforts that allow them to minimise visibility and manage their condition privately. Common strategies include the use of containment products (e.g., sanitary pads), fluid restriction, reduced participation in social or physical activities, and hypervigilant planning of daily life around restroom availability (Minassian et al., 2003). These behaviours serve the purpose of maintaining the appearance of normality, preventing disclosure of the condition to others, and reinforcing concealment as a central coping mechanism for women with UI. Such strategies typically focus on addressing the practical demands of the condition while striving to achieve *social continence*, a term described by Dingwall (2008) to denote the capacity to live an active social life despite ongoing urinary leakage through the adoption of compensatory measures that minimise the risk of visible accidents or odour. In this sense, social continence does not reflect the complete elimination of symptoms, but the successful mitigation of their social consequences, enabling women to participate in work, leisure, and community activities without undue anxiety, embarrassment, or restrictions.

Diokno et al. (2004) proposed a distinction between UI strategies: defensive coping strategies are behavioural adjustments intended to minimise the risk of symptom occurrence or exposure to potentially embarrassing situations. In the context of UI, these include behaviours such as preemptive voiding without urge, limiting fluid intake, avoiding unfamiliar locations without accessible toilets, reducing physical activity, and restricting participation in social events. Their primary purpose is reducing the likelihood of leakage episodes and associated emotional discomfort. While these strategies may provide short-term reassurance and symptom control, they often operate through avoidance mechanisms that can reinforce anxiety, perpetuate maladaptive beliefs, and contribute to long-term functional and social limitations (Bilgic et al., 2017; Diokno et al., 2004; John et al., 2010).

In contrast, hiding or concealment coping strategies do not aim to prevent leakage but to manage visibility and social detectability when it occurs. These include the use of panty liners, sanitary pads, improvised absorbent materials, wearing dark clothing to mask stains, and using long garments to cover potential signs of leakage. Their primary function is stigma management to

protect against perceived social judgment or embarrassment. While concealment strategies can reduce immediate social anxiety and maintain a sense of dignity, they do little to address symptom control; when relied upon exclusively, they may delay help-seeking and hinder engagement with rehabilitative or curative treatments (Diokno et al., 2004; John et al., 2010).

Defensive coping strategies target symptom prevention by modifying behaviour and the environment, whereas hiding strategies focus on social perception management by controlling how symptoms are outwardly perceived. Both approaches can serve important adaptive purposes in the short term, helping women maintain a sense of control and preserve social participation. In this way, they may provide reassurance and allow individuals to uphold personal, social, and professional roles (Bilgic et al., 2017; Diokno et al., 2004; Hayder & Schnepp, 2010; John et al., 2010; Lin et al., 2018). However, when overused or adopted in isolation from active treatment, these strategies can become maladaptive—sustaining avoidance behaviours, reinforcing internalised stigma, and contributing to the normalisation of UI as an inevitable aspect of ageing or motherhood. Such persistent reliance on concealment or self-management, without engagement with healthcare services, delays diagnosis and treatment, hinders participation in evidence-based interventions such as PFME, and increases the risk of chronicity and psychological burden (Shaw, 2001; Toye & Barker, 2020; Waetjen et al., 2018).

The adaptability and impact of a coping strategy are highly context dependent. For example, the use of containment products can be functional when integrated into a comprehensive management plan that includes PFME, medical follow-up, and lifestyle adjustments. In contrast, over-reliance on containment as the sole management approach may exacerbate symptoms over time, delay help-seeking, and reduce overall quality of life (John et al., 2010).

Traditionally, research has focused on the direct relationship between symptom severity and psychosocial consequences (Abrams et al., 2015; Chu et al., 2015; Molinuevo & Batista-Miranda, 2012; Subak et al., 2006). However, this linear approach neglects the cognitive and behavioural mechanisms—such as UI representations and hiding and defensive self-management coping strategies—that may mediate or moderate the impact of UI on women's lives, namely social isolation (SI), sexual functioning (SF), and work productivity (WP). The absence of integrative models limits the ability to design interventions that address the psychosocial burden of UI effectively.

Therefore, it is essential not only to map the psychosocial consequences of UI, but also to identify the mechanisms and contextual factors that determine how, and under what conditions, these outcomes occur. Building on the findings from Phase 1, this phase will examine these mechanisms in a group in which the incidence of UI peaks and whose needs remain under-represented in research and clinical practice. Understanding whether coping strategies such as hiding and defensive strategies drive psychosocial consequences, or whether these consequences themselves reinforce maladaptive coping, is critical. Clarifying this directionality will allow the development of interventions that are more precisely targeted—prioritising, for example, the modification of maladaptive strategies before addressing social isolation, or vice versa—thereby increasing both the efficiency and the impact of treatment. These insights will provide an empirical foundation for developing targeted, psychologically grounded interventions aimed at mitigating psychosocial burden and improving QoL.

Urinary Incontinence Multidisciplinary eHealth Interventions

Behavioural therapy for UI refers to a group of non-invasive, non-pharmacological interventions that aim to improve bladder control by strengthening pelvic floor function, modifying voiding habits, and addressing lifestyle factors. Both the European Association of Urology (EAU) and the International Continence Society (ICS) recommend behavioural therapy as the first-line management for most women with UI, given its effectiveness, safety, tolerability, and cost-effectiveness, as well as the absence of adverse effects commonly associated with pharmacological or surgical treatments (Dumoulin et al., 2016; Faiena et al., 2015). This conservative approach may substantially improve quality of life, delay or avoid the need for invasive treatments, and address the underlying functional mechanisms contributing to UI.

Key components of behavioural therapy include:

1. Pelvic Floor Muscle Exercises (PFME) – Also known as Kegel exercises, PFME aim to strengthen the pelvic floor muscles to improve urethral closure and support bladder control. PFME is the most extensively studied behavioural intervention for UI, with strong evidence demonstrating its effectiveness in reducing or curing stress UI and improving mixed UI (Dumoulin et al., 2015). Typically prescribed as at least eight pelvic floor muscle contractions, performed three times daily, for a minimum of 12 weeks, with symptom improvement rates ranging from 50% to 70%. Supervised training may further enhance

outcomes, and individualised guidance is essential to optimise adherence. Approximately 83% of women with stress UI can correctly contract their pelvic floor muscles following simple verbal instruction, and 88% of those initially unable to do so can learn with minimal assistance (Bø, 2004; Da Roza et al., 2012; Dumoulin et al., 2016; Nambiar et al., 2018).

2. Bladder Training – Particularly beneficial for urgency urinary incontinence (UUI) and overactive bladder (OAB), bladder training involves scheduled voiding intervals that are gradually extended over time, combined with urge suppression strategies such as distraction, relaxation, or rapid pelvic floor contractions to inhibit involuntary detrusor activity.

3. Urge Suppression Techniques – Patients are taught specific manoeuvres to control urgency episodes, including quick pelvic floor muscle contractions ("the Knack"), deep breathing, or mental distraction, allowing them to delay voiding until it is socially or practically appropriate.

4. Lifestyle Modifications – These include fluid and caffeine management, weight reduction, smoking cessation, constipation prevention, and exercise adjustments to reduce intra-abdominal pressure. For example, a weight loss of 5–10% can significantly reduce UI episodes in overweight women, and bariatric surgery has demonstrated a 41% cure rate for stress UI at 12 months (Lukacz et al., 2011; Zhu et al., 2009).

5. Scheduled or Timed Voiding – Particularly useful for individuals with cognitive impairment or limited mobility, this approach establishes fixed toileting intervals to prevent bladder overfilling and reduce leakage episodes.

Moreover, the Internet is a highly utilised source of health information among adults, prized for its accessibility, anonymity, and convenience. In the U.S., 43.6% of adults reported searching online for health-related information in the previous year (Amante et al., 2015). Among women with pelvic floor disorders, including UI, 75% reported frequent Internet use, although only a small fraction (4.9%) used it explicitly to understand their condition (Mazloomdoost et al., 2016). Social media also plays an increasingly important role; online interactions among women with UI provide peer validation and influence care decisions, highlighting the growing opportunity for patient-centred healthcare models (Gonzalez et al., 2020). These findings underscore the critical role of online platforms in facilitating health-seeking behaviour, particularly for stigmatised conditions

such as UI. However, the evolving landscape underscores the need to ensure the quality and credibility of available online information.

The rapid expansion of eHealth and mHealth platforms offers a promising and scalable avenue for the delivery of conservative and effective UI interventions, enabling broader access and potentially reducing barriers to care-seeking behaviour. Research has proven eHealth and mHealth effectiveness in reducing UI symptoms (Firet et al., 2019; Goode et al., 2020; Huang et al., 2020; Sjöström, 2013; Wadensten et al., 2021).

Furthermore, both traditional face-to-face conservative measures (e.g., physiotherapist-supervised PFME) and eHealth approaches face challenges with adherence. Barriers to traditional, clinic-based PFME for UI include practical and behavioural obstacles, such as forgetting to perform exercises, difficulty in maintaining a long-term routine, scheduling conflicts, and limited ongoing support from healthcare providers (Borello-France et al., 2013; Dumoulin et al., 2015). In contrast, digital (eHealth) interventions offer greater accessibility, flexibility, and privacy, but present their own challenges. As highlighted by Firet et al. (2022), eHealth-specific barriers include difficulties in integrating the program into daily life, forgetting to perform exercises, being too busy, lack of real-time feedback from a healthcare professional, and reduced sense of accountability in the absence of face-to-face contact. Existing eHealth interventions often face critical challenges, including high attrition rates, fluctuating participant engagement, and suboptimal long-term adherence (Firet et al., 2022; van Gemert-Pijnen et al., 2013; Jeyaraman et al., 2023), which undermine both sustained clinical impact and scalability for public health implementation (van Gemert-Pijnen et al., 2013).

Overcoming these barriers requires the development of interventions that go beyond short-term symptom relief to actively promote durable behavioural change, strengthen adaptive psychosocial adjustment, and ensure broad accessibility (EAU, 2023; Huang et al., 2020; Xu et al., 2024).

Beyond increasing symptom awareness to encourage help-seeking, effective UI care requires interventions that actively support the psychological processes underpinning treatment initiation, adherence, and sustained engagement with conservative management. This involves addressing motivation, self-efficacy, and perceived control, while fostering the skills and confidence necessary for long-term self-management (Venegas et al., 2018). The goal is to increase

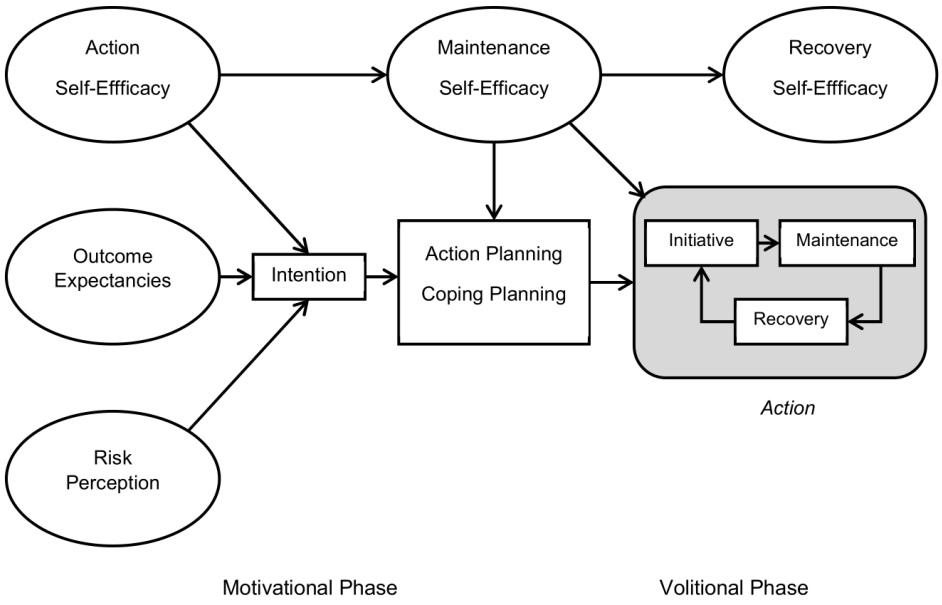
a patient's independence in performing emotional control and coping strategies to help them control their bladder and create an outline for adherence (Dumoulin et al., 2015).

Evidence-Based and Theory-Driven Intervention Frameworks

In this way, theory-driven interventions are capable of delivering evidence-based content and fostering sustained behavioural changes (Dumoulin et al., 2015; McClurg et al., 2015). The importance of grounding UI care in behavioural change models is well established. For example, the 2014 International Continence Society (ICS) Consensus Statement on PFME adherence emphasised the value of frameworks such as HAPA model in guiding the design of conservative UI interventions (Dumoulin et al., 2015). Furthermore, according to The Improved Clinical Effectiveness through Behavioural Research Group (ICEBeRG) In doing so, theoretical frameworks inform the development and delivery of interventions, guide their evaluation, and allow exploration of potential causal mechanisms. RCTs of interventions that aim to change behaviour can be more effective if they are based on explicit theories that specify measurable mediators of behaviour change (e.g., motivational and volitional mediators of HAPA) (The Improved Clinical Effectiveness through Behavioural Research Group - ICEBeRG, 2006). Therefore, integrating HAPA model into eHealth treatment for UI management offers a significant opportunity to enhance patient adherence, optimise treatment outcomes, and alleviate the substantial societal burden associated with UI, providing an ideal framework for intervention development by systematically addressing the cognitive and volitional mechanisms critical for health behaviour adoption and maintenance (Dumoulin et al., 2015; Schwarzer, 2016).

Figure 2

The Health Action Process Approach (HAPA): A Comprehensive Framework for Behaviour Change



Note. Adapted Generic Diagram of HAPA. Adapted from "Modelling Health Behaviour Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviours", by R. Schwarzer, 2008, *Applied Psychology*, *57*(1). p. 3.

The HAPA model is a rigorously validated psychological framework that conceptualises health behaviour change as a dynamic, two-phase process. In contrast to static stage models, HAPA adopts a process-oriented perspective that explicitly bridges the gap between intention formation and the sustained execution of health behaviours, integrating a suite of self-regulatory mechanisms to facilitate this transition. In the context of UI, the model offers a structured theoretical pathway for guiding women from initial awareness and motivation to consistent engagement in PFME, the adoption of healthy bladder habits, and the maintenance of long-term lifestyle modifications (Dumoulin et al., 2015; Schwarzer, 2016).

Its relevance to UI management is heightened by the fact that only one in four women living with the condition seek treatment (Hägglund et al., 2003; Toye & Barker, 2020; Waetjen et al., 2018). This statistic reflects the profound motivational gap that precedes behaviour change, often caused by symptom normalisation, embarrassment, stigma, or fatalistic beliefs about the inevitability of UI. HAPA model does not assume pre-existing readiness to act; rather, it is equally

effective as a *motivation-generation* framework and a *behaviour-maintenance* framework. Its motivational phase explicitly addresses the barriers that keep women from seeking help, fostering readiness for change by leveraging three core constructs: risk perception, which raises awareness of the personal and social consequences of untreated UI without relying on fear-based messaging; positive outcome expectancies, which shift beliefs from "nothing can be done" to "simple, evidence-based actions like PFME can meaningfully improve my symptoms"; and action self-efficacy, which strengthens confidence in the ability to start and sustain these behaviours even in the face of constraints (Schwarzer, 2016).

Once motivation is formed, HAPA's volitional phase ensures that intentions are not lost in the well-documented intention–behaviour gap. This is achieved through action planning, which translates intentions into detailed, context-specific execution plans defining when, where, and how PFME, bladder control strategies, and dietary adjustments will be carried out, and coping planning, which anticipates common barriers such as time constraints, fatigue, travel, and stress, while developing adaptive contingency strategies to maintain adherence (Schwarzer, 2008, 2016; Sniehotta et al., 2005; Sutton, 2008).

Self-efficacy in HAPA framework is a dynamic construct that evolves across the behaviour-change continuum. Maintenance (*coping*) self-efficacy underpins persistence despite competing demands or fluctuating motivation, whereas recovery self-efficacy reinforces the belief that behaviours can be resumed after a lapse, preventing temporary setbacks from escalating into sustained non-adherence. Importantly, HAPA-informed interventions normalise lapses as an anticipated and manageable component of the change process, reframing them as opportunities for skill refinement and adaptive problem-solving rather than as failures. This approach not only bridges the gap between intention and sustained practice but also addresses the more fundamental challenge of creating motivation in women who might otherwise never seek help, thereby fostering resilience, engagement, and long-term adherence to continence-promoting behaviours (Schwarzer, 2016).

By integrating these motivational drivers (i.e., risk awareness, positive outcome expectancies, and action self-efficacy) with volitional strategies, such as action and coping planning, and by deliberately cultivating evolving forms of self-efficacy, HAPA model provides a comprehensive, theory-driven blueprint for behaviour change. Within the UI context, this approach

supports both the initiation and durable maintenance of self-management behaviours, facilitating seamless integration into daily life and delivering sustained improvements in continence outcomes, psychosocial functioning, and overall QoL (Dumoulin et al., 2015).

Among its advantages, the model directly addresses the well-documented *intention–behaviour gap* by incorporating explicit planning processes and multiple forms of self-efficacy in UI interventions. Empirical evidence indicates that interventions that simultaneously enhance motivation and planning produce greater behavioural changes than those targeting either construct in isolation, thereby supporting the conceptual distinction between motivational and volitional phases in goal attainment (Prestwich & Kellar, 2014). Importantly, the model also foregrounds behaviour maintenance, a phase often underexplored in health behaviour research, where the predominant emphasis tends to be on initiating change rather than maintaining it. This bias is partly attributable to the logistical and financial demands of conducting longitudinal experimental studies. Notably, constructs unique to this framework, such as coping self-efficacy and recovery self-efficacy, have been shown to play a significant role in sustaining behaviour over time (Sniehotta et al., 2005). Additionally, the stage-based variant of the model may be particularly advantageous for developing tailored behaviour change interventions, whereas the continuum (non-stage-based) variant appears to be more suitable for predicting behaviour trajectories.

The CSM (Achstetter et al., 2019; Hagger & Orbell, 2022) provides a complementary theoretical lens to the HAPA framework by understanding how individuals interpret and cope with their health condition, as previously stated, highlighting the role of emotional representations in the adoption of coping strategies. According to the CSM, maladaptive illness representations—such as perceiving UI as untreatable—can undermine motivation and promote reliance on self-management strategies (e.g., using pads, restricting fluids, or avoiding activities). While these behaviours may provide short-term relief, although not addressing the underlying condition, they may reduce motivation to engage in more effective conservative strategies, such as PFME and lifestyle modifications (Alewijnse et al., 2002). Furthermore, this model highlights a critical feedback loop in which the appraisal of coping strategies influences whether individuals persist with or abandon their behaviour, making it a key target for interventions (Hagger & Orbell, 2022; Leventhal et al., 2016).

Complementing the HAPA and the CSM, Cognitive Behavioural Therapy (CBT) offers a

scientifically validated framework for facilitating cognitive and behavioural modifications in the management of UI, particularly through the application of urge- and stress-suppression techniques. CBT has been integrated into conservative UI treatment programs delivered in-person and online (Dowd & Dowd, 2006; Garley & Unwin, 2006).

From a cognitive perspective, interventions target the restructuring of maladaptive cognitive appraisals. For instance, during an urgency episode when rushing to the toilet, distressing automatic thoughts (e.g., “I can’t hold it anymore”) are reframed into adaptive beliefs, for example, (e.g., “If I have managed to control it this far, I can wait a few more seconds.”). Additionally, self-affirming statements (e.g., “I can do this”) are reinforced to enhance self-efficacy and to support adaptive coping (Dowd & Dowd, 2006; Garley & Unwin, 2006). It is important to note that these cognitive strategies are typically introduced once a degree of bladder control has been achieved, in order to minimise frustration and enhance adherence.

Behaviourally, patients are trained to implement targeted urge suppression strategies, including briefly pausing, performing a pelvic floor muscle contraction (commonly known as the *“Knack”*) to inhibit the micturition reflex, and walking slowly and purposefully toward the toilet to counteract the instinctive urge to rush.

Additionally, relaxation techniques are employed as adjunctive strategies to modulate bladder reflex activity, alleviate muscle tension during episodes of urgency, and foster improved voluntary control over urgency responses (Dowd & Dowd, 2006; Garley & Unwin, 2006). These combined cognitive and behavioural approaches aim to reduce bladder overactivity while enhancing patients’ confidence and autonomy in managing UI.

To optimise theory-based interventions, the strategic integration of the Behaviour Change Technique Taxonomy v1 (BCTTv1) is essential. The BCTTv1 is an internationally recognised, evidence-based classification system that defines and organises 93 distinct behaviour change techniques, allowing researchers and clinicians to specify the active ingredients of an intervention precisely (Carey et al., 2019). This structured approach enhances clarity by making the intervention content explicit, improves replicability by enabling other teams to reproduce the intervention with fidelity, and strengthens the theoretical grounding by directly mapping behavioural techniques to constructs from established models such as the HAPA and CSM. By systematically linking each program element to its corresponding BCT, researchers can ensure methodological transparency,

facilitate cross-study comparisons, and reinforce mechanistic links between theory-driven processes and observed clinical outcomes (Carey et al., 2019).

Building on this, Bohlen et al. (2020) examined patterns of co-occurrence among BCTs in a wide range of interventions and identified groups of techniques that often appear together, share a similar mechanism of action, and can be mapped to specific theoretical frameworks. These groupings do not replace the original taxonomy, but complement it by providing a pragmatic bridge between theory and practice. For example, the first group contained 13 BCTs, seven of which belong to the BCTTv1 "Goals and Planning" cluster, linked by experts to HAPA and Self-Regulation Theory, both of which emphasise intention formation, planning, and volitional control. Mapping these BCT groups to CSM dimensions and HAPA variables would allow for a more precise and synergistic intervention design.

By combining the precision of BCTTv1 with the grouped patterns identified by Bohlen et al. 2020 and explicitly linking them to both the HAPA model and CSM constructs, interventions can address not only the behavioural mechanics of change, but also the cognitive-emotional belief systems that drive coping choices. This dual targeting ensures that participants are supported in both the "what to do" and the "why it matters," increasing the likelihood of both the adoption and long-term maintenance of adaptive health behaviours.

Interestingly, most self-monitoring studies have focused on the effects of the technique on behaviour change rather than trying to identify how or why this technique changes behaviour. There are several possible mechanisms: increased awareness of one's level of activity, which may or may not compare favorably with one's targets or goals, serves as a cue to action and is motivational in nature. Recent evidence suggests that one potential mechanism is that self-monitoring boosts self-efficacy, so that individuals are more confident in their ability to perform the target behaviour (Prestwich et al., 2015).

In this way, eHealth interventions not only optimise individual-level outcomes, including improved symptom control, but also increase scalability and transferability to other populations and healthcare contexts (Carey et al., 2019; Chester et al., 2023).

Moreover, research has shown that multidisciplinary teams (MDTs) deliver superior outcomes in UI care, particularly when they integrate expertise across physiotherapy, psychology, and medical domains (Davis et al., 2003; Ferrari et al., 2023; Hainsworth et al., 2023; Pandeva et

al., 2019). Hence, by adopting such an integrated perspective, it becomes possible to more effectively translate theory into clinical practice.

Despite these recommendations, theory-informed, multidisciplinary UI interventions specifically targeting midlife women remain scarce, with the gap even more pronounced in digital or eHealth formats (Davis et al., 2003; Ferrari et al., 2023; Pandeva et al., 2019).

In this context, multidisciplinary interventions underpinned by theoretical frameworks of behaviour change and self-management appear to be crucial, capitalising on the advantages of eHealth—particularly the flexibility it affords–enabling women to choose when to perform their exercises, even on a potentially busy day.

Very few eHealth interventions for UI have been designed with an explicit theoretical framework, a gap that may partly explain the common challenges in this domain. Without the guiding structure of behavioural theory, such as the HAPA model or CSM, and without integrating psychological skill-building within MDTs, interventions often lack the mechanisms needed to translate initial motivation into sustained self-management.

Thus, there is a pressing need for structured, theory-informed eHealth treatment approaches supported by MDTs that address psychosocial, cognitive, and physiotherapy variables and effectively integrate them into a biopsychosocial model framework. Thus, the 2014 Consensus Statement on Improving PFME Adherence further underscores the necessity of theoretically grounded interventions to enhance adherence, citing models such as the Health Belief Model, Theory of Planned Behaviour, Social Cognitive Theory, and HAPA model (Dumoulin et al., 2015). Within this context, frameworks such as the HAPA, CSM, and Behaviour Change Technique Taxonomy v1 (BCTTv1; Carey et al., 2019) offer complementary yet distinct pathways for guiding intervention design.

Given these considerations, it would be highly beneficial to design a low-cost, evidence-based, multidisciplinary eHealth intervention that systematically incorporates both physical and psychosocial components. Such a program should explicitly link its content to established theoretical constructs, such as risk perception, outcome expectancies, and self-efficacy in HAPA, or illness identity, controllability, and perceived consequences in CSM, while embedding practical behaviour change techniques to bridge the gap between intention and sustained self-management. This approach could improve individual-level outcomes, including symptom control, quality of

life, and self-esteem, while also enhancing scalability and transferability to other populations and healthcare contexts.

PURI-PRO – Portuguese URinary Incontinence PRoject

PURI-PRO Phases 1, 2 and 3 Research Questions and Objectives

Phase 1 – Illness Representations and Self-Regulation in Women Living with Urinary Incontinence

Specific Objective 1 **(Empirical Study 1)**. To examine the cognitive, emotional, and behavioural dimensions of UI in middle-aged women through the lens of the Common-Sense Model (CSM) and to investigate their interdependence, critically assessing the suitability of the CSM framework in this context.

Specific Objective 2 **(Empirical Study 2)**. To validate the Portuguese version of the Brief Illness Perception Questionnaire (Brief IPQ) and to explore UI Representations

Phase 2 – Coping Strategies and the Functional and Psychosocial Impact of Urinary Incontinence

Specific Objective 3 **(Empirical Study 3)**. To validate the King's Health Questionnaire (KHQ) Symptom Severity Subscale in women with UI.

Specific Objective 4 **(Empirical Study 4)**. To develop and validate the Urinary Incontinence Self-Management Coping Strategies Inventory (UI-SMCSI), and to investigate self-management coping strategies in women with UI.

Specific Objective 5 **(Empirical Study 5)**. To examine differences between women with and without UI in quality of life (QoL) and sexual functioning (SF), and to investigate the potential moderating role of UI-related beliefs and coping strategies in the relationship between symptom severity and these outcomes.

Specific Objective 6 **(Empirical Study 6)**. To develop and validate the Urinary Incontinence Social Isolation Questionnaire (UI-SIQ)

Specific Objective 7 **(Empirical Study 7)**. To explore the potential mediating role of self-management coping strategies in the relationship between UI symptom severity and Social Isolation (SI).

Specific Objective 8 **(Empirical Study 8)**. To explore a predictive model testing the association between UI symptom severity and workplace productivity.

Phase 3 – Translating Health Psychology into Practice: Development and Evaluation of a Theory-Based eHealth Intervention Informed by the Health Action Process Approach and the Common-Sense Model of Self-Regulation

Specific Objective 9 **(Empirical Study 9)**. To evaluate the effectiveness of PURI-PRO, tested in a randomised controlled trial (RCT), in reducing UI symptom severity, threatening illness representations, and the use of hiding and defensive self-management coping strategies (primary outcomes).

Specific Objective 10 **(Empirical Study 9)**. To test whether volitional-phase variables (e.g., coping planning) potentially mediate the effects of motivational predictors (e.g., risk perception) on the primary outcomes at follow-up.

Study Designs

The PURI-PRO project encompassed a range of methodologies across its three phases. Study 1 employed a qualitative, cross-sectional, and exploratory design grounded in an interpretivist paradigm. Studies 2 through 8 utilised quantitative, observational, cross-sectional designs with descriptive and correlational analyses, including psychometric validation, mediation, and moderation. Finally, Empirical study 9 consisted of a quantitative, experimental, longitudinal 1:1 randomised controlled trial (RCT) with an open-label and single-masked design.

Participants and Recruitment

Across all studies, participant recruitment was conducted using non-probabilistic snowball sampling via social media platforms.

General inclusion and exclusion criteria

Inclusion criteria for all studies were: (1) women aged 40–65 years, (2) access to the internet, (3) self-reported occasional or frequent involuntary urine loss, and (4) proficiency in the Portuguese language. Exclusion criteria were: (1) pregnancy or less than six months post-partum, (2) previous surgery related to urinary incontinence, (3) neurological conditions affecting bladder control, (4) diagnosis of lower abdominal malignancy, and (5) history of pelvic organ prolapse.

Sample size estimation

For Empirical Study 1, sample size estimation was guided by the principle of data saturation, typically achieved with 12–30 participants (Hennink & Kaiser, 2022). For the cross-sectional quantitative studies (Studies 2-8) and the RCT (Study 9), the sample size estimation followed the guidelines proposed by Hair et al. (2009), which recommend a minimum of 5 to 10 participants per manifest variable.

Participants

Empirical Study 1. The sample comprised 34 women who met the general criteria.

Empirical Study 2. A total of 1,511 women (M_{age} = 50.19, *SD* = 6.58) were included.

Empirical Studies 3, 4, and 6. The final analytical sample comprised 1,538 women (M_{age} = 50.19 years, *SD* = 6.8).

Empirical Study 5. The primary aim included 2,648 women (M_{age} = 49.94, *SD* = 6.76), while the secondary aim focused on a sub-sample of 1,538 women with self-reported UI (M_{age} = 50.19, *SD* = 6.58).

Empirical Study 7. From an initial sample of 1,538 women, the final sample was refined to include 1,090 women who had not received any previous treatment for UI.

Empirical Study 8. This study included an additional inclusion criterion of current full-time employment. The final sample consisted of 1,214 women (M_{age} = 49.47, *SD* = 6.11).

PURI-PRO Protocol and Empirical Study 9 (RCT). The final baseline sample exceeded the recruitment goal, with 98 participants (EG: *n* = 46, CG: *n* = 52). Additional exclusion criteria for this phase included substance abuse and active suicidal ideation.

Measures

Data collection was based on self-reported measures encompassing sociodemographic, clinical, lifestyle, and UI-related variables. The following instruments were used across the studies:

Questionnaire for Urinary Incontinence Diagnosis (QUID; Bradley et al., 2005)

Used in Studies 1 to 7 to classify UI type.

International Consultation on Incontinence Questionnaire – Urinary Incontinence Short Form (ICIQ-UI SF; Avery et al., 2004)

Used in Studies 1 to 3, 6, and 9 to assess UI severity, frequency, and impact.

Brief Illness Perception Questionnaire (Brief IPQ; Broadbent et al., 2006)

Used in Studies 2, 5, and 9 to assess cognitive and emotional representations of UI.

King's Health Questionnaire (KHQ; Kelleher et al., 1997)

Used in Studies 3, 4, 6, and 9 to evaluate the quality of life impact of UI. A five-item severity index adapted from the KHQ was used in Study 5, and the refined Symptom Severity Subscale (KHQ-SSS) was used in Studies 7 and 8.

Urinary Incontinence Self-Management Coping Strategies Instrument (UI-SMCSI)

Developed by the research team for Study 4 to assess Hiding and Defensive coping. A refined version was used in Studies 5, 7, and 9.

Urinary Incontinence Social Isolation Questionnaire (UI-SIQ)

Developed by the research team for Study 6 to assess UI-related social isolation. It was also used in Studies 7 and 9.

Female Sexual Function Index – Short Form (FSFI-6; Isidori et al., 2010)

Used in Study 5 to evaluate sexual functioning.

World Health Organization Quality of Life Instrument – Short Version (WHOQOL-BREF)

Used in Studies 5 and 9 to measure overall quality of life.

Work Productivity and Activity Impairment Questionnaire (WPAI; Reilly et al., 1993)

A single item was used in Study 8 to assess work productivity.

HAPA-based Socio-cognitive Scales (Schwarzer, 2008)

Adapted from the RACK study, these scales were used in Study 9 to measure variables such as self-efficacy, planning, and action control.

Rosenberg Self-Esteem Scale (Rosenberg, 1965)

Used in Study 9 to assess self-esteem.

Procedure

Study 1 (Qualitative)

Semi-structured interviews were conducted via Zoom between December 2021 and March 2022, with an average duration of 25 minutes (*SD* = 5).

Studies 2 to 8 (Cross-sectional)

Data were collected online via Google Forms between March and October 2020.

Study 9 (PURI-PRO RCT)

Participant recruitment took place between April and May 2024. Following eligibility screening, participants were randomly assigned to either the Experimental Group (EG) or a minimal-contact Control Group (CG). Simple randomisation was performed using a sequence generated by an external researcher in SPSS (v.28), and the research team managed group assignment via email; no allocation concealment procedures were implemented. The EG received the structured eight-week eHealth intervention, while the CG received a single health literacy leaflet on melanoma. All procedures were conducted online, with outcomes measured via the Qualtrics platform at four distinct time points: baseline (T0), mid-intervention (T1), post-intervention (T2), and follow-up (T3). The intervention was delivered synchronously via Zoom by a multidisciplinary team, with seven sessions being delivered by a clinical psychologist and one of the sessions being delivered by a physiotherapist.

EG intervention. The program's content was theoretically grounded in the Health Action Process Approach (HAPA), the Common-Sense Model (CSM), and Cognitive-Behavioural Therapy (CBT) models. It integrated both psychoeducational and physiotherapeutic components, including a PFME regimen adapted from Sjöström et al. (2013), in line with international UI guidelines (Dumoulin et al., 2016), and systematically incorporated evidence-based Behaviour Change Techniques (BCTs) to enhance adherence and self-management.

Ethical Considerations

The entire PURI-PRO project received ethical approval from the Ethical Committee for Research at Ispa – Instituto Universitário (ref. D/022/11/2019; Appendix A) and was conducted in

accordance with the Declaration of Helsinki, Good Clinical Practice guidelines, and the ethical standards of the Order of Portuguese Psychologists (OPP) and the American Psychological Association (APA).

Across all studies, participants provided informed consent after receiving detailed information about the study's objectives, procedures, and their right to withdraw at any time. Confidentiality and anonymity were ensured by assigning unique identification codes, and access to raw data was restricted to the research team.

For the PURI-PRO RCT, participants were informed that some topics might cause emotional discomfort, and support from a licensed psychologist was available. Participants who completed all study phases (both in experimental and control conditions) received non-coercive compensation (TENA Lady product vouchers). Upon study completion, participants in the control group were offered access to the intervention if it proved effective.

Data Analyses

General statistical and psychometric framework

The statistical and psychometric validation procedures for the quantitative studies (Empirical studies 2 to 9) followed the Standards for Educational and Psychological Testing (AERA, APA, & NCME, 2014). All analyses were conducted using IBM SPSS Statistics (v.27-28), R (v.4.0-4.2.3), and the lavaan package, with SPSS AMOS used for one analysis.

Reliability. Internal consistency was assessed using ordinal alpha (α) and McDonald's omega (ω), with values ≥ .70 considered acceptable.

Validity evidence based on internal structure. Confirmatory Factor Analysis (CFA) using a DWLS estimator was applied. Model fit was evaluated based on established thresholds: CFI and TLI ≥ .90, RMSEA and SRMR ≤ .08, and $\chi^2/df < 5$. Convergent and discriminant validity were assessed according to Fornell and Larcker's (1981) criteria, requiring Average Variance Extracted (AVE) to be ≥ .50 and greater than the squared inter-factor correlations.

Validity evidence based on relations to other variables. Convergent validity evidence was established by analysing Pearson correlations between the scores of the new instrument and scores from other existing measures that assess theoretically similar constructs, as recommended by the

Standards for Educational and Psychological Testing (American Educational Research Association et al., 2014).

Measurement invariance. To ensure comparability across subgroups, measurement invariance was tested using Multigroup CFA. Invariance was considered supported when changes in fit indices were within established thresholds (ΔCFI < .01; ΔRMSEA ≤ .02), following the recommendations of Cheung and Rensvold (2002) and Rutkowski and Svetina (2014).

Study-specific analyses

Empirical Study 1. Data analysis was conducted using two complementary approaches. Directed content analysis with predominantly deductive coding was carried out in MAXQDA. In parallel, textual data were analysed using IRaMuTeQ (Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires), version 0.7 alpha 2. To explore the suitability of the Common-Sense Model (CSM)—particularly the interconnectedness between its dimensions—Descending Hierarchical Classification (DHC) and Multiple Correspondence Analysis (MCA) were performed.

Empirical Studies 2 to 8. The primary analyses involved the psychometric validation procedures detailed above, along with SEM (Structural Equation Modelling) predictive, mediation, and moderation models to explore relationships between variables.

PURI-PRO RCT and Empirical Study 9. Baseline group equivalence was tested using t-tests and chi-square tests. Longitudinal changes in outcomes were analysed using Conditional Latent Growth Modelling (CLGM) with an intention-to-treat approach and FIML for missing data.

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Chapter 2

Illness Representations and Self-Regulation in Women Living with Urinary Incontinence

This chapter is based on the papers

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2025). *Applying the Common-Sense Model to urinary incontinence experience: A qualitative analysis* [Manuscript submitted for publication]

Porto, M. G., Pimenta, F., Mascarenhas, T., & Marôco, J. P. (2023, June 3). Psychometric properties of the Brief IPQ with Portuguese women with urinary incontinence. In H. Pereira, G. Esgalhado, & P. Silva (Eds.), *Livro de Atas das 2as Conferências Internacionais em Psicologia Clínica e da Saúde* (Faculdade de Ciências Sociais e Humanas, Universidade da Beira Interior, Covilhã, Portugal)

Empirical Study 1. Applying the Common-Sense Model to Urinary Incontinence Experience: A Qualitative Analysis

Abstract

Objective: This study aimed to explore the cognitive, emotional, and behavioural dimensions, including coping strategies and their appraisals, within the Common-Sense Model (CSM) framework to provide a comprehensive understanding of their interdependence in the urinary incontinence (UI) experience among middle-aged women and to evaluate the framework's suitability.

Method: A qualitative study involving 34 middle-aged women with self-reported UI. Directed content analysis examined the cognitive, behavioural, and emotional dimensions based on CSM. Descending Hierarchical Classification and Multiple Correspondence Analysis assessed associations among variables identified in the first phase.

Results: Problem-solving strategies have emerged as central to maintaining daily functioning, despite UI. Cognitive processes partially influenced behavioural strategies; however, emotional coping was independent from both cognition and behaviour. Avoidance emerged as the predominant emotional response, illustrating fragmentation within coping mechanisms and contributing to inhibited help-seeking behaviours.

Conclusion: Although many women perceive self-management strategies as effective, UI continues to impose a psychosocial burden, particularly due to the lack of integration between emotional coping and cognitive-behavioural processes. These findings highlight the need for multidisciplinary interventions that address the cognitive, behavioural, and emotional dimensions to improve illness management and treatment adherence.

Keywords: Urinary Incontinence; Middle-Age Women; Common-Sense Model; Directed Content Analysis; Iramuteq.

Introduction

The International Continence Society defines Urinary Incontinence (UI) as the complaint of any involuntary loss of urine, emphasising that its characterisation should include frequency, severity, risk factors, social and hygienic impact, effects on Quality of Life (QoL), and healthcare-seeking behaviour (Abrams et al., 2002; Haylen et al., 2010). UI is a highly prevalent Public Health problem in middle-aged women (one of the UI peaks occurs around mid-age with a prevalence of 30% among women aged 50–54 years) that may severely impact health-related QoL, even in small quantities of urinary leakage (Krhut et al., 2018). The economic impact of UI is substantial, amounted to USD $82.6 billion (about €88.4 billion) in the United States in 2020 (Coyne et al., 2014) and with projected costs amounting to €86.7 billion in the European Union by 2030 (European Association of Urology, 2023). UI is a low-prestige condition [i.e., health issues that are highly stigmatised, elicit negative societal reactions, and receive disproportionately low medical, economic, and research investment (Stone, 2018). Although most women with UI can be significantly improved or cured with proper treatment, UI is often underreported, underdiagnosed, and undertreated and will increase with population ageing (Million et al., 2021; Molinuevo & Batista-Miranda, 2012; Subak et al., 2006). Thus, a critical challenge for health care providers is that women often delay seeking timely and effective treatment, allowing untreated UI to evolve into a chronic and progressive condition, which in turn substantially increases the cost of management. Therefore, timely reporting and treatment of early symptoms may contribute to better recovery, higher QOL, and a lower economic burden (Wu et al., 2015).

An extensive body of research has highlighted the multifaceted consequences of UI that extend well beyond physical symptoms to encompass psychological, sexual, sociocultural, professional, and economic dimensions (Smith, 2016). The severity of leakage is directly associated with greater distress and increasing restrictions on daily activities (Krhut et al., 2018). Among the different types of UI, Urgency UI (resulting from detrusor overactivity) and Mixed UI (combining symptoms of both Urgency and Stress UI, i.e., caused by urethral hypermobility or sphincter weakness) have been identified as significantly more distressing compared to pure Stress UI (Coyne et al., 2003).

Psychologically, UI may affect well-being, causing emotional distress (e.g., fear, shame, and embarrassment), as it challenges socially acceptable continence behaviour (Molinuevo &

Batista-Miranda, 2012). This frequent state of worry about experiencing urine loss in public and hypervigilance coupled with the restrictions that women impose on activities (e.g., traveling) and social life–safety behaviours–may lead to social isolation (Porto et al., 2024). Moreover, living with an uncontrollable body, the impact of UI on body image, feelings of unattractiveness, low self-esteem, and sexual activity are affected, highlighting that psychosocial consequences may be more devastating than physical ones.

Despite these repercussions, and although UI can be effectively treated or minimised with conservative treatment, particularly pelvic floor muscle exercise (PFME) as a first-line and conservative approach (Nambiar et al., 2018), less than half of affected women seek medical care, and those who seek it tend to delay it for 6 to 11 years (Bilgic et al., 2017).

Previous research has concluded that the process of not seeking professional health care involves numerous factors (Toye & Barker, 2020): 1) low symptom severity; 2) low perceived impact on QoL; 3) minimisation of UI-related dysfunctional beliefs regarding the condition's severity (e.g., the belief that UI is a minor problem requiring no treatment and that is not a symptom of a serious clinical condition) and about UI causes (e.g., the belief that UI is a normal ageing characteristic, that it is a long-term consequence of pregnancy/parity); 4) stigmatising condition, embarrassment and shame, 5) feeling capable of solely self-manage the condition with no professional guidance, 6) lack of awareness about available and effective treatments, 7) representation of treatment options as negative including medication and surgery (perceived as invasive and expensive); 8) fear of surgical procedures; 9) not be asked about UI directly/actively from a health care professional; 10) embarrassment to talk to the doctor - women prefer to be seen and talk about UI with a female care provider (Mendes et al., 2017); 10) absence or low knowledge about the condition, its causes and treatments (Waetjen et al., 2018).

Consequently, women with UI frequently engage in self-management strategies with the main purpose of concealing urine loss. Therefore, the purpose is to continue with daily life with minimum disruption possible, making incontinence management a part of their daily routine (St John et al., 2010). In this way, the strategy tends to be directed toward dealing with the practicalities of the problem and achieving social continence (i.e., navigating the psychosocial challenges of UI and allowing participation in social activities without anxiety or restriction; Dingwall, 2008).

UI self-management primarily encompasses the use of containment products, frequent intimate hygiene practices, frequent changes in underwear/clothes, frequent voiding, seeking out the location of toilets, restriction of physical activities, limiting fluid intake, planning or limiting activities, or even complete social withdrawal. This self-management is dysfunctional when women delay seeking medical assistance or treatment (Waetjen et al., 2018). Although they offer temporary relief, they do not provide long-term solutions and may worsen their condition over time. Moreover, women prioritise concealing leakage and maintaining daily activities over resolving the condition (Bilgic et al., 2017). Literature states that many women may also adopt avoidance and acceptance-resignation coping styles, opting to maintain secrecy about the condition and deliberating delay or neglect actions that would address UI symptoms (Yu et al., 2016).

The independent significant predictors of help-seeking behaviour for UI were identified as UI severity (severe and very severe) (strongest predictor), duration of UI, having one or more physician visits in the past year, actively seeking information about UI, belief that addressing UI during consultation was necessary, willingness to undergo surgery for UI symptoms (Schreiber Pedersen et al., 2018), feeling tired of experiencing urine loss, perceiving a strong odour of urine, and social implications (i.e., the leakage had reached a magnitude when it was embarrassing, and the women were afraid that others would detect the unpleasant odour of urine; Hägglund et al., 2003).

To promote treatment-seeking behaviours and consequently enhance UI treatment, it is important to deeply understand the UI experience, explaining *how and why* women manage UI symptoms, including adherence to treatments and adoption of lifestyle changes for coping with UI. In this way, the Common-Sense Model (CSM) of Self-Regulation provides a conceptual and comprehensive framework for understanding the dynamic interactions among the cognitive and emotional processes involved in health behaviours and self-management, addressing factors underlying behaviours. Thus, these processes are crucial to understanding and promoting successful self-management.

Research on CSM has indicated an emergent pattern of interconnectedness between the dimensions. The CSM is comprised of a three-phase process. The first stage encompasses two parallel, yet interrelated, processing systems that generate an objective representation of the UI (UI Cognitive Representations) and the respective emotional response (UI Emotional Representations).

Information regarding illnesses is stored schematically in memory as illness prototypes, constructed over time from personal and vicarious experiences and social and cultural knowledge of the illness. Subsequently, based on these representations, women select and implement coping strategies (UI cognitive and emotional coping). According to Leventhal (2016), emotions can increase or decrease the intensity of symptoms, given the interconnectedness between dimensions, and generate symptoms that can be confused with those of the illness/condition. It could also lead to a focus on the most negative consequences of the condition, thus directly affecting UI coping strategies and appraisals. Therefore, acknowledging negative emotional responses may lead to the alleviation of symptoms (Hagger et al., 2017). During the last stage, the women evaluate the effectiveness of these coping strategies by monitoring symptom changes ('Has my bladder control improved?'), and bodily signals ('Do I still experience leakage in certain situations?'). Adjustments may involve extending the duration of an intervention ('I need to persist with pelvic floor muscle exercises (PFME) before seeing results'), increasing its intensity ('I should perform PFME more frequently or with greater effort'), or refining its execution ('I may not be contracting the correct muscles, so I will adjust my technique') (Achstetter et al., 2019). When coping strategies are proven ineffective, individuals may reassess their perception of the illness, as outlined in the self-regulatory models. This re-evaluation can lead to the adoption of alternative coping strategies, influenced by personal beliefs about the feasibility, accessibility, and perceived burden of the new approach (Leventhal et al., 2016). This iterative process allows for continuous adaptation and readjustment to the UI experience.

Thus, according to the CSM, individuals actively engage in problem solving, with women dynamically self-regulating their responses to UI through iterative appraisals to regain bladder control. The co-occurrence of professional support is particularly beneficial as it may optimise the self-regulation process and promote more effective management of the condition.

The five main dimensions of Cognitive Representations are: 1) identity, which entails the recognition of UI signs and symptoms; 2) consequences, which refer to the perceived physical, social, economic, and emotional impacts; 3) cause, encompassing the perceived causes of UI; 4) timeline, which pertains to the perception of the duration and progression of UI; and 5) cure/control, which addresses beliefs about the possibility of treatment and cure and the level of control women perceive over managing their UI (Hagger et al., 2017). According to previous research, UI is often not perceived as a medical condition, but rather as a natural consequence of

ageing or childbirth, leading many women to normalise it and avoid seeking professional help (Shaw et al., 2019). This perception aligns with Leventhal's Common-Sense Model dimensions of illness representation: identity, consequences, cause, timeline, and cure. UI lacks an illness identity, as it is commonly seen as a long-term condition associated with ageing and requires management rather than treatment (Rashidi Fakari et al., 2021). Many women attribute UI to inevitable factors, such as childbirth or ageing, which reinforces a sense of inevitability and reduces motivation to seek care. Additionally, fear of symptom progression is often accompanied by the belief that treatment options are either ineffective or unavailable. Misconceptions, sometimes perpetuated by social/interpersonal and environmental factors, further exacerbate the low consultation rates. Addressing these barriers requires reshaping illness representations, increasing awareness of effective treatments, and reducing the stigma surrounding UI to encourage help-seeking behaviours (Shaw, 2001).

Illness perceptions play a crucial role in shaping individuals' emotional and behavioural responses to diseases. According to Hagger and Orbell (2003), individuals who perceive a greater degree of personal control over their illness are more likely to construe their condition as being less chronic and less severe. This cognitive pattern suggests a systematic organisation of lay beliefs about illness, where perceptions of control influence broader illness representations (and, in the end, the behaviour itself), including beliefs about prognosis and impact. These findings offer preliminary evidence for a common cognitive framework through which individuals interpret and manage their health conditions.

As illness perceptions are mental constructs that are open to change, it might be possible for women with UI to adopt (more) adaptive coping strategies by modifying the way they perceive their condition (Cameron, 2008; Leventhal et al., 2016), which would empower them to manage their condition more effectively and improve their well-being. Previous research has demonstrated that short interventions can successfully alter the illness perceptions of chronically ill individuals (Gehring et al., 2020). Tailored patient education to modify beliefs about illness timeline and consequences has improved self-reported treatment preparedness and recovery outcomes (Leventhal et al., 2016). Studies have also shown that individuals who believe that treatment is necessary tend to be more adherent and view their condition as more controllable (Achstetter et al., 2019; Gehring et al., 2020; Huston & Houk, 2011).

Existing research has examined the psychosocial and behavioural determinants of UI care seeking, focusing on aspects such as barriers to seeking professional help (Waetjen et al., 2018), self-management strategies for daily living (Hayder & Schnepp, 2010), and consequences of UI on QoL (Smith, 2016). However, a significant knowledge gap remains in the qualitative methods to deeply explore UI experience. Moreover, most CSM-based research emphasises the perceptual stage and the five dimensions of illness representation, while emotional and behavioural dimensions are frequently neglected (e.g., Hagger et al., 2017). Therefore, addressing this gap is essential for developing foundational research that provides effective help-seeking interventions.

In this context, the present study aimed to explore the cognitive, emotional, and behavioural dimensions—including coping strategies and their appraisals—within the CSM framework, to provide a comprehensive understanding of the content and interdependence of these dimensions in the UI experience among middle-aged women, while evaluating the framework's suitability for capturing this multidimensional experience.

Method

Qualitative Approach and Research Paradigms

This cross-sectional and exploratory study adopted an interpretivist paradigm and used directed content analysis with dominantly deductive coding and textual analysis aligned with CSM to explore the interview data. The analysis focused on understanding the cognitive, emotional, and behavioural dimensions of UI experience in middle-aged women and their interplay.

This study aimed to explore the lived experiences of women with UI through the theoretical lens of the Common-Sense Model of Self-Regulation (CSM). To address this objective, Directed Qualitative Content Analysis (QCA) was selected as the most appropriate methodological approach. As classified by Hsieh and Shannon (2005), QCA can be broadly divided into three main approaches based on how initial coding categories are developed: conventional QCA, where codes and categories emerge inductively from raw data; summative QCA, which emphasises quantifying keywords or content elements followed by interpretive analysis; and directed QCA, as employed in this study, which begins with a coding scheme derived from existing theory or prior research and allows for its refinement throughout the analytical process.

This deductive orientation made Directed QCA particularly well-suited to the study's dual purpose: to gain a deeper understanding of UI-related experiences while systematically applying

and critically evaluating a theoretically grounded conceptual framework. By employing a predefined coding frame derived from the core dimensions of the CSM, Directed QCA allowed for a systematic yet adaptable analytical process (Hsieh & Shannon, 2005; Schreier, 2014).

Schreier (2014) emphasises QCA as a rigorous and structured method for systematically reducing large volumes of qualitative material, abstracting varied responses into conceptually meaningful categories relevant to the research question. The coding process involved assigning segments of the material to clearly defined categories within a coding frame that met critical methodological criteria: unidimensionality, ensuring each main category addressed only one conceptual aspect; and mutual exclusiveness, requiring subcategories within a main category to be sufficiently distinct so that each unit of analysis was assigned to only one subcategory. To ensure robustness and analytical reliability, approximately 10% of the data underwent double coding, allowing for a critical assessment of category clarity, consistency, and conceptual rigour.

One of QCA's defining strengths lies in its capacity to integrate both concept-driven and data-driven categories within a single coding frame. While directed QCA began with theory-informed, predefined codes, it remained open to emergent insights. These insights had the potential to refine, extend, or nuance the theoretical model based on participants' narratives (Hsieh & Shannon, 2005). This approach ensured strong alignment with the theoretical framework while providing the necessary flexibility to accommodate the complexities of lived experience. Schreier (2014) further stresses the importance of continually testing and refining the coding scheme throughout the analysis, which significantly contributes to both the validity and reliability of qualitative interpretation. Furthermore, QCA allowed for the incorporation of frequency counts and pattern recognition, not as ends in themselves, but as indicators guiding interpretative depth. Recurrent expressions served as analytical cues, directing the researcher toward themes of potential significance, with meaning derived contextually rather than numerically. This capacity to blend structured analysis with in-depth interpretation makes QCA particularly well-suited for applied psychological and health research (Elo & Kyngäs, 2008).

Several alternative qualitative approaches were considered but ultimately deemed less suitable for this study's aims and epistemological orientation. Grounded Theory (Charmaz & Henwood, 2017), for example, was excluded due to its inductive logic and emphasis on generating new theory from data—a direct contrast to this study’s deductive, theory-testing orientation. While

Charmaz (2006) notes that Grounded Theory operates through both induction and abduction, it nonetheless prioritises theory emergence rather than model application or refinement.

Similarly, Interpretative Phenomenological Analysis (IPA; Eatough & Smith, 2017) was not adopted due to its idiographic focus and commitment to detailed individual case analysis. While IPA excels at exploring subjective lived experience and values the interpretative processes between researcher and participant, it is not designed to apply or evaluate structured theoretical models across cases. Narrative Analysis and Discourse Analysis were also deemed less appropriate, as their primary focus lies in the structure and sociolinguistic function of language, rather than the systematic categorisation of content related to illness representation.

Finally, Reflexive Thematic Analysis (e.g., Braun & Clarke, 2006, 2013), though widely used in qualitative psychological research, emphasises inductive coding, fluid theme development, and researcher subjectivity. These features, while valuable in purely exploratory contexts, limited its compatibility with a study explicitly aimed at the structured, theory-based analysis of cognitive, emotional, and behavioural illness representations.

In contrast, directed QCA offered the optimal analytical strategy due to its high level of transparency, theoretical coherence, and methodological rigour. It enabled the systematic exploration of meaning within a robust analytical structure while maintaining sensitivity to the voices and contexts of participants. Given its relevance in healthcare and psychological research (Elo & Kyngäs, 2008) and its suitability for testing and refining theoretical models, directed QCA represented the most appropriate methodological approach for this study, supporting both the structured application and critical evaluation of the CSM in the context of UI. A summarised comparison is presented in Table 1.

Table 1

Comparison of Qualitative Content Analysis Approaches

Aspect	Conventional QCA (Inductive)	Directed QCA (Deductive)
Initial coding process	Codes derived directly from data	Start with predefined codes based on theory
Theoretical foundation	Low – theory emerges from data	High – grounded in existing theories or conceptual frameworks
Flexibility in coding	High – codes are entirely data-driven	Moderate – some codes can be added later
Purpose	To explore and describe phenomena	To test or extend existing theory
Use of existing literature	Used minimally or not at all initially	Heavily informed by prior research
Type of category development	Data-driven	Concept-driven (theory-based)
Emerging codes allowed?	Yes	Yes, but must align with theoretical framework
Common in which fields?	Exploratory studies, theory generation	Theory-driven qualitative studies in healthcare, psychology, and social science

Participants

Through purposive sampling, this study included an intentional non-probabilistic sample of 34 middle-aged women. The inclusion criteria were as follows: sex - women, age range (40–65 years), occurrence of involuntary urine loss during intra-abdominal pressure increment (e.g., coughing) and when experiencing an uncontrollable urge to urinate, either occasionally or frequently, and online access for questionnaire completion and interviews performance. The exclusion criteria were pregnancy or being within six months post-partum, previous surgical procedures related to UI, presence of neurological disorders that could affect bladder control, known malignancy in the lower abdomen, and history of pelvic prolapse.

Participant recruitment was conducted during the initial phase of the PURI-PRO Project (quantitative phase) from March to October 2020 using Google Forms. Women interested in participating in the second phase of the study (the qualitative phase) provided additional contact

information at the end of the baseline survey. This included details such as their preferred method of contact (e.g., email or text message) and the most convenient time to be reached.

Data Collection Methods

The principal investigator (MP) contacted the participants (via email or telephone) to confirm their continued interest in participation. A triage questionnaire was administered to confirm eligibility. Eligible women were provided with a detailed explanation of the study's goals and nature, provided informed consent, and authorised the recording of interviews.

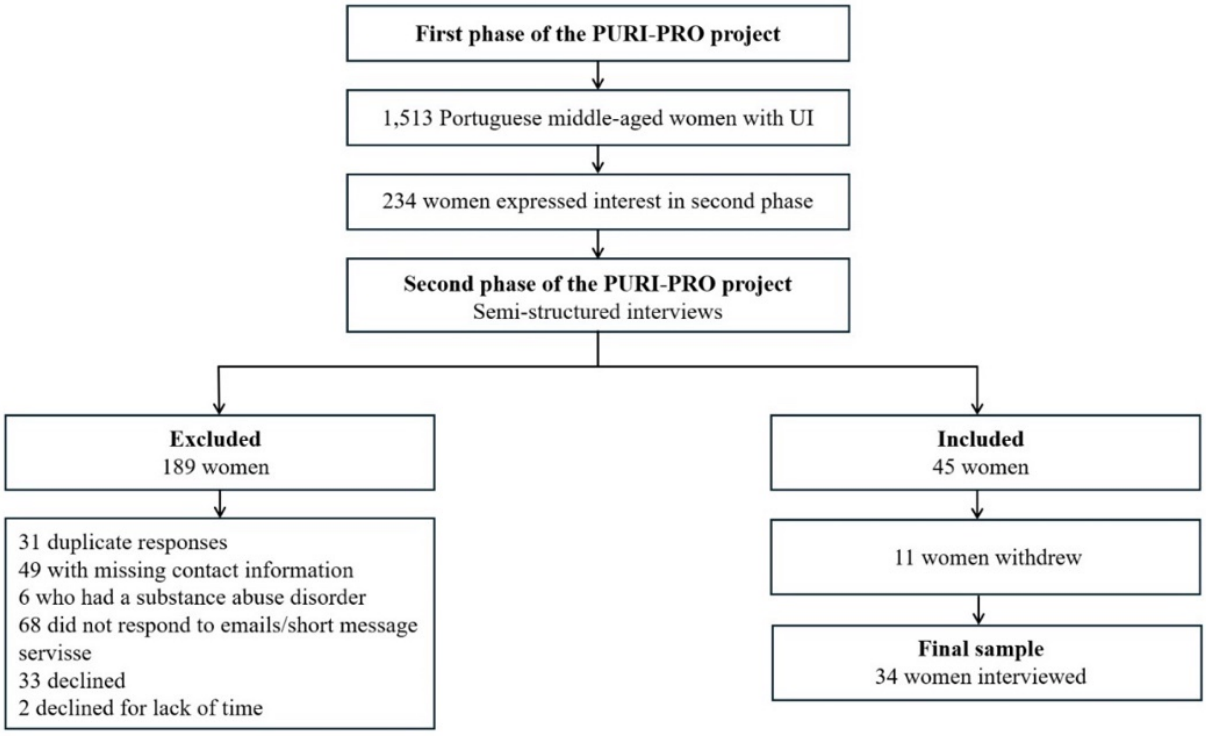
Sample size estimation was based on the principle of data saturation, which remains the most widely applied criterion in qualitative research. Saturation refers to the point at which no new themes or insights emerge from the data. Previous reviews indicate that, for interviews, saturation is typically reached with 12–30 participants, depending on the study's scope and the homogeneity of the participant group (Hennink & Kaiser, 2022).

The recruitment procedure, including reasons for dropout or exclusion, is shown in Figure 3. The final sample comprised of 34 middle-aged women with self-reported UI. Interviews were conducted via Zoom between December 2021 and March 2022, with an average duration of 25 minutes (SD = 5).

All interviews were audio transcribed verbatim. The principal investigator (MP), a female Clinical Psychologist PhD Student, impartially examined all transcripts to ensure accuracy.

Figure 3

Flowchart of Participant Recruitment



Data Collection Instruments

Data on sociodemographic characteristics, clinical details (e.g., UI type and severity, menopausal status according to the Stages of Reproductive Ageing Workshop's criteria (STRAW; Soules et al., 2001) and lifestyle factors were collected through self-reported questionnaires.

The ICIQ-UI SF was used to assess the frequency and amount of urinary leakage and its overall impact on daily life. The responses sum to an overall score between 0 and 21 points, with a higher score indicating more severe UI symptoms. The fourth unscored question asks whether leakage occurs. The global score can be divided into severity categories (i.e., 1–5 = slight, 6–12 = moderate, 13–18 = severe, and 19–21 = very severe; Bradley et al., 2005). Internal consistency reliability ($\alpha = .95$) was excellent (Avery et al., 2004).

The Questionnaire for Urinary Incontinence Diagnosis (QUID; Bradley et al., 2005), specifically tailored for identifying UI in women, was administered to assess the different UI types. Scores were calculated as the sum of the individual item responses, with QUID Stress and

Urge subscale scores ranging from 0 to 15. Responses were rated on a Likert-type scale ranging from 0 (“None of the time”) to 5 (“All of the time”). The diagnostic thresholds for stress and urge UI were set at scores ≥ 4 and ≥ 6, respectively. Thus, the classification of mixed UI depended on meeting both criteria concurrently (α =.85 and .87, respectively).

Furthermore, the research team developed a semi-structured interview questionnaire based on the CSM to explore the cognitive, behavioural, and emotional dimensions of women’s experience of living with UI (Appendix B).

Ethics

Following the ethical guidelines and standards of the Order of Portuguese Psychologists and American Psychological Association, this study was conducted as part of a research project (PURI-PRO: Portuguese Urinary Incontinence Project), which was approved by the Ethical Committee for Research from Ispa – Instituto Universitário (D/022/11/2019; Appendix A). Informed consent was obtained, data security and integrity were maintained, and no compensation was provided. Exclusive access to raw data was granted solely to principal researchers. Exclusive access to the interview material was granted to three researchers (MP, FP, and FF). All interviews were anonymised by assigning code numbers to each participant.

Data Analyses

To explore the suitability of CSM, two analyses were conducted: directed content analysis with a predominantly deductive approach to explore the cognitive, behavioural, and emotional dimensions associated with the experience of living with UI based on CSM, and lexical analysis to study the association and interconnectedness between the variables found in the first phase.

Directed content analysis

Directed Content Analysis is an approach guided by existing theory or prior research, and its objective is to validate or expand the current theoretical framework (Hsieh & Shannon, 2005).

The research team maintained reflexivity through analysis and writing, which included recording and discussing established assumptions. In addition, the MP maintained reflexive diaries.

The interview protocol included questions to explore the suitability presence of the dimensions of the CSM, namely: “In your opinion, how long do you think your UI symptoms will

last?" to explore the UI Cognitive Representation – Timeline; "In your opinion, how effective are the strategies you use to manage your emotions when you experience urine loss?" to address the UI Emotional Coping Appraisal.

Moreover, other questions addressing non-original CSM constructs were also included: 1) Behavioural Coping Inside and Outside Home ("What do you usually do to manage your urine loss when you are at home?") to explore how women cope with the physical symptoms; 2) Behavioural Appraisal ("What is your opinion on the strategies you use to manage your urine loss when you are at home?"), reflecting the behavioural strategies used by women to cope with UI and their evaluation; and 3) Distressing Thoughts associated with UI episodes ("When you experience urine loss, do any difficult thoughts come to mind?").

In addition to Behavioural coping, a distinction was made between Cognitive Coping – how women manage distressing thoughts; and Emotional coping – how women cope with UI emotional distress.

Additionally, to guide the identification of emotions (CSM dimension of Emotional Representations), Plutchi's wheel of emotions for Emotional Representations was shared with the participants. This integration allowed a more nuanced understanding of the UI experience.

The final a priori categories and respective subcategories were as follows: UI Cognitive Representations – 1) Identity, 2) Timeline, 3) Cause, 4) Control, 5) Consequences, 6) Distressing Thoughts, 7) UI Emotional Representations, 8) UI Behavioural Coping, 9) UI Emotional Coping, 10) UI Cognitive Coping, 11) UI Behavioural Coping Appraisal, 12) UI Emotional Coping Appraisal, and 13) UI Cognitive Coping Appraisal.

Strategies for trustworthiness

Intercoder reliability was assessed by an external researcher (FF), who independently coded three interview transcripts (10% of the sample) using the final coding system. MAXQDA's "code frequency in the document" feature showed an intercoder agreement of 82.7%, indicating strong reliability coding consistency.

Consolidated Criteria for Reporting Qualitative Research (COREQ; Tong et al., 2007) and Standards for Reporting Qualitative Research (SRQR; O'Brien et al., 2014) were used in this study.

Textual analysis

Textual analyses were conducted using IRAMUTEQ (Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires) 0.7 alpha 2 software to explore the suitability of the CSM, namely, the interconnectedness between dimensions. IRAMUTEQ allows qualification of the material's representativeness through the Text Segment Retention Index. A corpus is considered representative if the index is greater than or equal to 75.0% (Camargo & Justo, 2016). It was used Hapax coefficient (percentage of words, among the corpus, whose frequency is equal to one), which is an indicator of both corpus saturation (i.e., additional data will grant no significant new information) and phrase diversity (i.e., rich vocabulary, non-repetitive information). The participants' texts were examined while respecting their original linguistic structure. The text was prepared with all those mentioned above a priori categories and subcategories separately, without saying which variables were allocated in each dimension (e.g., timeline–from Cognitive Illness Representation) was considered a separate variable and consequently was not a priori associated with other variables from the same Main Category) to 1) avoid forcing the conceptual model and; 2) observe the actual CSM suitability and dimensions' dependence.

This study employed Descending Hierarchical Classification (DHC) and Multiple Correspondence Analysis (MCA); two statistically driven methods widely applied in textual data analysis. DHC was utilised as a hierarchical clustering technique to classify text segments into semantically homogeneous classes, based on lexical similarity and word frequency distributions. The statistical analysis followed a four-step procedure. First, the corpus was preprocessed by segmenting it into elementary context units (ECUs) according to syntactic structure and predefined segmentation rules, while applying lemmatisation to normalise lexical forms. To optimise statistical differentiation, a distinction was made between active forms (e.g., verbs, nouns) and supplementary forms (e.g., articles, conjunctions). Second, a contingency matrix was constructed to associate text segments with their respective vocabulary distributions, enabling the calculation of co-occurrence frequencies for each lexical form across the segments. An iterative hierarchical clustering algorithm then applied divisive partitioning, initially splitting text segments into two statistically distinct classes based on lexical contrast analysis. This divisive approach was recursively applied until no further statistically significant partitions were detected, ensuring internal lexical coherence within each class. Third, chi-square (χ^2) tests were performed to assess

the strength of association between lexical forms and the identified classes. χ^2 values served as statistical weights, determining the most discriminative words for each class along with their statistical significance. Finally, the results were visualised through a dendrogram, representing the hierarchical classification structure and the lexically dominant clusters (Camargo & Justo, 2013; Reinert, 1987, 2001).

Multiple Correspondence Analysis (MCA) assessed association patterns between lexical classes, lexical forms, and categorical variables. MCA applies factorial decomposition techniques to map the relationships among lexemes, classes, and variables within a multidimensional space, thereby enhancing the interpretative depth of the analysis. The method computes factor scores to project lexical and categorical variables onto factorial axes, facilitating the identification of latent semantic structures and underlying association patterns. The statistical strength of association between elements was determined based on their proximity within the factorial space (i.e., Cartesian plane), allowing for the detection of highly correlated lexical forms and their distribution across discourse categories.

Graphically, FCA represents the relationships between variables and dimensions on Cartesian maps, illustrating patterns of dependence and independence. Dependence is inferred when classes are located within the same quadrant or are positioned near each other, whereas independence is indicated by classes positioned in distinct quadrants or at greater distances in the spatial plane. Dimensions with higher inertia (variance) contributed more substantially to explaining the variance within the model. This approach enabled a robust exploration of statistical dependencies and semantic structures within the textual dataset (Camargo & Justo, 2013).

Results

Brief Social and Clinical Characterisation

The study sample consisted of 34 Portuguese women (M_{age} = 49.71, *SD* = 4.45) with self-reported UI, exhibiting a mean symptom severity of 12 (*SD* = 2.5; *Min* = 2, *Max* = 21). Most participants (82.4%) had vaginal deliveries. Over half of the sample (52.9%) was perimenopausal, and another 29.4% were postmenopausal, with 35.3% seeking medical help for menopausal symptoms. Stress UI symptoms were the most prevalent (50%), followed by mixed (29.4%) and urgency UI symptoms (20.6%). While 52.9% had sought medical help for UI, only 23.5% received treatment, with 17.6% currently engaging in pelvic floor muscle exercise (see Tables 2 and 3).

Table 2

Sociodemographic Characteristics of Participants

Characteristics	Women with UI (n = 34)	
	n	%
Age range		
40–44	4	11.8
45–49	11	32.4
50–54	13	38.2
55–59	5	14.7
60–65	1	2.9
Nationality		
Portuguese	34	100.0
Other	—	—
Level of Education		
4th grade	—	—
9th grade	3	8.8
12th grade	13	38.2
Bachelor's degree	10	29.4
Postgraduate degree	8	23.5
Doctorate	—	—
Professional Status		
Active	28	82.4
Inactive	6	17.6
Sexual-Affective Relationship		
Yes	28	82.4
No	6	17.6
Number of Biological Children		
0	2	5.9
1	9	26.5
2	18	52.9
3	3	8.8
≥ 4	2	5.9

Note. UI = Urinary incontinence.

Table 3

Clinical Characteristics and Lifestyle Habits of Participants

Characteristics	Women with UI (n = 34)	
	n	*%*
Number of vaginal deliveries		
0	14	41.2
1	6	17.6
2	10	29.4
3	3	8.8
≥ 4	1	2.9
Number of caesarean deliveries		
0	17	50.0
1	12	35.3
2	5	14.7
3	—	—
≥ 4	—	—
Perineal laceration		
Yes	15	44.1
No	19	55.9
Physical Illness Diagnosis		
No	26	76.5
Yes	8	23.5
Asthma	1	2.9
Hypothyroidism	2	5.9
Diabetes	1	2.9
Hypertension	1	2.9
Mental Illness Diagnosis		
No	31	91.2
Yes	3	8.8
Depressive Disorder	2	5.9
Anxiety Disorder	1	2.9
Obsessive Disorder	—	—
Psychotic Disorder	—	—
Menopausal Status		
Premenopause	6	17.6
Perimenopause	18	52.9
Postmenopause	10	29.4
Medical help to manage menopausal symptoms		
Yes	12	35.3
No	22	64.7

Coffee Intake		
Yes	30	88.2
No	4	11.8
Hot/cold beverages Intake		
Yes	30	88.2
No	4	11.8
High Impact Physical Activity		
Yes	3	8.8
No	31	91.2
BMI Status		
Underweight	—	—
Healthy Weight	22	64.7
Overweight	8	23.5
Obesity Level I	4	11.8
Obesity Level II	—	—
Obesity Level III	—	—
UI Types		
Stress	17	50.0
Urgency	10	29.4
Mixed	7	20.6
Medical help for UI		
Yes	15	44.1
No	19	55.9
Treatment for UI		
Yes	8	23.5
No	26	76.5
Prescribed UI medication		
Yes	1	2.9
No	33	97.1
Pelvic floor muscle exercise		
Yes	6	17.6
No	28	82.4
UI Severity Mean	12	

Note. UI = Urinary incontinence.

Directed Content Analysis using MAXQDA

The directed content analysis method was employed using a dominantly deductive approach, allowing inductive coding when content not addressed by the a priori categories emerged during the analysis. The extended Common-Sense Model (CSM) was subsequently developed to

incorporate these insights, resulting in an enriched comprehension of the experience of living with UI in this sample (Appendix C).

The emergent categories concerning the various main CSM categories and subcategories were as follows:

UI cognitive and emotional representations

The emergent categories in the *Cognitive UI Representations* included categories such as Timeline - Chronic condition without considering intervention and Timeline - Chronicity with Absent Intervention, as presented in Table 4.

UI cognitive, emotional and behavioural coping

In order to gain a more thorough comprehension of UI coping strategies, Hagger and Orbell's (2003) meta-analysis on coping strategies based on the Common-Sense Model was used as a framework for the classification of coping strategies. The strategies were categorised as follows: cognitive reappraisal, problem-focused coping (generic), problem-focused coping-specific, avoidance/denial, and seeking social support. The latter was further divided into formal support (replacing the original doctor visit category) and informal support, as shown in Table 4.

For example, Psychotherapy, Communication with significant others, Cognitive reappraisal, and Avoidance/Denial – further divided into Non-disclosure and Ignoring Symptoms - comprised the *UI Emotional Coping* category.

UI cognitive, emotional and behavioural coping appraisal

Finally, the UI Cognitive Coping Appraisal subcategory was categorised as either Effective or Ineffective. The UI Emotional Coping Appraisal subcategory was also divided into Effective and Ineffective strategies. The UI Behavioural Coping Appraisal subcategories were divided into three categories: Effective, Ineffective, and Partially efficacious/inefficacious strategies, as shown in Table 4.

Table 4

Main Categories, Emergent Categories and Sub-categories (Level 1, 2 and 3) of UI Cognitive, Emotional and Behavioural Coping Appraisal from Deductive-dominant Analysis based on Common Sense Model

Main Category	Level 1 Sub-category	Level 2 Sub-category	Level 3 Sub-category	Definition	Quotation Example	*n* (%)	MC
Cognitive UI Representations				Cognitive processes regarding UI			
	Other Distressing Thoughts			Cognitive distortions related to UI	"I can't stop thinking about what people might think of me if they knew."	10 (29.4)	11
	Catastrophising			The tendency to anticipate the worst possible outcomes related to UI	"What if this keeps getting worse and there's nothing, I can do about it?"	4 (11.8)	9
	Timeline			The perception of UI duration, whether chronic, acute, or intermittent[a]			
		Timeline - Chronic condition without considering intervention		The belief that UI is permanent and ongoing	"I've had to accept that this might be a part of my life now. It's not going away."	12 (35.3)	12
		Timeline - Chronicity with Absent Intervention		The perception that UI will continue to persist or worsen in the absence of specific medical or behavioural interventions	"Without proper treatment, I know this will only get worse over time."	22 (64.7)	24
	Cure/Control			Beliefs about whether UI can be controlled or cured[a]			
		Control		The belief that UI can be controlled through specific actions or interventions	"I've learned that if I manage my diet and exercise regularly, I can reduce the symptoms significantly."	23 (67.6)	36
		Loss of control		The belief that neither one or healthcare has any influence over the progression UI	"No matter what I do, it seems like I can't stop the symptoms from getting worse."	11 (32.4)	13
	Consequences			Anticipated impacts of UI[a]			
		Negative		Negative anticipated impacts of UI			
			Negative Avoidance of intercourse	Avoidance of sexual activity due to urine leakage	"I'm always worried about leaking during sex, and it makes me avoid intimacy with my partner."	3 (12.5)	7

	Negative Family - Restriction of activities with children	The negative impact of UI on family life and interactions, particularly in activities involving children	"I can't keep up with my kids because I'm constantly worried about finding a bathroom."	4 (11.8)	4
	Negative Physic - Urine odour	The strong smell of urine	"I hate the smell of urine on me."	11(32.4)	27
	Negative Professional	The impact of UI on work productivity			
	Negative Professional - Experiencing frequent restroom visits	The need to urinate more often than is considered typical, disrupting daily professional routines	Needing to use the restroom frequently impacts work or professional life. "I have to excuse myself during meetings multiple times."	6 (17.6)	11
	Negative Professional - Restricted Restroom Access and Incontinence Episodes	Difficulty or limited opportunities to reach a toilet in a timely manner, sometimes leading to involuntary leakage of urine	"When I'm out in public, it's a constant worry about where the nearest bathroom is."	6 (17.6)	11
	Negative Professional - Decreased professional productivity	Reduced efficiency and output in the workplace due to the physical and psychological challenges associated with urinary issues	"My productivity at work has taken a hit because I'm always managing my symptoms."	4 (11.8)	7
	Negative Social - Restriction of activities	The deliberate limitation of social, occupational, or recreational activities due to concerns about experiencing an incontinence episode in public	"I don't go out as much anymore because I'm too embarrassed about potentially leaking."	12 (35.3)	24
	Negative Personal	UI impact of self			
	Negative Personal - Wear wet pads	Discomfort associated with wearing wet pads	"My pads get soaked all the time."	7 (20.6)	10

		Negative Personal - Continuous necessity to carry pads	Need to always have pads on hand	"I never leave the house without extra pads, just in case."	11 (32.4)	16
		Negative Personal - Wear dark clothes	Choosing clothing to conceal potential leakage	"I only wear dark clothes now because I'm afraid of stains showing."	7 (20.6)	13
		Negative Personal - Diminished self-esteem	A diminished sense of self-worth or self-value	"Dealing with incontinence has really taken a toll on my self-esteem... I don't feel as confident or attractive as I used to."	8 (23.5)	12
	Positive		Positive anticipated consequences			
		Positive - Body Awareness	Positive outcomes related to increased awareness and understanding of one's body and health	"Having to pay attention to my bladder all the time has made me much more aware of my body."	8 (23.5)	12
Cause			The perceived causes of UI[a]			
	Behavioural/ Physiological		The perception that UI is caused by certain behaviours or physiological changes			
		Behavioural/ Physiological – Aging	Aging as a direct cause of UI	"I guess it's just something that happens as you get older."	9 (26.5)	11
		Behavioural/ Physiological - Overweight/ weight gain	Gaining excessive weight, which adds pressure on the bladder, as a UI cause	"I believe my excessive weight might be contributing to my incontinence."	3 (8.8)	4
		Behavioural/ Physiological - Delayed Voiding	Voluntary urinary retention as UI cause	"I think I've damaged my bladder by holding it too long too often."	7 (17.6)	10
		Behavioural/ Physiological – Neurogenetics	Genetic and neurological factors that affect bladder control	"I think it runs in my family; my mother and grandmother had the same problem."	11(32.4)	16
	Women's related issues		The belief that UI is related to gender-specific health issues, such as childbirth, menopause, or hormonal changes			

			Women's related issues - Vaginal delivery	Vaginal delivery as primary cause of UI	"After giving birth to my second child, my incontinence got worse."	14 (41.2)	20
			Women's related issues – Menopause	Menopause as primary cause of UI	"Since menopause, I've had sudden urges to pee and sometimes can't hold it."	6 (17.6)	9
			Women's related issues – Caesarean	Caesarean as primary cause of UI	"My UI started when I had a C-section 10 years ago."	6 (17.6)	7
			Women's related issues - Pregnancy	Pregnancy as primary cause of UI	"When you are pregnant there is too much weight…and nothing stays the same."	7 (20.6)	8
Identity				How women label UI and the symptoms they experience[a]			
		Lack of knowledge about the condition		Knowledge deficit pertaining to UI, encompassing both personal understanding and awareness of available resources	"I don't know what to do…I do not know if surgery can fix it…"	14 (41.2)	24
		Loss of bladder control		Losing complete control over bladder function	"UI is the absence of bladder control."	17 (50.0)	34
		Mixed UI		Encompasses symptoms of both stress urinary incontinence (SUI) and urge urinary incontinence (UUI)	"I'm never quite sure what's going to trigger it. Sometimes it's the urge, sometimes it's physical activity."	7 (20.6)	7
		Stress UI		The complaint of involuntary leakage on effort or exertion, or on sneezing or coughing	"I've been having some leakage when I sneeze or cough."	17 (50.0)	31
		Urgency UI		The complaint of involuntary leakage accompanied by or immediately preceded by urgency	"When I feel the urge, I have to go right away."	10 (29.4)	22
Emotional Representations				Emotional reactions that emerge during urine loss[a]			
	Frequent Insecurity			Insecurity due to loss of control of bodily functions due to UI	"I feel like I'm losing control of my own body, and it makes me feel so insecure."	23 (67.6)	48

	Shame		Shame associated with the stigma of UI	"It's so embarrassing; I don't want anyone to know."	20 (58.8)	31
	Anguish		Anquish associated with UI	"It's distressing to know that this could be my life now."	16 (47.1)	26
	Anger		Anger due to UI	"I get so angry at myself when it happens, like why can't I just control this?"	22 (64.7)	48
	Sadness		Sadness due to UI	"It's just so sad to think I have to live with this forever."	27 (79.4)	41
	Fear of others detecting an episode of incontinence		Fear or experience loss of bladder control in public	"I'm terrified of having a full-blown accident in public."	28 (82.3)	38
	Fear of ageing		UI contributing to anxiety about getting older	"This condition makes me feel old before my time."	6 (17.6)	10
	Fear of having urine loss during intercourse - worries about coital incontinence		Apprehension regarding bladder control during sexual activity	"I am afraid of wetting the bed and my partner during sex."	6 (17.6)	17
UI Emotional Coping			Strategies used for managing emotions related to UI[a]			
	Psychotherapy		The process of engaging with mental health professionals to manage emotional distress caused by UI	"I started seeing a therapist because I was really struggling to cope with the embarrassment and anxiety that UI was causing me."	6 (17.6)	7
	Communicate with significant other		Seeking reassurance, empathy, and emotional support from one's personal network	"I talk to my husband about how UI makes me feel. It's hard, but having his support helps me get through the worst days."	10 (29.4)	15
	Cognitive reappraisal to change emotional distress		Cognitive efforts to reappraise/seek the problem differently to reduce emotional distress, acknowledging its existence[b]	"I try to remind myself that UI is just a condition, not something that defines who I am. It helps me keep a positive outlook."	12 (35.3)	26
	Avoidance/ Denial		Cognitive or behavioural attempts to ignore/avoid the existence of the UI[b]			

		Non-disclosure	Maintain secrecy to avoid feelings of embarrassment, shame, or social stigma	"I haven't told anyone about my UI. It's just too embarrassing, so I keep it to myself."	5 (14.7)	9
		Minimising symptoms to manage emotional distress	Ignoring symptoms, avoiding medical consultations, or suppressing thoughts about the condition	"I try not to think about it too much. The more I dwell on it, the worse I feel, so I just push it to the back of my mind."	7 (20.6)	8
UI Cognitive Coping			Procedures used to manage distressing thoughts[a]			
	Cognitive reappraisal to change distressing thoughts		Cognitive efforts to reappraise/seek the problem differently to reduce emotional distress, acknowledging its existence[b]	"Whenever I start feeling down about my UI, I tell myself that it could be worse and that many people live with conditions like this."	21 (61.8)	39
UI Behavioural Coping			Strategies used to manage urine loss			
	Avoidance/ Denial		Cognitive or behavioural attempts to ignore/avoid the existence of UI symptoms[b]			
		Withdraw from social activities	Withdrawing from social activities or environments to prevent potential UI-related embarrassment	"I've stopped attending social events because I'm afraid of having an accident in front of people. It's just easier to stay home."	4 (11.8)	7
		Avoiding/Modifying activities	Modifying or completely avoiding activities that may exacerbate UI symptoms	"I used to love running, but now I avoid it."	7 (20.6)	9
		Minimising symptoms to inhibit UI behavioural management	Deliberately neglecting or delaying actions that would address UI symptoms	"I've put off seeing a doctor about my UI for years."	13 (38.2)	20
	Formal Social Support		Seeking structured support through organised groups or professional networks specifically designed to help individuals cope with UI			
		Physical Exercises	Engaging in physical exercises that are believed to improve UI symptoms	"I do pilates regularly because it helps strengthen my core..."	6 (17.6)	11

		Doctor Visits	Utilising medical treatments and regular healthcare consultations to manage UI (e.g., prescribed medications, attending urodynamic studies)	"I'm on medication now, and I also have regular check-ups with my urologist to monitor my UI and make sure we're managing it well."	15 (44.1)	37
	Information seeking		The proactive search for knowledge and information related to UI management	"I've spent countless hours researching UI online, trying to find solutions."	5 (14.7)	8
	Outside/Inside		Behavioural strategies employed by women to manage UI outside and inside the home			
		Outside/Inside- Frequent intimate hygiene practices	Regular maintenance of personal hygiene specifically focused on managing the effects of UI (e.g., use of intimate wipes or other hygiene products)	"I always carry wipes with me wherever I go…"	20 **(58.8)**	34
		Outside/Inside Pelvic Floor Muscle Exercise	Performing exercises designed to strengthen the pelvic floor muscles, which are crucial in controlling urination and reducing UI symptoms	"Kegel exercises are a part of my daily routine now."	22 **(64.7)**	53
		Outside/Inside - Changing underwear/clothes frequently	Frequent change of underwear or clothing to manage UI-related leakage and maintain personal comfort and hygiene	"I have to change my underwear a few times a day..."	15 **(44.1)**	20
		Outside/Inside -Voiding frequently	Regularly emptying the bladder even in the absence of a strong urge to urinate, thereby reducing the likelihood of involuntary leakage	"I go to the bathroom as often as I can, even when I don't feel the need to, just in case."	15 **(44.1)**	23
		Outside/Inside - Use of absorbent products	The use of absorbent products such as pads or specialised underwear to manage UI symptoms	"I've come to rely on absorbent pads. They give me the confidence to go about my day without worrying about leaks."	28 **(82.4)**	81
	Outside		Behavioural strategies employed by women to manage UI outside the home			

		Outside Seek - Seek toilet location	A proactive approach where individuals ensure they are aware of nearby restroom facilities when in public spaces	"The first thing I do when I go somewhere new is find out where the bathrooms are, just in case I need to go quickly."	6 (17.6)	11
		Outside - Activity Planning	Strategically selecting social or leisure activities that minimise the risk of UI-related embarrassment	"I prefer going to parks or outdoor events where I know there are accessible toilets nearby..."	12 (35.3)	23
		Outside - Limiting fluid intake	Deliberately reducing fluid consumption to decrease the likelihood of UI episodes	"I've cut down on how much I drink during the day, especially when I'm out, to avoid any accidents."	7 (20.6)	8
	Communicate with significant others		Seeking reassurance, empathy, and emotional support from one's personal network	"Talking to my sister about my UI has been a big relief. She's very understanding, and it's nice to have someone to talk to about it."	5 (14.7)	6
UI Cognitive Coping Appraisal			The process of evaluating UI Cognitive Strategies employed to manage distressing thoughts associated with urine loss[a]			
	Effective		UI Cognitive coping strategies that are evaluated as successful	"When I use positive self-talk during a stressful situation, I feel less anxious, so I believe it works!"	23 (67.6)	24
	Ineffective		UI Cognitive coping strategies that are evaluated as unsuccessful	"I tried to reason through my fears logically, but I still felt the same anxiety."	11 (32.4)	11
UI Emotional Coping Appraisal			The process of assessment strategies used to cope with the emotional impact of experiencing urine loss[a]			
	Effective		UI Emotional coping strategies that are evaluated as helpful	"When I listen to calming music, I feel much more at ease..."	26 (76.5)	30
	Ineffective		UI Emotional coping strategies that are evaluated as unhelpful	"Sometimes when I try to meditate, it makes me even angrier instead of calming me down."	8 (23.5)	9

UI Behavioural Coping Appraisal			The process of evaluating UI Behavioural Coping strategies employed to manage distressing thoughts associated with urine loss			
	Effective		UI Behavioural coping strategies that are evaluated as successful	"For now, drinking less water and peeing regularly is enough"	21 (61.8)	45
	Ineffective		UI Behavioural coping strategies that are evaluated as unsuccessful	"These strategies are not enough."	9 (26.5)	15
	Partially efficacious/ partially inefficacious		UI Behavioural Coping Strategies that have some positive impact but also falls short in some areas	"I manage it the best I can…sometimes it works, sometimes it does not…"	4 (11.8)	5

Note. *n* = number of participants reporting the sub-category (% = percentage of total participants reporting the sub-category); MC = Frequency of Sub-Category Occurrence; UI = Urinary Incontinence. [a] adapted from Leventhal et al. (2016); [b] adapted from Hagger & Orbell (2003).

Prominent Results Regarding Emergent Categories

UI cognitive representations

The most prominent findings revealed the following key aspects regarding Cognitive UI Representations: 41% of women have distressing thoughts about UI (Catastrophising and Other Distressing Thoughts Dimensions); 64.7% women perceived UI as manageable - chronic only when no intervention is applied (Timeline Dimension); most women perceived UI as controllable (68%) (Control Dimension). Fear of incontinence episodes (47.1%), fear of others detecting an episode (47.1%), urine odour (32.4%), and frequent insecurity (22%) were the most reported negative consequences (Consequences Dimension) of UI. Moreover, 41.2% of women attributed UI to vaginal delivery, while 32.4% attributed it to heredity, both past or non-modifiable factors (Cause Dimension). UI was perceived as the loss of bladder control by 50% of women (Identity Dimension), and a substantial proportion (41.2%) reported a lack of knowledge about the condition. Regarding Emotional UI Representations, 82.3% reported fear of others detecting an episode of incontinence, 80% reported feeling sad when experiencing urine loss, 67% reported Frequent Insecurity, and 64.7% reported anger.

UI cognitive, emotional, and behavioural coping

The most frequently employed coping strategies were as follows:

UI Emotional Coping: Cognitive reappraisal to change emotional distress (35.3%), followed by communicating with significant others for support (29.4%), and minimising symptoms managed emotional distress (20.6%).

UI Cognitive coping was exclusively performed through cognitive reappraisal to change distressing thoughts (meeting the 10% selection criteria) in 61.8% of the women.

UI Behavioural Coping: 82.4% of women used absorbent products, 64.7% performed pelvic floor muscle exercises (although only 10% practised consistently), and 58.8% maintained frequent intimate hygiene practices.

Appraisal

A significant percentage of participants reported that their coping strategies were effective in the cognitive (67.6%), emotional (76.5%), and behavioural (61.8%) domains.

Textual Analysis using IRAMUTEQ

The corpus comprised 34 interviews, totalling 7,807 words or expressions (occurrences: total word count, including repetitions), with an average of 600 words per participant. Within this dataset, 1,137 unique lexical forms (distinct words after lemmatisation) were identified, including both frequent and rare terms. Among these, 449 were hapax legomena (hapax – words appearing only once in the corpus), which serve as indicators of lexical diversity and contribute to thematic richness.

The hapax coefficient (5.75% of the total occurrences) was used to establish the data saturation criterion (Camargo & Justo, 2013), suggesting a balanced lexical structure, ensuring both diversity and coherence in the analysis.

Results obtained with DHC

The following criteria were used to qualify words for inclusion in the categories: 1) frequency exceeding the mean number of occurrences in the corpus and 2) association with the class as determined by the lowest significant chi-square value ($\chi^2 \geq 3.88$, $p < .05$). The retention rate was 83.49%. The DHC also showed the variables allocated to the different classes (Identity, Timeline, Cause, Control, Consequences, Distressing Thoughts, UI Emotional Representations, UI Behavioural Coping, UI Emotional Coping, UI Cognitive Coping, UI Behavioural Coping Appraisal, UI Emotional Coping Appraisal, and UI Cognitive Coping Appraisal).

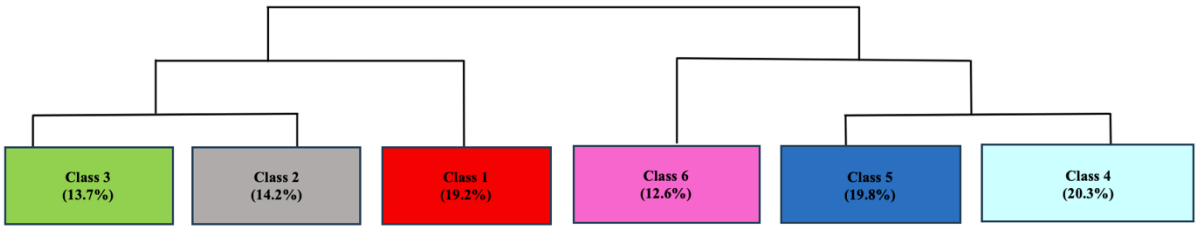
The DHC dendrogram (Figure 4) revealed a hierarchical relationship between the six classes, with two main ramifications, with all classes having inertia values (i.e., total variance explained by each class) above 10%.

Main ramification 1. **Class 1 – UI Controlled Appraisal** (19.2% of the total variance explained), constituted by the variables UI Control ($\chi^2 = 44.44$, $p < .001$); Cognitive ($\chi^2 = 17.18$, $p < .001$), Behavioural ($\chi^2 = 25.11$, $p < .001$) and Emotional Coping Appraisal ($\chi^2 = 26.06$, $p < .001$) and UI Timeline ($\chi^2 = 12.22$, $p < .001$); and UI Emotional Coping was non-significant ($p = .112$), with **Class 2 – Inside Home UI Self-management** (14.4% of the total variance explained**)** ($\chi^2 = 62.15$, $p < .001$) and **Class 3 – Outside Home UI Self-management** (13.7% of the total variance explained) ($\chi^2 = 66.4$, $p < .001$).

Main ramification 2. **Class 4 – Negative Cognitive Processing of UI** (20.3% of the total variance), constituted by the variables UI Negative Consequences (χ^2 = 103.36, p < .001), UI Distressing Thoughts, (χ^2 = 16.12, p <.001) and UI Cognitive Coping (χ^2 = 3.94, p = .0043) and **Class 5 – UI Identity and Causal Attributions** (19.8% of the total variance explained), constituted by the variables UI Identity (χ^2 = 75.12, p < .001) and Cause (χ^2 = 38.4, p < .001), with **Class 6 – UI Emotional Representations** (12.6% of the total variance explained), constituted by the variable UI Emotional Representations (χ^2 = 157.96, p < .001) isolated.

Figure 4

Descending Hierarchical Dendrogram



Word	%	X^2	p
Pad	64.00	61.79	<.001
carry	81.82	45.80	<.001
Sanitary	100.00	38.96	<.001
Daily	87.50	38.42	<.001
toilet_location	100.00	32.29	<.001
change	46.15	26.90	<.001
Pantyliner	56.25	26.76	<.001
Home	40.74	19.51	<.001
Manage	29.51	19.26	<.001
House	80.00	19.05	<.001
immediately	80.00	19.05	<.001
urine_loss	25.64	16.33	<.001
Protection	66.67	14.67	<.001
Drink	66.67	14.67	<.001
Frequently	55.56	13.97	<.001
Day	43.75	13.34	<.001
less_water	44.44	07.53	<.001
Clothes	35.29	07.35	<.001
Paper	66.67	07.21	<.001
Periodically	66.67	07.21	<.001
incontinence	66.67	07.21	<.001
Avoid	40.00	06.16	<.001
Know	40.00	06.16	.013
Extra	42.86	05.21	.022
Dark	50.00	04.54	.033
pelvic_floor_strengthening_exercises	28.57	04.41	.035
*behaviouralcoping_01	47.06	66.40	<.001

Word	%	X^2	p
clean	100.00	50.21	<.001
wash	71.43	40.44	<.001
regularly	100.00	37.23	<.001
part	66.67	28.79	<.001
hygiene	70.00	26.82	<.001
manage	32.79	25.65	<.001
change	46.15	25.16	<.001
wipe	100.00	24.54	<.001
management	83.33	24.16	<.001
maintain	63.64	23.29	<.001
clothe	52.94	22.88	<.001
urine_loss	28.21	21.60	<.001
pilates	100.00	18.30	<.001
practice	100.00	18.30	<.001
essential	80.00	18.13	<.001
pelvic	80.00	18.13	<.001
underwear	53.85	17.89	<.001
pelvic_floor strengthening	42.86	15.83	<.001
wear	54.55	15.50	<.001
less_water	55.56	13.17	<.001
Stay	50.00	11.02	<.001
extra	50.00	11.02	<.001
practice	57.14	10.92	<.001
home	57.14	10.92	<.001
Help	33.33	09.39	<.001
panty_liner	40.00	08.83	<.001
routine	37.50	07.72	<.001
attend	44.44	07.03	<.001
Read	66.67	06.83	<.001
slightly	66.67	06.83	<.001
hygiene	66.67	06.83	<.001
perform	66.67	06.83	<.001
Keep	66.67	06.83	<.001
exercise	50.00	06.46	.012
Need	31.82	06.28	.027
reduce	42.86	04.85	.039
toilet	50.00	04.26	.049
*behavioural coping_01	47.06	62.15	<.001

Word	%	X^2	p
effective	100.00	83.90	<.001
strategy	63.64	31.77	<.001
relatively_effective	100.00	30.58	<.001
treatment	100.00	26.06	<.001
solution	100.00	26.06	<.001
emotion	87.50	25.11	<.001
consult	100.00	21.59	<.001
surgery	85.71	20.72	<.001
medication	100.00	17.18	<.001
improvement	100.00	17.18	<.001
improve	100.00	17.18	<.001
find	75.00	16.76	<.001
option	83.33	16.41	<.001
urologist	100.00	12.81	<.001
remain	100.00	12.81	<.001
effectiveness	100.00	12.81	<.001
address	71.43	12.77	<.001
chronic	80.00	12.22	<.001
chronic_if_not_treated	80.00	12.22	<.001
approach	80.00	12.22	<.001
continue	62.50	10.09	<.001
method	66.67	08.99	<.001
effectively	66.67	08.99	<.001
manage	31.15	08.39	<.001
uncertain	75.00	08.19	<.001
thought	60.00	05.50	<.001
handle	60.00	05.50	<.001
step	60.00	05.50	<.001
require	60.00	05.50	<.001
minimise	66.67	04.42	<.001
decrease	66.67	04.42	.041
issue	44.44	03.88	.034
doctor	44.44	03.88	.028
*illnessrepresentation_control	100.00	44.44	<.001
*appraisal_emotional coping_06	100.00	26.06	<.001
*appraisal_behaviour coping_05	87.50	25.11	<.001
*appraisal_cognitive coping_04	100.00	17.18	<.001
*illnessrepresentation_timeline_03	80.00	12.22	<.001
*emotional coping_02ª	50.00	02.49	.112

Word	%	X^2	p
Sadness	100.00	04.85	<.001
fear_of_aging	100.00	57.85	<.001
Frustration	100.00	50.33	<.001
Shame	100.00	50.33	<.001
Helpless	100.00	42.89	<.001
Anger	100.00	35.54	<.001
insecurity	100.00	35.54	<.001
humiliate	100.00	35.54	<.001
fragility	100.00	35.54	<.001
disappointment	100.00	35.54	<.001
Feel	37.21	30.79	<.001
feelings	100.00	28.27	<.001
despair	100.00	28.27	<.001
embarrassment	66.67	25.03	<.001
overwhelm	80.00	21.13	<.001
vulnerable	100.00	21.09	<.001
fragile	100.00	21.09	<.001
anxious	100.00	21.09	<.001
Live	75.00	14.41	<.001
linger	75.00	14.41	<.001
Leave	50.00	10.58	<.001
accompany	50.00	10.58	<.001
moment	44.44	08.68	<.001
utterly	66.67	08.07	<.001
isolate	66.67	08.07	<.001
intensify	66.67	08.07	<.001
insecure	66.67	08.07	<.001
haunt	66.67	08.07	<.001
frustrate	66.67	08.07	<.001
Fill	66.67	08.07	<.001
embarrass	66.67	08.07	<.001
comfort	66.67	08.07	<.001
discomfort	42.86	06.02	<.001
Old	50.00	05.17	<.001
Talk	50.00	05.17	<.001
stress	50.00	05.17	<.001
front	50.00	05.17	.023
worry	33.33	04.98	.045
Fear	27.27	04.86	.048
*emotionalrepresentation_06	88.46	157.96	<.001

Word	%	X^2	p
negative	94.74	72.52	<.001
consequence	94.12	63.03	<.001
unpleasant_odour	100.00	37.11	<.001
constant	80.00	35.94	<.001
fear	68.18	35.38	<.001
lose	78.57	31.76	<.001
impact	83.33	31.49	<.001
self_esteem	100.00	20.15	<.001
concern	100.00	20.15	<.001
life	66.67	17.03	<.001
worry	66.67	17.03	<.001
husband	100.00	16.03	<.001
unpleasant	100.00	16.03	<.001
toll	100.00	16.03	<.001
professionally	100.00	16.03	<.001
smell	66.67	12.55	<.001
condition	52.94	12.31	<.001
unable	100.00	11.95	<.001
sexual	100.00	11.95	<.001
limit	80.00	11.30	<.001
emotional	62.50	09.19	<.001
change_clothes	75.00	07.55	<.001
difficult	75.00	07.55	<.001
potential	75.00	07.55	<.001
person	75.00	07.55	<.001
odour	75.00	07.55	<.001
notice	50.00	06.98	<.001
urinary_incontinence	30.65	06.18	<.001
cause	57.14	06.09	<.001
discomfort	57.14	06.09	<.001
work	46.15	05.76	<.001
significant	46.15	05.76	<.001
feel	32.56	05.20	<.001
woman	66.67	04.04	<.001
uncomfortable	66.67	04.04	<.001
major	66.67	04.04	<.001
dread	66.67	04.04	<.001
call	66.67	04.04	<.001
aspect	66.67	04.04	<.001
add	66.67	04.04	<.001
*ilnessrepresentation_consequences_04	89.66	102.36	<.001
*distressing_thoughtsthoughts_07	70.00	16.12	<.001
*cognitive coping_02	100.00	03.94	<.001

Word	%	X^2	p
urinary_incontinence	41.94	29.09	<.001
bed	87.50	24.18	<.001
symptom	100.00	20.85	<.001
small	100.00	20.85	<.001
hold	72.73	20.68	<.001
factor	85.71	19.95	<.001
leak	57.89	19.42	<.001
urine	48.39	19.27	<.001
reach	70.00	16.82	<.001
cough	70.00	16.82	<.001
jump	100.00	16.59	<.001
lack	100.00	16.59	<.001
contribute	100.00	16.59	<.001
involuntary	100.00	16.59	<.001
birth	100.00	16.59	<.001
inability	75.00	16.08	<.001
body	83.33	15.79	<.001
aging	100.00	12.37	<.001
vaginal	100.00	12.37	<.001
urine_leakage	100.00	12.37	<.001
urge_to_urinate	100.00	12.37	<.001
signify	100.00	12.37	<.001
mechanism	100.00	12.37	<.001
drop	100.00	12.37	<.001
start	80.00	11.75	<.001
bladder	80.00	11.75	<.001
night	80.00	11.75	<.001
toilet	38.10	11.75	<.001
lead	53.85	10.24	<.001
sneeze	62.50	09.62	<.001
happen	62.50	09.62	<.001
urinate	66.67	08.60	<.001
effort	75.00	07.86	<.001
leakage	75.00	07.86	<.001
long	55.56	07.64	<.001
due	57.14	06.40	<.001
wet	43.75	06.35	<.001
laugh	60.00	05.24	<.001
experience	45.45	04.86	.027
thing	50.00	04.82	.028
occur	50.00	04.82	.028
pregnancy	66.67	04.23	.028
trigger	66.67	04.23	.039
struggle	66.67	04.23	.039
specific	66.67	04.23	.039
room	66.67	04.23	.039
escape	66.67	04.23	.039
*ilnessrepresentation_identity_01	94.74	75.12	<.001
*ilnessrepresentation_cause_02	100.00	38.40	<.001

Note. % = the proportion of text segments in a specific class containing at least one occurrence of the form relative to the total number of text segments in the classified corpus containing the form, indicating how frequently the form appears in a specific class compared to its occurrence in the entire corpus; χ^2 = chi-square value reflecting the strength of association between the form and the class; *p* = significance level of the association between the form and the cluster.

Results obtained with FCA

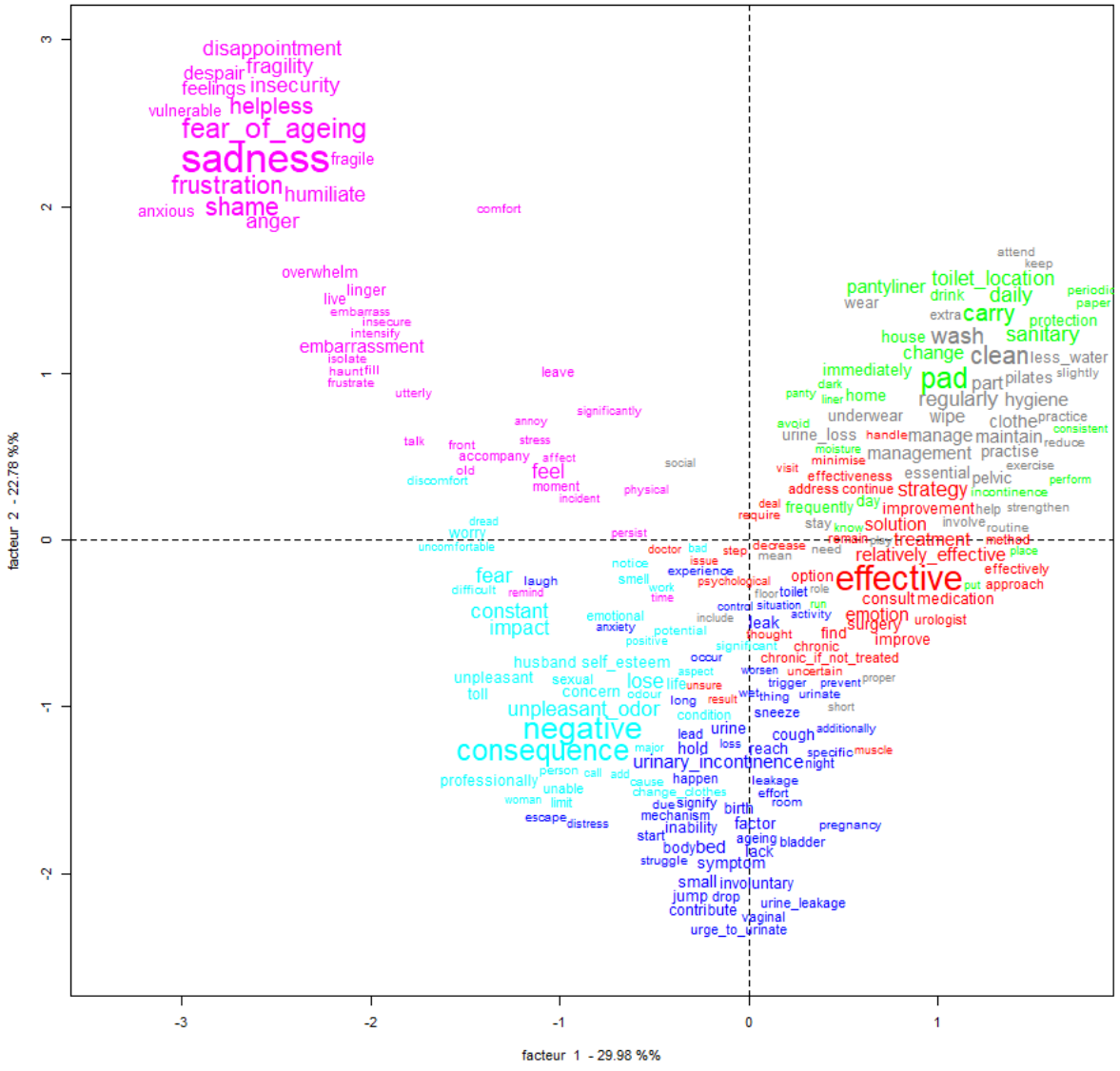
Highly dependent classes. The FCA showed that Class 5 – UI Identity & Causal Attributions and Class 4 – Negative Cognitive Processing of UI are highly dependent on each other, as they are in the same quadrant. These two classes depict the UI cognitive processes. Likewise, Class 2 – Inside Home UI Self-management and Class 3 – Outside Home UI Self-management, which are also located in the same quadrant (Q1), are highly dependent and represent strategies to manage urine loss (Figures 5 and 6).

Moderately dependent classes. Furthermore, Class 2 – Inside Home UI Self-management, Class 3 – Outside Home UI Self-management, and Class 1 – UI Controlled Appraisal were moderately dependent (in different quadrants, but close in the Cartesian plane). Class 1 – UI Controlled Appraisal was also moderately dependent on both Class 4 – Negative Cognitive Processing of UI and Class 5 – UI Identity and Causal Attributions (Figures 5 and 6).

Independent classes. Furthermore, Class 4 – Negative Cognitive Processing of UI and Class 5 – UI Identity and Causal Attributions (both cognitive dimensions), were independent from Class 2 – Inside Home UI Self-Management and Class 3 – Outside Home UI Self-management (both behavioural dimensions), since they were situated in opposite quadrants. Class 6 – UI Emotional Representation was in a different quadrant and independent of all classes, with the greatest distance from Class 1 (Figures 5 and 6).

Figure 5

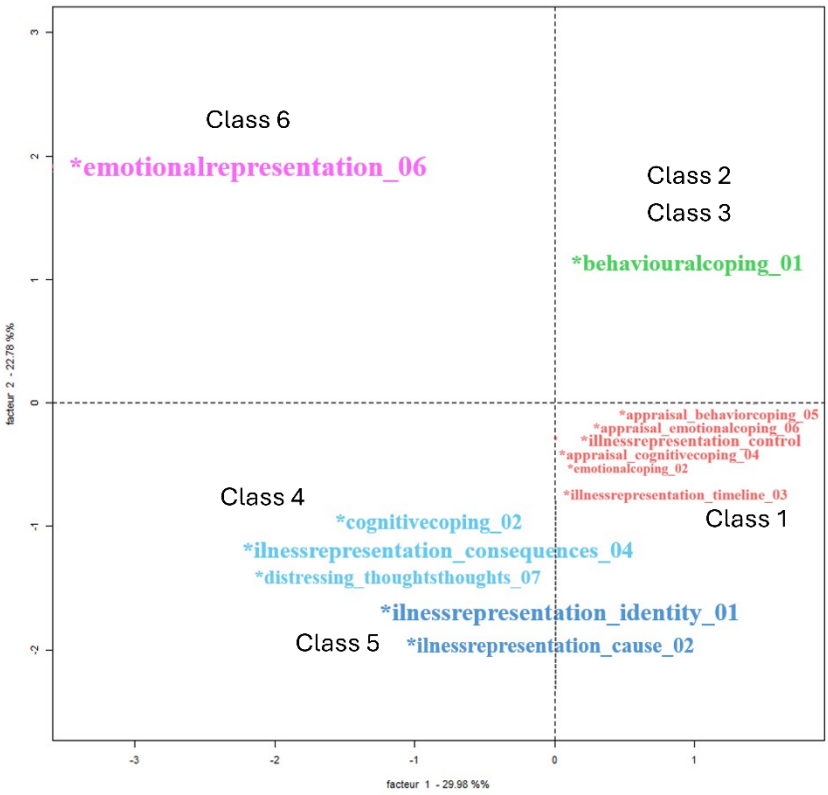
Multiple Correspondence Analysis of Lexical Terms related to Emotional, Cognitive, and Behavioural Dimensions of the UI Experience



Note. The figure presents the factorial correspondence analysis of lexical terms extracted from participants' interviews. Each colour represents the lexical terms extracted of each class. Factor 1 (horizontal axis) explains 29.98% of the variance and Factor 2 (vertical axis) explains 22.27%. The spatial positioning of terms illustrates the semantic proximity and differentiation among emotional, cognitive, and behavioural dimensions of the UI experience.

Figure 6

Multiple Correspondence Analysis Mapping the Cognitive-Behavioural-Emotional Structure of UI Experience



Note. Each colour represents one of the identified classes, while the labels correspond to the predefined corpus variables (*) used to segment the corpus. Factor 1 (horizontal axis) explains 29.98% of the variance, and Factor 2 (vertical axis) explains 22.27% of the variance. The spatial positioning illustrates the semantic proximity and differentiation between the cognitive, behavioural, and emotional dimensions of the urinary incontinence experience.

Discussion

Directed Content Analysis

The findings from directed content analysis confirmed the suitability of CSM as a comprehensive framework for understanding the multidimensional experience of living with UI, demonstrating its relevance in capturing the cognitive, emotional, and behavioural processes involved.

Similar to findings in previous epidemiological studies, most participants reported mild to moderate stress UI symptoms, reinforcing the existing prevalence patterns (Minassian et al., 2013).

Regarding cognitive representations of UI, women in our sample – who mainly had mild to moderate UI – perceived UI as a non-chronic, controllable, and treatable condition, which contrasts with findings from previous studies with participants with similar severity (Shaw et al., 2019). In addition, participants acknowledged that UI symptoms were treatable, even if the condition became more severe. Although women in this sample viewed UI as treatable, less than half of the sample had consulted a doctor. Our findings align with previous research indicating that greater perceived control is associated with viewing the condition as less chronic (Hagger & Orbell, 2003).

As previously stated, regarding causal attributions, participants primarily attributed UI to vaginal delivery and heredity. However, unlike previous studies, where these factors were viewed as deterministic predictors of chronic UI, our sample did not perceive UI as inevitable. Instead, they interpreted these causes as vulnerabilities or predispositions rather than as an unchangeable condition. This perspective highlights the importance of cognitive appraisal in shaping attitudes toward intervention and willingness to seek treatment.

Regarding emotional representations of UI, the findings emphasise the significant emotional impact of UI, particularly the pervasive fear of public detection and feelings of sadness, insecurity, and stigma, which is congruent with previous research (John et al., 2010; Toye & Barker, 2020). The nature of these emotions reinforces the need for targeted psychological interventions, including Emotional support programs to help women process and manage their experiences, develop adaptive emotional coping strategies to improve well-being, and stigma reduction initiatives and educational interventions to build a social protective impact.

Despite a sense of control, many participants reported negative psychological, family, sexual, social, and professional consequences; distressing thoughts; and emotional distress, as mentioned above. This highlights a certain paradox concerning UI management—while it is perceived as controllable, it remains stigmatised, hidden, and emotionally demanding (Toye & Barker, 2020).

Only about one-third of the sample actively employed emotional coping strategies, with many women relying on emotion avoidance mechanisms or focusing solely on symptom

management. This finding suggests that UI remains an under-addressed psychological burden, reinforcing the importance of integrating emotional support into treatment frameworks.

Moreover, the results align with prior research indicating that over half of the women with UI do not seek professional help until their symptoms become too severe to manage independently (likewise, Bilgic et al., 2017). Instead, many women rely on self-management strategies, often without exploring evidence-based medical interventions, highlighting the need for greater emphasis on health awareness campaigns and preventive care.

Our findings also indicate that women proactively adopt distinct coping strategies depending on the context in which UI occurs: 1) Inside the Home (e.g., frequent hygiene rituals, such as washing and cleaning, to maintain a sense of control); 2) Outside the Home (hiding strategies (e.g., regular use of absorbent products to prevent public accidents) and defensive strategies (e.g., identifying toilet locations before leaving home) (Porto et al., 2025). Some strategies, such as absorbent product use, were employed in both settings. A previous study had already noticed that these methods, although providing short-term relief, mask rather than treat UI, do not address the underlying causes of UI, potentially reinforcing avoidance behaviours and delayed treatment-seeking (Porto et al., 2025).

Given that conservative management, particularly pelvic floor muscle exercise (PFME), is considered a first-line treatment for UI (Dumoulin et al., 2018), our findings align with those of previous studies indicating critically low adherence rates, with only 10% of our sample reporting consistently practising PFME.

A substantial proportion of women in our sample reported engaging in symptom minimisation (i.e., deliberately neglecting or delaying actions that would address UI symptoms) as a coping strategy for UI, potentially inhibiting behavioural management efforts and alleviating emotional distress. This tendency may further obscure the need for psychological and medical interventions, thereby hindering timely access to appropriate care (Waetjen et al., 2018).

This underscores the importance of 1) enhanced education on UI management and available treatments, 2) motivational strategies to improve engagement with evidence-based interventions, and 3) multidisciplinary teams to facilitate long-term adherence.

Another key finding from our analysis is that most women perceived their self-management strategies as effective (e.g., psychotherapy – emotional coping; cognitive reappraisal to change

distressing thoughts – cognitive coping; voiding frequently–behaviour coping), which reduced the likelihood of seeking professional treatment. Several factors might have contributed to this perception, as has been previously stated in UI care-seeking research: 1) Symptom Minimisation – women tend to downplay UI symptoms and devote little time to considering long-term consequences. 2) Daily Life Adaptation – UI may require adjustments (e.g., pads use), but they generally continue their routines 3) Limited Awareness of Treatment Options – Women assume that if their self-management strategies fail, other solutions will be available; 4) UI as a Non-Chronic Condition in the presence of treatment – Many do not perceive UI as a serious or progressive health issue (Shaw et al., 2019) recognising that there are solutions available if severity increases; 5) Competing Priorities – Work and family obligations take precedence, making UI a secondary concern (Yip et al., 2013); 6) Self-Reliance – Women feel responsible for managing UI on their own, similar to other aspects of life; 6) Barriers to PFME Adherence – The demands of multitasking make it challenging to integrate PFME into daily routines, which is congruent with previous research that shows that self-care behaviours in middle-aged women are often suboptimal, particularly in populations managing chronic conditions, since they encounter a convergence of occupational, domestic, and caregiving responsibilities that significantly constrain their capacity for self-care and engagement in health-promoting behaviours. Persistent gendered expectations continue to burden women with household and caregiving roles, contributing to chronic stress, role conflict, and guilt over prioritising personal health, despite their increased participation in the labour force (Mishra, 2014; Zhou et al., 2023). These factors reinforce continued self-management rather than treatment-seeking behaviours, leading to the persistence of both functional and dysfunctional coping mechanisms.

As UI progresses, self-management strategies alone may become insufficient (some are dysfunctional, while others should be in consonance with other medical interventions), highlighting the urgency of targeted interventions to improve long-term health outcomes.

These findings emphasise the need for tailored interventions that address the cognitive, emotional, and behavioural dimensions of UI management. Specific recommendations include:1) Health Literacy & Patient Education – Increasing awareness of UI treatment options to encourage early intervention; 2) Enhancing Emotional Regulation and Resilience – Providing psychological support to manage distress, anxiety, and stigma; 3) Encouraging Medical Help -Seeking – Reducing barriers to healthcare access and promoting preventive care strategies; 4) Improving PFME

Adherence – Developing structured support programs to enhance motivational and volition dimensions and integrate them into daily routines (e.g., using self-monitoring); and 5) Inclusion of Life Skills – training to achieve better work-life balance and self-care practices (Arpanantikul, 2006).

Textual Analysis

Textual analysis allowed us to assess the suitability of the CSM framework and to further explore the interconnectedness between the cognitive, behavioural, and emotional dimensions of the UI experience. Our findings support the presence of the key dimensions proposed by CSM; however, their interconnectedness, as postulated by the original model, was only partially corroborated. While the CSM assumes a parallel processing of cognitive and emotional representations with three consecutive phases (representations, coping, and appraisal), our results suggest a less integrated dynamic, particularly regarding the independence of emotional representations, from coping strategies and appraisal processes.

Notably, Class 4 – Negative Cognitive Processing of UI (which encompasses UI Negative Consequences, UI Distressing Thoughts, and UI Cognitive Coping) explained the highest percentage of variance. This highlights the centrality of cognitive processes in how women experience and manage UI, in line with previous literature that underscores the importance of illness representations in both self-management and treatment-seeking behaviours (Leventhal et al., 2003; Hagger & Orbell, 2003).

Our data indicated that the highest degree of interdependence was between cognitive dimensions Class 5 – UI Identity and Causal Attributions and Class 4 – Negative Cognitive Processing of UI, as well as between two behavioural dimensions – Class 2 and 3 – Inside and Outside Home UI Self-Management.

Moreover, Classes 2 and 3 (Inside and Outside Home UI Self-Management) and Class 1 (UI Controlled Appraisal) were moderately dependent on each other. Interestingly, Class 1 also exhibited moderate dependence on both Class 4 (Negative Cognitive Processing) and Class 5 (UI Identity and Causal Attributions).

Importantly, Control and Timeline were the only illness representation dimensions that showed dependence on behavioural coping strategies. In contrast, Negative Consequences, Identity, and Cause remained independent, suggesting that their understanding of UI causes or

identity does not directly influence their behaviour. This may be due to the normalisation of UI as a manageable condition, one that, regardless of aetiology or perceived severity, is integrated into daily routines with the aim of minimising disruption. One may also state that this aligns with CSM's proposition that illness representations shape coping strategies, although other factors (e.g., social context and symptom severity) may also contribute to the variability in behavioural responses.

Class 6 – UI Emotional Representation emerged as entirely independent from all other classes and positioned furthest from Class 1 – UI Controlled Appraisal in the multidimensional analysis space. This independence highlights a key deviation from CSM's assumption of an integrated emotional-cognitive framework.

Another critical finding was the non-significance of emotional coping. Although emotional distress is undoubtedly part of the UI experience, our results reveal that it is not linked to either cognitive or behavioural coping dimensions, thereby challenging the integrative assumptions of CSM in this sample. This disconnect suggests that women with UI focus predominantly on the physical and practical aspects of symptom management, often at the expense of emotional processing. Their approach is pragmatic, centred on maintaining daily routines and employing actionable strategies to mitigate the impact of UI (although all of them have self-reported UI, perceived negative consequences at various levels, and almost half of them did not seek professional help).

Additionally, participants actively monitored both cognitive and behavioural coping, emphasising the effectiveness of strategies aimed at preserving normalcy in life activities. Many participants actively engaged in multiple roles (e.g., caregiving and professional responsibilities) and demonstrated a preference for problem-solving strategies–72% of the coping strategies focused on directly resolving UI symptoms. Emotional avoidance also emerged as a significant theme: 21% avoided thinking about UI and 15% kept their condition secret to shield themselves from embarrassment and social stigma. This form of emotional distancing appears to serve as a coping mechanism, allowing women to "move forward" without becoming overwhelmed by their condition. However, emotional avoidance might contribute to the high percentage of women managing a clinical problem without talking to a professional or having numerous negative consequences being perceived but not associated with behavioural coping.

Furthermore, the evaluation of coping strategies as effective by more than half of the participants may explain the lack of help-seeking behaviour. Since their current coping methods are perceived as successful, there is little perceived need for re-evaluation or professional-guided treatment engagement, reflecting a state of supposed adaptive equilibrium that can, however, maintain the problem and allow exacerbation with the ageing process or precipitating/predisposing risk factors rather than a search for a cure or clinical intervention given by a health professional.

Appraisal processes (cognitive, behavioural, and emotional) were moderately dependent on both Control and Timeline, reinforcing the idea that perceptions of control and chronicity of the condition shape how women assess and respond to UI. In addition, Negative Consequences were linked to Cognitive Coping (but not emotional), supporting the idea that awareness of impact motivates strategic mental adjustments (though not behavioural ones) even in the absence of emotional expression.

While cognitive representations facilitate coping and reinforce a sense of control, emotional acceptance of UI remains elusive. Many women retain hope for improvement or cure, even as they report the burden of living with their condition. This may point to a complex process in which practical management and emotional distancing coexist, enabling women to function while avoiding emotional coping regarding their clinical condition, although most of them remain without seeking professional help, which might be a predictor of long-term symptom exacerbation and missing the opportunity for a conservative noninvasive solution.

This nuanced understanding of UI experience affirms the partial suitability of CSM and underscores the complex interplay between cognitive, emotional, and behavioural dimensions in middle-aged women's experiences of UI. While rational and practical problem solving emerged as central coping strategies (which enables women to maintain day-to-day functioning despite the ongoing challenges posed by the condition), the lack of emotional distress management, with avoidance playing a pivotal role, illustrates a disconnection between cognitive control and emotional processing. Moreover, the non-integration of emotional coping in cognitive-behavioural interconnectedness and inhibition of help-seeking behaviour might point to much-needed professional support for these women. Professional support can mitigate this disconnection by facilitating emotional processing, reinforcing cognitive-emotional integration, and encouraging more adaptive patterns of healthcare engagement.

This study provides important insights into how women construct and respond to their representations of illness. Although CSM prioritises coping strategies aimed at managing cognitive and emotional processes, as Leventhal et al. (2016) noted, the strict dichotomy between cognition and emotion may impose conceptual limitations (Postolica et al., 2017). Thus, there was a need to assess behaviours enacted in response to the perceived stressor (i.e., UI symptoms), leading to the exploration of a complementary dimension and a deeper examination of the model. Specifically, a tripartite framework—addressing cognitive, behavioural, and emotional coping strategies and their subsequent appraisals—was introduced as a priori contribution and served as a main category within the directed content analysis.

In addition, a posteriori contribution emerged through textual analysis, revealing that no significant association exists between behavioural coping strategies and emotional responses. These findings suggest a disconnection between cognitive-behavioural coping efforts and emotional processing, further expanding the understanding of coping processes within the CSM framework.

Our findings also suggest that although UI is often perceived as manageable through self-directed strategies, the efficacy of such approaches should be critically assessed and validated by health professionals. Furthermore, the study found that emotional and social issues related to UI persist and can worsen if women do not use or have access to effective emotional coping strategies.

Despite the insights gained, this study has several limitations. First, the use of a convenience sampling approach limits the generalisability of the study's findings, and does not sufficiently represent women with more severe forms of UI. Additionally, UI symptoms were self-reported without clinical or objective medical validation, which may have introduced reporting bias. Future studies would benefit from distinguishing between personal and treatment control as separate dimensions and from including illness coherence to better capture how women make sense of their condition, since our focus was on the original five categories of CSM Illness Representations. Further, future research would benefit from including a specific appraisal for each UI behaviour and emotional and cognitive coping strategies.

Conclusion

In conclusion, although many women perceive UI as controllable through self-management strategies, they consider it effective—often without engaging in formal treatment-seeking—UI

continues to impose a significant psychosocial burden, particularly due to the lack of emotional coping strategies specific to the condition. This highlights the importance of developing multidisciplinary interventions that address not only the cognitive and behavioural aspects of illness management, but also the emotional responses and needs associated with living with UI.

Specifically, interventions should include routine assessment of emotions and emotional burden and respective coping and appraisal, complementing QoL evaluations using standardised and validated tools, and trained psychologists and experts in UI Cognitive Behavioural Therapy interventions. Emotional distress, when unacknowledged or unaddressed, can contribute to the persistence of maladaptive coping mechanisms and interfere with adherence to treatments.

Additionally, improving outcomes requires tackling dysfunctional self-management, enhancing perceived treatment efficacy, expanding illness knowledge, and overcoming barriers to care and help-seeking behaviours. Healthcare professionals should aim to enhance women's understanding of UI, including its causes, preventive strategies, and treatment options, to support informed decision-making and foster adaptive illness perceptions that promote long-term well-being.

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***Empirical Study 2*.** Psychometric Properties of the Brief IPQ with Portuguese Women with Urinary Incontinence

Abstract

Objective: This study aimed to evaluate the psychometric properties of the Portuguese version of the Brief Illness Perception Questionnaire (Brief IPQ) in a community sample of midlife women experiencing urinary incontinence (UI), and to explore their cognitive and emotional representations of the condition.

Method: A cross-sectional online survey was conducted with 1,538 Portuguese women aged 40 to 65 years (M = 50.19, SD = 6.58), all of whom self-reported occasional or frequent urinary leakage. The Brief IPQ was scored on a 0 ("no effect at all") to 10 ("extremely affects me") scale. Data analysis included item sensitivity, confirmatory factor analysis (CFA) using R (RStudio, v.27), and model fit evaluation.

Results: Items 7 and 4 were excluded due to very low factor loadings. Although Item 3 also showed a low loading (< .05), it was retained due to clinical relevance. The final model demonstrated excellent global fit (SRMR = .024; CFI = .994; TLI = .990) and adequate internal consistency (α = .70). Evidence of validity based on internal structure was established.

Conclusion: The Portuguese version of the Brief IPQ is a generally reliable and valid instrument for assessing illness perceptions in midlife women with UI. Additionally, the study offers a meaningful understanding of how women cognitively and emotionally represent urinary incontinence, reinforcing the scale's relevance in psychosomatic health assessment.

Keywords: Urinary Incontinence; Illness Perceptions; Brief Illness Perception Questionnaire; Psychometric Validation; Illness Representations.

Introduction

Urinary incontinence (UI) is a major public health problem and a highly prevalent condition affecting women of all ages, with one of its prevalence peaks around middle age (Abrams et al., 2015). UI has numerous negative physical (e.g., urine odour, frequent urinary infections), psychological (e.g., stigma, shame, dysfunctional coping), sexual (e.g., loss of urine during sex, sexual dysfunction, decreased libido), sociocultural (e.g., social isolation, limitations in activities of daily living), professional (e.g., absenteeism, lower productivity), and economic/financial (e.g., increased expenditure on underwear and pads/diapers) consequences (Shaw et al., 2019). These consequences lead to poorer Quality of Life (QoL) in women, highlighting that psychosocial effects can be more devastating than physical consequences (Abrahams et al., 2015).

Despite the significant impact of urinary incontinence (UI) on daily functioning and quality of life, only 25% of affected women seek medical care, and less than half ultimately receive treatment. Many women tend to normalise UI, delaying help-seeking until symptoms become intolerable or severely disruptive. Psychological barriers—such as shame, social stigma, dysfunctional beliefs, and limited knowledge about treatment options—further contribute to low consultation rates. These cognitive and emotional obstacles underscore the need to better understand and address illness-related beliefs as a critical component of intervention.

The Common-Sense Model of Self-Regulation (CSM; Leventhal et al., 2016) provides a robust theoretical framework for examining how middle-aged women perceive and manage UI. According to the CSM, individuals form both cognitive and emotional representations of their health condition (Hagger et al., 2003), which in turn shape coping strategies and healthcare behaviours. Applied to UI, the model helps illuminate the belief-based barriers that drive underreporting, delayed help-seeking, and insufficient engagement with self-management strategies. As such, the CSM offers a valuable foundation for developing targeted psychosocial interventions aimed at reshaping maladaptive beliefs and promoting proactive health behaviours.

UI Cognitive representations, according to the CSM, are structured along five key dimensions: (1) Identity, referring to the symptoms and labels associated with the condition (e.g., recognising leakage or urgency as indicators of UI); (2) Timeline, which reflects beliefs about the condition's duration and progression (e.g., whether UI is seen as temporary or chronic); (3) Causality, encompassing beliefs about the origins of the condition (e.g., aging, childbirth, or

lifestyle factors); (4) Consequences, which pertain to the perceived impact of UI on daily life and well-being; and (5) Curability/Controllability, addressing perceptions about whether UI can be treated or effectively managed. These dimensions interact within a three-phase self-regulatory loop: initial illness representation, the selection of coping strategies (e.g., hiding and defensive (Porto et al., 2005), or treatment-seeking), and the appraisal of those strategies' effectiveness. Understanding these beliefs in middle-aged women is critical for designing interventions that target misconceptions, emotional barriers, and a perceived lack of control, all of which can significantly influence health outcomes.

The Illness Perception Questionnaire (IPQ) was developed to empirically assess the core dimensions of illness representation. Subsequent advancements in the model and psychometric refinement led to the development of the Illness Perception Questionnaire-Revised (IPQ-R; Moss-Morris et al., 2002). Recent research using the IPQ-R has further refined the model by dividing the control dimension into personal and treatment control, incorporating a cyclical timeline dimension, introducing an overall comprehension of illness factors, and explicitly including an emotional representation component. This revision offers a more nuanced, concise, and multidimensional assessment of both cognitive and emotional illness representations.

UI is frequently not conceptualised as a medical condition but rather as an expected and inevitable consequence of ageing (Shaw et al., 2019). This normalisation often results in UI lacking a clearly defined illness identity, which consequently reduces its salience as a legitimate health concern and diminishes the likelihood of women seeking treatment. This pattern is particularly salient among women, who commonly interpret UI as a normative outcome of gendered life experiences, especially childbirth (John et al., 2010). Moreover, when UI is viewed through the lens of ageing as an unchangeable and enduring condition, its timeline is typically perceived as chronic and resistant to intervention.

Within this representational framework, an individual's beliefs about UI can profoundly influence their health behaviours, including whether they seek help, adhere to treatment, or even consider their condition treatable (Alewijnse et al., 2002). Consequently, assessing these illness perceptions is critical for designing targeted health interventions capable of shifting maladaptive cognitive schemas and promoting adaptive coping strategies (McAndrew et al., 2008).

The Brief Illness Perception Questionnaire (Brief IPQ; Broadbent et al., 2006) is a concise and multidimensional measure of illness representation. Developed based on the CSM and incorporating recent conceptual advancements, including those integrated into the Illness Perception Questionnaire–Revised (IPQ-R), the Brief IPQ offers an efficient tool for assessing both cognitive and emotional illness beliefs related to UI. To the best of our knowledge, this is the first study to specifically explore UI-related beliefs using the Brief IPQ. Therefore, the present study aimed to examine the psychometric properties of the Brief IPQ in a sample of Portuguese middle-aged women experiencing UI. In addition, it offers an understanding of how these women cognitively and emotionally represent UI.

Method

Design

This study employed a cross-sectional design, with participant recruitment conducted through non-probabilistic snowball sampling.

Participants

A total of 1,511 women *(*M_{age} = 50.19, *SD* = 6.58), drawn from an initial pool of 2,578 respondents, met the inclusion criteria and were included in the study. Eligibility was determined based on the following criteria: (1) age between 40 and 65 years, (2) female sex, (3) self-reported involuntary urine leakage—either occasionally or frequently—when coughing and/or experiencing a strong urge to urinate, and (4) access to the Internet.

Exclusion criteria comprised: (1) current pregnancy or up to 6 months post-partum, (2) history of surgical intervention for urinary incontinence, (3) diagnosis of abdominal malignancy, (4) presence of neurological conditions, and (5) clinically diagnosed pelvic organ prolapse.

Measures

Sociodemographic questionnaire

Self-reported questionnaires were used to collect sociodemographic, clinical, health, and lifestyle information.

Questionnaire for Urinary Incontinence Diagnosis (QUID; Bradley et al., 2010)

Identifies stress, urge, and mixed UI in women. It includes six items—three per subscale—rated from 0 ("none of the time") to 5 ("all of the time"), with subscale scores ranging from 0 to 15. Diagnostic thresholds are ≥ 4 for stress UI and ≥ 6 for urge UI; mixed UI is identified when both criteria are met. The QUID demonstrated acceptable internal consistency (α = .64 for stress; α = .87 for urge).

International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF; Avery et al., 2004)

Measures the frequency, volume, and impact of urinary leakage through three scored items (range: 0–21) and one unscored item identifying leakage circumstances. Higher scores reflect greater symptom severity, with categorical cut-offs: 1–5 (slight), 6–12 (moderate), 13–18 (severe), and 19–21 (very severe). The instrument demonstrated excellent reliability (α = .95).

Brief Illness Perception Questionnaire (Brief IPQ; Figueiras et al., 2011; Broadbent et al., 2006)

The Portuguese version was used to assess cognitive representations of UI. Brief IPQ is based on a unifactorial structure with nine items: five of the items assess cognitive illness representations: consequences (Item 1), timeline (Item 2), personal control (Item 3), treatment control (Item 4), and identity (Item 5). Two of the items assessed emotional representations: concern (Item 6) and negative emotions (Item 8). One item assessed illness comprehensibility (Item 7). Assessment of the causal representation is by an open-ended response item, which asks patients to list the three main causal factors of their illness (Item 9). These eight items were rated on a response scale ranging from 0 (e.g., does not affect at all) to 10 (e.g., severely affects my life). The total score is generated by summing the scores for the Brief IPQ items with a reverse scoring of Items 3, 4, and 7. A higher total score reflects a more threatening perception of the illness. The Brief IPQ has been shown to generate data with good psychometric properties in 36 countries and populations with numerous conditions and illnesses (Broadbent et al., 2015). The causal representations were not included in the present study. The psychometric properties of the Brief IPQ in the present sample are reported in the Results section.

Data Collection

The study data were collected online between March and October 2020 using the online survey platform Google Forms. When inviting participants online (i.e., via social media, Facebook), the research purpose was clearly explained.

Ethics Issue

Participants were given a link to an informed consent statement and an online survey questionnaire, and were assured that participation was anonymous and voluntary. Informed consent was obtained from all participants who agreed to collaborate. The informed consent and assessment protocol (sociodemographic, clinical, and psychosocial measures) are available in Appendix D. The present study was approved by the Ethical Committee for Research from ISPA-University Institute, Portugal (reference D/022/11/2019; Appendix A). This study followed the standards of the Order of Portuguese Psychologists (2024) and the American Psychological Association (2024) regarding the ethical treatment of participants.

Data Analyses

In accordance with the *Standards for Educational and Psychological Testing* (American Educational Research Association et al., 2014), one key source of validity evidence was examined for the Brief Illness Perception Questionnaire (Brief IPQ): its internal structure. This included analyses of dimensionality, internal consistency reliability, and measurement invariance, providing evidence for how well the test items represent the intended construct across different subgroups.

All data analyses were performed using IBM SPSS Statistics, version 27, and R (R Core Team, 2020) through RStudio (RStudio Team, 2020) (v. 26). The existence of outliers was evaluated using Mahalanobis distance (Marôco, 2021).

Confirmatory factor analysis (CFA) was conducted using the diagonally weighted least squares (DWLS) estimator, which is appropriate for ordinal data, via the Lavaan package (v.0.6-14) in R (Finney et al., 2016; Marôco, 2024). Model refinement followed both theoretical justification and empirical indicators, with modification indices exceeding 11 ($p < .001$) guiding the correlation of residuals, which are conceptually appropriate.

Model fit was assessed using multiple goodness-of-fit indices: Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) values ≥ .90, and Root Mean Square Error of Approximation

(RMSEA) and Standardised Root Mean Square Residual (SRMR) values ≤ .08, consistent with established thresholds (Byrne, 2016; Marôco, 2021).

Internal consistency reliability was evaluated using ordinal alpha (α) derived from the polychoric correlation matrix and McDonald's omega (ω). Values ≥ .70 were interpreted as indicating acceptable reliability (Marôco, 2021). All reliability estimates were computed using the SemTools package.

Model refinement will follow recommended psychometric criteria, including the potential exclusion of items with standardised factor loadings below .50 (Cheung et al., 2002). However, items with lower loadings may be retained if justified by clinical relevance and theoretical importance.

A Multigroup Confirmatory Factor Analysis was conducted to assess measurement invariance by randomly dividing the sample into two groups of 50% each. Nested models with increasing loadings, intercepts, and error variance constraints were used to test for configural, metric, scalar, and strict invariance. Invariance was determined based on the values of $|\Delta CFI| < .01$ (Cheung & Rensvold, 2002) and $|\Delta RMSEA| \leq .02$ (Rutkowski & Svetina, 2014) between consecutive nested models. If these values were met, the model was considered to be invariant. For this purpose, the total sample was randomly divided into two equal subsamples.

Results

Brief Characterisation of the Sample

With respect to UI, the most commonly reported type was stress UI (36.3%), followed by urgency UI (21.7%) and mixed UI (15.8%). Most participants reported mild to moderate UI severity (78%), with 29.1% undergoing treatment and 24.0% practising pelvic floor muscle exercise (PFME). Although 40.3% had sought professional medical help for UI, only 4.6% reported being prescribed medication. Additionally, the ICIQ-UI SF scores showed that 38.5% were categorised as having slight symptoms, 40.6% as moderate, 15.2% as severe, and 5.8% as very severe.

The sociodemografic, clinical and lifestyle data characteristics of the individuals are summarized in Tables 5 and 6.

Table 5

Sociodemographic Characteristics of Participants (n = 1,511)

Characteristic	*N*	%
Age		
40−44	347	23.0
45−49	385	25.5
50−54	362	24.0
55−59	261	17.3
60−65	156	10.3
Nationality		
Portuguese	1456	96.4
Other	55	3.6
Education Level		
4th grade	6	.4
9th grade	116	7.7
12th grade	439	29.1
Bachelor's degree	563	37.3
Postgraduate degree	352	23.3
Doctorate	35	2.3
Professional Status		
Active	1223	80.9
Inactive	288	19.1
Sexual-affective Relationship		
Yes	1201	79.5
No	310	20.5
Number of Biological Children		
0	149	9.9
1	454	30.0
2	683	45.2
3	182	12.0
> 4	43	2.8

Table 6

Clinical and Lifestyle Characteristics of Participants (n = 1,511)

Characteristic	*N*	%
Number of Vaginal Deliveries		
0	418	27.7
1	434	28.7
2	500	33.1
3	129	8.5
4	30	2.0
Number of Caesarean Deliveries		
0	1043	69.0
1	319	21.1
2	119	7.9
3	28	1.9
4	2	.1
Perineal Laceration		
Yes	836	55.3
No	675	44.7
Physical Illness Diagnosis		
No	976	64.6
Yes	535	35.4
Asthma	44	2.9
Hypothyroidism	50	3.3
Diabetes	34	2.3
Hypertension	71	4.7
Mental Illness Diagnosis		
No	1267	83.9
Yes	244	16.1
Depressive disorder	131	8.7
Anxiety disorder	94	6.2
Obsessive disorder	4	.3
Psychotic disorder	5	.3
Menopausal Status		
Pre-menopause	343	22.7
Peri-menopause	549	36.3
Post-menopause	619	41.0
Help for Menopause		
Yes	652	43.2
No	859	56.8
Coffee Intake		

Yes	1241	82.1
No	270	17.9
Hot/Cold Beverages Intake		
Yes	1263	83.6
No	248	16.4
High Impact Physical Activity		
Yes	203	13.4
No	1308	86.6
BMI Status		
Underweight	31	2.1
Normal weight	640	42.4
Overweight	542	35.9
Obesity I	222	14.7
Obesity II	59	3.9
Obesity III	17	1.1
UI Types		
Stress UI	548	36.3
Urgency UI	328	21.7
Mixed UI	239	15.8
UI Severity		
Mild to Moderate	1179	78.0
Moderate to Severe	332	22.0
ICIQ-UI SF Levels		
Slight [1–5]	582	38.5
Moderate [6–12]	613	40.6
Severe [13–18]	229	15.2
Very Severe [19–21]	87	5.8
Medical Help for UI		
Yes	609	40.3
No	902	59.7
Treatment for UI		
Yes	440	29.1
No	1071	70.9
Prescribed UI Medication		
Yes	69	4.6
No	1442	95.4
Pelvic floor muscle exercise		
Yes	363	24.0
No	1148	76.0

UI Representations

Participants reported the highest mean score for Timeline (M = 6.45, SD = 3.64) suggesting perceptions of long-term duration. The lowest means were observed for Treatment Control (M = 3.50, SD = 3.18) and Illness Understanding (M = 3.97, SD = 3.13), both reverse-scored. Personal Control also yielded a modest mean (M = 4.46, SD = 3.02). In relation to the subjective perception of symptom burden, the results indicate that participants generally report experiencing only mild symptoms (Timeline).

Regarding categorical responses, 40% of participants rated consequences of UI as minimal (scores 0–2), and 52.5% indicated low emotional impact. In contrast, 37.3% endorsed the highest score for illness duration, suggesting a discrepancy between perceived chronicity and daily burden.

For reverse-scored items, 28.8% of respondents rated personal control ≤ 4, 23.2% rated treatment control ≤ 3, and 24.8% reported low illness understanding (≤ 3). Frequencies indicate substantial variability in illness-related beliefs.

Validity Evidence based on the Internal Structure

Dimensionality

Item distributional properties. There were no severe violations of normality given that all items presented adequate absolute values of skewness and kurtosis (see Table 7 and Appendix E).

Table 7

Descriptive Statistics for the Brief IPQ

Items	Descriptive Statistics			
	M	*SD*	*Sk*	*Ku*
1. How much does your UI affect your life?	2.78	2.56	0.98	.11
2. How long do you think your UI will continue?	6.45	3.64	-.53	-1.22
3. How much control do you feel you have over your UI?*	4.46	3.02	.25	-1.10
4. How much do you think your treatment can help your UI?*	3.50	3.18	-.61	-.76
5. How much do you experience symptoms from your UI?	3.35	2.55	.73	-.33
6. How concerned are you about your UI?	4.36	3.13	.34	-1.09
7. How well do you feel you understand your UI?*	3.97	3.13	.36	-1.03
8. How much does your UI affect you emotionally? (e.g., does it make you angry, scared, upset or depressed?)	3.18	3.08	.75	-.62

Note. M = mean, SD = standard deviation, *Sk* = Skewness, *Ku* = Kurtosis. * reversed item.

Factor related validity evidence. CFA supported the original unifactorial structure of the Brief IPQ. Most items demonstrated adequate factor loadings ($\lambda \geq .50$) and item reliability ($R^2 \geq .25$), indicating acceptable contributions to the latent illness perception construct. However, Item 4 (Treatment Control) presented a negative loading ($\lambda = -.36$), and Item 7 (UI Comprehensibility) showed a very low loading ($\lambda = .12$), both suggesting insufficient statistical coherence with the underlying factor and thus were excluded from the final model. Item 3 (Personal Control), despite a sub-threshold loading ($\lambda = .37$), was retained due to its strong clinical relevance in health psychology. Following the removal of Items 4 and 7, the model fit improved substantially, with all fit indices indicating a good fit with the data (CFI = .994, TLI = .990, RMSEA = .072, SRMR = .024).

Measurement invariance. The model showed scalar/strong invariance ($|\Delta CFI \leq .01|$, $|\Delta RMSEA \leq .02|$), indicating that the Brief IPQ demonstrated a stable factor structure across independent groups, providing additional validity evidence based on the internal structure in the sample of Portuguese women with UI.

Internal consistency reliability. Regarding reliability, the data gathered with Brief IPQ showed good reliability ($\alpha = .92$; $\omega = .86$).

Discussion

This study evaluated the psychometric properties of the Brief IPQ in a sample of middle-aged women experiencing UI. Focusing on validity evidence based on internal structure — dimensionality, internal consistency, and measurement invariance—the findings aligned with prior validations across diverse health conditions and cultural contexts (e.g., Bazzazian, 2010; Chew et al., 2017). Confirmatory factor analysis supported a unidimensional structure, justifying the use of a total score to assess illness representations.

While the overall scale demonstrated good psychometric robustness, three items—personal control (Item 3), treatment control (Item 4), and illness comprehensibility (Item 7)—exhibited low or negative factor loadings, with Item 4 performing particularly poorly. These challenges are consistent with prior research reporting item-level weaknesses in the Brief IPQ across various clinical conditions (e.g., Leysen et al., 2015; Machado et al., 2019), though not always involving the same items. This suggests that certain constructs within illness representation—particularly those related to control and coherence—may be contextually sensitive or conceptually complex.

One plausible explanation lies in the relatively low to moderate symptom severity of the current sample. Participants may not have perceived their condition as sufficiently problematic to warrant deep reflection on its controllability or comprehension. Accordingly, these items should be interpreted with caution. Future research should replicate the validation in symptom-stratified or treatment-seeking UI samples to determine whether these psychometric limitations reflect broader measurement challenges or population-specific variance. Additionally, methodological refinements—such as interviewer-administered surveys—may help reduce cognitive burden and improve item clarity, particularly for reverse-coded content.

Beyond psychometric properties, this study offers novel insights into how women in this sample cognitively and emotionally represent UI. A distinct pattern emerged in which UI was perceived as chronic, poorly understood, and largely uncontrollable, yet not emotionally distressing. This apparent paradox—characterised by high perceived chronicity alongside minimal emotional impact and low perceived consequences—suggests a minimally disruptive chronicity representation, in which the condition is cognitively acknowledged as persistent but regarded as emotionally neutral and not warranting behavioural change (Hägglund et al., 2003; John et al., 2010). In this conceptualisation, urinary incontinence (UI) is viewed as a persistent yet manageable aspect of life—one that does not require behavioural change or elicit emotional distress, both of which may otherwise exacerbate UI symptoms and their consequences.

Such normalisation may present a significant barrier to care, particularly when the condition is not framed as a clinical condition or modifiable. In this context, treatment becomes cognitively irrelevant, and motivational pathways toward self-management or professional help-seeking may be weakened. Low ratings of perceived control, treatment efficacy, and illness understanding—particularly in the absence of psychological distress—further support this interpretation. Rather than reflecting helplessness, these ratings may indicate that UI is mainly perceived as a non-disruptive, expected feature of ageing, not warranting specific attention or intervention. This perception appears to limit health information-seeking and engagement with care, reinforcing cycles of under-treatment.

These findings carry meaningful implications for the development of health psychology interventions aimed at improving self-management and healthcare engagement among women with UI. Grounded in the CSM, UI interventions should address the cognitive and emotional dimensions

that appear to undermine behavioural activation: 1) Enhance perceived control through personalised goal-setting and behavioural self-monitoring to promote a stronger sense of agency, 2) Clarify treatment options via accessible, evidence-based educational materials to reduce ambivalence and promote informed decisions; 3) Increase illness coherence through psychoeducational content that explains the mechanisms, trajectory, and modifiability of UI.

Reframing UI as clinically meaningful and manageable—without invalidating women's lived experiences or pathologising a common condition—may strengthen cognitive engagement and intervention receptiveness. In particular, improving condition-specific health literacy, especially through enhanced comprehensibility of UI information, is essential for activating proactive coping and informed care-seeking behaviour.

Conclusion

This study supports the Brief IPQ as a concise, theory-driven instrument for assessing illness representations in women with UI. Despite item-level limitations in a few domains, the scale exhibited overall psychometric integrity and effectively captured key cognitive-emotional constructs relevant to self-management. The findings reinforce the utility of the CSM for understanding how UI is conceptualised—even in the absence of perceived disruptive health condition —and underscore the need for tailored interventions that align with these representations to promote engagement, adherence, and quality of life.

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Chapter 3

Coping Strategies and the Functional and Psychosocial Impact of Urinary Incontinence

This chapter is based on the papers

Porto, M. G., Pimenta, F., Queiroz-Garcia, I., Uva, M., Patrone, M., Mascarenhas, T., & Marôco, J. (*in press*). Psychometric properties of the KHQ Symptom Severity Scale among middle-aged women. In H. Pereira, G. Esgalhado, & P. Silva (Eds.), *Livro de Atas das 4as Conferências Internacionais em Psicologia Clínica e da Saúde*. Faculdade de Ciências Sociais e Humanas, Universidade da Beira Interior.

Porto, M. G., Pimenta, F., Queiroz-Garcia, I., Uva, M., Patrone, M., Mascarenhas, T., & Marôco, J. (2025). Assessing self-management coping in urinary incontinence: Psychometric evaluation of the UI-SMCSI in middle-aged women. *International Urogynecology Journal*. https://doi.org/10.1007/s00192-025-06274-z

Porto, M. G., Marôco, J. P., Mascarenhas, T., & Pimenta, F. (2024). Corrigendum: Beliefs and strategies about urinary incontinence: A possible moderation role between symptoms and sexual function, and quality of life. *Frontiers in Psychology, 15*, Article 1359674. https://doi.org/10.3389/fpsyg.2024.1359674

Porto, M. G., Pimenta, F., Queiroz-Garcia, I., Uva, M., Patrone, M., Mascarenhas, T., & Marôco, J. (2025). Measuring social isolation in women with urinary incontinence: Validation of the UI-SIQ [Manuscript submitted for publication]

Porto, M. G., Marôco, J., Mascarenhas, T., & Pimenta, F. (2025). Dysfunctional urinary incontinence strategies: A mediation model to explain why urinary incontinence symptoms are associated with social isolation among women. *Neurourology and Urodynamics*, *44*, 1361-1369. https://doi.org/10.1002/nau.70079

Porto, M. G., Marôco, J., Mascarenhas, T., Vergamota, P., Queiroz-Garcia, I., & Pimenta, F. (2025). Urinary incontinence severity: The impact on workplace productivity. *World Journal of Urology, 43*(1), 430. https://doi.org/10.1007/s00345-025-05822-y

Empirical Study 3. Psychometric Properties of the KHQ Symptom Severity Scale Among Middle-Aged Women

Abstract

Introduction: Urinary incontinence (UI) is prevalent among middle-aged women and has a significant psychosocial impact. A biopsychosocial assessment, supported by multidisciplinary teams and standardised instruments, is essential for providing individualised care. Although the King's Health Questionnaire has been validated, its supplementary component — the King's Symptom Severity Scale (KHQ-SSS) —lacked formal validation as a standalone instrument. This study aimed to assess the sources of validity evidence for the KHQ-SSS.

Method: A total of 1,538 Portuguese women aged 40 to 65 years who self-reported UI symptoms participated in the study. A Confirmatory Factor Analysis (DWLS) method was conducted. Internal reliability was assessed using ordinal alpha and omega coefficients; measurement invariance was tested through MGCFA; and convergent validity was evaluated via Pearson correlation between KHQ-SSS scores and those of the ICIQ-UI SF.

Results: The five-item version of the KHQ-SSS demonstrated a stable unidimensional structure with excellent fit indices (CFI = .983, TLI = .965, RMSEA = .075) and good internal reliability (α = .70), providing evidence of validity based on internal structure. A strong correlation with the ICIQ-IU SF (r = .589) confirmed the scale's convergent validity.

Discussion: The KHQ-SSS proved to be a valid and robust psychometric measure for assessing UI severity, contributing to more comprehensive and patient-centred clinical practices.

Keywords: Urinary Incontinence; King's Health Questionnaire; Validation; Quality of Life.

Introduction

The International Continence Society (ICS) defines Urinary Incontinence (UI) as the complaint of any involuntary loss of urine (Abrams et al., 2003; Haylen et al., 2010). UI represents a significant worldwide public health issue with a profound impact on QoL, particularly among the psychosocial dimensions experienced by women. UI also imposes a substantial economic burden on healthcare systems and society. Projections indicate total annual costs reaching €69.2 billion in the United States by 2023 and €86.7 billion across the European Union by 2030, reflecting significant direct healthcare expenditures and indirect costs associated with diminished productivity, informal caregiving, and loss of functional independence (Million et al., 2021; Subak et al., 2006).

UI prevalence rates range from 25 to 45% in midlife. This life stage is particularly critical, as these physiological and behavioural shifts heighten susceptibility to overlapping lower urinary tract symptoms (LUTS), contributing to the onset or exacerbation of UI (Bedretdinova et al., 2016; Coyne et al., 2009; Irwin et al., 2006). Notably, population-level data from Portugal corroborate these trends, reporting an overall female prevalence of 9.9%, with a marked escalation from 2.0% in women aged 18–39 to 28.9% in those aged 75–85 (Manso et al., 2023; Silva et al., 2013).

The development and persistence of UI are influenced by a complex interplay of biological, obstetric, and individual and socio-environmental factors, including age, obesity and adiposity, parity, mode of delivery, menopausal status, menopausal Replacement Therapy, Hysterectomy, diet, high impact exercise, comorbidities: Diabetes, Urinary Tract Infection, Cognitive Impairment, Ischemic Heart Disease, Physical Impairment, and Depression, socio-economic vulnerability, and ethnicity (AboAlheija et al., 2024; Alizadeh et al., 2023; Gartland et al., 2016; Seshan et al., 2023; Suhr & Lahmann, 2018).

Clinically, UI is primarily categorised into three main subtypes: Stress urinary incontinence (SUI), often resulting from urethral hypermobility or intrinsic sphincter deficiency; Urgency urinary incontinence (UUI), typically associated with detrusor overactivity; and Mixed urinary incontinence (MUI), characterised by the co-occurrence of both SUI and UUI symptoms. Notably, MUI is frequently linked to a greater psychological and functional burden due to the compounded nature of the symptoms (Alencar-Cruz & Lira-Lisboa, 2019; Faria et al., 2015; Saboia et al., 2017). Further underscoring the clinical heterogeneity of this condition, findings from the EPINCOT study

revealed significant variability in symptom severity, with 42.1% of women reporting mild, 45.5% moderate, and 10.5% severe UI (Ebbesen et al., 2013).

Despite the established efficacy of non-invasive interventions, notably Pelvic Floor Muscle Exercises (PFME), UI persists as a significant yet underreported, underdiagnosed, and consequently undertreated condition (Hägglund et al., 2003; Nambiar et al., 2018). Alarmingly, fewer than 50% of women with UI pursue medical intervention (Shaw et al., 2019). Among the multifaceted predictors influencing UI healthcare seeking behaviour, the perceived severity of UI consistently emerges as the most salient determinant (Kinchen et al., 2003). This underscores the critical and immediate imperative for the implementation of timely, patient-centred strategies aimed at optimising the assessment and subsequent management of UI within routine clinical practice (Aoki et al., 2017).

Comprehensive evaluation of UI in contemporary clinical practice requires the integration of both objective assessments—such as physical examination, pad testing, and urodynamic studies—and standardised patient-reported outcome (PRO) instruments. While objective measures quantify physical parameters, PROs are essential for capturing perceived/self-reported symptom severity, functional impairment, and treatment benefit, playing a critical role in promoting shared decision-making and delivering individualised care (Arlandis-Guzmán et al., 2023).

Strong correlations between self-report instruments and objective measures (e.g., the 24-hour pad weight test) underscore their psychometric robustness and clinical validity across both research and applied settings (Burkhard et al., 2020; Nambiar et al., 2018). In this context, several PRO instruments have been developed and validated to assess both the severity of urinary symptoms and their broader impact on women's health and quality of life.

Among the most widely adopted are the King's Health Questionnaire (KHQ; Kelleher et al., 1997) and the ICIQ-UI Short Form (ICIQ-UI SF; Avery et al., 2004), both of which have demonstrated strong psychometric properties, including in Portuguese populations (Viana et al., 2015), and have received Grade A recommendations from the International Consultation on Incontinence (ICI). Both tools have been extensively validated, including in Portuguese samples (Viana et al., 2015), and are highly recommended by the International Consultation on Incontinence (ICI), having received a Grade A recommendation. They are routinely used in both clinical practice and research (Arlandis-Guzmán et al., 2023).

However, few PROMs are specifically designed to assess the severity of UI symptoms. Widely used tools such as the Urogenital Distress Inventory (UDI-6), Incontinence Severity Index (ISI), and the Questionnaire for Urinary Incontinence Diagnosis (QUID) primarily focus on aspects like leakage frequency, volume, and UI type. However, these instruments often fail to capture additional clinically relevant symptoms—such as nocturia, urinary frequency, and recurrent urinary tract infections (UTIs)—that contribute to a more comprehensive understanding of UI. This limited scope may constrain diagnostic precision and hinder personalised treatment planning.

The King's Health Questionnaire (KHQ), a widely validated instrument for assessing the impact of UI on quality of life, includes a lesser-known supplementary component—the King's Symptom Severity Scale (KHQ-SSS). This subscale encompasses a broader range of UI symptoms, including those often overlooked in traditional measures, such as nocturia, recurrent UTIs, and both stress and urgency incontinence. Despite its clinical relevance, the KHQ-SSS is not incorporated into the KHQ's primary severity scoring algorithm and has not been formally validated as a standalone instrument. This study, therefore, aimed to evaluate the psychometric properties of the KHQ-SSS as an independent tool for assessing UI symptom severity.

Method

Design

This study followed a cross-sectional, observational, descriptive, and correlational design.

Participants

Initially, the non-probabilistic sample comprised 1606 women (M_{age} = 50.19 years, *SD* = 6.58) who self-reported occasional or frequent urine loss. Inclusion criteria were: (1) being female; (2) aged between 40 and 65 years; (3) experiencing involuntary urine loss either during increases in intra-abdominal pressure and/or following an uncontrollable urge to urinate, either occasionally or frequently; and (4) having internet access.

Exclusion criteria were: (1) being pregnant or within six months post-partum; (2) having undergone prior UI-related surgery; (3) having an oncological disease; (4) having neurological disabilities; and (5) experiencing pelvic organ prolapse. After excluding 56 women due to previous UI-related surgeries and 12 women who declined to provide informed consent, the final analytical sample comprised 1538 participants.

Measures

Questionnaire for Urinary Incontinence Diagnosis (QUID). The QUID (Bradley et al., 2010), specifically designed to identify UI in women, was used to assess different UI types. The diagnostic cut-off points were set ≥ 6 for urge UI and ≥ 4 for stress UI. To be classified as having mixed UI, participants had to meet both criteria simultaneously. The QUID consists of six items, with three assessing stress incontinence symptoms, and the remaining three addressing urge incontinence symptoms. Each item is rated on a Likert scale ranging from 0 ("none of the time") to 5 ("all of the time"), resulting in a total possible score of 0 to 15 for each dimension. The QUID demonstrated moderate to good internal consistency, with α=.64 for stress UI scores and α=.87 for urge UI scores (Bradley et al., 2010).

International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). The ICIQ-UI SF (Avery et al., 2004) was used to assess the frequency and amount of urinary leakage, as well as its overall impact on daily life. This questionnaire consists of three scored questions addressing these aspects, with sample items such as: "How often do you leak urine?" or "How much urine do you usually leak (whether you wear protection or not)?". Responses are summed to yield an overall score ranging from 0 to 21, where higher scores indicate more severe UI symptoms. Additionally, the ICIQ-UI SF includes a fourth, unscored question that identifies the circumstances in which leakage occurs. The total score on the ICIQ-UI Short Form can be interpreted categorically to reflect symptom severity: scores of 1–5 indicate slight incontinence, 6–12 moderate, 13–18 severe, and 19–21 very severe. The instrument has demonstrated excellent internal consistency reliability (α = .95; Avery et al., 2004).

King's Health Questionnaire (KHQ). The KHQ (Kelleher et al., 1997) was used to assess the impact of UI on health-related quality of life, being a multidimensional patient-reported outcome measure (PROM) widely used in both clinical and research settings. Developed to capture the psychosocial, physical, and relational consequences of UI, the KHQ has demonstrated robust psychometric properties across diverse populations and has been validated for use in Portuguese (Viana et al., 2015). The KHQ consists of 21 items divided across three parts and nine domains, each scored on a scale of 0 to 100, where higher scores indicate greater perceived impairment: Part I includes two domains: (1) General Health Perception, assessed via a five-point scale from *very good* to *very poor*, and (2) Incontinence Impact, rated on a four-point scale measuring perceived

burden (*not at all* to *a lot*); Part II assesses six domains reflecting functional and psychosocial limitations, including: (3) Role Limitations, (4) Physical Limitations, (5) Social Limitations, (6) Personal Relationships, (7) Emotions, (8) Sleep/Energy and (9) Severity Measures. Each of these domains comprises two to three items answered on a four-point Likert scale (*not at all* to *all the time* or equivalent wording), allowing fine-grained analysis of the multifaceted burden of UI. Part III includes the Symptom Severity Scale, composed of 10 sub-items (Appendix F) assessing the frequency and severity of core urinary symptoms such as nocturia, urgency, stress and urge incontinence, bedwetting, intercourse incontinence, urinary infections, dysuria, and dribbling. Each sub-item is rated on a four-point severity scale (*none* to *severe*), yielding a total score ranging from 0 to 30. This supplementary scale assesses eleven bladder-related symptoms: urinary frequency (frequent need to void), nocturia (waking at night to urinate), urgency (a sudden and difficult-to-control urge to urinate), urge urinary incontinence (involuntary leakage associated with urgency), stress urinary incontinence (leakage during physical exertion such as coughing or running), nocturnal enuresis (bedwetting during sleep), coital incontinence (urinary leakage during sexual intercourse), recurrent urinary tract infections, bladder pain, difficulty passing urine (voiding dysfunction).

Procedure

This study's data was collected during the COVID-19 pandemic (March to October 2020) using Google Forms, an online survey platform that included all previously described measures (Appendix D). Due to COVID-19 restrictions, a contingent plan was implemented as an alternative to hospital-based recruitment. Participants were recruited via social media, particularly Facebook, where invitations were shared in groups of middle-aged and menopausal women. These groups were provided with a brief overview of the study and its objectives.

Data Analyses

Following the Standards for Educational and Psychological Testing (American Educational Research Association et al., 2014), two sources of validity evidence were assessed: (1) internal structure, focusing on dimensionality, internal consistency reliability, and measurement invariance; and (2) relations to other variables.

Data analyses were performed using R 4.0 statistical system (R Core Team) via RStudio and IBM SPSS Statistics 27.0. Descriptive statistics–including the mean (*M*), standard deviation

(*SD*), skewness (*Sk*) and kurtosis (*Ku*)–were used to assess the distribution properties of the KHQ-SSS items. These analyses were conducted using the multivariate normality (MVN) library (Kormaz et al., 2014) in R. Items were considered severe violations of normality if the absolute values of $Sk > 3$ and $Ku > 7$ (Marôco, 2021). Sample size estimation followed the recommendations of Hair et al. (2019), suggesting a minimum of 5 to 10 participants per manifest variable (i.e., between 50 and 100 participants, considering the initial ten items), thereby ensuring adequate statistical power.

Given the strong theoretical foundation supporting the hypothesised factor structure, the present study employed Confirmatory Factor Analysis (CFA) as the initial analytic strategy. The use of CFA is supported by prior research and established theory that clearly define the expected relationships between latent constructs and their observed indicators. As such, CFA enables a direct assessment of model fit, offering a rigorous test of the hypothesised factor structure and underlying conceptual framework (Bandalos & Finney, 2019).

The CFA was performed to evaluate validity evidence based on internal structure, using the diagonally weighted least squares (DWLS) estimation method, which is designed for ordinal data, via the *Lavaan* package (v. 0.6-14) in R (Finney et al., 2016; Marôco, 2024). Error term correlations were applied based on modification indices (> 11; $p < .001$), along with theoretical considerations. An acceptable goodness of fit included: Comparative Fit Index (CFI) ≥ .90, Tucker–Lewis Index (TLI) ≥ .90, Root Mean Square Error of Approximation (RMSEA) ≤ .08 and the Standardised Root Mean Square Residual (SRMR) ≤ .08 (Byrne, 2016; Marôco, 2021). Internal structure validity evidence was also evaluated using the criterion that the Average Variance Extracted (AVE) exceeded .50, in line with Fornell and Larcker's (1981) guidelines. Additionally, it was confirmed that the AVE for each factor was greater than the squared correlations between factors.

Internal consistency reliability was assessed using ordinal α—derived from the polychoric correlation matrix—and ω coefficients. Values above .70 for both indicated acceptable reliability (Marôco, 2021). The package semTools was used to estimate the reliability indices.

Finally, measurement invariance of the KHQ-SSS model was evaluated using two independent Multigroup Confirmatory Factor Analyses (MGCFA). For this purpose, the total sample was randomly divided into two equal subgroups (50%–50 %) using SPSS randomisation procedures, and a series of hierarchically nested models were estimated to test increasingly

restrictive levels of measurement invariance—namely, configural, metric, scalar, latent mean, and strict invariance. Second, a separate MGCFA was conducted to assess invariance across clinical groups defined by type of UI: stress, urge, and mixed UI. Both analyses were performed employing robust maximum likelihood estimation (MLR), as this estimator performs well with ordinal data non severely biased (Marôco, 2024). Invariance was assumed when the absolute value of the change in Comparative Fit Index (|ΔCFI|) was less than .01 (Cheung & Rensvold, 2002), and the absolute value of the change in RMSEA (|ΔRMSEA|) was less than .02 (Rutkowski & Svetina, 2014).

Convergent validity evidence regarding validity evidence based on relations to other variables was assessed through Pearson correlation between the total scores of KHQ-SSS and the ICIQ-UI SF.

To classify the severity levels of UI, and given that the original scale does not provide predefined cut-off points, the total score was computed by summing the responses to the five retained KHQ-SSS items. A score range of 5 to 20 was therefore possible, reflecting increasing symptom severity. The threshold of 12.5 was selected to distinguish between *mild to moderate* (5–12.5) and *moderate to severe* (12.5–20) UI. This cut-off was determined based on its midpoint placement within the total scale range, ensuring a balanced division between lower and higher symptom burden. Additionally, the threshold provided a practical and interpretable distinction between levels of severity, aligning with the scale's continuous structure and facilitating its use in both clinical and research settings.

Results

Brief Sample Clinical Characterisation

Among the 1538 women with UI included in the study, the majority had experienced one or two vaginal deliveries (61.2%), and more than half (54.6%) reported a history of perineal laceration. Most participants were in the peri- or postmenopausal stage (77.3%). Overweight and obesity were common, affecting 56.5% of the sample. Physical illnesses were reported by 34.4%, and 14.7% had a diagnosed mental health condition, most frequently depression (8.8%) and anxiety (4.7%). Stress UI was the most prevalent subtype (36.2%), followed by urgency (21.7%) and mixed UI (16.1%). Regarding severity, based on the ICIQ-UI SF, 38.5% of participants were classified as having slight UI, 40.6% moderate, 15.1% severe, and 5.8% very severe. Although 41% of women

sought medical support for UI, only 29.1% received any treatment, and just 24% reported engaging in pelvic floor muscle exercise (PFME) (see Tables 9 and 10). The sociodemographic characteristics of the participants are presented in Table 8.

Table 8

Sociodemographic Characteristics of Participants

Characteristics	Women with UI (*n* = 1,538)	
	n	%
Age range (in years)		
40−44	353	23.3
45−49	392	25.9
50−54	368	24.3
55−59	266	15.9
60−65	159	10.5
Nationality		
Portuguese	1482	96.3
Other	56	3.7
Level of education		
4th grade	6	0.4
9th grade	118	7.8
12th grade	447	29.5
Bachelor's degree	573	37.9
Postgraduate degree	358	22.0
Doctorate	36	2.4
Professional status		
Active	1245	80.6
Inactive	293	19.4
Sexual-affective relationship		
Yes	1222	79.1
No	316	20.9
Number of biological children		
0	152	10.0
1	462	28.9
2	695	45.9
3	185	12.2
> 4	44	2.9

Note. UI = Urinary incontinence.

Additionally, information on clinical details, lifestyle-related factors, and UI (Table 9) was gathered.

Table 9

Clinical Characteristics of Participants

Characteristics	Women with UI (*n* = 1,538)	
	N	%
Number of vaginal deliveries		
0	425	28.1
1	442	27.6
2	509	33.6
3	131	8.7
4	31	2.0
Number of caesarean deliveries		
0	1062	70.2
1	325	19.8
2	121	8.0
3	28	1.9
4	2	0.1
Perineal laceration		
Yes	851	54.6
No	687	45.4
Physical illness diagnosis[a]		
No	993	65.6
Yes	545	34.4
Asthma	45	2.9
Hypothyroidism	51	3.3
Diabetes	35	2.2
Hypertension	72	4.7
Mental illness diagnosis[a]		
No	1290	85.3
Yes	248	14.7
Depressive disorder	133	8.8
Anxiety disorder	96	4.7
Obsessive disorder	4	0.3
Psychotic disorder	5	0.3
Menopausal status		
Premenopause	349	22.7
Perimenopause	559	36.3
Postmenopause	630	41.0
Medical help to manage menopausal symptoms		

Yes	664	43.9
No	874	56.1
Coffee intake		
Yes	1263	83.5
No	275	16.5
Hot/cold beverages intake		
Yes	1286	85.0
No	252	15.0
High impact physical activity		
Yes	207	13.7
No	1331	86.3
BMI Status		
Underweight (BMI < 18.5 kg/m^2)	32	2.1
Normal weight (BMI 18.5–24.9 kg/m^2)	651	41.4
Overweight (BMI 25.9–29.9 kg/m^2)	552	36.5
Obesity class I (BMI 30–34.9 kg/m^2)	226	14.9
Obesity class II (BMI 35–39.9 kg/m^2)	60	4.0
Obesity class III (BMI > 40 kg/m^2)	17	1.1
UI Types		
Stress	558	36.2
Urgency	334	21.7
Mixed	243	16.1
UI Severity		
Mild to Moderate	1200	78.0
Moderate to Severe	338	22.0
ICIQ-UI SF levels		
Slight [1–5]	592	38.5
Moderate [6–12]	624	40.6
Severe [13–18]	233	15.1
Very Severe [19–21]	89	5.8
Medical help for UI		
Yes	620	41.0
No	918	59.0
Treatment for UI		
Yes	448	29.1
No	1090	70.9
Prescribed UI medication		
Yes	70	4.6
No	1468	95.4
Pelvic floor muscle exercise		

Yes	369	24
No	1169	76

Note. UI = Urinary incontinence. [a] Most prevalent self-reported diagnosis.

Participants' menopausal status was classified according to the guidelines outlined in the Stages of Reproductive Ageing Workshop (STRAW; Soules et al., 2001). Based on self-reported menstrual patterns, participants were categorized into three groups: (1) premenopausal, defined as no reported changes in menstrual cycle regularity; (2) perimenopausal, characterized by variable cycle lengths (deviations greater than seven days from their typical cycle) or the absence of two or more consecutive cycles, leading to an amenorrhea period of more than sixty days; and (3) postmenopausal, defined as having experienced at least twelve consecutive months of amenorrhea. Detailed information regarding menopausal classification is presented in Table 10.

Table 10

Severity and UI Types per Menopause Status

Menopause Status	Severity		UI types			
	Mild to Moderate	Moderate to Severe	Stress	Urgency	Mixed	Below UI Stress/Urgency Scores
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Pre-menopausal	258 (21.5)	91 (26.9)	87 (15.6)	39 (11.7)	30 (12.3)	193 (47.9)
Peri-menopausal	424 (35.3)	135 (39.9)	242 (43.4)	144 (43.1)	103 (42.4)	65 (16.1)
Pos-menopausal	518 (43.2)	112 (33.2)	229 (41.0)	151 (45.2)	110 (45.3)	145 (36.0)

Note. UI = Urinary Incontinence.

Validity Evidence based on the Internal Structure

Dimensionality

Items' distributional properties. Descriptive statistics were analysed for each item (Table 11). No severe violations of normality were observed, as all items presented acceptable absolute values of skewness ($.01 \leq |Sk| \leq 1.38$) and kurtosis ($.27 \leq |Ku| \leq 2.00$).

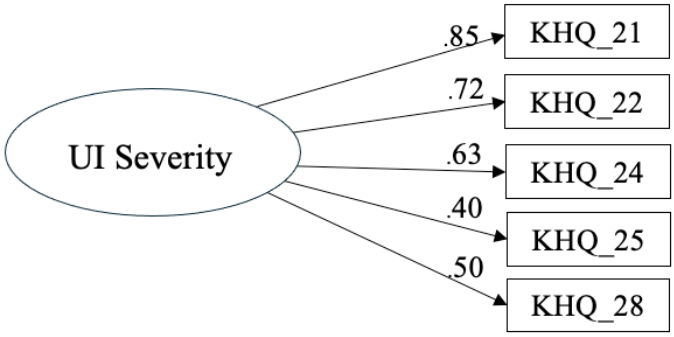
Table 11
Descriptive Statistics of the KHQ-SSS Items

Item	*M*	*SD*	Min	Max	*Sk*	*Ku*
KHQ 21	1.81	1.39	0	4	-.06	-1.21
KHQ 22	1.70	1.38	0	4	-.01	-1.24
KHQ 23	1.45	1.34	0	4	.38	-.45
KHQ 24	1.52	1.39	0	4	.18	-1.30
KHQ 25	2.31	1.19	0	4	-.42	-.27
KHQ 26	0.82	1.10	0	4	.92	.12
KHQ 27	1.12	1.26	0	4	.67	-.28
KHQ 28	0.67	1.13	0	4	1.38	-2.00
KHQ 29	1.36	1.28	0	4	-.21	-.60
KHQ 30	1.58	1.32	0	4	.15	.35

Factor related validity evidence. To examine the latent structure underlying the KHQ-SSS, a CFA was conducted on the original set of 10 items. The initial model revealed an unacceptable fit to the data, prompting a refinement process to improve its psychometric quality. Following standard psychometric criteria, items with factor loadings below .40 were removed from the analysis. As a result, the final structure retained the five items with the strongest psychometric properties: 21. Frequency – going to the toilet often; 22. Nocturia – getting up at night to urinate; 24. Urge incontinence – urine leakage associated with a strong desire to pass urine; 25. Stress incontinence – urine leakage with physical activity (e.g., coughing, running); and 28. Frequent urinary infections. All final items, except for item 25 ($\lambda = .40$), demonstrated adequate standardised factor loadings ($.50 \leq \lambda \leq .85$) and satisfactory individual reliability, indicating their substantial contribution to the measurement of UI symptom severity. Although Item 26 exhibited a loading below .50, it was retained due to its clinical significance in the context of UI. The final unidimensional, first-order factor structure of the KHQ-SSS was confirmed via CFA (Figure 7), showing excellent model fit indices: CFI = .983, TLI = .965, RMSEA = .075, and SRMR = .036.

Figure 7

First-order Latent Factor Structure of the Reduced Five-item Version KHQ-SSS in a Sample of Portuguese Middle-aged Women with UI (n = 1538)



Note. Numeric values represent standardised factor loadings for each item.

Internal consistency reliability. Internal consistency estimates were calculated to assess the reliability of the KHQ-SSS scores. The results indicated acceptable reliability ($\alpha_{ordinal}$ = .70, ω = .70), suggesting that the item scores are consistently clustered around the latent variable (i.e., severity). These findings support the robustness of the data collected using the KHQ-SSS.

Measurement invariance of the KHQ-SSS. The measurement invariance of the KHQ-SSS model was assessed using MGCFA. To this end, the total sample was randomly split into two equal subsamples (50%–50%) (Table 12) using SPSS randomisation procedures. The results demonstrated configural, strict measurement, and structural invariance across the two groups, indicating that the factor structure of the KHQ-SSS is stable and consistent across samples. Collectively, these findings provide robust support for the validity evidence based on the internal structure of the KHQ-SSS.

Table 12

Measurement Invariance of the KHQ-SSS

Model	Df	χ^2	$\Delta\chi^2$	ΔDf	P[$\Delta\chi^2$>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	10	40.949	—	—	—	.990	.064	.000	.000
Metric	14	44.414	3.004	4	.557	.990	.054	.000	-.010
Scalar	24	48.290	6.987	10	.727	.992	.037	.002	-.017
Strict	25	50.565	0.613	1	.434	.991	.037	.000	.000

Note. Df = degrees of freedom; χ^2 = chi-square value; $\Delta\chi^2$ = difference in chi-square from the previous model; ΔDf = difference in degrees of freedom from the previous model; P[$\Delta\chi^2$>] = p-value for the chi-square difference test.

Structural invariance of the KHQ-SSS across UI types. Multigroup confirmatory factor analysis (MGCFA) provided evidence for strict invariance of the one-factor structure of the KHQ-SSS across different types of UI (see Table 13).

Table 13

Multigroup Invariance of the One-factor Model of the KHQ-SSS across UI Types

Model	Df	χ^2	$\Delta\chi^2$	ΔDf	P[$\Delta\chi^2$>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	4	11.480				.991	.050	.000	.000
Metric	7	18.244	7.112	3	.068	.986	.046	-.005	-.004
Scalar	14	21.704	5.421	7	.609	.991	.027	.004	-.019
Strict	15	21.705	.000	1	.983	.992	.024	.001	-.003

Note. Df = degrees of freedom; χ^2 = chi-square value; $\Delta\chi^2$ = difference in chi-square from the previous model; ΔDf = difference in degrees of freedom from the previous model; P[$\Delta\chi^2$>] = p-value for the chi-square difference test.

Validity Evidence based on Relations to Other Variables

Convergent validity evidence

A Pearson correlation analysis was conducted between the KHQ-SSS total score and the ICIQ-UI SF total score, revealing a strong correlation (r = .589, p < .001). This result provides evidence of convergent validity, indicating that the KHQ-SSS is strongly correlated with other instruments that assess the same underlying construct (i.e., UI symptom severity).

Discussion

This study aimed to validate the psychometric properties of the King's Health Questionnaire Symptom Severity Scale (KHQ-SSS) among Portuguese women aged 40–65, with particular attention to reliability, construct validity, and measurement invariance.

The five-item version of the KHQ-SSS (Appendix G) demonstrated excellent model fit (CFI = .983, TLI = .965, RMSEA = .075, SRMR = .036) and satisfactory internal consistency (α = .70, ω = .70), supporting its structural robustness. Convergent validity was confirmed through significant correlations with the International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form (ICIQ-UI SF), a recognised gold standard in UI assessment. These findings align with validation evidence for other established instruments such as the ICIQ-UI SF and the Incontinence Severity Index (ISI), which similarly demonstrate correspondence between subjective symptom burden and objective evaluations (Karantanis et al., 2004; Sandvik et al., 1993).

The confirmation of strict measurement invariance ensures that scores differences across UI subtypes reflect actual differences in symptom severity rather than measurement bias, enhancing the scale's robustness and comparability across groups.

Incorporating symptoms such as nocturia, recurrent urinary tract infections (UTIs), and the combined presentation of stress and urgency incontinence acknowledges the multidimensional nature of UI and its clinical impact. Nocturia, a central indicator in the KHQ framework, is particularly disruptive to sleep and daily functioning. Recurrent UTIs also impose substantial physical and emotional burdens. The co-occurrence of stress and urgency symptoms—hallmarks of mixed incontinence—has been associated with greater disease complexity, reduced treatment efficacy, and elevated psychological distress (Moore et al., 2008). Integrating these features into the KHQ-SSS enhances its capacity to stratify clinical risk and guide targeted interventions.

The KHQ-SSS emerges as a brief yet comprehensive tool for assessing UI severity in clinical practice. Its ability to differentiate between mild, moderate, and severe symptoms, alongside its applicability across stress, urge, and mixed incontinence subtypes, makes it well-suited for both specialist and primary care settings. This versatility supports diagnosis and optimisation of treatment planning.

Nevertheless, certain limitations must be acknowledged. This study's cross-sectional design limits inferences regarding the instrument's sensitivity to clinical change, a key property for monitoring therapeutic outcomes. Although the sample was large (N = 1,538), reliance on self-reported data introduces potential recall and social desirability biases. Future studies should incorporate objective measures, such as pad weight tests or bladder diaries, to triangulate self-reported data and enhance validity. Furthermore, the use of a non-probabilistic sampling method limits the generalizability of the findings, as the sample may not be fully representative of the broader population of women with urinary incontinence. Broader validation across diverse populations, including men, younger individuals, and varied socio-economic and ethnic groups, is necessary. However, the large sample size ensures adequate sampling of the population variance.

Future research should prioritise evaluating the KHQ-SSS's longitudinal responsiveness (Sensitivity to change) and establishing the minimal clinically important difference (MCID). Integrating the KHQ-SSS into multimodal diagnostic frameworks may further enhance its clinical utility and contribute to a more comprehensive understanding of UI burden.

In conclusion, the KHQ-SSS demonstrates strong psychometric integrity as a concise and clinically meaningful instrument for assessing UI severity. By capturing symptom frequency and key domains—such as nocturia, recurrent UTIs, and mixed incontinence —the scale provides a robust representation of UI burden. Its brevity and diagnostic precision support practical use across UI subtypes, enabling accurate assessment, effective monitoring, and tailored treatment planning. The implementation of the KHQ-SSS has the potential to improve UI management strategies and elevate the quality of care and well-being of affected individuals. Ongoing validation in diverse settings will further establish its role as a cornerstone in UI severity assessment.

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Empirical Study 4. Assessing Self-Management Coping in Urinary Incontinence: Psychometric Evaluation of the UI-SMCSI in Middle-Aged Women

Abstract

Introduction: Urinary incontinence (UI) significantly impairs women's quality of life and often leads to the adoption of self-management coping strategies. This study aimed to develop and validate the UI Self-Management Coping Strategies Instrument (UI-SMCSI) to assess coping strategies in women with UI. This study also explored the UI hiding and defensive self-management coping strategies used by this sample.

Method: A sample of 1,538 Portuguese women aged 40–65 years with self-reported UI participated in the study. A quantitative design was employed to evaluate the instrument's factor structure, multigroup invariance, internal consistency, and validity evidence based on its internal structure and relations to other variables.

Results: Confirmatory Factor Analysis supported a bidimensional first-order structure comprising Defensive and Hiding strategies, with excellent model fit indices (CFI = .989, TLI = .987, RMSEA = .072). Internal consistency was strong ($\alpha_{defensive}$ = .94; α_{hiding} = .80). Measurement invariance was confirmed across UI subtypes (stress, urge, and mixed). Convergent validity was supported by a moderately strong correlation (r = .615, p < .001) with the Severity Measures dimension of the King's Health Questionnaire.

Conclusion: The UI-SMCSI is a reliable and valid instrument for assessing UI self-management coping strategies among Portuguese women with UI. It offers a practical tool for healthcare professionals to identify behavioural patterns that may hinder effective UI management. Future research should explore the scale's sensitivity to intervention and its applicability to other demographic and cultural populations.

Keywords: Urinary Incontinence; Self-Management; Coping Strategies; Psychometric Validation; Women's Health.

Introduction

Urinary incontinence (UI), defined by the International Continence Society as the complaint of any involuntary loss of urine, is a prevalent and often distressing condition that disproportionately affects women (Abrams et al., 2015). More than a physiological dysfunction, UI impairs psychosocial functioning, restricts daily activities, and undermines quality of life (QoL) through stigma, embarrassment, and social withdrawal (Davis & Wyman, 2020; Manso et al., 2023; Ricci et al., 2001).

UI is clinically classified into three major subtypes: Stress UI (SUI), typically associated with urethral hypermobility or sphincter weakness; Urgency UI (UUI), linked to detrusor overactivity; and Mixed UI (MUI), which presents features of both (Coyne et al., 2003). Studies consistently show that MUI and UUI are associated with greater psychological distress than SUI, especially due to their unpredictability and higher perceived burden (Alencar-Cruz & Lira-Lisboa, 2019; Saboia et al., 2017). According to the EPINCOT study, most women report mild (42.1%) to moderate (45.5%) symptoms, with approximately 10.5% experiencing severe UI (Ebbesen et al., 2013).

The psychosocial implications of UI are equally significant. Recent data show that 50% of women with MUI and 40% with UUI report anxiety, while 16.8% of those with SUI experience depressive symptoms (Manso et al., 2023). These mental health effects are often exacerbated by the emotional burden of embarrassment, fear of public accidents, and reduced social engagement (Coyne et al., 2011; Güner et al., 2023).

Despite the burden of UI, only around one in four women with symptoms seek professional medical treatment, due in part to stigma, shame, cultural beliefs, and the normalisation of symptoms as part of ageing (Javanmardifard et al., 2022; Waetjen et al., 2018). Consequently, the majority turn to self-management strategies to cope with their symptoms and maintain daily functionality.

These self-management strategies range from functional—such as adjusting fluid intake, planning bathroom access, or using containment products—to dysfunctional, including avoidance of physical or social activity, excessive concealment, and complete resignation. While some may maintain short-term social normalcy, these maladaptive responses often delay diagnosis, worsen symptoms, and reduce quality of life.

A notable empirical foundation was laid by Diokno et al. (2004), who conducted a large-scale, population-based study in the United States identifying a wide range of coping strategies among women with UI. These included frequent voiding, fluid restriction, use of pads, concealment through clothing, and avoidance of social activities, which were categorised into three domains: hiding strategies, defensive strategies, and treatment strategies. While treatment strategies (e.g., pelvic floor exercises done according to recommendations and, preferably with validations/verification by a specialist health professional, or medication use) are considered adaptive, many hiding and defensive responses represent dysfunctional coping—behaviours that may preserve "social continence" (Dingwall, 2008), but ultimately hinder the implementation of UI adaptative mitigation behaviours, and delay help seeking and subsequent diagnosis. Despite the value of this typology, Diokno's framework was not developed into a validated instrument, and it included medical strategies that may not reflect the self-management strategies women employ in their daily lives.

While existing instruments tend to assess the impact of UI on QoL, only a few address the coping strategies women use to manage UI symptoms directly and in the context of their daily lives. Among the limited tools available, only two are condition-specific: Avci et al. (2022) developed the *Frequency of the Use of Non-Medication Coping Strategies for Urinary Incontinence Questionnaire*, targeting older adults and incorporating 16 items across bodily, psychological, social, and material domains; Xu et al. (2016), building on Wu et al. (2012), employed the *Incontinence Coping Style Questionnaire* (I-CSQ) to evaluate three coping types—avoidant, palliative, and instrumental—but it remains available only in Chinese. Other instruments such as the *Measure of Adaptations for Pelvic Symptoms* (MAPS; Wren et al., 2006) and the *Adaptive Behaviour Index* (ABI; Wei et al., 2017) are broader in scope, assessing coping in pelvic floor disorders more generally, and do not isolate behaviours specific to UI.

Given the scarcity of validated, culturally and contextually appropriate instruments that assess non-medical coping strategies for UI—particularly in middle-aged women—this study aims to develop and validate the UI Self-Management Coping Strategies Instrument (UI-SMCSI). Grounded in Diokno et al.'s (2004) empirical typology but refined to capture exclusively self-management behaviours, the UI-SMCSI is designed as a patient-reported outcome measure (PROM) to systematically assess UI self-management coping strategies, which might be dysfunctional. In the absence of structured strategies aimed at mitigating UI —such as pelvic floor

muscle exercise or engagement with professional medical care—this instrument serves to enhance the systematic assessment of self-management behaviours. It is designed to support the development of individualised clinical guidance and tailored symptom management strategies. Owing to its brevity and targeted scope, the instrument offers practical utility for both clinical and research applications, facilitating efficient data collection without compromising the specificity required for meaningful interpretation. Furthermore, this study also explored the UI hiding and defensive self-management coping strategies used by this sample.

Method

Design

For this study, an observational, cross-sectional, descriptive, and correlational design was used.

Participants

A non-probabilistic sample of 1,606 women who self-reported occasional or frequent urine loss (M_{age} = 50.19, SD = 6.58) were recruited. The inclusion criteria for this study were: (1) female sex; (2) aged between 40 and 65 years; (3) experiencing involuntary urine loss either during intra-abdominal pressure increases and/or when feeling an uncontrollable urge to urinate, occasionally or frequently; and, (4) having access to the internet. Exclusion criteria included: (1) being pregnant or less than six months post-partum; (2) having undergone UI-related surgery; (3) having an oncological disease; (4) having neurological disabilities; and (5) having experienced pelvic organ prolapse. The final analytical sample consisted 1,538 women, as 56 participants were excluded due to previous UI-related surgeries and 12 women declined to provide informed consent.

Measures

The **Questionnaire for Urinary Incontinence Diagnosis** (QUID; Bradley et al., 2010), specifically designed for identifying UI in women, was administered to assess the different UI types. The diagnostic threshold was set at ≥ 4 for stress UI and ≥ 6 for urge UI. Consequently, mixed UI classification required meeting both criteria simultaneously. This scale consists of six items: three corresponding to stress incontinence symptoms and three relates to urge incontinence symptoms. Each item is rated on a Likert scale, ranging from 0 (“none of the time”) to 5 (“all of the time”). The total score for each dimension ranges from 0 to 15. The QUID demonstrated

moderate to good internal consistency, with α = .64 for stress UI and α = .87 for urge UI (Bradley et al., 2010).

The **International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form** (ICIQ-UI SF; Avery et al., 2004) was used to assess the frequency and amount of urinary leakage, as well as its overall impact on daily life. This questionnaire consists of three scored questions addressing these aspects, with sample items such as: "How often do you leak urine?" or "How much urine do you usually leak (whether you wear protection or not)?". Responses are summed to yield an overall score ranging from 0 to 21, where higher scores indicate more severe UI symptoms. Additionally, the ICIQ-UI SF includes a fourth, unscored question that identifies the circumstances in which leakage occurs. The total score on the ICIQ-UI Short Form can be interpreted categorically to reflect symptom severity: scores of 1–5 indicate slight incontinence, 6–12 moderate, 13–18 severe, and 19–21 very severe. The instrument has demonstrated excellent internal consistency reliability (α = .95; Avery et al., 2004).

The **King's Health Questionnaire** (KHQ; Kelleher et al., 1997) was used to assess the impact of UI on health-related quality of life, being a multidimensional patient-reported outcome measure (PROM) widely used in both clinical and research settings. Developed to capture the psychosocial, physical, and relational consequences of UI, the KHQ has demonstrated robust psychometric properties across diverse populations and has been validated for use in Portuguese (Viana et al., 2015). The KHQ consists of 21 items divided across three parts and nine domains, each scored on a scale of 0 to 100, where higher scores indicate greater perceived impairment: Part I includes two domains: (1) General Health Perception, assessed via a five-point scale from *very good* to *very poor*, and (2) Incontinence Impact, rated on a four-point scale measuring perceived burden (*not at all* to *a lot*); Part II assesses six domains reflecting functional and psychosocial limitations, including: (3) Role Limitations, (4) Physical Limitations, (5) Social Limitations, (6) Personal Relationships, (7) Emotions, (8) Sleep/Energy and 9. Severity Measures. Each of these domains comprises two to three items answered on a four-point Likert scale (*not at all* to *all the time* or equivalent wording), allowing fine-grained analysis of the multifaceted burden of UI. Part III includes the Symptom Severity Scale, composed of 10 sub-items assessing the frequency and severity of core urinary symptoms such as nocturia, urgency, stress and urge incontinence, bedwetting, intercourse incontinence, urinary infections, dysuria, and dribbling.

The **UI Self-Management Coping Strategies Instrument (UI-SMCSI)** was designed to measure non-medical coping strategies employed by women with urinary incontinence (UI), based on the framework by Diokno et al. (2004). The initial 16-item scale encompassed two dimensions: *Hiding Coping* (concealing urine loss) and *Defensive Coping* (preventing leakage through restrictive or anticipatory behaviours). Items were rated on a five-point Likert scale. After confirmatory factor analysis and item refinement, 13 items were retained in the final version, with higher scores indicating greater use of potentially maladaptive strategies. An additional section assessed treatment history and care-seeking behaviours. Instrument development and validation are detailed in the Results section.

The translation and cross-cultural adaptation of the UI-SMCSI began with formal authorisation from the original author, in accordance with ethical guidelines for instrument adaptation. The process followed internationally established standards to ensure semantic, conceptual, and cultural equivalence between the original and the translated versions. The English version was translated into European Portuguese by three independent bilingual researchers with no prior contact with the scale. Two translators had subject-matter expertise in UI, while the third had no familiarity with the construct and was not briefed on the instrument to maintain neutrality. In cases of disagreement among the translated versions, a panel of three experts in the field was consulted to reach a consensus. The reconciled translations were reviewed and synthesised by two specialists in continence care, producing an intermediate Portuguese version. This version underwent a thorough grammatical and linguistic review by a native Portuguese language expert to ensure clarity, fluency, and appropriateness for the target sample. It was then back-translated into English by an American researcher fluent in Portuguese, with expertise in health psychology but no prior knowledge of the UI-SMCSI. A detailed comparison between the back-translated and original versions revealed no significant semantic or conceptual inconsistencies, confirming the accuracy and fidelity of the European Portuguese adaptation.

Procedure

This study's data was collected during the COVID-19 pandemic (March to October 2020) using the online survey platform Google Forms, which included the previously described measures (Appendix D). Due to pandemic-related restrictions, a contingency plan was implemented as an alternative to the original hospital-based recruitment strategy. To recruit participants, invitations

were distributed via social media, primarily Facebook. A concise summary of the research objectives was shared across various groups of middle-aged and menopausal women to encourage participation.

Data Analyses

Statistical analyses for the present study were conducted in two distinct phases, aligning with the adaptation and validation process of the *Urinary Incontinence Self-Management Coping Strategies Instrument* (UI-SMCSI**).** Phase 1 focused on the adaptation of items from an existing instrument, ensuring content relevance and clarity for the target population. Phase 2 encompassed comprehensive psychometric evaluation.

To guide the validation process in Phase 2, the study followed the *Standards for Educational and Psychological Testing* (American Educational Research Association et al., 2014). In accordance with these guidelines, two primary sources of validity evidence were examined for the UI-SMCSI:

1. Evidence based on internal structure, including analyses of dimensionality, internal consistency reliability, and measurement invariance; and
2. Evidence based on relations to other variables, assessing construct validity through correlations with theoretically relevant constructs.

Data analyses were conducted using R 4.0 (R Core Team) via RStudio, and IBM SPSS Statistics 27.0. Descriptive statistics—including mean (*M*), standard deviation (*SD*), skewness (*Sk*), and kurtosis (*Ku*)—were computed to evaluate the distributional properties of each item. Multivariate normality was tested using the *MVN* package (Korkmaz et al., 2014). Items were flagged for severe non-normality if $|Sk| > 3$ or $|Ku| > 7$ (Marôco, 2021). Sample size estimation followed the recommendations of Hair et al. (2019), suggesting a minimum of 5 to 10 participants per manifest variable (i.e., between 80 and 160 participants, considering the initial sixteen items), thereby ensuring adequate statistical power.

Given the strong theoretical foundation in the construction of the items and its factors, the present study employed Confirmatory Factor Analysis (CFA) as the primary analytic strategy to assess the internal structure of the UI-SMCSI. The use of CFA is well-supported by existing literature and psychometric standards, particularly when the relationships between latent constructs

and observed indicators are theoretically grounded. As such, CFA enables a direct test of model fit, providing a rigorous assessment of whether the hypothesised two-factor structure—comprising *Hiding* and *Defensive* coping dimensions—accurately reflects the underlying conceptual framework (Bandalos & Finney, 2019).

The CFA was conducted using the diagonally weighted least squares (DWLS) estimator, appropriate for ordinal data, through the *Lavaan* package (v.0.6-14) in R (Finney et al., 2016; Marôco, 2024). Model refinement involved correlating residuals based on both theoretical rationale and modification indices exceeding 11 ($p < .001$). Goodness-of-fit was evaluated using multiple indices: Comparative Fit Index (CFI) ≥ .90, Tucker–Lewis Index (TLI) ≥ .90, Root Mean Square Error of Approximation (RMSEA) ≤ .08, and Standardised Root Mean Square Residual (SRMR) ≤ .08 (Byrne, 2016; Marôco, 2021). Internal structure validity evidence was also evaluated using the criterion that the Average Variance Extracted (AVE) exceeded .50, in line with Fornell and Larcker's (1981) guidelines. Additionally, it was confirmed that the AVE for each factor was greater than the squared correlations between factors.

Internal consistency reliability was assessed using ordinal α—calculated from the polychoric correlation matrix—and McDonald's ω. Coefficients ≥ .70 were considered acceptable (Marôco, 2021). The package semTools was used to estimate the reliability indices.

To test measurement invariance, two Multigroup Confirmatory Factor Analyses (MGCFA) were conducted. First, the full sample was randomly split into two subsamples (50% each) using SPSS, and a sequence of nested models—configural, metric, scalar, and strict—was evaluated. Second, a separate MGCFA tested invariance across UI subtypes (stress, urge, and mixed). Both analyses used the robust maximum likelihood estimator (MLR) in *Lavaan* as this estimator performs well with ordinal data non severely biased (Marôco, 2024). Invariance was assumed when changes in Comparative Fit Index (ΔCFI) were < .01 (Cheung & Rensvold, 2002) and changes in RMSEA (ΔRMSEA) were < .02 (Rutkowski & Svetina, 2014).

To examine validity evidence based on relations to other variables, convergent validity was assessed through Pearson correlation analyses. Specifically, we tested the association between the total score of the UI Self-Management Coping Strategies Instrument (UI-SMCSI) and selected items from the King's Health Questionnaire (KHQ) Severity Measures dimension—namely, Item 17 ("Do you wear pads to keep dry?"), Item 18 ("Do you have to be careful about how much fluid

you drink?"), and Item 19 ("Do you change your underclothes because they get wet?"). These items were chosen due to their conceptual alignment with the behavioural content captured in the UI-SMCSI, particularly regarding non-medical self-management behaviours. Given the scarcity of validated instruments that directly assess UI self-management coping strategies, these items offer a meaningful point of comparison.

Results

Brief Sample Clinical Characterisation

Among the 1538 women with UI included in the study, the majority had experienced one or two vaginal deliveries (61.2%), and more than half (54.6%) reported a history of perineal laceration. Most participants were in the peri- or postmenopausal stage (77.3%). Overweight and obesity were common, affecting 56.5% of the sample. Physical illnesses were reported by 34.4%, and 14.7% had a diagnosed mental health condition, most frequently depression (8.8%) and anxiety (4.7%). Stress UI was the most prevalent subtype (36.2%), followed by urgency (21.7%) and mixed UI (16.1%). Regarding severity, based on the ICIQ-UI SF, 38.5% of participants were classified as having slight UI, 40.6% moderate, 15.1% severe, and 5.8% very severe. Regarding *medical management strategies*, although 41% of women reported seeking professional support for urinary incontinence, only 29.1% received any form of treatment. Furthermore, just 24% reported engaging in pelvic floor muscle exercise, and only 4.6% were using prescribed medication (Tables 14, 15, and 16).

Regarding *self-management coping strategies*, the most frequently endorsed behaviours included the use of feminine hygiene pads (hiding dimension; $M = 1.96$, $Md = 2.00$), immediately locating the bathroom upon entering an unfamiliar environment (defensive; $M = 1.18$, $Md = 1.00$), reducing fluid intake (defensive; $M = 1.15$, $Md = 1.00$), and frequent voiding even in the absence of urgency to maintain an empty bladder (defensive; $M = 1.13$, $Md = 1.00$). These findings suggest a preference for practical, anticipatory strategies aimed at managing symptoms and minimising the risk of leakage. In contrast, strategies indicative of avoidance or concealment were less commonly reported. These included limiting social outings (defensive; $M = .48$, $Md = .00$), avoiding unfamiliar places (defensive; $M = .74$, $Md = .00$), and wearing dark clothing to mask potential stains (hiding; $M = .58$, $Md = .00$) (see Table 17 and Appendix H). The sociodemographic characteristics of the participants are presented in Table 14.

Table 14
Sociodemographic Characteristics of Participants

Characteristics	Women with UI (*n* = 1,538)	
	N	%
Age range (in years)		
40−44	353	23.3
45−49	392	25.9
50−54	368	24.3
55−59	266	15.9
60−65	159	10.5
Nationality		
Portuguese	1482	96.3
Other	56	3.7
Level of education		
4th grade	6	.4
9th grade	118	7.8
12th grade	447	29.5
Bachelor's degree	573	37.9
Postgraduate degree	358	22.0
Doctorate	36	2.4
Professional status		
Active	1245	80.6
Inactive	293	19.4
Sexual-affective relationship		
Yes	1222	79.1
No	316	20.9
Number of biological children		
0	152	10.0
1	462	28.9
2	695	45.9
3	185	12.2
> 4	44	2.9

Note. UI = Urinary incontinence.

Additionally, information on clinical details, lifestyle-related factors, and UI (Table 15) was gathered.

Table 15

Clinical Characteristics and Lifestyle Habits of Participants

Characteristics	Women with UI (*n* = 1,538)	
	N	%
Number of vaginal deliveries		
0	425	28.1
1	442	27.6
2	509	33.6
3	131	8.7
4	31	2.0
Number of caesarean deliveries		
0	1062	70.2
1	325	19.8
2	121	8.0
3	28	1.9
4	2	0.1
Perineal laceration		
Yes	851	54.6
No	687	45.4
Physical illness diagnosis[a]		
No	993	65.6
Yes	545	34.4
Asthma	45	2.9
Hypothyroidism	51	3.3
Diabetes	35	2.2
Hypertension	72	4.7
Mental illness diagnosis[a]		
No	1290	85.3
Yes	248	14.7
Depressive disorder	133	8.8
Anxiety disorder	96	4.7
Obsessive disorder	4	0.3
Psychotic disorder	5	0.3
Menopausal status		
Pre-menopause	349	22.7
Peri-menopause	559	36.3
Post-menopause	630	41.0
Medical help to manage menopausal symptoms		
Yes	664	43.9
No	874	56.1
Coffee intake		
Yes	1263	83.5
No	275	16.5
Hot/cold beverages intake		
Yes	1286	85.0
No	252	15.0

High impact physical activity		
Yes	207	13.7
No	1331	86.3
BMI Status		
Underweight (BMI < 18.5 kg/m^2)	32	2.1
Normal weight (BMI 18.5–24.9 kg/m^2)	651	41.4
Overweight (BMI 25.9–29.9 kg/m^2)	552	36.5
Obesity class I (BMI 30–34.9 kg/m^2)	226	14.9
Obesity class II (BMI 35–39.9 kg/m^2)	60	4.0
Obesity class III (BMI > 40 kg/m^2)	17	1.1
UI Types		
Stress	558	36.2
Urgency	334	21.7
Mixed	243	16.1
UI Severity		
Mild to Moderate	1200	78.0
Moderate to Severe	338	22.0
ICIQ-UI SF levels		
Slight [1–5]	592	38.5
Moderate [6–12]	624	40.6
Severe [13–18]	233	15.1
Very Severe [19–21]	89	5.8
Medical help for UI		
Yes	620	41.0
No	918	59.0
Treatment for UI		
Yes	448	29.1
No	1090	70.9
Prescribed UI medication		
Yes	70	4.6
No	1468	95.4
Pelvic floor muscle exercise		
Yes	369	24
No	1169	76

Note. UI = Urinary incontinence. [a] Most prevalent self-reported diagnosis.

The guidelines outlined in the Stages of Reproductive Ageing Workshop (STRAW; Soules et al., 2001) were used to determine participants' menopausal stages. Based on their self-reports, participants were classified into three categories: 1) pre-menopausal, no changes in menstrual cycle regularity; 2) peri-menopausal, characterised by variable cycle lengths (deviating by more than seven days from their typical cycle) or the absence of two or more cycles, resulting in an amenorrhea period of more than sixty days; and 3) postmenopausal, defined as having experienced at least twelve consecutive months of amenorrhea (Table 16 presents the classification details).

Table 16

Severity and UI Types per Menopause Status

Menopause Status	Severity		UI types			
	Mild to Moderate	Moderate to Severe	Stress	Urgency	Mixed	Below UI Stress/Urgency Scores
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Pre-menopausal	258 (21.5)	91 (26.9)	87 (15.6)	39 (11.7)	30 (12.3)	193 (47.9)
Peri-menopausal	424 (35.3)	135 (39.9)	242 (43.4)	144 (43.1)	103 (42.4)	65 (16.1)
Pos-menopausal	518 (43.2)	112 (33.2)	229 (41.0)	151 (45.2)	110 (45.3)	145 (36.0)

Note. UI = Urinary Incontinence.

Phase 1 – Instrument Development

Conceptually grounded in the framework proposed by Diokno et al. (2004), the initial version of the UI-SMCSI consisted of 16 items (Appendix I), organised into two theoretically distinct dimensions:

1. Hiding Coping (7 items): This dimension reflects strategies aimed at concealing visible signs of urine leakage, particularly in social or public settings. These behaviours are often oriented toward minimising embarrassment or avoiding stigma. Illustrative items include: "*Wearing dark clothes to hide urine stains*", "*Using feminine hygiene pads*", and "*Carrying extra underwear or clothing*".

2. Defensive Coping (9 items): This dimension captures anticipatory or restrictive behaviours intended to prevent or control urine loss. These strategies often involve modifications to daily routines or social engagement to reduce the risk of leakage. Representative items include: "*Limiting fluid intake*", "*Avoiding social activities*", and "*Voiding frequently to stay dry*".

Together, these dimensions reflect distinct yet interrelated coping responses that women may adopt in the absence of or alongside formal medical intervention for urinary incontinence. Each item was rated on a five-point Likert scale, ranging from 1 ("Never") to 5 ("Always"), with total scores in the initial version ranging from 16 to 80. Following confirmatory factor analysis and item refinement—described in detail in *Phase 2 – Instrument Validation (see Results Section)*—the final version retained 13 items, resulting in a revised total score range of 13 to 65. Higher scores indicate a greater reliance on potentially maladaptive self-management strategies.

Moreover, to provide a more comprehensive understanding of participants' UI self-management, a brief questionnaire was included to assess treatment history and clinically oriented behaviours. This section captured key contextual information, including current use of UI-related medication (Yes/No; if yes, specify); engagement in pelvic floor muscle exercise (e.g., Kegel exercises); history of surgical interventions for UI; and whether the participant had discussed their condition with a healthcare professional. When applicable, participants were asked to report any recommendations they received from healthcare providers. These items are critical for situating self-management coping strategies within the broader context of formal care-seeking, clinical guidance, and treatment engagement among women with UI.

Phase 2 – Instrument Validation

Validity evidence based on the internal structure

Dimensionality.

Items' distributional properties. After analysing the descriptive statistics of all items on the UI Self-Management Coping Strategies Instrument (Table 17), it was found that Items 10, 15 and 16 presented severe violations of normality. Therefore, its exclusion was considered. However, these three items could be used in future studies with clinical samples. Apart from these three items, no other severe violations of normality were found as all the items exhibited adequate absolute values of skewness ($1.04 \leq |Sk| \leq 2.5$) and kurtosis ($.29 \leq |Ku| \leq 3.94$).

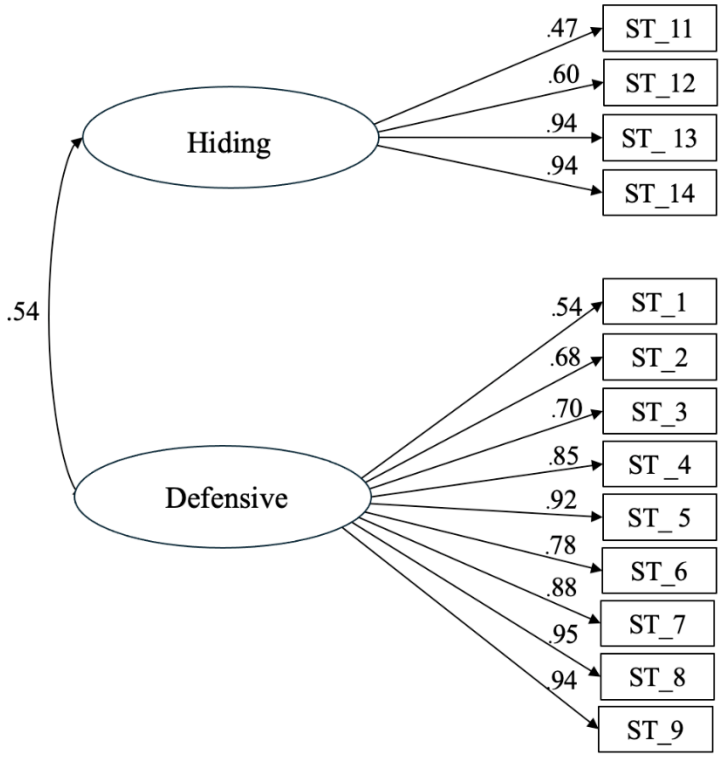
Table 17
Descriptive Statistics of the UI-SMCSI Items

	Item	*M*	*SD*	Min	Max	*Sk*	*Ku*
Defensive coping	Item 1	1.13	1.03	0	4	.63	-.30
	Item 2	1.17	1.06	0	4	.15	.23
	Item 3	1.15	1.11	0	4	.65	-.48
	Item 4	.74	1.02	0	4	1.42	1.41
	Item 5	.61	.96	0	4	1.69	2.33
	Item 6	.84	1.10	0	4	1.23	.60
	Item 7	.72	1.07	0	4	1.49	1.37
	Item 8	.48	.85	0	4	2.02	3.97
	Item 9	.55	.93	0	4	1.87	3.04
Hiding coping	Item 10	.10	.46	0	4	5.54	34.95
	Item 11	1.96	1.47	0	4	.10	-1.34
	Item 12	.73	1.00	0	4	1.33	1.13
	Item 13	.58	1.03	0	4	1.80	2.33
	Item 14	.37	.85	0	4	2.49	5.71
	Item 15	.15	.61	0	4	4.67	22.72
	Item 16	.21	.64	0	4	3.59	13.83

Factor related validity evidence. After excluding these three items, all remaining items demonstrated adequate and significant standardised factor loadings ($.47 \leq \lambda \leq .95$) and individual reliability. The UI-SMCSI showed strong validity evidence based on internal structure, as indicated by the excellent goodness-of-fit indices (CFI = .989, TLI = .987, RMSEA = .072, SRMR = .039; see Figure 8).

Figure 8

First-order Latent Factor Structure of the Reduced 13-item Version of the UI-SMCSI in a Sample of Portuguese Women (n = 1,538)



Note. Numeric values represent standardised factor loadings for each item.

The Average Variance Extracted (AVE) for the Defensive (.69) and Hiding (.54) dimensions exceeded their shared variance (r^2 = .402), also providing validity evidence based on internal structure and confirming that the two dimensions represent structurally distinct constructs. As such, the second-order factor model was rejected in favour of a bidimensional first-order solution.

Internal consistency reliability. Internal consistency estimates were used to assess the reliability of the scores. The Defensive ($\alpha_{ordinal}$ = .94, ω = .92) and Hiding ($\alpha_{ordinal}$ = .80, ω = .83) coping dimensions demonstrated excellent and good internal consistency, respectively. These results indicate that the item scores are consistently clustered around the latent variable for UI strategies.

Measurement invariance of the UI-SMCSI. The measurement invariance of the UI-SMCSI was tested using Multigroup Confirmatory Factor Analysis (MGCFA). For this purpose, the total sample was randomly divided into two equal subsamples (50%–50%) using SPSS randomisation

procedures (see Table 18). A series of hierarchically nested models were estimated to assess increasingly restrictive levels of invariance. The results supported configural, metric, scalar, and strict invariance across the two subsamples. These findings indicate that the UI-SMCSI demonstrates a stable factor structure across independent groups, providing additional validity evidence based on internal structure.

Table 18

Measurement Invariance of the UI-SMCSI

Model	Df	c^2	Dc^2	DDf	P[Dc^2>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	128	422.777	—	—	—	.997	.055	.000	.000
Metric	139	462.028	15.245	11	.172	.997	.055	.000	.000
Scalar	176	489.726	52.175	37	.050	.997	.049	.000	-.007
Strict	178	528.925	8.351	2	.015	.996	.051	.000	.003

Note. Df = degrees of freedom; c^2 = chi-square value; Dc^2 = difference in chi-square from the previous model; DDf = difference in degrees of freedom from the previous model; P[Dc^2>] = p-value for the chi-square difference test.

Structural invariance of the UI-SMCSI across UI types. To assess whether the original one-factor model holds across different UI types (Table 19), a series of nested models with indications of equivalence were required. This analysis accounts for the ordinal nature of the scales. Therefore, a structural invariance analysis was conducted across UI types and severity.

Table 19

Multigroup Invariance of the One-factor Model of the UI-SMCSI across UI Types

Model	Df	c^2	Dc^2	DDf	P[Dc^2>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	212	377.308	¾	¾	¾	.998	.045	.000	.000
Metric	242	552.061	76.466	30	.000	.996	.058	-.002	.013
Scalar	344	819.500	380.580	102	.000	.994	.061	-.002	.002
Strict	350	2354.883	391.625	6	.000	.975	.123	-.019	.063

Note. Df = degrees of freedom; c^2 = chi-square value; Dc^2 = difference in chi-square from the previous model; DDf = difference in degrees of freedom from the previous model; P[Dc^2>] = p-value for the chi-square difference test.

Validity evidence based on relations to other variables

Convergent validity evidence. A Pearson correlation analysis was conducted between the total score of the UI-SMCSI and the total score of the 8th dimension ("Do you do any of the following?") from the KHQ. The analysis revealed a strong correlation between the two total scores (r = .615, p < .001). This finding provides convergent validity evidence for the instrument, demonstrating a strong association with scores from other tests that assess the same construct.

Discussion

The current study aimed to validate the psychometric properties of the UI Strategies Instrument for Portuguese women (UI-SMCSI; Appendix J), specifically evaluating its reliability, validity, and measurement invariance. Furthermore, we sought to analyse the multigroup invariance of the proposed one-factor model across different types of UI, establishing a robust basis for assessing dysfunctional coping strategies associated with UI.

In line with our objectives, the results confirmed a bidimensional first-order structure of the 13-item version of the UI-SMCSI ($AVE_{Defensive}$ = .69 and AVE_{Hiding} = .54; > r^2 = .402), yielding excellent goodness-of-fit indices (CFI = .989; TLI = .987; RMSEA = .072; SRMR = .039). Internal consistency reliability estimates (Defensive: α = .94; ω = .92; Hiding: α = .80; ω = .83) further reinforced the scale's robustness. Convergent validity was established through a strong correlation with the King's Health Questionnaire's (KHQ) Severity Measures Dimension (r = .615, p < .001), a gold-standard instrument with Grade A recommendations from the International Consultation on Incontinence. This supports the instrument's ability to assess self-management coping strategies effectively.

These findings provide strong validity evidence based on internal structure, confirming that the UI-SMCSI functions consistently across independent samples and can be confidently applied in diverse clinical or research settings.

These findings align with previous validation efforts of UI-related tools, such as the International Consultation on Incontinence Questionnaire-Urinary Incontinence short form (ICIQ-UI SF) and the Measure of Adaptations for Pelvic Symptoms (MAPS), which have also demonstrated high reliability and validity across diverse populations (Bradley et al., 2010; Wren et al., 2006). Notably, our results revealed that all but three items exhibited adequate standardised factor loadings (.47 ≤ λ ≤ .95) and individual reliability, validating their relevance in capturing dysfunctional coping strategies. Items 10, 15 and 16 were excluded due to violations of normality; however, it is recommended that the scale be used in its original version, as developed by Diokno et al. (2004), to preserve conceptual completeness.

Our findings also showed that regarding the self-management coping strategies most used by our sample, the results indicate that women predominantly adopted defensive strategies, such as frequent voiding, reducing fluid intake, and locating bathrooms in unfamiliar settings. These

behaviours reflect a preventive and control-oriented approach aimed at minimising the risk of leakage, rather than avoiding situations or concealing symptoms. Although hiding strategies were generally less endorsed, the most frequently used individual item overall—the use of feminine hygiene pads—belongs to the hiding dimension, suggesting that while concealment is not the dominant coping style, practical protection remains a widely adopted and accessible method. This overall pattern may be influenced by factors such as symptom severity, perceived control, or sociocultural norms (Kinchen et al., 2003; Schreiber Pedersen et al., 2017), highlighting a preference for active self-management over social restriction or concealment. These findings are consistent with prior research emphasising the prevalence of such strategies among women with UI (Bilgic et al., 2017; Diokno et al., 2004). Moreover, the invariance of the scale across UI types underscores its versatility and suitability for application in diverse clinical contexts.

Regarding its strengths, the UI-SMCSI offers significant clinical value as a tool for healthcare professionals, enabling the identification of coping strategies that may interfere with effective management of urinary incontinence (UI). It addresses a critical gap in the literature by providing a structured assessment of how women manage UI symptoms in the context of their everyday lives—something that has been largely underrepresented in existing measures. Its bidimensional structure—capturing both symptom-hiding behaviours and protective or defensive strategies to prevent leakage—allows for more nuanced clinical insights. This differentiation supports the development of tailored, patient-centred interventions that can more effectively address individual coping patterns. Ultimately, such personalised approaches may enhance treatment adherence and lead to improved quality of life for women living with UI.

Despite its strengths, this study has several limitations. First, although the questionnaire included supplementary items addressing treatment history, such as current medication use, engagement in pelvic floor muscle exercise (e.g., Kegel exercises), history of surgical intervention, and previous consultations with a healthcare provider, it did not assess critical dimensions of treatment adherence (Alewijnse et al., 2003). Specifically, future research should evaluate whether pelvic floor muscle exercises are performed under professional supervision, practised with consistency (e.g., frequency per day or per week), and sustained over a clinically relevant duration (e.g., at least three months), as these factors are known to significantly influence therapeutic outcomes (Dumoulin et al., 2016; Todhunter-Brown et al., 2022). Structured adherence questions (e.g., “How many days last week did you follow the behavioural advice?” or “How often did you

perform the recommended exercises yesterday?") would provide a more accurate understanding of treatment implementation.

Additionally, it is crucial to contextualise self-management strategies in terms of their adaptive or maladaptive functionality. These behaviours—such as fluid restriction, toilet mapping, or strategic use of containment products—are not inherently dysfunctional. For example, they may serve as effective symptom-management tools in contexts of limited healthcare access or while a woman is undergoing treatment. However, these same strategies may become maladaptive when used as standalone substitutes for medical consultation, particularly if they contribute to delayed diagnosis or hinder engagement with evidence-based interventions. Recognising this nuance is essential for accurately interpreting coping strategies and for informing the development of interventions that foster adaptive self-regulation, without inadvertently reinforcing treatment avoidance or dysfunctional defensive and concealment-based coping Styles (John et al., 2010; Porto et al., 2025).

Future research should further explore this contextual variability, distinguishing between coping strategies that are functional and appropriate within constrained or transitional circumstances, and those that may ultimately undermine help-seeking behaviour and contribute to poorer health outcomes.

Moreover, the use of a non-probabilistic sampling method limits the generalisability of the findings. Longitudinal studies are warranted to assess the scale's responsiveness to clinical interventions and its utility in tracking treatment outcomes.

Given that participants were primarily recruited via social media platforms, particularly Facebook, it is likely that our sample overrepresents women who are digitally literate and have regular internet access. This introduces potential selection bias, as these individuals may differ systematically from those who are not active on social media or lack digital resources. For instance, they may have higher levels of education, income, or health literacy, which could influence both their engagement with the intervention and the outcomes. Therefore, the generalisability of our findings to women experiencing UI—particularly those from lower socio-economic backgrounds or with limited digital access—may be restricted. Future studies should incorporate more diverse recruitment strategies to enhance representativeness.

Another important consideration is the potential influence of neurodevelopmental conditions or forms of neurodivergence that, while not classified as severe neurological disabilities, may still impact cognitive processing, item interpretation, or coping styles. These aspects were not explicitly addressed in the current validation. Future versions of the instrument and study designs should consider including self-reported items to identify participants with confirmed or self-identified neurodivergent conditions (e.g., ADHD, autism spectrum traits). This would enable subgroup analyses to assess whether the instrument maintains its psychometric properties across diverse cognitive profiles or requires semantic adaptation to ensure validity and accessibility.

Additionally, the cross-sectional design limits the ability to assess the instrument's test–retest reliability and its responsiveness to change over time—both crucial aspects for evaluating intervention outcomes. While the sample size was large (N = 1538), the reliance on self-reported data may introduce recall or reporting bias, particularly in the assessment of coping behaviours. Further research should explore not only the strategies themselves but also the underlying barriers that lead women to adopt them, with efforts to develop and validate additional assessment tools tailored to the Portuguese population. Incorporating objective measures, such as bladder diaries, could enrich the validity of self-reported data. Moreover, examining contextual variables—such as access to healthcare services and social support networks (Dantas et al., 2018), along with beliefs (Porto et al., 2024)—may yield deeper insights into the mechanisms driving dysfunctional coping and inform more targeted intervention strategies.

In conclusion, the UI Self-Management Coping Strategies Instrument is a reliable and valid tool for assessing coping strategies in Portuguese women with UI. Its strong psychometric properties and clinical relevance contribute to a deeper understanding of UI-related strategies, supporting improved interventions and patient outcomes. Continued research will further reinforce its role in both clinical and research contexts, ultimately enhancing the management of UI.

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***Empirical Study 5*.** Beliefs and Strategies about Urinary Incontinence: A Possible Moderation Role between Symptoms and Sexual Function, and Quality of Life

Abstract

Introduction: Urinary Incontinence (UI) has numerous repercussions in women's lives, and it is underreported/underdiagnosed.

Objective: The present study aimed to understand: (1) the differences between women with and without urine loss regarding Quality of Life (QoL) and Sexual Function (SF); (2) the possible moderation role of UI-related beliefs and strategies on the relationship between UI-symptom severity and SF and QoL, in women with UI.

Method: Cross-sectional Design. Participants: Primary aim: Overall, 2,578 women aged 40–65 (M_{age} = 49.94, *DP* = 6.76) were collected online. Secondary aim: 1,538 women who self-reported having urine loss occasionally/frequently (M_{age} = 50.19, *DP* = 6.58). All data analyses were done with IBM SPSS Statistics and R statistical system 4.0 through RStudio. Statistical Path analysis was performed with the lavaan package to study the hypothetical association and moderating effects between the variables.

Results: Primary aim: women without UI had a better SF [$t(2576) = 3.13$, $p = .002$; 95% C.I., .18 to .80] and QoL [$t(2576) = 7.71$, $p < .001$; 95% C.I., 3.14 to 5.28] than their counterparts with UI.Secondary aim: UI-related coping strategies attenuated the impact of UI-symptom severity on SF($\beta = -.07$; $p = .041$); the more dysfunctional the UI-related beliefs were, the poorer QoL was ($\beta = -.06$; $p = .031$); the more frequent the UI-related hiding/defensive strategies were, the poorer QoL was ($\beta = -.26$; $p < .001$).

Discussion: Limitations: online data collection, which thwarted the clarification of participants, if needed; absence of a UI medical diagnosis (only self-reported measures were used). Strengths and practical implications: (i) the crucial role of UI-related beliefs and strategies in the QoL of women with UI; (ii) the impact that UI-concealing/defensive strategies have in attenuating the impact of UI- symptom severity on SF, which might be perceived as a short-term benefit and hence contribute to maintaining the UI condition and constitute a barrier to help-seeking, (iii) impact of UI-symptom

severity on QoL and SF (including a comparison group entailing women without UI, which is scarcely used); and (iv) the use of gold-standard and psychometrically robust instruments.

Conclusion: Changing dysfunctional UI-related beliefs and strategies in clinical settings may improve the QoL; UI-concealing strategies may reinforce themselves by immediate effects on SF, but are not functional in the long term.

Keywords: Beliefs; Female Urinary Incontinence; Functional Urology; Moderation; Quality of Life; Sexual Function; Strategies.

Introduction

According to Abrams et al. (2009), Urinary Incontinence (UI) is defined as the complaint of any involuntary loss of urine (D'Ancona et al., 2019; Frawley et al., 2021; Haylen et al., 2010). Although UI is not a life-threatening disease, the loss of urine involves numerous physical (e.g., urine odour, frequent urinary infections), psychological (e.g., stigma, shame, dysfunctional coping), sexual (e.g., loss of urine during intercourse, sexual dysfunction, decreased libido), sociocultural (e.g., social isolation, limitations in activities of daily living, precocious institutionalisation of the elderly), professional (e.g., absenteeism, lower productivity), and economic/financial repercussions (e.g., increased expenditure on underwear and pads and diapers) (Abrams et al., 2015; Caruso et al., 2017; Shaw et al., 2019; Subak et al., 2006). These consequences lead to poorer Quality of Life (QoL) in women, highlighting that the psychosocial effect can be more devastating than the physical consequences. In this way, these numerous repercussions may lead to the implementation of lifestyle changes and coping strategies, which can be (dys) functional and are based on an individual's illness representations (Minassian et al., 2012; Waetjen et al., 2018).

The Common-Sense Model of Self-Regulation (CSM; Leventhal et al., 2016) is a dynamic conceptual framework that allows understanding cognition (i.e., individual UI beliefs) and coping strategies, explains health-related behaviours and can be used to guide health promotion and health education interventions by identifying the gaps in knowledge that present the most adverse effects on help-seeking behaviours. According to this regulatory model, individuals simultaneously create a cognitive and emotional representation of the illness/health threat (Fernandez-Duque & Schwartz, 2016; Leventhal et al., 2016). Cognitive representation has five dimensions: (1) identity (i.e., UI label and the individual's ideas about the somatic representation UI), (2) timeline (i.e., expected duration of UI), (3) causality (i.e., beliefs about the perceived cause of UI), (4) consequences (i.e., imagined consequences or anticipated repercussions in terms of personal experiences, economic hardship, or the emotional upheaval of the UI) and (5) curability/controllability (i.e., UI responsiveness to self and/or professional intervention) (Fan et al., 2017; Hagger & Orbell, 2003; Leventhal et al., 2016). These representations are processed through three stages: (1) firstly, a representation of the illness or health threat (i.e., UI representations) appears; (2) secondly, the adoption of behaviours to cope with the illness takes place (i.e., coping strategies); and (3) lastly,

it occurs the evaluation of the efficacy of these behaviours (i.e., appraisal of coping strategies) (Hagger & Orbell, 2003).

Moreover, identifying the types of beliefs about UI could explain individual differences in help-seeking behaviour and related outcomes (such as coping strategies adopted and compliance with medical regimens) (Bascur-Castillo et al., 2019; Minassian et al., 2012). Literature documents that only 25% of affected women seek care, and less than half receive treatment (Minassian et al., 2012). Those who seek medical help will tend to consult a primary healthcare clinician and rarely will be referred to a clinician with training in incontinence management (Lucas et al., 2012). Depending on their beliefs, women may tend to self-manage UI, perpetuating symptoms (Mahfouz et al., 2023; Toye & Barker, 2020). Since women's dysfunctional beliefs toward UI (e.g., the belief that UI is a normal ageing characteristic) are considered one of the barriers to seeking health care, understanding, and changing them is crucial (Bush et al., 2001; Cooper et al., 2015).

On experiencing the first symptoms of UI, women may face other factors that also impact healthcare-seeking: (1) embarrassment about leakage, (2) low confidence regarding health professionals (e.g., patients' self-perceived symptoms devaluation by medical professionals), (3) lack of knowledge about treatment options and; (4) adaptation of their daily routine to UI symptoms (Lasserre et al., 2009). The latter may require the use of UI dysfunctional coping strategies, including defensive ones (e.g., limiting social and physical activities; avoiding sexual intercourse) or/and strategies intended to conceal urine loss (e.g., wearing pads and/ or diapers) (Diokno et al., 2004). These maladaptive strategies might also impair Quality of Life (QoL). This is congruent with many studies: women with UI present an impairment of their Quality of Life and Sexual Function (SF) (e.g., sexual embarrassment, vaginal dryness, loss of urine during sex, decreased libido) (e.g., Abrams et al., 2015; Felippe et al., 2017). However, most studies have explored Sexual Function and Quality of Life without comparing their counterparts with no urine loss. For example, Bilgic and Kizilkaya Beji (2020), who studied the impact of UI types on the aforementioned variables, concluded that one of their study's limitations was the lack of a control group without UI. Likewise, Fatton et al. (2014) found that the presence of UI was significantly associated with poor SF, but only focused on women with UI. Moreover, little is known about the role of UI-related beliefs, as well as UI-related coping strategies.

In this way, more studies are needed to address this empirical knowledge gap and better understand: (1) the differences between women with and without urine loss regarding QoL and SF (primary aim); (2) the possible moderation role of UI-related beliefs and strategies on the relationship between UI symptoms' severity and SF and QoL, in women with UI (secondary aim).

Method

Design

The current study follows a cross-sectional design.

Participants

Primary aim. Overall, 2,648 women, aged 40 to 65 (M_{age} = 49.94, *SD* = 6.76), were inquired online (community non-probabilistic sample). Inclusion criteria were (1) age (40–65 years), (2) sex (women), and (3) internet access. Exclusion criteria were (1) Pregnancy or delivery in the past 6 months. Due to this exclusion criteria, 40 women were excluded, resulting in a total of 2,578 women.

Secondary aim. One thousand five hundred and thirty-eight women who self-reported having urine loss occasionally/frequently (M_{age} = 50.19, *SD* = 6.58), from the abovementioned sample, were selected. Inclusion criteria were (1) age (40–65 years), (2) sex (women), (3) women who initially responded affirmatively in the research protocol to the question regarding involuntary urine leaks when coughing or experiencing the urge to urinate occasionally or frequently, and (4) internet access. Exclusion criteria included (1) pregnancy or until 6 months post-partum, (2) previous UI-related surgery, (3) abdomen, gynaecological and breast cancer, (4) neurological disease and (5) pelvic organ prolapse. Fifty-six women were excluded since they had had surgery for UI.

Measures

Sociodemographic and clinical characterisation. Self-reported questionnaires collected sociodemographic characteristics (age, nationality, level of education, professional status, sexual-affective relationship, number of biological children), as well as clinical (number of vaginal deliveries, number of caesarean deliveries, perineal laceration, physical and mental illness diagnosis, menopausal status, BMI Status), lifestyle characteristics (coffee intake, hot and cold

beverages intake, high impact physical activity) and UI-related information (medical help for UI, treatment for UI, prescribed UI medication, and PFME).

UI types were assessed using the QUID questionnaire (Bradley et al., 2010), specifically designed for diagnosing UI in women. The cut-off points for diagnosis were stress scores ≥ 4 and urge scores ≥ 6. Mixed UI type indicated the presence of both QUID diagnoses.

The menopausal status was defined according to the Stages of Reproductive Ageing Workshop‘s criteria (STRAW; Soules et al., 2001). Pre-menopausal women self-reported as not having any changes in their menstrual cycle. Peri-menopausal participants self-reported a variable cycle length (a difference of more than seven days than usual) or had skipped two or more cycles and experienced an amenorrhea interval of more than 60 days. Post-menopausal women self-reported having experienced at least 12 months of amenorrhea (Tables 20 and 21).

Table 20

Sociodemographic Characteristics of Participants

Characteristics	Women with UI (*n* = 1,538)		Women without UI (*n* = 1,040)		Total (*N* = 2,578)	
	n	%	*n*	%	*n*	%
Age range						
40–44	353	23.3	298	28.3	662	24.4
45–49	392	25.9	232	23.3	638	24.9
50–54	368	24.3	224	21.0	592	23.1
55–59	266	15.9	181	17.4	422	16.4
60–65	159	10.5	105	10.0	264	10.3
Nationality						
Portuguese	1,482	96.3	1,010	97.2	2,492	96.6
Other	56	3.7	30	2.8	86	3.4
Level of Education						
4th grade	6	0.4	4	.4	10	0.4
9th grade	118	7.8	60	7.0	192	7.5
12th grade	447	29.5	305	28.9	763	29.3
Bachelor’s degree	573	37.9	422	40.0	995	38.8
Postgraduate degree	358	22.0	225	21.3	558	21.7
Doctorate	36	2.4	24	2.3	600	2.3
Professional status						
Active	1,245	80.6	810	78.2	2055	79.6
Inactive	293	19.4	230	21.8	523	20.4

Sexual-affective relationship						
Yes	1,222	79.1	859	81.5	2056	80.1
No	316	20.9	181	18.5	522	19.9
Number of biological children						
0	152	10.0	148	14	300	11.7
1	462	28.9	338	32.1	786	30.2
2	695	45.9	452	44.2	1,161	45.2
3	185	12.2	82	7.8	267	10.4
> 4	44	2.9	20	1.9	64	2.5

Table 21

Clinical Characteristics and Lifestyle Habits of Participants

Characteristics	Women with UI (n = 1,538)		Women without UI (n = 1,040)		Total (N = 2,578)	
	n	%	*n*	%	*N*	%
Number of vaginal deliveries						
0	425	28.1	460	43.6	885	34.3
1	442	27.6	248	24.9	690	26.8
2	509	33.6	268	25.4	777	30.1
3	131	8.7	54	5.1	185	7.2
4	31	2.0	10	.9	41	1.6
Number of caesarean deliveries						
0	1,062	70.2	636	60.3	1,698	65.9
1	325	19.8	242	23.0	567	22.0
2	121	8.0	135	14.1	256	9.9
3	28	1.9	26	2.5	54	2.1
4	2	.1	61	.1	63	2.4
Perineal laceration						
Yes	851	54.6	403	38.2	1,254	48.6
No	687	45.4	637	61.8	1,324	51.4
Physical illness diagnosis						
Yes	545	34.4	276	26.2	821	31.8
No	993	65.6	764	73.8	1757	68.2
Asthma	45	2.9	32	3.1	77	3.0
Hypothyroidism	51	3.3	35	3.4	86	3.3
Diabetes	35	2.2	22	2.1	57	2.2
Hypertension	72	4.7	50	4.8	122	4.7
Mental illness diagnosis						
Yes	248	14.7	116	11.0	364	14.1
No	1,290	85.3	924	89.0	2,214	85.9

Depressive disorder	133	8.8	57	5.4	190	7.4
Anxiety disorder	96	4.7	46	4.4	142	5.5
Obsessive disorder	4	.3	2	.2	6	.2
Psychotic disorder	5	.3	8	.8	13	.5
Menopausal status						
Premenopause	339	22.4	262	24.9	601	23.31
Perimenopause	574	36.3	322	31.9	896	34.8
Postmenopause	625	41.3	456	43.3	1,081	41.9
Medical help to manage menopausal symptoms						
Yes	664	43.9	441	43.2	1,105	42.9
No	874	56.1	599	56.8	1,473	57.1
Coffee intake						
Yes	1,263	83.5	854	82.4	2,117	82.1
No	275	16.5	186	17.6	461	17.9
Hot/cold beverages intake						
Yes	1,286	85.0	868	83.7	2,154	83.6
No	252	15.0	172	16.3	424	16.4
High impact physical activity						
Yes	207	13.7	183	17.4	390	15.13
No	1,331	86.3	857	82.6	2,188	84.87
BMI status						
Underweight	32	2.1	5	1.8	37	1.4
Healthy weight	651	41.4	491	46.6	1,142	44.3
Overweight	552	36.5	350	33.2	902	35.0
Obesity level I	226	14.9	158	15.0	384	14.9
Obesity level II	60	4.0	32	3.0	92	3.6
Obesity level III	17	1.1	4	.4	21	.81
Medical help for UI						
Yes	620	41.0	—	—	—	—
No	918	59.0	—	—	—	—
Treatment for UI						
Yes	448	448	—	—	—	—
No	1,090	1,090	—	—	—	—
Prescribed UI medication						
Yes	70	4.6	—	—	—	—
No	1,468	95.4	—	—	—	—
Pelvic Floor Muscle Exercises						
Yes	369	24	—	—	—	—
No	1,169	76	—	—	—	—

Note. UI = Urinary Incontinence.

Exogenous variables

King's Health Questionnaire – Five severity-related items. An unidimensional five-item index ("Do you wear pads to keep dry?"; "Frequency: Going to the toilet very often"; Stress Incontinence: Urine leakage during physical activity (e.g., coughing, running"), "Nocturnal Enuresis: Wetting the bed at night"; Intercourse Incontinence: Urine leakage with sexual intercourse") driven from King's Health Questionnaire (Kelleher et al., 1997; Viana et al., 2015) (a self-administered questionnaire that assesses both the presence of UI symptoms and their impact on Quality of Life), was used to measure UI symptom severity. The Likert-type response scale ranged from 1 – "Not at all" to 4 – "A lot". Higher score levels indicate higher symptom severity (total score ranged between 5 and 25). Total Scores under the middle point (i.e., 12,5) indicated Mild to Moderate UI-symptom Severity, while total scores above the middle point.

Endogenous variable

Female Sexual Function Index. The Portuguese version of the Female Sexual Function Index (FSFI-6; Isidori et al., 2010; Pimenta et al., 2017) measures women's sexual functioning. It is a six-item short version of the 19-item Sexual Functioning Index. Each item refers to a dimension related to sexual functioning: desire (e.g., "In the last four weeks, how would you rate your level (degree) of sexual desire or interest?"), arousal (e.g., "In the last four weeks how would you rate your level (degree) of sexual arousal during intercourse or vaginal penetration?"), lubrication (e.g., "Over the past four weeks, how often have you felt lubricated (noticed more vaginal discharge) during sexual activity or vaginal penetration?"), orgasm (e.g., "Over the last four weeks, how often have you had an orgasm when you have had sexual stimulation or penetration?"), satisfaction (e.g., "Over the past four weeks, how satisfied have you been with your sexual activity?"), and pain (e.g., "Over the past four weeks, how often have you felt vaginal discomfort or pain with penetration?"). The items are scored on a five-point Likert scale. The total score varies between 2 and 30 points (four questions including 0), with higher values indicating better sexual functioning. A cutoff point less than or equal to 19 points identifies individuals with low sexual functioning. Regarding psychometric sensibility, there were no severe violations of normality, given that all items presented adequate absolute values of skewness and kurtosis ($Sk < 3$, $Ku < 7$). All items presented adequate standardised factor weights ($.58 < \lambda < .93$), and adequate individual reliability ($R^2 > .25$). Goodness-of-fit indices indicated a good fit of the final factor structure (CFI = .992, TLI = .987,

RMSEA = .127, SRMR = .038). In this way, FSFI-6 presented good factorial validity. The convergent validity evidence based on the internal structure was good (AVE = .67). The data gathered with FSFI-6 showed good reliability (α = .92, ω = .914).

WHO-QOL. The Portuguese version of WHO Quality-of-Life-Bref (Skevington et al., 2004; Canavarro et al., 2010), assesses QoL generically and multi-dimensionally. The WHOQOL-Bref consists of 26 items, assessed on a five-point Likert scale from 1 (e.g., "Not at all") to 5 (e.g., "Completely"), comprising four quality of life domains: physical (e.g., "To what extent do you need medical care to carry out your daily life?"), psychological ("Are you able to accept your physical appearance?"), social relationships (e.g., "How satisfied are you with your personal relationships?"), and environment (e.g., "How satisfied are you with the transport you use?"). Regarding psychometric sensibility, there were no severe violations of normality, given that all items presented adequate absolute values of skewness and kurtosis ($Sk < 3$, $Ku < 7$). All items presented adequate standardised factor weights ($.503 < \lambda < .920$) and adequate individual reliability ($R^2 > .25$). Goodness-of-fit indices indicated a good adjustment of the final factor structure, with the correlation between the residuals of Items 1 and 2 Goodness-of-fit indices indicated an acceptable fit of the factor structure (CFI = .919, TLI = .907, RMSEA = .101, SRMR = .065), indicating factorial validity. The four dimensions abovementioned presented adequate average variance extracted values, indicating convergent validity. Discriminant validity was verified between the subscales. Regarding reliability, the four subscales presented adequate reliability (Physical: α = .94; ω = .92; Psychological: α = .86; ω = .80; Social Relationships: α = .85; ω = .80; Environment: α = .87; ω = .80).

Moderation variables

Illness Perception Questionnaire-Brief. The Portuguese version of the Brief Illness Perception Questionnaire (IPQ-Brief; Broadbent et al., 2006; Figueiras et al., 2012) was used to assess the cognitive representations of UI. IPQ-Brief has a unifactorial structure with eight items: five items appraising cognitive illness through (1) consequences ("How much does your illness affect your life?"), (2) timeline ("How long do you think your illness will continue?"), (3) personal control ("How much control do you feel you have over your illness?"), (4) treatment control ("How much do you think your treatment can help your illness?"), and (5) identity ("How much do you experience symptoms from your illness?"); two assessing emotional representations ("How

concerned are you about your illness?" / "How much does your illness affect you emotionally? (e.g., does it make you angry, scared, upset or depressed?"); and one assessing illness comprehensibility ("How well do you feel you understand your illness?"). These eight items are rated on a response scale ranging from 0 (e.g., does not affect at all) to 10 (e.g., severely affects my life). The last item is a causal open-response item, adapted from the IPQ-R (Moss-Morris et al., 2002), which asks patients to list the three main causal factors in their illness. The total score is generated by summing up the scores for the Brief-IPQ items with a reverse scoring of Items 3, 4 and 7. The total score varies between 10 and 80 and a higher total score reflects a more threatening perception of illness. Regarding psychometric sensibility, there were no severe violations of normality, given that all items presented adequate absolute values of skewness and kurtosis ($Sk < 3$, $Ku < 7$). All items presented good factor loadings ($\lambda \geq .50$), with adequate individual item reliability ($R^2 \geq .25$) except for Item 4 ($\lambda = -.358$), Item 7 ($\lambda = .119$), which presented very low loadings, and Item 3 ($\lambda = .372$), which was not removed due to its phenomenological and clinical relevance. After the elimination of these two items (4 and 7), most goodness-of-fit indices were indicative of a good fit to the data (CFI = .994, TLI = .990, RMSEA = .111, SRMR = .024). The convergent validity evidence based on the internal structure was good (AVE = .60). Regarding reliability, the data gathered with Brief IPQ showed good reliability ($\alpha = .92$, $\omega = .86$).

UI-related coping strategies instrument. A bi-factorial instrument developed by our team that entails a set of UI-related maladaptive coping strategies to manage the immediate effects of UI based on the work of Diokno et al. (2004). The "hiding coping" dimension is constituted by five strategies whose purpose is concealing urine stains strategies (e.g., "Use feminine hygiene pads," "Wear dark clothes to conceal urine stains," "Use panty liners"), and the "defensive coping" dimension, which includes eight strategies to control urine loss (e.g., "Limit fluid intake," "Limit social activities," "Limit physical exercise"). A Likert scale was used from 1 – "Never" to 5 – "Always." The total score varies between 13 and 65, and a higher score reflects a more frequent use of coping strategies. Regarding psychometric sensibility, there were no severe violations of normality, given that all items presented adequate absolute values of skewness and kurtosis ($Sk < 3$, $Ku < 7$). All items presented adequate standardised factor weights ($.54 < \lambda < .95$) and adequate individual reliability ($R^2 > .25$). Goodness-of-fit indices indicated a good fit of the factor structure (CFI = .986, TLI = .984, RMSEA = .074, SRMR = .058), indicating factorial validity. Both the Defensive and Hiding subscales had adequate average variance extracted values of .69 and .54,

respectively, indicating convergent validity. Discriminant validity was verified between the subscales (r^2 = .402). Regarding reliability, both subscales presented good reliability (Defensive: α = .94; ω = .92; Hiding: α = .80; ω = .83). This is the first validation study.

Data Collection

The study data was collected online between March and October 2020 using the online survey platform Google Forms (including all the material described above). When inviting the participants online (i.e., via social media - Facebook), and disseminating a brief description of the research in several posts in groups of middle-aged/menopause-related women, the research purpose was clearly explained. The survey was administered via Google Forms using conditional logic. Female participants who reported not experiencing urinary incontinence were automatically directed to complete only the sociodemographic and clinical questionnaire, the World Health Organization Quality of Life Instrument (WHOQOL-BREF), and the Female Sexual Function Index (FSFI) (see Appendix D).

Ethics Issue

This study is part of the research project (PURI-PRO: Portuguese Urinary Incontinence Project), which aims to contribute to the promotion of a healthier life and well-being for middle-aged women (specifically, menopausal women), meeting the United Nations 2030 Agenda. Participants were given a link to an informed consent statement and the online survey questionnaire and were assured that participation was anonymous and voluntary. Informed consent was obtained from all participants. The main goal was explained, the study's procedures and that they could stop answering whenever they wanted and that anonymity and confidentiality were ensured since no identification data was requested, and a code was attributed to each participant. Non-responses were not allowed and participants could return to verify and/or correct the answer to each survey before submission. The leading researcher's contact number was provided for any inquiries. The present study was approved by the Ethical Committee for Research from ISPA- Instituto Universitário and followed the ethical guidelines and the standards of the Order of Portuguese Psychologists (2024), and the American Psychological Association (2024).

Data Analyses

All data analyses were done with the IBM SPSS Statistics, version 27, and with R 4.0 (R Core Team, 2020), through RStudio (R Core Team, 2020) (v. 26).

Primary aim. Confirmatory Factor Analyses (CFA) were performed to assess psychometric properties in the present sample for all the instruments used. CFA used Robust Maximum Likelihood estimation as implemented in the lavaan package (v.0.6-14) for the R statistical system (Rosseel, 2012). After attesting for construct validity evidence for each construct, a multigroup analysis was performed to show the equivalence of the proposed model across women with and without UI, to verify if the differences in scale scores are caused by differences in levels of the underlying construct, not other causes (e.g., items' interpretation). Configural, metric, scalar, and strict invariance were tested using nested models with increasing loadings, intercepts, and error variance constraints. Values of $|\Delta CFI| < .01$ (Cheung & Rensvold, 2002), and $|\Delta RMSEA| \leq .02$ (Rutkowski & Svetina, 2014) between consecutive nested models indicated that the model was invariant in women with and without urine loss. After confirming invariance and the assumptions of the dependent variable's normality and homogeneity of variance, Student's t-tests were run on the data with a 95% confidence interval (CI) for the mean difference between women with and without urine loss, regarding QoL and SF.

Secondary aim. Pearsons' Correlations were used to verify the possible association between UI-symptom severity and (1) UI-related beliefs and (2) UI-related strategies to proceed with the planned analysis (i.e., without association between these variables, a moderation model would not be plausible). The Pearson correlations were considered high if > .50, low below < .20, and moderate if in between (Marôco, 2021). After the association of these variables was verified, the data normality was assessed. No severe deviations from the normal distribution that would be recommended against parametric testing were considered for absolute values of Kurtosis (*Ku*) smaller than seven and Skewness (*Sk*) smaller than three (Kline, 2016). Additionally, the mean interpolation method imputed missing values for variables whose frequency was lower than 5% of the sample. Multicollinearity between the independent variables was also evaluated with the variance inflation factor (VIF) (Marôco, 2021). A value below five indicates the absence of multicollinearity. Finally, the existence of outliers was evaluated through the Mahalanobis distance (Marôco, 2021). Path analysis was performed with the lavaan package for the R statistical system (R Core Team, 2020) to study the hypothetical association and moderating effects between the variables under study (i.e., evaluate whether UI-related beliefs and strategies would moderate the effects of UI symptom severity on SF and QoL). Moreover, the model goodness of fit was evaluated using the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA),

the Tucker-Lewis Index (TLI) and the Standardised Root Mean Square Residual (SMRM) (Cheung & Rensvold, 2002). CFI and TLI above .9, as well as SRMR and RMSEA below .08, were indicative of good model fit (Byrne, 2010; Marôco, 2021). To better understand the relationship between strategies and sexual function an additional analysis was made, namely a multigroup analysis comparing women who are sexually active and women who are not sexually active regarding the impact of strategies on sexual function. Additionally, we adjusted the moderation model to the three different types of IU (i.e., Stress UI, Urgency UI and Mixed UI) to explore whether these groups have differences regarding QoL. A 5% level of significance was used for the decision-making regarding the statistical significance of the results.

Results

Clinical Characterisation of the UI Sub-Sample

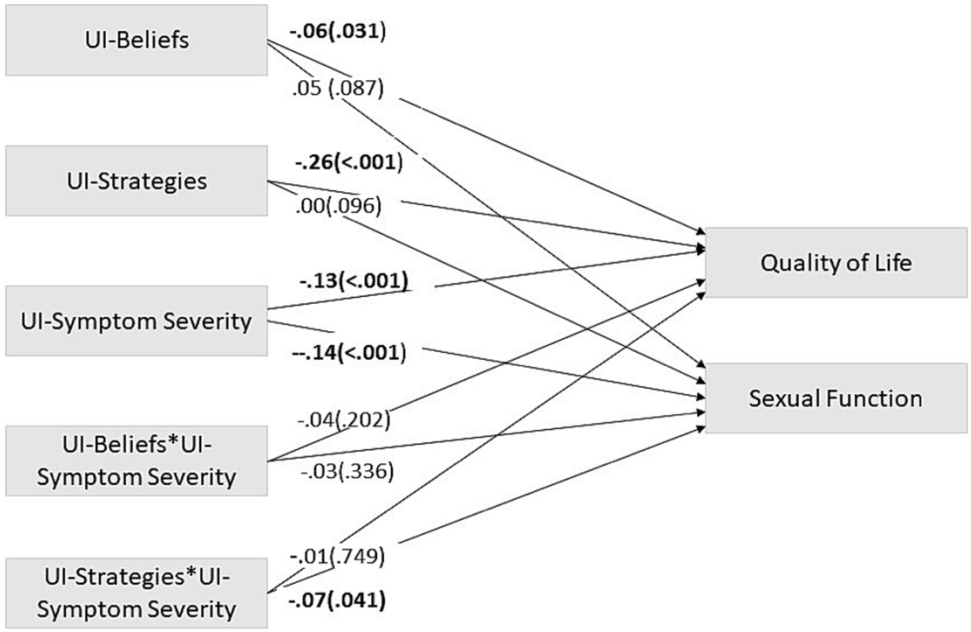
Regarding UI types, 558 (36.2%) women presented symptoms congruent with a UI stress pattern, 334 (21.7%) women with an urgency pattern, and 243 (16.1%) with a mixed pattern. The other 26% of women did not meet the criteria for diagnosis since their total score was under the cut-point. Regarding UI severity, 1,200 (78%) presented mild to moderate UI-symptom severity, and 338 (22%) presented moderate to severe UI. Concerning sexual function, 405 (27%) women did not have sexual intercourse during the last 4 weeks; 269 (17.7%) women reported that UI affected the relationship with their partner; 309 (20.1%) women reported that UI affected their sexual life; and 427 (28.2%) women lost urine during sexual intercourse.

Primary aim. All instruments presented evidence of good psychometric properties (reliability, sensitivity, and construct validity – factorial, convergent and discriminant validity) in the present study. The model showed scalar/strong invariance ($|\Delta CFI \leq .01|$, $|\Delta RMSEA \leq .02|$) for both QoL and SF for women with and without urine loss. It was found that the total score of FSFI in women without involuntary loss of urine ($M = 20.23$, $SD = 3.78$) was significantly higher than in women with involuntary loss of urine ($M = 19.74$, $SD = 4.01$), [$t(2576) = 3.13$, $p = .002$; 95% C.I., .18–.80]: women without UI had a better SF, compared with their counterparts with UI. Moreover, it was also found that the total score of WHO-QOL in women without UI ($M = 98.43$, $SD = 12.56$) was significantly higher than in women with involuntary loss of urine ($M = 94.22$, $SD = 14.37$), [$t(2576) = 7.71$, $p < .001$; 95% C.I., 3.14–5.28]: women without UI had a better QoL, compared with their counterparts with UI.

Secondary aim. Pearson correlations were calculated to investigate whether UI symptom severity was associated with UI-related beliefs and strategies. Significant associations among UI and UI-related beliefs [$r(1513) = .714$, $p < .001$] and strategies were found [$r(1513) = .705$, $p < .001$]. The obtained model of path analysis was saturated. UI-related coping strategies significantly moderated the effects of UI symptom severity on Sexual Function (SF) (i.e., the presence of UI-related strategies to manage the immediate effects of UI attenuated the impact of UI-symptom severity on SF). Also, UI-related beliefs did not moderate the relation between UI-symptom severity and SF. Regarding Quality of Life (Qol), neither UI-related strategies nor UI-related beliefs moderated the effects of UI symptom severity on QoL. Finally, the direct main effects of UI symptom severity were significant on both QoL and SF: women with more severe UI symptoms reported poorer QoL/SF. Regarding UI-related beliefs and strategies, their main effects were only significant on QoL: on the one hand, the more dysfunctional the UI-related beliefs were, the poorer QoL was; on the other, the more frequently the dysfunctional UI-related strategies were used, the poorer QoL was (see Figure 9).

Figure 9

Path Analysis Model – Moderation Model



Note. This path analysis model shows UI-related beliefs and strategies as possible moderators of the relation between Urinary Incontinence and Quality of Life and Sexual function. The coefficients presented are standardised linear regression coefficients (β) accompanied by their p-values. Significant trajectories' values are in bold. UI = Urinary Incontinence.

Additional Analysis

To better understand the relationship between strategies and sexual function an additional analysis was made, namely a multigroup analysis comparing women who are sexually active and women who are not sexually active regarding the impact of strategies on sexual function. The model was not invariant [ΔX^2_{λ} (13) = 38.901, $p < .001$], which means that there are differences between sexually and non-sexually active women, regarding the impact of UI-related strategies on Sexual Function. In sexually inactive women, UI-related strategies did not significantly impact Sexual Function ($\beta_{defensive}$ = -.085; p = .096; β_{hiding} = -.034, p = .513). However, in sexually active women, the impact of UI-related strategies on Sexual Function was significant ($\beta_{defensive}$ = -.117, $p < .001$; β_{hiding} = -.066, p = .046) (i.e., the more dysfunctional the UI-related beliefs were, the poorer Sexual Function was).

Additionally, we adjusted the moderation model to the three different types of IU to explore whether these groups have differences regarding QoL. The direct effect of UI-symptom severity was significant on QoL in women with Mixed UI (β = -.174, p = .043). In this way, the more severe UI symptom, the worse QoL was). The direct effect of UI-symptom severity was not significant either for women with Stress UI (β = -.051, p = .390), nor for women with Urgency UI (β = -.139, p = .191).

Discussion

The present study aimed to explore how UI symptoms impact Quality of Life (QoL) and Sexual Function (SF), also tackling the moderating role of UI-related beliefs and strategies in the relationship between UI-symptom severity, and both QoL and SF.

Direct Effects

Regarding the direct effect of UI-symptom severity on QoL and SF, our results support previous research in the field of UI, which links symptom severity and QoL (e.g., Abrams et al., 2015; Lasserre et al., 2009) and SF (e.g., Bilgic and Kizilkaya Beji, 2020; Fatton et al., 2014) (although in the absence of a comparison group with women without UI, in previous studies). Several studies report women with UI symptomatology as having poorer QoL and SF-17, lower libido, lubrication, and satisfaction, as also shown by our data. Our findings also highlight the role of UI-related beliefs and strategies in the QoL of women with UI. In this sense, the more frequent UI-related strategies are (in this study, characterised by hiding and defensive behaviours), the more

negative the impact on QoL is. This is consistent, especially considering three QoL domains and the detrimental effect that some of the UI-management strategies used by these women might have on these domains: (1) physical (UI-related strategy example: “reduce physical activity”), (2) psychological (UI-related strategy example: “staying at home to avoid uncomfortable situations”; and (3) social relationships (UI-related strategy example: “reduce social gatherings”). For example, to enhance QoL, women with SUI might follow a Pelvic Floor Muscle Training protocol to reduce UI symptoms, as Pires et al. (2020) concluded.

Contrary to our predictions, the direct impact of UI-related strategies was not observed on SF. One possible explanation may be that QoL is a broader construct, being easier to be impacted by hiding/ defensive behaviours to manage UI. Another explanation might be due to the fact that there are differences between sexually and non-sexually active women, regarding the use of UI-strategies on Sexual Function.

The direct impact of UI-related beliefs was also not observed in SF. This result might be explained by the fact that UI-related beliefs (measured in our study by IPQ-Brief) include dimensions related to symptoms, control/cure, timeline, and general consequences, and do not include dimensions related to SF, such as shame, and intimacy. Future studies should assess UI-related beliefs more closely related to sexual function/distress (e.g., fear of UI’s impact on sexual interaction).

Moderation

Concerning moderation, these results represent the first direct demonstration of the moderation role of UI-related strategies in the relationship between UI-symptom severity and Sexual Function, as far as the authors know. In this sense, UI-related strategies aiming to control UI symptoms (which include “reduce fluid intake,” “go to the bathroom often, even if you do not feel like it,” and “use feminine/ sanitary pads”) attenuate the relationship between UI and SF. Due to the efficacy of these strategies and consequent reduction of UI symptoms during sexual intercourse, women may be more available for sexual intercourse. If, on the one hand, these control behaviours may have value in alleviating and controlling symptoms in the immediate (i.e., immediately before or during sexual intercourse), on the other hand, they also perpetuate UI symptoms in the long term since women do not seek medical help and maintain these hiding and defensive behaviours. Additionally, the moderation effect, but not the direct effect of the UI

management strategies in SF, might have been shown because this sample shows only mild to moderate UI-symptom severity levels.

Limitations

There are three potential limitations concerning the results of this study. The first limitation is related to online data collection because it limits the opportunity to clarify questions, if they emerge during the protocol fulfillment. A second limitation is that the findings are based on individual self-reports (in the absence of a medical diagnosis), which may contribute to participant bias. A third potential limitation is that the only source of sexual activity characterisation was the Female Sexual Function Index (FSFI-6). Finally, most women in the present sample presented a mild to moderate UI degree.

Strengths

Despite these limitations, these results suggest several theoretical and practical implications and strengths: (i) the crucial role of UI-related beliefs and strategies (both modifiable through brief interventions) in the QoL of women with UI; (ii) the impact that UI-hiding/defensive strategies have in attenuating the impact of UI-symptom severity on SF, which might be perceived as a short-term benefit and hence contribute to maintaining the UI condition and constitute a barrier to help-seeking, (iii) confirmation of the impact of UI-symptom severity on QoL and SF (including a comparison group entailing women without UI, which is scarcely used); and (iv) the use of gold-standard and psychometrically robust instruments.

Future Research

Regarding future research, it would be helpful to extend the current findings by examining the role of UI-related beliefs and strategies among the different UI types (i.e., Stress UI, Urgency UI and Mixed UI). Future studies should also contemplate the assessment of vaginal dryness as it relates to menopausal transition and might have a confusional effect on sexual functioning in middle-aged women. It would also be useful for future research to assess both relationship and sexual satisfaction, and use specific UI-related beliefs measures. Finally, the fact that data collection was done in a pandemic period, including phases of mandatory lockdown, might have impacted Sexual Function and Quality of Life values. Future studies should address these variables in non-pandemic periods to explore if the report of the variables changes.

Conclusion

Regarding translation to practice and although the generality of the current results must be established by future research, the present study has provided clear support for the importance of assessing and changing UI-related beliefs and strategies in clinical settings (among multidisciplinary teams - including urologists and psychologists for middle-aged women) to improve the efficacy of UI healthcare interventions and providing tailored urological health promotion regimens.

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Empirical Study 6. Measuring Social Isolation in Women with Urinary Incontinence: Validation of the UI-SIQ

Abstract

Introduction: Urinary incontinence (UI) is a significant public health issue that adversely affects women's quality of life, often leading to psychosocial challenges such as social withdrawal and isolation. This study aimed to develop and validate the Urinary Incontinence Social Isolation Questionnaire (UI-SIQ), assessing its factor structure, internal consistency, measurement invariance, and validity evidence based on its internal structure and relations to other variables. An accurate assessment of social isolation associated with UI is crucial for reducing its negative consequences and destigmatising the condition, thereby promoting help-seeking behaviour.

Method: This cross-sectional, quantitative study included 1,538 Portuguese women aged 40 to 65 years, who self-reported episodes of UI. Participants completed a sociodemographic questionnaire, along with three self-report measures assessing UI symptoms, types, and their impact on quality of life. The internal consistency and convergent validity evidence of the UI-SIQ were evaluated using Dimensions 4 (Physical Limitations) and 5 (Social Limitations) of the King's Health Questionnaire (KHQ).

Results: The final five-item version of the UI-SIQ exhibited a robust unidimensional structure (CFI = .996, TLI = .992, RMSEA = .039, SRMR = .021) and excellent internal consistency (α = .95). Its strong correlation with KHQ dimensions (r = .594) provided evidence of convergent validity.

Conclusion: These findings support the UI-SIQ as a valid and reliable instrument for assessing social isolation among Portuguese women with UI. This study contributes to a more nuanced understanding of social isolation in this sample and supports the development of targeted interventions aimed at enhancing women's quality of life.

Keywords: Urinary Incontinence; Psychometric Properties; Validation Study; Social Isolation.

Introduction

Urinary incontinence (UI), defined as the involuntary loss of urine, is a significant public health concern that can profoundly affect the health-related quality of life (HRQL) of women worldwide, disrupting their physical, emotional, and social well-being (Luz et al., 2017). Beyond its personal financial burden, UI imposes considerable economic costs on society. In the European Union, UI-related expenditures are projected to rise from €69.1 billion in 2023 to €86.7 billion by 2030 (European Association of Urology, 2023). Similarly, in the United States, the estimated economic burden of UI has reached approximately USD $82.6 billion (Coyne et al., 2014). Epidemiological studies have estimated that the prevalence of UI among women ranges from 25% to 45% (Bedretdinova et al., 2016; Irwin et al., 2006; Perry et al., 2000; Sexton et al., 2009). National data from Portugal align with these findings, reporting a marked age-related increase from 2.0% among women aged 18–39 to 28.9% among those aged 75–85 years (Manso et al., 2023; Silva et al., 2013).

Despite its high prevalence, UI remains significantly underdiagnosed and undertreated, exacerbated by its perception as a low-prestige condition. This stigma contributes to limited societal investment in care, support, and healthcare funding, often resulting in neglect (Hannestad et al., 2000; Irwin et al., 2006; Nguyen et al., 2013; Ostaszkiewicz, 2023).

UI manifests as several distinct clinical subtypes, each with different triggers and associated levels of psychological distress. The primary subtypes include stress, urgency, and mixed UI, in which urine leakage occurs due to an increase in intra-abdominal pressure from physical exertion such as coughing, sneezing, or exercise. In contrast, urgency UI is characterised by leakage that is either accompanied or immediately preceded by a sudden, compelling urge to urinate. The third subtype, mixed UI, involves co-occurrence of both stress and urgency symptoms within the same individual (Abrams et al., 2003; Haylen et al., 2010).

These distinctions are clinically significant, as the subtype often correlates with the level of distress experienced. Specifically, urgency and mixed UI are typically associated with a greater psychological burden than stress UI alone (Coyne et al., 2003). While symptom severity can vary widely, population-based studies have indicated that most women report mild-to-moderate symptoms. For instance, a large study classified 42.1% of cases as mild, 45.5% as moderate, and

only 10.5% as severe (Ebbesen et al., 2013). This highlights that, while severe UI is less common, a substantial portion of affected individuals experience a notable, ongoing symptom burden.

Greater symptom severity is associated with a heightened impact on daily functioning (Krhut et al., 2018), although even mild symptoms can significantly impair quality of life (QoL). UI affects multiple QoL domains, including physical (e.g., reduced physical activity, poor sleep, increased risk of infections; Smith, 2016), psychological (e.g., heightened anxiety, diminished self-esteem, embarrassment due to leakage or odour), sexual (e.g., avoidance of intimacy, especially among women with mixed UI; Gomes et al., 2020; Molinuevo & Batista-Miranda, 2012; Mota, 2017; Radoja & Degmečić, 2019; Ugurlucan et al., 2020), and occupational (e.g., increased absenteeism, work disability, and frequent disruptions to work performance due to restroom use; Oliveira et al., 2020) domains.

UI is further associated with profound social consequences, exacerbated by its unpredictable and uncontrollable nature (Smith, 2016). From an early age, the internalisation of bladder control as a marker of maturity reinforces societal expectations, leading individuals to associate incontinence with shame and incompetence (Avery et al., 2013). These perceptions shape broader notions of social acceptability and adherence to social norms, subsequently influencing how women perceive and respond to UI (Ricci et al., 2001; Waetjen et al., 2018).

Furthermore, many women alter or restrict their daily and social activities due to fear of urine loss in public settings and/or feelings of inadequacy, which can lead to inhibited social interactions, progressive social withdrawal, and, in severe cases, social isolation (SI), characterised by a lack of engagement with others/social contacts. SI has been linked to diverse health outcomes, such as depression, anxiety, social anxiety disorder, suicidal ideation, reduced cognitive functioning, and reduced immune function and mortality (Manso et al., 2023).

When UI becomes visible to others, feelings of inadequacy may intensify, further reinforcing social withdrawal behaviours (Farrés-Godayol et al., 2022; Javanmardifard et al., 2022). Emerging evidence suggests that hiding behaviours and defensive coping strategies, defined as self-management efforts undertaken in the absence of formal care seeking, may play a critical mediating role in the relationship between UI severity and SI. Defensive coping mechanisms, such as avoiding specific locations, activities, or social events where UI episodes might occur, are typically employed preemptively to minimise the risk of public embarrassment. Although these

strategies may provide short-term psychological relief by offering a sense of control, they can inadvertently reinforce social withdrawal by increasing women's participation in physical, social, and community activities (Porto et al., 2025). Consequently, this perceived sense of control over their condition may exacerbate SI, as women progressively disengage from social environments, ultimately diminishing their social interactions and support networks (Bilgic et al., 2017; Pintos-Díaz et al., 2019; Xu et al., 2016).

Given the significant impact of UI on women's QoL, particularly across the emotional and social domains, numerous patient-reported outcome measures (PROMs) have been developed to assess its effects.

Several instruments have been used to study the impact of UI on QoL, psychosocial burden associated with UI (assessing social dimensions). For example, Coyne et al. (2003) employed the OAB-q, MOS SF-36, MOS Sleep Scale, CES-D, and KHQ, while Krhut et al. (2018) utilised the KHQ, ICIQ-SF, and PPBC. Abrams et al. (2015) used the ICIQ-LUTSqol to evaluate the impact of UI symptoms on daily activities and social interactions. Other studies applied broader health-related QoL instruments, such as the SF-36 (Saboia et al., 2017), WHOQOL-BREF (Szymanski et al., 2017), and I-QOL (Tannenbaum et al., 2019), and assessed social isolation using the NHP (Bedretdinova et al., 2016), and loneliness scales such as the UCLA and De Jong-Gierveld Loneliness Scale (Farrés-Godayol et al., 2022; Stickley et al., 2017). An overview of the scales is presented in Table 22. In Portugal, adapted and validated instruments include the KHQ (Viana et al., 2015), ICIQ-UI SF (Guerra et al., 2023a), ISI (Pereira et al., 2011), and the Brazilian Portuguese version of the I-QOL (Souza et al., 2009). However, none of these tools specifically capture SI directly related to UI.

Table 22
Summary of the Instruments

Instrument	What it evaluates	Dimensions	Subdimensions (items)	Original authors	Validation to Portuguese
ICIQ-LUTSqol (International Consultation on Incontinence Questionnaire - Lower Urinary Tract Symptoms Quality of Life)	Impact of UI on QoL, including daily activities, social life, and emotional Health	6 dimensions with 19 items	Daily activities (5), social life (3), personal relationships (3), feelings (4), sleep/energy (2), protection (2)	Kelleher et al. (1997)	Guerra et al. (2023b)
BFLUTS (Bristol Female Lower Urinary Tract Symptoms Questionnaire)	Lower urinary tract symptoms, sexual function and QoL	5 dimensions with 19 items	Incontinence symptoms (5), voiding symptoms (3), filling symptoms (4), and additional subscales for sexual function (2) and QoL (5)	Jackson et al. (1996)	No
KHQ (Kings Health Questionnaire)	QoL in women with UI, including physical, social, emotional limitations, and personal relationships	8 dimensions with 21 items	General health (2), incontinence impact (2), role limitations (2), physical limitations (2), social limitations (2), personal relationships (3), emotions (3), sleep/energy (2)	Kelleher et al. (1997)	Viana et al. (2015)
SF-36 (Medical Outcomes Study 36-Item Short-Form Health Survey)	General health-related QoL such as physical and social functioning, mental health, and vitality	8 dimensions with 36 items	Physical functioning (10), role limitations due to physical/emotional (4), vitality (4), mental health (5), social functioning (2), general health (2)	Ware & Sherbourne (1992)	Severo et al. (2006)
PISQ-12 (Pelvic Organ Prolapse Incontinence Sexual Questionnaire - Short Form)	Sexual function in women with pelvic floor dysfunctions like UI or prolapse across behavioural-emotive, physical, and partner-related domains	3 dimensions with 12 items	Behavioural-emotive (4), physical (4), partner-related domains (4)	Rogers et al. (2001)	Santana et al. (2012)

ICIQ-SF (International Consultation on Incontinence Questionnaire - Short Form)	Severity of UI symptoms and their impact on QoL	3 dimensions with 3 items	Frequency (1), severity (1), impact (1)	Avery et al. (2004)	Guerra et al. (2023a)
Nottingham Health Profile (NHP)	QoL across dimensions like SI, emotional reactions, energy, sleep, pain, and physical mobility	6 dimensions with 38 items	SI (5), emotional reactions (9), energy (3), sleep (5), pain (8), physical mobility (8)	Hunt et al. (1985)	No
SIS (Social Impact Scale)	Perceived social impact (stigma experienced) in patients with chronic disease and cancer (such as UI; Xing et al., 2024)	4 dimensions with 24 items	Social exclusion (9), economic discrimination (3), internal shame (5), and social alienation (7)	Fife, B. L., & Wright, E. R. (2000)	No
De Jong-Gierveld Loneliness Scale	Loneliness, focusing on emotional and social dimensions	2 dimensions with 6 items	Emotional loneliness (3), social loneliness (3)	De Jong-Gierveld & Kamphuis (1985)	No
WHOQOL-BREF	Overall QoL across physical, psychological, social, and environmental domains	4 dimensions with 26 items	Physical health (7), psychological health (6), social relationships (3), environment (8)	WHOQOL Group (1998a, 1998b)	Canavarro et al. (2007, 2010)
I-QoL (Incontinence Quality of Life Questionnaire)	Limitations in behaviour, psychosocial impact, and social embarrassment associated with UI	3 dimensions with 22 items	Behavioural restrictions (8), psychosocial impact (9), social embarrassment (5)	Wagner et al. (1996) Patrick et al. (1999)	No
IIQ (Incontinence Impact Questionnaire)	Impact of UI on emotional health, physical activity, travel, and social relationships	4 dimensions with 30 items	Emotional health (8), physical activity (6), travel (6), social relationships (10)	Lin & Dougherty (2003)	No

Condition-specific PROMs offer a substantial advantage over generic tools because they are more sensitive to the nuanced impacts of a condition, demonstrate greater responsiveness to meaningful clinical changes, and exhibit higher construct validity. These advantages have fueled the development of several preference-based condition-specific instruments aimed at more accurately capturing the psychosocial burden of UI. Nevertheless, a critical gap persists: no condition-specific PROM directly measures SI in women with UI.

To meaningfully assess social isolation (SI) among middle-aged women with UI, it is essential to consider the interrelated cognitive, emotional, and behavioural processes involved. From a Cognitive Behavioural Therapy (CBT) perspective, SI is maintained by maladaptive cognitive appraisals (e.g., catastrophising public leakage, fear of social rejection, negative self-evaluation), affective responses (e.g., loneliness, shame), and avoidance behaviours (e.g., declining invitations, avoiding new people or social settings) (Dowd & Dowd, 2006; Lam & Cheng, 2001; Funada et al., 2020; Garley & Unwin, 2006).

These mechanisms, originally intended to minimise the risk of embarrassment, often lead to reduced social participation and perceived disconnection. For instance, the pervasive fear of odour or visible signs of UI can prompt women to avoid social activities, intensify feelings of isolation, and undermine their well-being (Avery et al., 2013).

While stigma contributes to the broader psychosocial burden of UI, our focus is specifically on social isolation (SI), the behavioural endpoint through which women limit participation and contact with others. Despite the availability of general QoL or stigma-related instruments, no existing PROM specifically captures SI, as it relates to UI. A brief CBT-informed instrument is therefore warranted to support targeted screening, clinical decision-making, and monitoring of psychosocial outcomes in both specialised and non-specialised healthcare settings.

The importance of anchoring measurement development within a robust theoretical framework is well established, as theory not only delineates constructs with conceptual precision but also articulates their expected relationships with related psychological and behavioural phenomena (Redding et al., 2011). Psychological and behavioural processes are increasingly recognised as central to how individuals experience a wide range of health conditions, including urinary incontinence (UI), regardless of chronicity or aetiology (Avci et al., 2022; Bush et al., 2001; Toye & Barker, 2020; Waetjen et al., 2018). In the present study, the Cognitive Behavioural

Therapy (CBT) model was adopted as the theoretical foundation for the development of a measure to assess social isolation (SI) in women with UI. CBT is a structured, time-limited, and evidence-based psychological framework that targets maladaptive patterns of thinking, emotional responses, and behaviour (Beck, 1997; Butler et al., 2006). Within the context of UI-related SI, CBT offers a functional model for understanding how negative self-appraisal, experiential avoidance, and emotional withdrawal interact to reinforce and sustain isolation. It also informs strategies for re-engagement with socially meaningful activities and the restoration of valued roles.

In this context, the development of a theory-driven instrument to assess SI among women with UI provides both specialist and non-specialist clinicians with a targeted, conceptually grounded tool for evaluating its psychosocial impact. Such a measure supports a more integrative, person-centred approach to UI care by capturing modifiable psychological and behavioural mechanisms that may otherwise be overlooked.

Accordingly, the aim of the present study was to develop and validate the Urinary Incontinence Social Isolation Questionnaire (UI-SIQ)—a brief PROM grounded in CBT principles to assess perceived SI specifically associated with UI in middle-aged women.

Method

Design

This study employed a cross-sectional, descriptive, observational, and correlational design.

Participants

Initially, the sample comprised 1606 women (M_{age} = 50.19 years, SD_{age} = 6.58) who self-reported occasional or frequent urine loss. Inclusion criteria were: (1) being female; (2) aged between 40 and 65 years; (3) experiencing involuntary urine loss either during increases in intra-abdominal pressure and/or following an uncontrollable urge to urinate, either occasionally or frequently; and (4) having internet access.

Exclusion criteria were: (1) being pregnant or within six months post-partum; (2) having undergone prior UI-related surgery; (3) having an oncological disease; (4) having neurological disabilities; and (5) experiencing pelvic organ prolapse. After excluding 56 women with previous UI-related surgeries and 12 women who declined to provide informed consent, the final analytical sample comprised 1538 participants.

Measures

Questionnaire for Urinary Incontinence Diagnosis (QUID). The QUID (Bradley et al., 2010) was specifically developed to identify the different types of UI among women. This scale assesses stress and urge urinary incontinence, with diagnostic thresholds set at scores of ≥ 4 for stress UI and ≥ 6 for urge UI. A mixed UI is classified when both criteria are met simultaneously. The QUID consists of six items: three assessing stress incontinence symptoms and three assessing urge incontinence symptoms. Each item was rated on a Likert scale ranging from 0 ("none of the time") to 5 ("all of the time"), with subscale scores ranging from 0 to 15. The QUID demonstrated moderate to good internal consistency, with $\alpha = .64$ for the stress subscale and $\alpha = .87$ for the urge subscale (Bradley et al., 2010).

International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). The ICIQ-UI SF (Avery et al., 2004) was used to assess the frequency and amount of urinary leakage, as well as its overall impact on daily life. This questionnaire consists of three scored questions addressing these aspects, with sample items such as: "How often do you leak urine?" or "How much urine do you usually leak (whether you wear protection or not)?". Responses were summed to yield an overall score ranging from 0 to 21, with higher scores indicating more severe UI symptoms. Additionally, the ICIQ-UI SF includes a fourth, unscored question that identifies the circumstances in which leakage occurs. The total score on the ICIQ-UI Short Form can be interpreted categorically to reflect symptom severity: scores of 1–5 indicate slight incontinence; 6–12, moderate; 13–18, severe; and 19–21, very severe. The instrument demonstrated excellent internal consistency reliability ($\alpha = .95$; Avery et al., 2004).

King's Health Questionnaire (KHQ). The KHQ developed by Kelleher et al. (1997), was used to assess the impact of UI on HRQoL. As a multidimensional patient-reported outcome measure (PROM), the KHQ has been widely applied in both clinical and research settings. It was specifically designed to capture the psychosocial, physical, and relational consequences of UI and has demonstrated strong psychometric properties across diverse samples. A validated Portuguese version is available and has shown equivalence in structure and scoring (Viana et al., 2015). The KHQ consists of 21 items, distributed across three parts and nine domains. Each domain was scored on a standardised scale from 0 to 100, with higher scores indicating greater perceived impairment in QoL. Scoring was performed at the domain level rather than at the individual item level. Raw

scores were transformed linearly into a 0–100 scale using the formula [(raw score – lowest possible score) / possible score range] × 100. Part I includes two domains: *General Health Perception*, assessed via a five-point scale ranging from "very good" to "very poor", and *Incontinence Impact*, assessed on a four-point scale ranging from "not at all" to "a lot". Each of these domains comprises a single item, with the raw score transformed to a 0–100 scale. Part II evaluated six domains reflecting functional and psychosocial limitations: *Role Limitations*, *Physical Limitations*, *Social Limitations*, *Personal Relationships*, *Emotions*, and *Sleep/Energy*. Each domain contained two to three items rated on a four-point Likert scale (e.g., from "not at all" to "all the time" or equivalent expressions). The raw domain scores are calculated by summing the item responses and then transforming them to the standardised 0–100 scale. Part III comprises the *Symptom Severity Scale*, which includes 10 individual items assessing the frequency and severity of core urinary symptoms such as nocturia, urgency, stress and urge incontinence, bedwetting, coital incontinence, urinary tract infections, dysuria, and post-void dribbling. These items are typically reported individually, rather than being combined into a single composite score. While some studies sum the raw scores across the 10 items and convert them into a global severity score, the most common and clinically informative approach is to report each symptom separately.

Urinary Incontinence Social Isolation Questionnaire (UI-SIQ). The UI-SIQ was developed by the present research team, which was composed of health psychologists and a gynaecologist, to assess the extent of SI specifically experienced by women living with UI. Designed for application in both research and clinical settings, the UI-SIQ offers a brief, yet targeted measure of psychosocial withdrawal associated with UI. The instrument was conceptually grounded in the CBT. The original item pool consisted of nine items (Appendix K), reflecting the key emotional, cognitive, and behavioural dimensions of the SI. Through iterative refinement and psychometric evaluation (see the Results section), the final version retained five items that demonstrated strong empirical performance and clinical relevance. Each item is rated on a four-point Likert scale ranging from 1 ("Strongly Disagree") to 4 ("Strongly Agree"), capturing the intensity of agreement with each statement. The total scores, based on the final set of five items retained after Confirmatory Factor Analysis, ranged from 5 to 20, with higher scores reflecting greater levels of perceived SI associated with UI. Item generation details are reported in the Data Analysis and Results section, and psychometric validation, including dimensionality analysis and evidence of reliability and validity, are reported in the Results section.

Procedure

Data collection and recruitment. Data were collected using Google Forms from March 1 to October 31, 2020, as part of the PURI PRO study. COVID-19 restrictions necessitated replacing the planned hospital-based recruitment with an online strategy. Participants were recruited through social media (primarily Facebook) by posting a brief overview of groups that targeted middle-aged and menopausal women. The survey was accessed through an open link, and no incentives were offered.

All items were presented in a fixed order: (1) ICIQ-UI SF (*International Consultation on Incontinence Questionnaire – Urinary Incontinence Short Form*); (2) WHOQOL-BREF (*World Health Organization Quality of Life – BREF*); (3) FSFI (*Female Sexual Function Index*); (4) UI Self-Management Coping Strategies Scale; (5) KHQ (*King's Health Questionnaire*); (6) UI-SIQ (*Urinary Incontinence Social Isolation Questionnaire*); (7) Brief IPQ (*Brief Illness Perception Questionnaire*); and (8) WPAI (*Work Productivity and Activity Impairment Questionnaire*) (see Appendix D).

Forced-response and page-submission controls eliminated item-level-missing data and blocked incomplete submissions; therefore, no imputation was required.

Analytic sample and reporting. All responses submitted within the recruitment window were analysed, consistent with feasibility-based sampling in observational survey research. Within the full survey battery, the present report analysed the ICIQ UI SF, KHQ, and UI-SIQ. Reporting followed established guidelines for online survey methodology (Sischka et al., 2022; Turk et al., 2018).

Ethics

The PURIPRO project was approved by the Ethical Committee for Research at Ispa, Instituto Universitário (ref. D/022/11/2019; Appendix A) and was conducted in accordance with the Declaration of Helsinki, Good Clinical Practice guidelines, and the ethical standards of the Order of Portuguese Psychologists and American Psychological Association (APA).

Data Analyses

The study was conducted in two phases: Phase 1 involved the development of the item pool, and Phase 2 focused on evaluating the psychometric properties of the resulting scale.

To guide the validation process in Phase 2, the study followed the *Standards for Educational and Psychological Testing* (American Educational Research Association et al., 2014). In accordance with these guidelines, two primary sources of validity evidence were examined for the UI-SIQ:

3. Evidence based on internal structure, including analyses of dimensionality, internal consistency reliability, and measurement invariance; and
4. Evidence based on relations to other variables, assessing construct validity through correlations with theoretically relevant constructs.

Phase 1 – Instrument Development

Item generation

UI-SIQ development. The Urinary Incontinence–Social Isolation Questionnaire (UI-SIQ) was developed following established guidance for health-measurement instruments (Boateng et al., 2018). Item generation was theory-driven: drawing on CBT and prior research on SI in UI, a multidisciplinary panel (health psychologists, and a gynecologist) drafted nine items to capture CBT-consistent processes implicated in UI-related SI—maladaptive cognitions (e.g., catastrophising, negative self-image), behavioural withdrawal (e.g., avoidance/safety behaviours, declining invitations), and affective states (e.g., loneliness, shame). Within a CBT framework, these domains interact reciprocally and can become self-reinforcing, maintaining social withdrawal (Dowd & Dowd, 2006; Lam & Cheng, 2001; Funada et al., 2020; Garley & Unwin, 2006).

Measurement model. The initial specification was a second-order model with three interrelated first-order factors—cognition, behaviour, and emotion—mapped to the UI-related SI. Following psychometric evaluation and model refinement, the final hypothesised structure was unidimensional, representing a single latent construct of UI-related SI. Details of the psychometric refinement are reported in the Results section.

Phase 2 – Psychometric Properties

Data analyses were conducted using R (version 4.2.3; R Core Team, 2020) via RStudio (version 2023.06.1+524; RStudio Team, 2020) and IBM SPSS Statistics (version 28). Descriptive statistics, including mean (*M*), standard deviation (*SD*), skewness (*Sk*), and kurtosis (*Ku*) were computed to assess the distributional properties of the UI-SIQ items. The multivariate normality

(MVN) package (Korkmaz et al., 2014) in R was used for the analysis. Severe violations of normality were defined as absolute skewness greater than three and kurtosis greater than seven respectively (Marôco, 2021).

Confirmatory Factor Analysis (CFA) was performed to evaluate the validity evidence based on the internal structure. Given the strong theoretical foundation supporting the hypothesised factor structure (Cuijpers et al., 2008; Dowd & Dowd, 2006; Garley & Unwin, 2006; Perry et al., 2006; Reisch et al., 2021; Steenstrup et al., 2022), this study began with a CFA. The use of CFA is justified by prior research and an established theory that clearly delineates the expected relationships among the latent constructs and observed variables. As such, CFA allows for direct evaluation of the proposed model's fit to the data, providing a rigorous test of the underlying theoretical framework (Bandalos & Finney, 2019). The diagonally weighted least squares (DWLS) estimation method, appropriate for ordinal data, was implemented using the *lavaan* package (version 0.6.15; Rosseel, 2012) in R (version 4.4.1; R Core Team, 2025), which is recommended for categorical indicators (Finney et al., 2016; Marôco, 2024). Modification indices (> 11; $p < .001$) guided the inclusion of theoretically justified correlated errors. Model fit was evaluated using the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardised Root Mean Square Residual (SRMR). Acceptable model fit was indicated by CFI and TLI values above .90, and RMSEA and SRMR values below .08 (Byrne, 2016; Marôco, 2021). Sample size estimation followed the recommendations of Hair et al. (2019), suggesting a minimum of 5 to 10 participants per manifest variable (i.e., between 45 and 90 participants, considering the initial nine items), thereby ensuring adequate statistical power.

Internal consistency reliability was assessed using ordinal Cronbach's alpha (α) coefficients based on the polychoric correlation matrix and McDonald's omega (ω) coefficients. Values above .70 were considered indicative of acceptable reliability (Marôco, 2021). The semTools package was used to estimate the reliability indices.

To assess measurement invariance, two sets of Multigroup Confirmatory Factor Analyses (MGCFA) were performed. In the first analysis, the full sample was randomly divided into two equal subsamples (50% each), using IBM SPSS Statistics (IBM Corp., 2025). A hierarchical sequence of increasingly constrained models—configural, metric, scalar, and strict—was evaluated to test for invariance across the subsamples. In the second analysis, a separate MGCFA was

conducted to examine measurement invariance across different UI subtypes, specifically stress, urge, and mixed types. Measurement invariance was supported when changes in the Comparative Fit Index (ΔCFI) were less than .01, following the guidelines of Cheung and Rensvold (2002), and when changes in the Root Mean Square Error of Approximation (ΔRMSEA) were less than .02, as recommended by Rutkowski and Svetina (2014).

Convergent validity evidence – regarding validity evidence based on relations to other variables – was assessed by examining Pearson correlations between the UI-SIQ total score and the scores on two domains of the KHQ: Physical Limitations and Social Limitations. The relevant KHQ items included: (5) “Does your bladder problem affect your physical activities (e.g., going for a walk, running, sport, gym, etc.)?”; (6) “Does your bladder problem affect your ability to travel?”; (7) “Does your bladder problem limit your social life?”; and (8) “Does your bladder problem limit your ability to see and visit friends?”.

Results

Brief Sample Clinical Characterisation

The majority of participants were aged 40–54 years (73.5%), predominantly Portuguese (96.3%), and had a bachelor's degree or higher (62.3%). Most were professionally active (80.6%) and in a sexual-affective relationship (79.1%). Nearly half (45.9%) had two biological children. The majority experienced mild to moderate UI severity (78.0%), and 40.6% scored within the moderate range of the ICIQ-UI SF, although 5.8% reported very severe symptoms.

Despite the prevalence, only 41.0% sought medical help for UI, and fewer (29.1%) reported receiving treatment. Pelvic floor muscle training was reported by 24% of the participants, and only 4.6% had been prescribed medication.

The mean score of SI was 7.2 (*SD* = 2.8). The sociodemographic characteristics of the participants are presented in Table 23.

Table 23

Sociodemographic Characteristics of Participants

Characteristics	Women with UI (*n* = 1538)	
	N	%
Age range (in years)		
40−44	353	23.3
45−49	392	25.9
50−54	368	24.3
55−59	266	15.9
60−65	159	10.5
Nationality		
Portuguese	1482	96.3
Other	56	3.7
Level of education		
4th grade	6	0.4
9th grade	118	7.8
12th grade	447	29.5
Bachelor's degree	573	37.9
Postgraduate degree	358	22.0
Doctorate	36	2.4
Professional status		
Active	1245	80.6
Inactive	293	19.4
Sexual-affective relationship		
Yes	1222	79.1
No	316	20.9
Number of biological children		
0	152	10.0
1	462	28.9
2	695	45.9
3	185	12.2
> 4	44	2.9

Note. UI = Urinary incontinence.

Additionally, information on clinical details, lifestyle-related factors, and UI was gathered (Table 24).

Table 24

Clinical Characteristics and Lifestyle Habits of Participants

Characteristics	Women with UI (n = 1,538)	
	n	%
Number of vaginal deliveries		
0	425	28.1
1	442	27.6
2	509	33.6
3	131	8.7
4	31	2.0
Number of caesarean deliveries		
0	1062	70.2
1	325	19.8
2	121	8.0
3	28	1.9
4	2	0.1
Perineal laceration		
Yes	851	54.6
No	687	45.4
Physical illness diagnosis[a]		
No	993	65.6
Yes	545	34.4
Asthma	45	2.9
Hypothyroidism	51	3.3
Diabetes	35	2.2
Hypertension	72	4.7
Mental illness diagnosis[a]		
No	1290	85.3
Yes	248	14.7
Depressive disorder	133	8.8
Anxiety disorder	96	4.7
Obsessive disorder	4	0.3
Psychotic disorder	5	0.3
Menopausal status		
Pre-menopause	349	22.7
Peri-menopause	559	36.3
Post-menopause	630	41.0
Medical help to manage menopausal symptoms		
Yes	664	43.9
No	874	56.1

Coffee intake		
Yes	1263	83.5
No	275	16.5
Hot/cold beverages intake		
Yes	1286	85.0
No	252	15.0
High impact physical activity		
Yes	207	13.7
No	1331	86.3
BMI Status		
Underweight (BMI < 18.5 kg/m^2)	32	2.1
Normal weight (BMI 18.5–24.9 kg/m^2)	651	41.4
Overweight (BMI 25.9–29.9 kg/m^2)	552	36.5
Obesity class I (BMI 30–34.9 kg/m^2)	226	14.9
Obesity class II (BMI 35–39.9 kg/m^2)	60	4.0
Obesity class III (BMI > 40 kg/m^2)	17	1.1
UI Types		
Stress	558	36.2
Urgency	334	21.7
Mixed	243	16.1
UI Severity		
Mild to Moderate	1200	78.0
Moderate to Severe	338	22.0
ICIQ-UI SF levels		
Slight [1−5]	592	38.5
Moderate [6−12]	624	40.6
Severe [13−18]	233	15.1
Very Severe [19−21]	89	5.8
Medical help for UI		
Yes	620	41.0
No	918	59.0
Treatment for UI		
Yes	448	29.1
No	1090	70.9
Prescribed UI medication		
Yes	70	4.6
No	1468	95.4
Pelvic floor muscle training		
Yes	369	24
No	1169	76

Note. UI = Urinary incontinence. [a] Most prevalent self-reported diagnosis.

Menopausal status was classified according to the guidelines outlined in the Stages of Reproductive Ageing Workshop (STRAW; Soules et al., 2001). Based on self-reported menstrual patterns, participants were categorised into three groups: (1) premenopausal, defined as no reported changes in menstrual cycle regularity; (2) perimenopausal, characterised by variable cycle lengths (deviations greater than seven days from their typical cycle) or the absence of two or more consecutive cycles, leading to an amenorrhea period of more than 60 days; and (3) postmenopausal, defined as having experienced at least 12 consecutive months of amenorrhea. Detailed information regarding the menopausal classification is presented in Table 25.

Table 25

Severity and UI Types per Menopause Status

Menopause Status	Severity		UI types			
	Mild to Moderate	Moderate to Severe	Stress	Urgency	Mixed	Below UI Stress/Urgency Scores
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Pre-menopausal	258 (21.5)	91 (26.9)	87 (15.6)	39 (11.7)	30 (12.3)	193 (47.9)
Peri-menopausal	424 (35.3)	135 (39.9)	242 (43.4)	144 (43.1)	103 (42.4)	65 (16.1)
Pos-menopausal	518 (43.2)	112 (33.2)	229 (41.0)	151 (45.2)	110 (45.3)	145 (36.0)

Note. UI = Urinary Incontinence.

Validity Evidence based on the Internal Structure

Dimensionality

Item distributional properties. Descriptive statistics were analysed for each UI-SIQ item (Table 26). No severe violations of normality were detected, as all items presented acceptable absolute values of skewness and kurtosis ($.07 \leq |Sk| \leq 2.00$; $1.20 \leq |Ku| \leq 4.00$).

Table 26

Descriptive Statistics of the UI-SIQ Items

Item	*M*	*SD*	Min	Max	*Sk*	*Ku*
UI-SIQ 1	.71	.91	0	4	1.08	.21
UI-SIQ 2	.45	.70	0	4	1.62	2.41
UI-SIQ 3	.40	.68	0	4	1.82	3.27
UI-SIQ 4	.39	.68	0	4	2.00	4.53
UI-SIQ 5	.81	.97	0	4	0.86	-.48
UI-SIQ 6	.43	.72	0	4	1.77	2.80
UI-SIQ 7	.70	.92	0	4	1.08	.03
UI-SIQ 8	.43	.71	0	4	1.75	2.75
UI-SIQ 9	.37	.67	0	4	2.01	4.03

Model refinement

During model refinement, the initially proposed second-order structure, comprising cognitive, emotional, and behavioural first-order factors loaded onto a higher-order SI factor, was re-evaluated in light of empirical constraints. A perfect correlation between the higher-order SI factor and emotional factor (r = 1.00) indicated empirical redundancy and a lack of discriminant validity, rendering the second-order specification psychometrically untenable. Consequently, the model was represented as a single first-order factor.

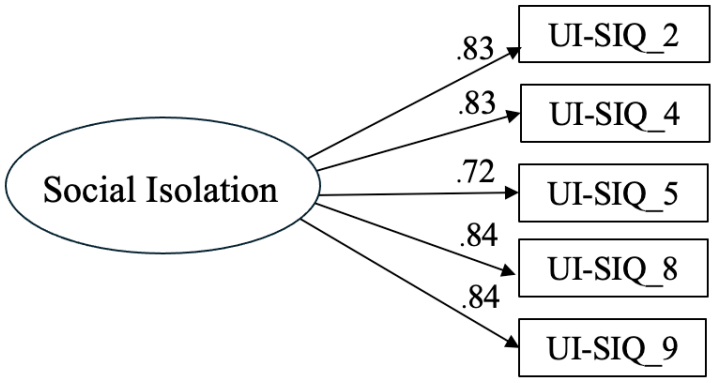
At the item level, four items were removed to improve the model parsimony and fit. Items 3, 6, and 7 were excluded because of their conceptual redundancy and low item-specific variance. Item 1 was removed based on large modification indices and substantial residual correlations that negatively impacted global model fit. Additionally, the originally proposed cognitive factor did not demonstrate sufficient empirical distinctiveness or substantive contribution and was therefore discarded. However, Item 9, originally assigned to the cognitive domain, demonstrated both conceptual and empirical alignment with behavioural withdrawal and was retained under the unified SI factor.

The final model, supported by the CFA, retained five items (2, 4, 5, 8, and 9) reflecting CBT-consistent mechanisms associated with UI-related SI. These items capture both a behavioural dimension (e.g., avoidance and social withdrawal) and an emotional dimension (e.g., loneliness and self-stigma), indicating that these domains function as the interdependent components of a single latent construct. This unidimensional structure aligns with theoretical expectations derived from CBT, wherein behavioural disengagement and negative affective states are conceptualised as mutually reinforcing processes that contribute to SI. The resulting factor structure is also consistent with PROM development in clinical conditions, where psychosocial constructs frequently emerge as unified dimensions encompassing cognitive, emotional, and behavioural markers (Lam & Cheng, 2001; Redding et al., 2011).

Factor-related validity evidence. Validity evidence based on the internal structure was demonstrated by the excellent fit of the factor structure (CFI = .996, TLI = .992, RMSEA = .039, SRMR = .02; see Figure 10), although it was nearly saturated with four degrees of freedom. Additional evidence, including strong standardised factor loadings and high internal consistency estimates, substantiates the factorial validity evidence of the UI-SIQ.

Figure 10

First-order Latent Factor Structure of the Reduced Five-item Version of the UI-SIQ in a Sample of Portuguese Women (n = 1,538)



Note. First-order latent loadings for each item are presented.

To maximise the estimation of SI, only the five items with factorial weights above .5 from the original scale were retained on a single latent factor: (1) "Having incontinence makes me decline invitations to go out, or be with friends/family"; (2) "I often feel isolated from others"; (3) "Urine loss makes me feel bad about myself"; (4) "I feel misunderstood by others"; and (5) "I avoid meeting new people". The selected items demonstrated adequate standardised factor loadings ($.72 \leq \lambda \leq .93$) and individual reliability.

Internal consistency reliability. Internal consistency reliability was evaluated using alpha (α) and omega (ω) coefficients. The UI-SIQ demonstrated excellent internal consistency, with $\alpha_{ordinal} = .95$, and $\omega = .90$.

Measurement invariance of the UI-SIQ. Measurement invariance was tested using a Multigroup Confirmatory Factor Analysis (MGCFA). For this purpose, the total sample was randomly divided into two equal subsamples (50–50%) using SPSS randomisation procedures (see Table 27). A series of hierarchically nested models were used to assess increasingly restrictive levels of invariance. The results supported configural, metric, scalar, and strict invariance across the two subsamples, providing additional validity evidence based on internal structure.

Table 27

Measurement Invariance of the UI-SIQ

Model	Df	c^2	Dc^2	DDf	P[Dc^2>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	10	194.293	—	—	—	.961	.156	.000	.000
Metric	14	195.204	.439	4	.979	.962	.131	.001	-.025
Scalar	18	200.883	5.702	4	.223	.962	.116	.000	-.015
Strict	19	201.196	.316	1	.574	.962	.113	.000	-.003

Note. Df = degrees of freedom; c^2 = chi-square value; Dc^2 = difference in chi-square from the previous model; DDf = difference in degrees of freedom from the previous model; P[Dc^2>] = p-value for the chi-square difference test.

Structural invariance of the UI–SIQ across UI types. To examine whether the initial one-factor model remains consistent across different UI types (Table 28), a series of hierarchical models with equivalent indicators are needed. Given the ordinal nature of the scales, this analysis carefully accounted for non-continuous data properties. As a result, structural invariance analysis was performed across UI types. Multigroup analysis confirmed the measurement invariance of the one-factor model across the UI. This finding indicates that the UI-SIQ maintains the same factorial structure, factor loadings, item intercepts, and residual variances across the groups.

Table 28

Multigroup Invariance of the One-factor Model of the UI-SIQ across UI Types

Model	Df	c^2	Dc^2	DDf	P[Dc^2>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	20	175.184	—	—	—	.963	.143	.000	.000
Metric	32	202.308	16.990	12	.15	.959	.119	-.004	-.025
Scalar	44	325.457	105.385	12	.00	.933	.130	-.027	.011
Strict	47	545.522	—	3	—	.881	.167	-.052	.037

Note. Df = degrees of freedom; c^2 = chi-square value; Dc^2 = difference in chi-square from the previous model; DDf = difference in degrees of freedom from the previous model; P[Dc^2>] = p-value for the chi-square difference test.

These results further support the validity evidence based on the internal structure, demonstrating that the retained items represent the underlying construct of SI in women with UI.

Validity Evidence based on Relations to Other Variables

Convergent validity evidence

Pearson correlation analysis between the UI-SIQ total score and the total scores of dimensions 4 (Physical Limitations) and 5 (Social Limitations) of the KHQ revealed a strong positive correlation ($r = .594$, $p < .001$). This finding provides robust convergent validity evidence,

supporting the validity of relation-to-other variables, indicating that the UI-SIQ is strongly associated with similar constructs measured by related instruments.

Discussion

This study aimed to validate the psychometric properties of the proposed one-factor model of the Urinary Incontinence Social Isolation Questionnaire (UI-SIQ), focusing on its reliability, validity, and utility as a concise measure of SI in women with UI (Appendix L). Additionally, this study examined the structural robustness of the UI-SIQ across different UI types to ensure its broad applicability. To our knowledge, this is the first condition-specific instrument developed to assess SI in the UI context.

Although the model is near-saturated and the results should be interpreted with caution, additional sources of validity evidence support its use. The UI-SIQ demonstrated excellent fit indices (CFI = .996, TLI = .992, RMSEA = .039, SRMR = .021, near-saturated model with 4 degrees of freedom). However, these results should be interpreted cautiously. Given the scale's brevity and the relatively small number of estimated parameters, the model almost approaches saturation, which inherently limits the discriminative power of the fit indices. Therefore, a strong model fit must be considered along with the theoretical foundations, reliability estimates, convergent validity evidence, and measurement invariance findings to fully support the scale's psychometric robustness.

Internal consistency estimates were equally strong ($\alpha = .95$, $\omega = .90$), confirming the scale's reliability in capturing SI among middle-aged women with UI.

The results demonstrated strong measurement invariance across groups, as evidenced by non-significant chi-square difference tests and minimal changes in CFI and RMSEA values across the increasingly constrained models. This supports the validity of comparing latent constructs between groups and aligns with previous findings in the literature, providing external evidence for the robustness of the measurement model (Cheung & Rensvold, 2002).

Moreover, the structural invariance of the UI-SIQ across UI types strengthens its clinical and research utility. Its ability to capture the same construct across diverse UI presentations supports its use in heterogeneous clinical samples and comparative research designs. Thus, the scale functions equivalently, ensuring that comparisons of SI scores are meaningful and valid regardless of the type or severity of the UI.

The UI-SIQ also demonstrated convergent validity, as evidenced by a strong positive correlation ($r = .594$, $p < .001$) with the Physical and Social Limitations dimensions of the King's Health Questionnaire (KHQ). This finding reinforces the capacity of the UI-SIQ to measure the key psychosocial outcomes associated with UI. Furthermore, the strong association with a widely recognised gold standard instrument in the urology field (KHQ) provides additional support for the clinical and research utility of the UI-SIQ.

The unexpectedly low mean SI score observed in women with UI in this study warrants consideration of the sample characteristics. A notable proportion of participants reported professional engagement and stable sexual-affective relationships, suggesting that they maintained social and interpersonal activities. Furthermore, the high prevalence of higher education within the cohort may correlate with enhanced health literacy and broader access to social support structures (Manso et al., 2023). Clinically, the predominantly mild to moderate UI severity in this sample likely minimised substantial disruption to daily routines and social engagement (Kinchen et al., 2003). Moreover, the relatively low incidence of self-reported depression and anxiety, both of which are well-established contributors to UI (Felde et al., 2017) and SI, may have further attenuated the tendency toward social withdrawal in this sample.

Its concise format enables the rapid identification of SI in women with UI, facilitating timely interventions. The strong psychometric properties, including its one-dimensionality and internal consistency, provide a reliable foundation for assessing the psychosocial consequences of UI and support the development of tailored therapeutic strategies aimed at improving women's QoL. Furthermore, the demonstrated structural invariance across UI types broadens their applicability to diverse clinical and research samples.

Framed within the CBT in understanding (Molinuevo & Batista-Miranda, 2012) and treating UI (Cuijpers et al., 2008; Dowd & Dowd, 2006; Garley & Unwin, 2006; Perry et al., 2006; Reisch et al., 2021; Steenstrup et al., 2022), the final unidimensional solution exhibits strong theoretical and empirical coherence. The retained items capture a constellation of processes—including avoidance and social withdrawal (behavioural dimension), negative self-beliefs (cognitive dimension), and distressing affective states (emotional dimension), that collectively sustain SI in the context of UI (Steenstrup et al., 2022b). Although the originally hypothesised cognitive factor was not retained as a distinct latent construct, its core content was preserved. For example, Item 9, initially mapped to the cognitive domain, functioned empirically as a marker of

behavioural disengagement, illustrating the conceptual interdependence between thought patterns and behavioural expression.

The perfect correlation between SI and the emotional factor (r = 1.00) indicated construct redundancy, with overlap reflecting common experiences, such as loneliness, sadness, and frustration. These findings reinforce the need for comprehensive biopsychosocial approaches to UI, in which emotions are addressed alongside physical symptoms, to improve assessment sensitivity and guide more effective interventions.

The UI-SIQ is a brief PROM specifically developed to assess the SI in women with UI. Its brevity and theoretical clarity make it well-suited for both time-limited clinical workflows and research applications. Designed for use by both specialist and non-specialist clinicians, it can be easily integrated into diverse healthcare settings. The current findings support several key applications of UI-SIQ. First, it can serve as a screening and triage tool in primary care, urogynecology, and pelvic health physiotherapy by identifying elevated SI even when UI symptom severity is modest. Second, it facilitates belief-aligned communication by validating patients' lived experiences, providing accessible explanations of modifiable psychological and behavioural mechanisms, and introducing strategies for graded re-engagement with socially meaningful activities. Third, the UI-SIQ may be used to monitor changes over time; repeated administration along with symptom-specific measures (e.g., the ICIQ-UI SF) can track behavioural re-engagement and psychosocial outcomes. Finally, it can inform referral decisions by identifying individuals with high levels of SI despite mild UI symptoms, which may indicate a need for additional psychosocial support or structured behavioural intervention.

Its unidimensionality, strong internal consistency, and demonstrated measurement/structural invariance across UI types provides a reliable foundation for assessing psychosocial consequences and monitoring responses to interventions in diverse clinical and research samples.

Despite these strengths, several limitations should be acknowledged. Although the UI-SIQ was theoretically grounded in CBT, we recognise that item generation was not preceded by formal cognitive interviewing or item-pool generation from clinical sessions, which are often integral to the CBT-based scale development. However, the final items retained in the unidimensional model correspond closely with CBT components of SI in UI—avoidant behaviour, affective withdrawal,

and negative self-evaluation—thus offering a psychometrically sound and theoretically coherent measurement of the construct.

First, this study did not assess validity evidence based on test content or response processes. Future research should incorporate qualitative methods such as cognitive interviews to evaluate the relevance and clarity of the items, ensuring greater alignment with the lived experiences of women with UI (American Educational Research Association et al., 2014). Second, the cross-sectional design limited the ability to assess the scale's sensitivity to changes over time, which is an important aspect for evaluating intervention outcomes. To address this limitation, longitudinal research is recommended. Third, the non-probabilistic sample method limits the generalisability of the findings; however, the large sample size ensures adequate sampling of population variance. Future studies should explore the applicability of the UI-SIQ among younger women and across different cultural backgrounds, and further investigate the scale's responsiveness to therapeutic interventions, as well as test-retest reliability.

Although the development of the UI-SIQ was theoretically grounded in CBT, item generation did not include cognitive interviewing or item derivation from clinical interactions—methodological steps commonly recommended to strengthen content and response process validity (American Educational Research Association et al., 2014). Despite this limitation, the retained items in the final unidimensional model closely reflected core CBT constructs relevant to SI associated with UI, including behavioural avoidance and withdrawal, emotional disengagement, and negative self-evaluation. These alignments contribute to a psychometrically coherent and theoretically defensible assessment of SI in this sample. However, the lack of targeted qualitative procedures remains a critical issue.

The lack of formal evaluation of the content and response process validity presents a challenge for interpreting item clarity and respondent understanding. Without evidence derived from cognitive interviews or think-aloud protocols, assumptions regarding item relevance and interpretive processes are inferential. Future studies should incorporate structured cognitive interviews and expert reviews to provide empirical support for content validity, in alignment with established validation standards (AERA et al., 2014).

Another limitation is the cross-sectional nature of the study design, which precludes the evaluation of the UI SIQ's sensitivity to change over time. Responsiveness, defined as the instrument's ability to detect meaningful changes in SI, is essential for its application in

interventional research. Longitudinal research is therefore needed to estimate responsiveness and establish minimally important differences. In addition, the inclusion of test–retest reliability assessments would allow for the evaluation of temporal stability.

The sampling procedures also warrant careful consideration. The reliance on online non-probabilistic recruitment methods may introduce coverage and self-selection biases, potentially limiting the generalisability of the findings. Although the sample size was substantial, replication studies using probability- or clinic-based samples are necessary to support broader population-level inferences. Future work should also include younger cohorts and culturally diverse samples to test the measure's transportability in demographic and sociocultural contexts.

Methodologically, the factor model used was near-saturated, with few free parameters, which can inflate global model fit indices and obscure misfits. Future model evaluations should interpret fit indices in conjunction with theoretical coherence, internal consistency, convergent validity, and measurement invariance. Testing alternative structural models in independent samples would further bolster the construct validation.

Another important limitation is that the CFA and MGCFA were conducted using the same overarching sample. While this raises the risk of overfitting, this concern was partially mitigated through random sample splitting, the use of robust estimation methods (e.g., DWLS), and adherence to a parsimonious modelling approach. Nevertheless, pre-registered replication studies using external samples from various clinical and community settings are essential to confirm the generalisability and stability of the structure of the measure.

Invariance across age groups could not be evaluated owing to sample limitations, including overlapping menopausal status and insufficient subgroup sizes. As a result, the extent to which the UI SIQ is generalisable across different age groups remains unclear. Future studies should be powered to test for age-by-status invariance, especially in midlife and older adult samples.

In conclusion, the UI-SIQ appears to be a reliable, valid, and efficient instrument to assess SI in women with UI. Its foundation in CBT theory strengthens construct validity, consistent with the longstanding principle that robust theoretical underpinnings are essential for meaningful psychological measurements (Cronbach & Meehl, 1955). The instrument's internal consistency, convergent validity, evidence of measurement, and structural invariance support its use in both research and time-limited clinical settings. By enabling systematic identification and evaluation of

SI, the UI-SIQ has the potential to complement symptom-based assessments and provide more comprehensive, patient-centred approaches to UI management.

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Empirical Study 7. Dysfunctional Urinary Incontinence Strategies: A Mediation Model to explain why Urinary Incontinence Symptoms are Associated with Social Isolation among Women

Abstract

Introduction: Female urinary incontinence (UI) can lead to social isolation (SI). To reduce UI's probable impact, women tend to self-manage their symptoms and employ coping strategies which can sometimes be dysfunctional and exacerbate SI. UI dysfunctional coping strategies are primarily employed as a means of self-management, with women failing to engage in efforts to seek treatment. Literature regarding the mediating role of dysfunctional UI strategies in the relationship between UI severity and SI is scarce. Therefore, this study investigated the mediating role of dysfunctional UI hiding and defensive coping strategies in explaining the relationship between UI severity and SI, among middle-aged women experiencing stress, urgency, and mixed UI.

Method: The study adopted a cross-sectional, observational, descriptive, and correlational design, and recruited 1090 women online (social media) aged 40–65 years, who reported occasional or frequent urine loss and were not receiving any treatment for UI. The predictor was symptom severity; the mediator outcome was dysfunctional UI strategies, and the main outcome measure was SI.

Results: Mediation analysis with structural equation modelling indicated that dysfunctional coping strategies significantly mediated the relationship between UI severity and SI, explaining a variability of .45 in SI. The direct effect between UI severity and SI was non-significant when indirect paths were included. Multigroup analysis indicated that the mediation model was consistent across different UI types, showing that the influence of dysfunctional strategies on SI was similar, regardless of the UI type.

Discussion: UI severity influences social isolation through coping behaviours focused on defensive and hiding behaviours in women who have not sought treatment for UI and across the different UI types, highlighting the importance of addressing these strategies in healthcare interventions. Tailoring interventions to modify maladaptive coping strategies is crucial for reducing SI, and enhancing the quality of life of women experiencing UI.

Keywords: Coping Strategies; Dysfunctional Coping Strategies; Female Urinary Incontinence; Mediation Analysis; Middle-Aged Women; Social Isolation; Urinary Incontinence Severity.

Introduction

Urinary incontinence (UI), a public health concern that exhibits a notable prevalence (30–40%) among menopausal women (Abrams et al., 2015; Milsom & Gyhagen, 2019), is often underreported, underdiagnosed, and undertreated, and tends to increase with population ageing (Abrams et al., 2015). It exerts a multifaceted impact, affecting not only physical and psychological health, but also professional, sexual, and sociocultural dimensions, engendering a profound impairment in the quality of life (QoL) (Ugurlucan et al., 2020).

Literature highlights social isolation (SI) as a noteworthy consequence of UI (Biordi & Nicholson, 2013; Ricci et al., 2001; Tannenbaum et al., 2015). A considerable proportion of women with UI often experience feelings of shame, leading them to abstain from engaging in social activities, but despite these potential consequences, only a minority actively seek professional care, especially during its initial stages (Tannenbaum et al., 2015; Waetjen et al., 2018). Reported reasons for not seeking treatment include dysfunctional beliefs (e.g., UI is a normal part of ageing), embarrassment and shame, failure to recognise the symptoms as abnormal, and feeling capable of self-management. Moreover, treatments are perceived as being scarce, costly, ineffective, and invasive (Diokno et al., 2004; Ricci et al., 2001; Waetjen et al., 2018).

Despite this lack of seeking medical assistance, UI symptoms impact daily living, and to continue with their regular activities, women tend to resort to self-management coping strategies (Diokno et al., 2004; Waetjen et al., 2018; Hayder & Schnepp, 2010). These strategies can be categorised into two distinct approaches: 1) functional—behavioural adaptations to minimise/treat UI symptoms and to mitigate the impact of symptoms in social settings (e.g., adopting practical measures, like knowing nearby restrooms' location when leaving the house, seeking professional help (Bilgic et al., 2017; Peek et al., 2016; Pintos-Díaz et al., 2019; Ricci et al., 2001; St John et al., 2013), 2) dysfunctional, that is, avoidance strategies to conceal the condition from others (e.g., restricting both social and previous recreational activities, refraining from sexual contact) and hiding strategies to disguise urine loss, such as always wearing sanitary pads as an alternative to effective continence promotion (Diokno et al., 2004). Hence, these strategies only serve the purpose of managing the condition in daily life, often leading to (1) restriction of social activities and (2) lack of focus on finding solutions to minimise and potentially treat UI, or implement behavioural changes for healthy bladder management and pelvic floor muscle exercises (PFME) adherence (St

John et al., 2013; Xu et al., 2016).

UI is a condition that may require ongoing and routine management. One must address that depending on the context, the same coping strategy, such as using containment products, may be adaptive or maladaptive. Arguably, they are adaptive if used within a broader, proactive approach to UI management, providing security and enabling women to maintain social engagement while pursuing long-term solutions, such as pelvic floor muscle exercises or medical interventions (Anders, 2000). They are maladaptive if they become the primary or sole strategy for managing UI, especially without efforts to seek treatment. Over-reliance on containment products can create a false sense of security, delay help-seeking, and allow the condition to worsen, leading to increased distress and reduced quality of life (St John et al., 2013).

The role of dysfunctional UI coping strategies on SI remains unclear, as most studies have primarily concentrated on (1) daily-living management of UI, (2) coping styles to mitigate UI symptoms, and (3) treatment adherence (Bilgic et al., 2017; Peek et al., 2016; Pintos-Díaz et al., 2019; St John et al., 2013). Considering the aforementioned gap in the literature, and that UI-related symptom severity and dysfunctional strategies can potentially significantly worsen SI, this study aimed to explore the potential mediating role of dysfunctional UI strategies in the influence of UI on SI.

Materials and Methods

Design

This study adopted a cross-sectional, observational, descriptive, and correlational design.

Participants

Overall, 1606 women who self-reported occasional or frequent urine loss (M_{age} = 50.19, *SD* = 6.58) were recruited. The criteria for inclusion in this study were as follows: (1) age ranging from 40 to 65 years; (2) female sex; (3) positive response to a question about experiencing involuntary urine loss during intra-abdominal pressure increment and/or when feeling an uncontrollable urge to urinate, occasionally or frequently; and (4) access to the internet. The exclusion criteria were: (1) being pregnant or < six months post-partum; (2) having undergone a UI surgery; (3) having an oncological disease; (4) having neurological disabilities; and (5) experiencing pelvic organ prolapse. After excluding 56 and 12 women owing to previous UI-related surgeries and refusal to

provide informed consent, respectively, 1538 women were initially selected. And since the focus was on dysfunctional strategies, only those who had not received any treatment for UI, while experiencing the condition, were included (n = 1090).

This study followed Hair et al.'s (2009) proposal for calculating the minimum sample size: a minimum of 5–10 participants per manifest variable.

Measures

Self-reported questionnaires were administered to collect data on sociodemographic characteristics, clinical details, lifestyle factors, and information related to urinary incontinence (Tables 29 and 30).

Table 29

Sociodemographic Characteristics of Participants

Characteristics	*N*	*%*
Age range (in years)		
40−44	235	21.6
45−49	305	28.0
50−54	262	24.0
55−59	187	17.6
60−65	101	9.3
Nationality		
Portuguese	1042	95.6
Other	48	4.4
Level of education		
4th grade	7	.6
9th grade	89	8.2
12th grade	333	30.6
Bachelor's degree	408	37.4
Postgraduate degree	226	20.7
Doctorate	27	2.5
Professional status		
Active	899	82.5
Inactive	191	17.5
Sexual-affective relationship		
Yes	853	78.3
No	237	21.7
Number of biological children		
0	118	10.8

1	332	30.5
2	473	43.4
3	131	12.0
≥ 4	36	3.3

Note. UI = Urinary incontinence.

Table 30

Clinical Characteristics and Lifestyle Habits of Participants

Characteristics	*N*	*%*
Number of vaginal deliveries		
0	335	30.7
1	295	27.1
2	339	31.1
3	94	8.6
≥ 4	27	2.5
Number of caesarean deliveries		
0	744	68.3
1	215	19.7
2	98	9.0
3	26	2.4
4	7	.6
Perineal laceration		
Yes	566	51.9
No	524	48.1
Physical illness diagnosis[a]		
No	710	65.1
Yes	380	34.9
Asthma	39	3.6
Hypothyroidism	27	2.5
Diabetes	26	2.4
Hypertension	56	5.1
Mental illness diagnosis[a]		
No	917	84.1
Yes	173	15.9
Depressive disorder	97	8.9
Anxiety disorder	49	4.5
Obsessive disorder	3	.3
Menopausal status		
Premenopause	257	23.6
Perimenopause	397	36.4

Postmenopause	436	40.0
Medical help to manage menopausal symptoms		
Yes	470	43.1
No	620	56.9
Coffee intake		
Yes	910	83.5
No	180	16.5
Hot/cold beverages intake		
Yes	927	85.0
No	163	15.0
High impact physical activity		
Yes	146	13.4
No	944	86.6
BMI Status		
Underweight (BMI < 18.5 kg/m^2)	25	2.3
Normal weight (BMI 18.5–24.9 kg/m^2)	450	41.3
Overweight (BMI 25.9–29.9 kg/m^2)	394	36.1
Obesity class I (BMI 30–34.9 kg/m^2)	167	15.3
Obesity class II (BMI 35–39.9 kg/m^2)	40	3.7
Obesity class III (BMI > 40 kg/m^2)	14	1.3
UI Types		
Stress[a]	211	19.4
Urgency	71	6.5
Mixed	145	13.3
UI severity		
Mild to Moderate	929	85.2
Moderate to Severe	161	14.8
Treatment for UI		
Yes	—	—
No	1090	100.0
Prescribed UI medication		
Yes	—	—
No	1090	100.0
Pelvic floor muscle exercise		
Yes	—	—
No	1090	100.0

Note. UI = Urinary incontinence. [a] Most prevalent self-reported diagnosis.

The different UI types were evaluated using the Questionnaire for Urinary Incontinence Diagnosis (QUID; Bradley et al., 2010), specifically tailored for identifying UI in women. The

diagnostic threshold for stress and urge UI was set at scores of ≥ 4 and ≥ 6, respectively. The classification of mixed UI depended on meeting both criteria simultaneously (Table 31).

Table 31

Severity and UI Types per Menopause Status

UI Characterisation	Total	Premenopause *n* (%)	Perimenopause *n* (%)	Postmenopause *n* (%)
UI Severity				
Mild to Moderate UI	929	229 (24.7)	343 (36.9)	357 (38.4)
Moderate to Severe UI	161	20 (12.4)	57 (35.4)	84 (52.2)
Types of UI				
Stress UI	211	58 (27.5)	86 (40.8)	67 (31.8)
Urge UI	71	11 (15.5)	30 (42.3)	30 (42.3)
Mixed UI	145	20 (13.8)	67 (46.2)	58 (40.0)
Below Diagnostic Threshold for Any UI	663	160 (24.1)	220 (33.2)	283 (42.7)

Note. UI = Urinary Incontinence. A chi-squared test of independence showed a significant association between UI types/severity and menopausal status ($\chi 2$ (10) = 36.997, $p < .001$).

Participants' menopausal stages were determined according to the guidelines outlined in the Stages of Reproductive Ageing (STRAW; Soules et al., 2001). According to their self-reports, they were classified into three categories: 1) pre-menopausal, indicating no changes in menstrual cycle regularity; 2) peri-menopausal, characterised by variable cycle lengths (deviating by > seven days from their typical cycle) or the absence of two or more cycles, resulting in an amenorrhea period > sixty days; and 3) postmenopausal, defined as having experienced at least twelve consecutive months of amenorrhea.

Endogenous variable – SI

The **Urinary Incontinence Social Isolation Questionnaire** (UI-SIQ) was developed for use in research and clinical contexts. UI-SIQ is a brief five-item instrument from an initial nine-item pool to assess SI in women with UI. It was developed by this team (health psychologists and a gynaecologist), and created based on the theory regarding SI in urological conditions. The UI-SIQ contains items assessing emotional, cognitive, and behavioural domains of social isolation related to UI. Three items were eliminated owing to their low factorial loadings, while one was removed following the identification of potential issues through modification indices.

Confirmatory factor analysis (CFA) supported the existence of a unidimensional first-order

structure (comparative fit index [CFI] = .989; Tucker–Lewis index [TLI] = .995; root mean square error of approximation [RMSEA] = .039; standardised root mean square residual [SRMR] = .006; Porto et al., 2024). To optimise the estimation of SI, from the original scale loading, only five items that displayed optimal psychometric properties on a single factor were used: (1) "Having incontinence makes me decline invitations to go out, or be with friends/family"; (2) "I often feel isolated from others"; (3) "Urine loss makes me feel bad about myself"; (4) "I feel misunderstood by others"; and (5) "I avoid meeting new people". A Likert scale was used ranging from "1 – Strongly Disagree" to "4 – Strongly Agree". The total score ranged from 4 to 20, with higher scores indicating increased levels of SI.

No severe violations of normality existed, as all the items presented adequate absolute values of skewness and kurtosis ($.07 \leq |Sk| \leq 2.00$, $1.20 \leq |Ku| \leq .4.00$). All the final items had significant and adequate standardised factor loadings ($.72 \leq \lambda \leq .93$) and individual reliability. Goodness-of-fit indices indicated a very good fit of the factor structure (CFI = .989, TLI = .995, RMSEA = .039, SRMR = .006), supporting validity evidence based on the internal structure.

Convergent validity evidence based on the internal structure [average variance extracted (AVE) = .80] and internal consistency reliability of data gathered with UI-SIQ ($\alpha = .95$, $\omega = .90$) were excellent.

Exogenous variable - UI Symptom Severity

The **King's Health Questionnaire Symptom Severity Scale** (KHQSSS) includes a separate nine-item symptom checklist from the King's Health Questionnaire (Kelleher et al., 2004) for measuring the severity of UI symptoms. Four items were eliminated from the initial subscale (factor loadings exceeding one, indicating full redundancy with other items of the same construct). Therefore, from the initial subscale, the final structure entailed five items: 1) "Frequency: going to the toilet very often", 2) "Nocturia: getting up at night to pass urine", 3) "Urge incontinence: urine leakage associated with a strong desire to pass urine", 4) "Stress incontinence: urine leakage with physical activity (e.g., coughing, running)" and 5) "Waterworks infections". A Likert scale from "1 – Does not apply" to "4 – Very much apply" was used; scores ranged from 4 to 20, with higher scores indicating a higher severity of symptoms. No severe violations existed as all the items displayed adequate absolute values of skewness and kurtosis ($.07 \leq |Sk| \leq 2.01$; $.69 \leq |Ku| \leq 1.28$). All the final standardised factor weights were significant and adequate ($.51 \leq \lambda \leq .85$). Goodness-

of-fit indices suggested a very good fit of the factor structure (CFI = .983, TLI = .965, RMSEA = .070, SRMR = .036), supporting its validity based on the internal structure. Convergent validity evidence based on the internal structure was also observed (AVE = .512). The data gathered with KHQSSS showed acceptable internal consistency reliability (α = .74, ω = .73).

Endogenous Variable – UI Dysfunctional Strategies

The **Dysfunctional UI Strategies Instrument**, developed by this research team, employs a two-factor structure for evaluating maladaptive coping strategies related to UI management, drawing from the research of Diokno et al. (2004). The hiding coping dimension includes five strategies aimed at hiding urine stains (e.g., "using feminine hygiene pads", "wearing dark clothes to conceal urine stains"). Conversely, the defensive coping dimension consists of eight strategies focused on controlling urine loss (e.g., "limiting fluid intake", "limiting physical exercise"). Responses were collected using a Likert scale ranging from "1 – Never" to "5 – Always". The total score varied between 13 and 65, with higher scores reflecting greater dysfunctionality in coping strategies in women who were not receiving any treatment for UI. No severe violations of normality were found as all the items displayed adequate absolute values of skewness and kurtosis ($1.04 \leq |Sk| \leq 2.5$; $.29 \leq |Ku| \leq 3.94$). The final items presented adequate and significant standardised factor weights ($.51 \leq \lambda \leq .95$) and individual reliability. According to goodness-of-fit indices, the factor structure demonstrated a good fit (CFI = .986, TLI = .984, RMSEA = .074, SRMR = .058), indicating factorial validity evidence. The defensive and hiding subscales had adequate AVE values of .69 and .54, respectively, supporting convergent validity based on the internal structure evidence. Discriminant validity evidence was confirmed between the subscales (r^2 = .402). Both subscales exhibited good internal consistency reliability (defensive: α = .94; ω = .92; hiding: α = .80; ω = .83).

Procedure

This study's data were collected during the COVID-19 pandemic (March to October 2020) using Google Forms—an online survey platform—which included all the measures previously described (Appendix D). Owing to COVID-19, a contingent plan was established as an alternative to the original plan of recruitment in hospital settings. Participant recruitment involved invitations distributed through social media channels, particularly Facebook. A brief outline of the research and its objectives was disseminated among various groups of middle-aged/menopausal women.

Data Analyses

Statistical analyses were performed using IBM SPSS Statistics 27.0 and the R 4.0 statistical system (R Core Team) via RStudio. Pearson's correlations were employed to verify the possible associations between UI severity and defensive and hiding coping; between hiding and defensive coping and SI; and between UI severity and SI. Pearson's correlations were considered high if > .50, low if < .20, and moderate if in between (Fornell & Larcker, 1981).

The items' distribution properties were evaluated using descriptive statistics, including the mean (*M*), standard deviation (*SD*), skewness (*Sk*), and kurtosis (*Ku*), which were calculated using the multivariate normality (MVN) library in the R statistical system. The items with absolute values of *Sk* and *Ku* above 3 and 7, respectively, were considered severe violations of the normal distribution assumption (Marôco, 2021).

The evaluation of multicollinearity among the independent variables was conducted by employing the variance inflation factor (Fornell & Larcker, 1981). A value below 5 indicates the nonexistence of multicollinearity. Lastly, the evaluation of outliers was performed using the Mahalanobis distance (Fornell & Larcker, 1981; Marôco, 2021).

To assess validity evidence based on the internal structure, CFA was conducted on the current sample's instruments. The diagonally weighted least squares (DWLS) estimation method—specifically tailored for ordinal data—was employed using the Lavaan package (v. 0.6–14) for the R statistical system (Finney et al., 2016). Error term correlations were applied based on the analysis of modification indices (MI > 11; $p < .001$) alongside theoretical considerations. The internal consistency reliability was derived from ordinal α—from the polychoric correlation matrix—and ω coefficients (Fornell & Larcker, 1981). For both coefficients, values above .70 yielded acceptable reliability of the scores (Fornell & Larcker, 1981). Convergent validity evidence regarding internal structure was assessed when AVE was higher than .50, following Fornell and Larcker's criterion (Finney et al., 2016; Marôco, 2021). Discriminant validity evidence (Marôco, 2021) was established when AVE was higher than the inter-factor squared correlation (r^2).

Following the assessment of good psychometric properties of the measurement model, a mediation analysis was undertaken using maximum likelihood estimation (MLR) in the Lavaan package to examine the hypothesised associations and mediation effects among the study variables. Specifically, the analysis aimed at determining whether dysfunctional UI hiding and defensive

coping strategies mediate the relationship between UI severity and SI, in women who were not undergoing any treatment for UI while self-reporting this condition.

The criteria used to assess goodness of fit included the CFI, TLI, RMSEA, and SRMR. A CFI and TLI score above .9, as well as an SRMR and RMSEA score below .08, were considered indicative of an acceptable model fit (Byrne, 2016).

A multigroup analysis was conducted to assess the proposed model's equivalence across the three UI types: stress, urgency, and mixed UI. This analysis evaluated configural, metric, scalar, and strict invariance by utilising nested models that progressively imposed constraints on factor loadings, intercepts, and error variances. Invariance was determined by examining changes in fit indices, specifically ensuring that $|\Delta CFI|$ was $< .01$ and $|\Delta RMSEA|$ was $\leq .02$ between consecutive nested models (Rutkowski & Svetina, 2014). These values indicated the degree of similarity across the three UI types, suggesting the model's equivalence. Metric invariance enables comparing the regression coefficients. Regression invariance means that direct and indirect trajectories do not differ significantly between the three UI types (Rutkowski & Svetina, 2014).

The item "limiting social activities" from the dysfunctional UI strategies instrument was excluded as it was associated with SI, an exogenous variable.

Additionally, a Chi-square Test of Independence was conducted to assess whether there was a significant association between UI severity and the use of feminine hygiene pads (containment products). The threshold for statistical significance was set at $p < .05$.

Results

The sociodemographic and clinical characteristics, along with the UI types of urinary and severity categorised by menopausal status, are presented in Tables 29, 30, and 31.

Brief Description of Hiding Strategies

To conceal urine loss, 35% of women in this sample reported using feminine hygiene pads very frequently or always; 8% reported frequently or always using alternative absorbent materials; and 6% reported using dark clothing very frequently or always.

Correlation Analysis

The data's normality was confirmed, and no missing values were found. The results showed high and positive correlations between UI severity and defensive coping (r = .663, p < .001), and hiding coping (r = .578, p < .001); and between defensive and hiding coping, and SI (r =.634, p < .001); (r =.612, p < .001), respectively. There was also a strong, positive, and significant association between UI severity and SI (r =.601, p < .001).

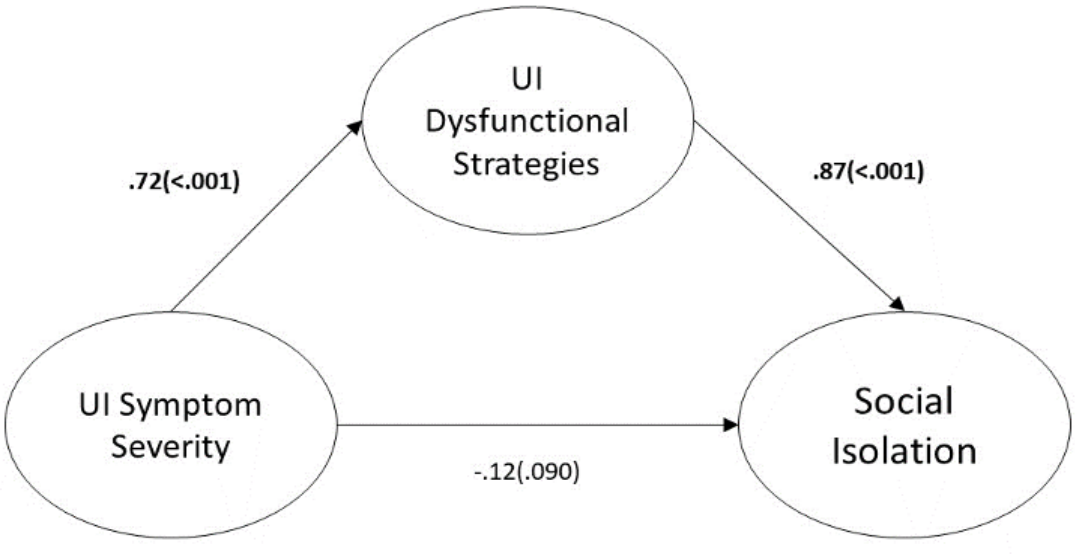
Mediation Analysis

All the instruments presented evidence of sound psychometric properties (reliability and validity related to the internal structure) in this sample.

The parallel mediation model, which investigated the mediating role of defensive and hiding strategies on the relationship between UI severity and SI, showed a good fit (CFI =.921, TLI =.908, RMSEA =.066, SRMR =.064). The direct effect of UI severity on SI was non-significant (β =.008, p =.895). Defensive (β = .216, p < .001) and hiding strategies (β = .255, p < .001) were both significant indirect effects of UI severity on SI, resulting in a total effect of β = .479, p < .001. The model accounted for 44.9% of the variability in SI (R^2 = .449), suggesting that dysfunctional coping strategies mediated the relationship between UI severity and SI (Figure 11).

Figure 11

Mediation Model with Latent Variables



Note. This mediation model showed that dysfunctional UI defensive and hiding strategies are possible mediators in the relationship between UI symptom severity and social isolation. The coefficients presented are standardised linear regression coefficients. The values above and below the observable variables are the standardised factor loadings. UI = Urinary Incontinence. *** *p-value* < .001 (highly significant)
Defensive Indirect effect = a1 × b1; Hiding Indirect effect = a2 × b2

The multigroup analysis showed that regression invariance was established (Table 32). As the mediation model observed in the overall sample was consistent with the model observed for each type of UI, the connection between UI severity and increased SI through maladaptive strategies is generally applicable to all UI types, in women who have UI but are not receiving any treatment.

Table 32
Invariance Analysis through Multigroup Confirmatory Analysis

	Df	Chisq	Chisq.diff	Df. dif	P[Chisq. diff>]	CFI	RMSEA	ΔCFI	ΔRMSEA
Configural	664	1638.784	NA	NA	NA	.903	.074	.000	.000
Metric	712	1739.690	71.645	48	.015	.898	.074	-.005	-.001
Scalar	760	2220.712	427.015	48	.000	.854	.085	-.043	.011
Regressions	772	2264.148	33.337	12	.001	.851	.085	-.003	.000

Note. χ^2 = chi-square; *df* = degrees of freedom; *p* = statistical significance.

Additional Analysis

The Chi-square Test of Independence revealed a significant association between UI severity (mild to moderate; moderate to severe) and the use of feminine hygiene pads (containment products), $\chi 2(4, N = 1090) = 59.99, p < .001$, suggesting that women with more severe UI are more likely to use containment products.

Discussion

This study aimed to explore the possible mediating role of dysfunctional UI strategies in the relationship between UI severity and SI. Its results confirmed the association between UI and dysfunctional coping strategies (Ricci et al., 2001). Previous research showed that women with UI tend to use self-managing strategies, which may be dysfunctional (St John et al., 2013). This study enhances the literature regarding UI and SI, highlighting the crucial role of dysfunctional UI hiding and defensive coping strategies between these variables in women not receiving UI-related treatment and emphasising the need to acknowledge dysfunctional UI behavioural management.

The results show that UI dysfunctional hiding and defensive coping strategies significantly mediate the relationship between UI severity and SI. Defensive coping strategies, such as refraining from locations or activities, where episodes of UI may occur, are designed to alleviate the condition in advance. Although these behaviours may temporarily alleviate the distress associated with the possibility of experiencing urine loss in public, they significantly contribute to social isolation by restricting women's participation in physical and social activities (Bilgic et al., 2017; Diokno et al., 2004; Hayder & Schnepp, 2010; Peek et al., 2016; Pintos-Díaz et al., 2019; St John et al., 2013; Xu et al., 2016).

Similarly, women can manage their symptoms carefully in public by employing hiding strategies, such as the use of absorbent materials or dark clothing to conceal urine stains. Although these behaviours may protect women from public embarrassment, they can also hinder them from seeking assistance or implementing functional strategies to manage UI symptoms, giving them a false sense that they are managing the condition adaptably. This can result in SI, as women may avoid social activities to maintain control over their condition, which increases their social withdrawal (i.e., decreased contact with friends and other social networks) (Bilgic et al., 2017; Diokno et al., 2004; Hayder & Schnepp, 2010; Peek et al., 2016; Pintos-Díaz et al., 2019; St John et al., 2013; Xu et al., 2016).

Our results also highlight that the same underlying process occurs regardless of the specific UI type. These strategies (avoidance and hiding), if used alone and frequently, are dysfunctional, as they might have an immediate protective effect (e.g., in sexual functions) (Ugurlucan et al., 2020; Xu et al., 2016), but are not associated with symptom-mitigation behaviour. As stated in previous research, they would be adaptive if women use them as an attenuating/protective mechanism while also seeking or implementing treatment for UI symptoms (St John et al., 2013; Peek et al., 2016). Thus, interventions that intend to attenuate SI in middle-aged women with UI would benefit from assessing dysfunctional UI strategies and promoting adaptive ones (e.g., bladder training, PFME), as the latter may play a pivotal role in mitigating SI (Biordi et al., 2013; Ricci et al., 2001; Tannenbaum et al., 2015), and enhancing the QoL (Abrams et al., 2015; Biordi et al., 2013; Ugurlucan et al., 2020).

The present study lends insight into why UI severity may be associated with SI. The impact of UI on SI primarily occurs through dysfunctional coping strategies. In this sense, the strategies

women employ to manage their UI symptoms, particularly when they resort to defensive or concealing behaviours, influence their susceptibility to SI. This finding underscores the critical role of coping strategies as mediators in the relationship between UI and SI and the need to assess coping behaviours in parallel to symptom severity in clinical settings.

Additionally, frequent use of containment products, such as feminine hygiene pads or alternative absorbent materials, was observed among women in this study. While these products provide a practical solution for managing symptoms, they may reinforce hiding behaviours and contribute to SI. Women with more severe UI symptoms are more likely to use these products, suggesting that future interventions should focus on transitioning from these temporary solutions to treatment approaches, which may include concomitant use of absorbent products.

The absence of a direct effect of UI severity on SI demonstrates that defensive and hiding behaviours fully explained the association between UI severity and SI in our sample of women. Thus, health professionals must assess how women cope and manage UI – their behaviours - rather than only symptom intensity. Interventions based on the Cognitive Behavioural Therapy (CBT) framework would help to explore and change maladaptive UI-related coping strategies that may lead to SI.

Despite the insights gained from this study, some of its limitations are noteworthy. One such limitation was its sample's low and mild severity of UI symptoms. Furthermore, its cross-sectional structure limited the capacity to ascertain causality between UI symptom severity, dysfunctional UI strategies, and SI. Moreover, dependence on self-reported measures for UI diagnosis and symptom severity could have introduced bias. Finally, as it focused on a specific demographic (i.e., women with internet access), its findings could introduce the potential for significant selection bias and limit the generalisability of its findings.

This study offers interesting insights into the complex interplay between UI and SI among women, clarifying that UI can profoundly impact SI through dysfunctional coping strategies. It also included a significant sample size of 1090 women, and novelty in exploring the mediating role of dysfunctional UI strategies in the relationship between UI and SI, while offering some foundation for understanding and addressing UI´s multifaceted impact. Another strength of the manuscript is its contribution to expanding the diversity of the UI literature, given that most participants are Portuguese. Future studies would benefit from extending their data collection to

clinical settings with objective measures (e.g., physical examination) for clinical validation, greater variance in UI symptom severity, incorporating longitudinal designs, measuring the regularity/consistency/supervision of treatment received, and assessing UI treatment perceived success.

Conclusion

In healthcare interventions addressing UI, and when coping strategies are already dysfunctional, our results shed light on the need for heightened awareness of UI treatment options and interventions to promote adaptive coping strategies (e.g., lifestyle changes, bladder training and PFME) to minimise UI symptoms and prevent SI. This approach would enhance access to care and overall well-being for middle-aged women with UI.

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Empirical Study 8. Urinary Incontinence Severity: The Impact on Workplace Productivity

Abstract

Purpose: Urinary Incontinence (UI) is a highly prevalent yet underreported condition among middle-aged women, with its symptom severity significantly impacting Workplace Productivity (WP). This study aimed to explore the impact of UI symptom severity on the WP of middle-aged women and to investigate the proportion of women who refrain from seeking medical treatment.

Method: A cross-sectional study was conducted with 1,214 Portuguese women aged 40−65 (M_{age} = 49.97, *SD* = 6.74), actively employed and self-reporting occasional/frequent urine loss. All data analyses were done with IBM SPSS Statistics and IBM SPSS AMOS. Structural equation modelling (SEM) was performed to analyse associations while adjusting for confounders such as age, education, menopausal status, BMI, and perceived sleep quality.

Results: The predictive model showed an acceptable fit (CFI = .921; TLI = .850; RMSEA = .076; SRMR = .049). Higher UI symptom severity significantly predicted greater WP impairment (β = .440, $p < .001$). Age (β = -.107, $p = .002$) and education (β = -.061, $p = .020$) were associated with a lower impact of UI on WP, while poor sleep quality was associated with greater WP impairment (β = .121, $p = .006$). Notably, 60% of participants experiencing had not contacted a doctor regarding their symptoms, and 72.7% had never undergone treatment for UI.

Discussion: UI symptom severity negatively impacts WP, yet most affected women do not seek treatment. More effective workplace-based online interventions and accessible UI management strategies are essential to mitigating these effects. Future research should also incorporate objective clinical assessments and explore interventions tailored to different UI subtypes.

Keywords: Urinary Symptoms; Symptom Burden; Occupational Productivity; Help-Seeking Behaviour.

Introduction

According to the International Continence Society (ICS), Urinary Incontinence (UI) is defined as the involuntary loss of urine, affecting approximately 30 to 40% of middle-aged women (Abrams et al., 2018; Mostafaei et al., 2020). Given its high prevalence, UI represents a significant public health concern.

However, only one in four women seek medical treatment, largely influenced by: 1) feelings of shame and social stigma, 2) dysfunctional UI beliefs (e.g., the misconception that UI is a minor problem and an inevitable long-term consequence of the natural ageing process, pregnancy or post-partum), 3) limited awareness regarding available treatments, 4) low expectations of treatment efficiency, and 5) use of defensive and hiding strategies (e.g., avoid certain places, restrict social activities, drink less water); and 6) feeling able to self-manage (Rashidi et al., 2021; Xu et al., 2014).

Several risk factors contribute to UI development, including obesity, ageing, and menopause (Seshan et al., 2016), since UI's incidence is higher in middle-aged women, with a 30-40% prevalence (Minassian et al., 2012). Thus, the rationale for selecting the target population of the present study (40–65 years) stems not only from the increased prevalence of UI during this life stage, but also from the psychological changes associated with menopause, which can exacerbate UI symptoms due to estrogen depletion and weakened pelvic floor muscles (Alperin et al., 2018).

Severity of UI symptoms is, in the vast majority of studies, correlated with the magnitude of its consequences (Abrams et al., 2014). Thus, UI symptom severity exerts a considerable impact on various aspects of these women's lives, encompassing physical (e.g., less energy due to decreased sleep quality), psychological (e.g., low self-esteem), social (e.g., social isolation), sexual (e.g., decreased satisfaction), and economic repercussions (e.g., increased expenses on personal hygiene products) (Caruso et al., 2017; Pizzol et al., 2020). Moreover, there might also be professional consequences associated with UI symptom severity, leading to a decline in Workplace Productivity (WP) (Fultz et al., 2005).

The Organisation for Economic Co-operation and Development (OECD) defines WP as an assessment of the percentage of time or number of days one has (or has not) been productive or functioning well while at work (OECD, 2017). Hence, WP may be impacted by UI symptom severity, stemming from: 1) worries about interrupting work tasks with frequent trips to the

bathroom, 2) concerns regarding work schedule (e.g., long hours without breaks) and location (e.g., distance from home), 3) diminished energy and ability to concentrate and engage in physical activities at work, 4) decreased self-confidence while working, 5) a higher likelihood of hospitals and pharmacies visits during work hours (leading to increased absenteeism), 6) and an elevated tendency to quit their jobs (Lin et al., 2018; Pierce et al., 2017).

Nevertheless, there remains a significant gap in the available literature regarding the impact of IU symptom severity on the WP. To address this research gap, further research is needed. Therefore, the present study aims to explore the impact of UI symptom severity on the WP of middle-aged women while controlling for relevant demographic and clinical variables. This objective was defined to answer the following research question: "Does UI symptom severity significantly predict WP impairment among middle-aged women?". Additionally, this study seeks to assess the proportion of women with UI symptoms who refrain from seeking medical treatment.

It is hypothesised that higher UI symptom severity is associated with a more pronounced negative impact on WP (i.e., diminished WP), and that most women don't contact their doctor regarding UI symptoms and don't undergo any form of treatment. If supported, the findings of this study would underscore the economic and professional implications of UI symptom severity, highlighting the necessity for greater awareness, and for targeted and effective interventions within professional and workplace settings. To strengthen the reliability of our findings, potential confounders such as age, education level, menopausal status, body mass index (BMI), and perceived sleep quality were controlled.

Materials and Methods

Design

The current study follows a cross-sectional, correlational and observational design.

Participants

A total of 1,214 women, self-reporting occasional/frequent urine loss (M_{age} = 49.47, SD = 6.11), were selected (community non-probabilistic sample) through the dissemination of invitations via social media channels (i.e., particularly Facebook) and the distribution of a concise description of the research objectives among diverse groups of middle-aged/menopause-related women.

Inclusion criteria comprised: 1) age (40–65 years), 2) sex (women), 3) reports of occasional/frequent involuntary urine loss experiences when coughing or experiencing an urge to urinate (defined based on participant self-report using validated scales that measure urine loss frequency), 4) current employment status (active and full-time), and 5) internet access.

Exclusion criteria encompassed: 1) pregnancy or being within six months post-partum, 2) prior UI-related surgery; 3) abdominal, gynaecological and breast cancer; 4) presence of neurological disorders; and 5) pelvic organ prolapse. Pelvic organ prolapse was initially screened via self-reported history of prior medical diagnosis and excluded due to its potential confounding effect on UI symptom severity; however, given the limitations of self-reporting, future research should consider alternative approaches for assessment. Table 33 presents participants' characterisation.

Table 33

Sociodemographic Characteristics of Participants (N = 1214)

Characteristics	*N*	*%*
Age range (in years)		
40−44	296	24.4
45−49	339	27.9
50−54	304	25.0
55−59	195	16.1
60−65	80	6.6
Nationality		
Portuguese	1177	97.0
Dual Nationality[a]	37	3.0
Level of education		
4th grade	2	.2
9th grade	83	6.8
12th grade	336	27.7
Bachelor's degree	472	38.9
Postgraduate degree	290	23.9
Doctorate	31	2.6
Sexual-affective relationship		
Yes	961	79.2
No	253	20.8
Number of biological children		
0	124	10.2
1	355	29.2

2	549	45.2
3	158	13.0
≥ 4	28	2.3

Note. [a] holds Portuguese and another nationality.

Measures

Sociodemographic and Clinical Characterisation

Self-reported questionnaires were used to collect sociodemographic characteristics (e.g., age, education level, employment status, number of biological children), clinical details (e.g., obstetric history, diagnosis of physical and mental illnesses), and lifestyle factors (alcohol and tobacco consumption, intake of hot and cold beverages, high-impact physical activity). The data are presented in Table 34.

Table 34

Clinical Characteristics and Lifestyle Habits of Participants (N = 1214)

Characteristics	*N*	*%*
Number of vaginal deliveries		
0	352	29.0
1	345	28.4
2	396	32.6
3	106	8.7
≥ 4	15	1.2
Number of caesarean deliveries		
0	829	68.3
1	262	21.6
2	96	7.9
3	25	2.1
4	2	.2
Physical illness diagnosis[a]		
No	379	31.2
Yes	835	68.8
Asthma	48	4.0
Hypothyroidism	35	2.9
Diabetes	30	2.5
Hypertension	69	5.7
Mental illness diagnosis[a]		
No	165	13.6
Yes	1049	86.4

Depressive disorder	102	8.4
Anxiety disorder	54	4.4
Obsessive disorder	3	.2
Psychotic disorder	5	.4
Menopausal status		
Premenopause	303	25.0
Perimenopause	452	37.2
Postmenopause	459	37.8
Coffee intake		
Yes	1028	84.7
No	186	15.3
Hot/cold beverages intake		
Yes	1033	85.1
No	181	14.9
High impact physical activity		
Yes	175	14.4
No	1039	85.6
BMI Status		
Underweight (BMI < 18.5 kg/m^2)	28	2.3
Normal weight (BMI 18.5–24.9 kg/m^2)	507	41.8
Overweight (BMI 25.9–29.9 kg/m^2)	443	36.5
Obesity class I (BMI 30–34.9 kg/m^2)	178	14.7
Obesity class II (BMI 35–39.9 kg/m^2)	44	3.6
Obesity class III (BMI > 40 kg/m^2)	14	1.2

Note. BMI = Body Mass Index.

Exogenous variable – UI Symptom Severity

Five items from King's Health Questionnaire Symptom Severity Scale (Porto et al., 2021). Consists of a separate symptom checklist, derived from the King´s Health Questionnaire (KHQ) – translated and validated for European Portuguese (Viana et al., 2015). This scale aims to measure the severity of Urinary Symptoms by assessing responses to specific items: 22 ("Frequency: going to the toilet very often"), 23 ("Nocturia: getting up at night to pass urine"), 25 ("Urge Incontinence: urinary leakage associated with a strong desire to pass urine"), 26 ("Stress Incontinence: urinary leakage with physical, e.g., coughing, running") and 29 ("Waterworks infections"). Participants provide responses on a Likert scale ranging from 1 ("No at all") to 4 ("A lot"). The global score is calculated by summing these items, yielding scores between 5 and 20 points, with higher scores indicating a higher UI symptom severity. Total scores below the midpoint (i.e., 12.5) indicated

mild to moderate UI symptom severity, whereas total scores exceeding the midpoint indicated moderate to severe UI symptom severity. The psychometric properties of the scale were confirmed in this study, ensuring validity in the local language (i.e., Portuguese).

Endogenous variable – UI symptoms impact on the Workplace Productivity

One item from Work Productivity and Activity Impairment Questionnaire (WPAI; Ciconelli et al., 2006; Reilly et al., 1993). This item measures the impact of IU symptoms on the Workplace (WP) by assessing participants' responses to the question: "During the past seven days, how much did your UI symptoms affected your productivity while you were working?", using a 10 point-Likert scale, with higher scores denoting a higher impact on WP. Only one item was used from the WPAI, since this was the only item specifically measuring productivity. Being used as a manifest variable, only the psychometric sensibility was analysed, which revealed no severe violations of normality and displayed adequate skewness and kurtosis values for further parametric analysis (*Sk* = 2.04, *Ku* = 3.74).

Endogenous variable – Perceived Sleep Quality

One item from King's Health Questionnaire (KHQ; Viana et al., 2015). This item measures the participant's perceived sleep quality through their responses to the question: "Does your bladder problem affect your sleep?", using a four-point Likert scale, with higher scores denoting a higher impact on sleep quality. Being used as a co-variable, only the psychometric sensibility was analysed, which revealed no severe violations of normality and displayed adequate skewness and kurtosis values (*Sk* = 1.40, *Ku* = 1.62).

Sample Size Estimation

Before data collection, a minimum sample size of 10 participants per survey item was defined, as recommended for studies that aim to conduct confirmatory factor analyses (CFA) (Boateng et al., 2018). With a total of seven items, a sample size of 70 participants was required. Our final sample (*N* = 1,214) exceeded this threshold, enhancing the robustness of the CFA.

Data Collection

The study's data was collected online using the survey platform Google Forms, encompassing all the previously mentioned material (see Appendix D).

Ethics Issue

This study is part of the PURI-PRO's (Portuguese Urinary Incontinence Project) research project. This project was approved by the ISPA-Instituto Universitário Ethical Committee for Research and followed the ethical guidelines and standards outlined by the Order of Portuguese Psychologists (OPP) and the American Medical Association (AMA). All participants were required to read and agree to an informed consent statement, in which it was indicated that all ethical guidelines and standards were to be respected, assuring that participation was voluntary and anonymous. Contact information for the primary researcher was provided for any queries or concerns.

Data Analyses

All data analyses were conducted using the IBM SPSS Statistics (Statistical Package for Social Sciences) (v. 28), and the IBM SPSS AMOS (Analysis of Moment Structures) (v. 28).

Confirmatory Factor Analyses (CFA) were conducted to evaluate the psychometric properties of all employed instruments in this study. The model goodness-of-fit was assessed using the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), the Standardised Root Mean Square Residual (SRMR), and the Tucker-Lewis Index (TLI) (Cheung & Rensvold, 2002). CFI and TLI above .9, as well as SRMR and RMSEA below .08, were indicative of good model fit (Marôco, 2021). Convergent validity was used to determine the extent of association between the observed variables and was analysed using the average variance extracted (AVE) of the factors, where values greater than .5 indicate adequate convergent validity (Marôco, 2021). Composite Reliability (CR) was used to assess reliability and values equal to or exceeding .7 were considered acceptable indicators of reliability (Marôco, 2021).

The following assumptions were also verified: normality of the data, absence of outliers, absence of missing values and lack of multicollinearity between the exogenous variables (Kline, 2011; Marôco, 2021).

A Predictive Structural Equation Model was performed to study the hypothetical association between the variables under study (i.e., evaluate the statistical significance and the trajectory significance of the impact of UI symptom severity on the WP) (Marôco, 2021).

Results

Clinical Characterisation

Regarding UI symptom severity, 609 (50.2%) women experienced mild symptoms, 521 (42.9%) reported moderate symptoms, and 84 (6.9%) indicated severe symptoms. Furthermore, 728 (60%) women reported not having contacted their doctor about their UI symptoms, and 883 (72.7%) did not undergo any form of treatment for UI.

Main Results

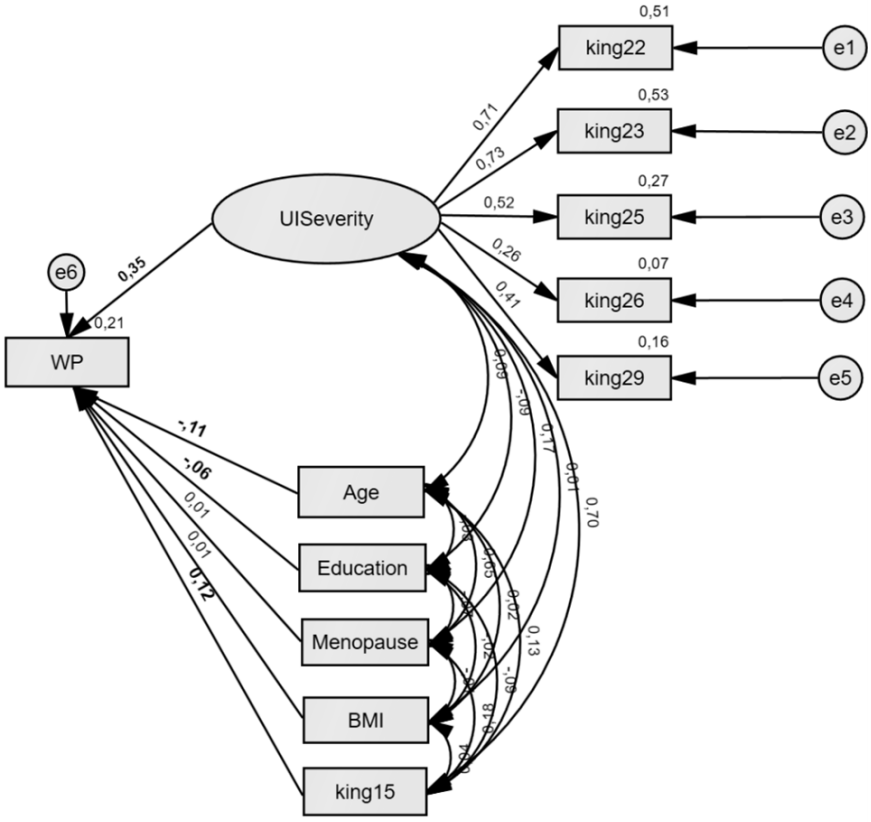
In the present study, the King's Health Questionnaire Symptom Severity Scale presented evidence of good psychometric properties (reliability, sensitivity, and construct validity – factorial, convergent and discriminant validity).

The SEM model (Figure 12) presented an acceptable fit (CFI = .921, TLI = .850, RMSEA = .076, SRMR = .049). Regarding the trajectory significance, UI symptom severity emerged as a significant predictor of these symptoms' impact on WP ($\beta = .353$, $p < .001$) (i.e., higher UI symptom severity was associated with a greater impact on WP). Overall, the model explained 21% of the variance of the impact on WP.

Regarding the co-variables' trajectory significance, Age emerged as a significant predictor of UI symptoms' impact on WP ($\beta = -.107$, $p = .002$) (i.e., a higher age was associated with a lower impact of UI symptoms on WP). Education also emerged as a significant predictor of UI symptoms' impact on WP ($\beta = -.061$, $p = .020$) (i.e., a lower education level was associated with a high impact of UI symptoms on WP). Finally, perceived sleep quality also emerged as a significant predictor of UI symptoms' impact on WP ($\beta = .121$, $p = .006$) (i.e., a higher UI symptom's impact on sleep quality was associated with a greater impact of UI symptoms on WP). However, menopausal status ($\beta = .009$, $p = .802$) and BMI level ($\beta = .010$, $p = .709$) were not predictors of UI symptoms' impact on WP.

Figure 12

SEM Model – Predictive Model



Note. This SEM model shows UI symptom severity, age, education and perceived sleep quality (king15) as possible predictors of a greater impact on WP. The coefficients presented are standardised linear regression coefficients. Significant trajectories' values are in bold. UI = Urinary Incontinence; WP = Workplace Productivity; BMI = Body Mass Index.

Discussion

The current study aimed to explore the impact of UI symptom severity on the WP of middle-aged women while controlling for relevant demographic and clinical variables, such as age, education level, menopausal status, BMI, and perceived sleep quality. Additionally, this study sought to assess the proportion of women with UI symptoms who refrain from seeking medical treatment.

Regarding the present study results, UI symptom severity was identified as a substantial predictor of WP impairment in middle-aged women. This finding suggests that women experiencing more severe UI symptoms are likely to face a greater negative influence on their WP.

These results are consistent with previous research, which has established a relationship between higher UI symptom severity and increased adverse effects on WP.[14] Hence, these adverse impacts may arise from more frequent trips to the bathroom and visits to hospitals and pharmacies during working hours, diminished self-confidence and ability to concentrate while working, and even an increased tendency to quit their jobs (Lin et al., 2018; Pierce et al., 2017).

Age also emerged as a significant predictor of the impact of UI symptom severity on WP, indicating that older middle-aged women experience less pronounced negative effects of UI symptoms on WP compared to their younger counterparts. These findings contradict earlier studies, which have shown that UI symptoms generally become more severe with advancing age (Sandvik et al., 1993). However, this discrepancy can be attributed to the fact that 1,130 participants (93.1%) in the current study reported only mild to moderate UI symptoms.

Furthermore, education attainment was found to be a significant predictor of the impact of UI symptom severity on WP, with women holding lower levels of education experiencing more pronounced negative effects. This aligns with prior research suggesting that women with lower educational levels often have limited awareness of pelvic health, including risk factors for UI and preventive strategies (Manso et al., 2023).

Perceived sleep quality also emerged as a substantial predictor of the impact of UI symptom severity on WP, implying that women who experience greater disruption to their sleep due to UI symptoms report a more significant negative effect on their WP. These findings corroborate existing research linking nocturia (i.e., getting up at night to urinate) with greater work impairment, including increased absenteeism and presenteeism (Hafner et al., 2020).

Conversely, menopausal status and BMI did not emerge as significant predictors of the impact of UI symptom severity on WP. These results may be explained by the fact that the majority of participants (62.8%) were either in the premenopausal (i.e., reproductive stage preceding menopause) or postmenopausal (i.e., reproductive stage following menopause) phases, during which UI symptoms are generally less severe (Møller et al., 2000). Additionally, only 19.5% of participants were classified as obese, a condition associated with greater urine loss.

Moreover, this study revealed that 60% of women experiencing UI symptoms reported not having contacted their doctor regarding these symptoms, and 72.7% did not undergo any form of treatment. These results corroborate what has been widely documented in previous research,

indicating that women experiencing UI symptoms often refrain from reporting them to their doctors (Rashidi et al., 2021; Xu et al., 2014), underscoring the need for greater awareness and intervention strategies.

Regarding the moderated explanatory power observed in our model, one plausible explanation may be the exclusion of occupational characteristics intrinsic to specific professional roles. Certain job demands—such as prolonged standing, restricted restroom access, toxin exposure, occupational stress, shift work, long-distance travel, and sustained sedentary behaviour—are often embedded in particular occupations and have been linked to the onset or aggravation of UI (Kim & Kwak, 2017).

Furthermore, addressing UI subtypes in research may have important implications for occupational functioning and productivity. In particular, urgency and mixed U are typically more severe and characterised by sudden, uncontrollable urges to urinate, often resulting in frequent accidents and heightened embarrassment. This unpredictability can lead to psychological distress, increased healthcare utilisation, and challenges in sustaining consistent job performance. Women with these subtypes report significantly more work-loss days due to medical absenteeism, higher rates of sick leave and short-term disability, and elevated absence-related costs for employers (Salo et al., 2024; Yoo et al., 2023).

In this context, workplace interventions addressing UI, besides raising UI awareness, may play a crucial role in symptom mitigation by addressing occupational demands through measures such as lifting restrictions, scheduled breaks, ergonomic postural adjustments, enhanced restroom accessibility, and flexible time management strategies.

Limitations

While this study offers valuable insights, several methodological limitations must be considered in interpreting its findings. These limitations arise primarily from the reliance on self-report measures, the digital mode of data collection, and the cross-sectional design employed.

First, the use of self-reported UI symptoms without clinical verification introduces a risk of reporting bias. Given the stigmatised and sensitive nature of UI, participants may underreport or misrepresent symptom severity, which could compromise the validity of symptom classification and obscure associations with psychological and occupational variables. Second, the exclusive use of online data collection limited participation to individuals with consistent internet access and

digital literacy, thereby introducing potential socio-economic sampling bias and reducing sample representativeness. The asynchronous nature of this methodology also restricted opportunities for clarification during the protocol, possibly affecting the quality and interpretability of participant responses.

Finally, the cross-sectional design precludes causal inference. Although associations between UI severity and work-related outcomes were identified, the temporal dynamics of these relationships remain unclear.

Strengths

Despite these limitations, these findings suggest some theoretical and practical implications, alongside notable strengths. Firstly, the sample size facilitates a more comprehensive assessment of the variables under study. Secondly, we were able to confirm the considerable impact of UI symptom severity on WP (given that there is a lack of research within this particular topic). Lastly, we used an instrument to measure UI symptom severity that considered not only frequency and quantity of urine leaks (as it has been done previously), but also incorporated items associated to nocturia, waterworks infections, stress and urge UI that allowed a more thorough assessment of UI symptom severity.

Future Research

To strengthen the validity and applicability of findings, future studies should consider implementing face-to-face data collection protocols. This would allow for real-time clarification of participant queries and improve data accuracy. In addition to self-report instruments, incorporating objective clinical assessments, such as physician-confirmed diagnoses or urodynamic evaluations, would enhance diagnostic precision and reduce the risk of reporting bias. Furthermore, integrating occupational risk factors/professional role and UI subtype-specific variables into future models may improve explanatory power and inform more targeted, effective interventions to support urinary health and workplace productivity.

To advance causal understanding, future research should adopt prospective longitudinal cohort designs, enabling the examination of how changes in UI symptoms influence occupational functioning over time. Such designs are critical for elucidating the dynamic interplay between UI severity, psychosocial well-being, and work capacity. Expanding recruitment beyond online platforms—through clinical, occupational, and community-based channels—will also improve

sample diversity and external validity, allowing for a more comprehensive representation of UI experiences across sociodemographic strata.

By accounting for UI subtype in both research predictive modelling and intervention development, researchers and clinicians can more precisely address the occupational consequences of UI and implement strategies that mitigate productivity loss and enhance quality of life.

Conclusion

The findings gleaned from this study hold potential relevance in fostering the development of and more targeted effective interventions, with multidisciplinary teams (e.g., psychologists, urologists, urogynecologists), addressing UI symptom severity to enhance WP among middle-aged women. Furthermore, given that a substantial proportion of participants reported not seeking medical attention for their UI symptoms, workplace initiatives – such as online educational programs and cognitive-behavioural strategies – geared towards raising awareness about the advantages of early intervention in UI and offering the possibility of contact with professional help if desired, may serve as practical solutions and as a catalyst for bolstering WP.

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Chapter 4

Translating Health Psychology into Practice: Development and Evaluation of a Theory-Based eHealth Intervention Informed by the Health Action Process Approach and the Common-Sense Model of Self-Regulation

This chapter is based on the paper

Porto, M. G., Queiroz-Garcia, I., Marôco, J., Mascarenhas, T., & Pimenta, F. (2025). *PURI-PRO: A study protocol for an eHealth cognitive-behavioural intervention to improve urinary incontinence symptoms and self-management* [Manuscript submitted for publication]

Protocol. PURI-PRO: A Study Protocol for an eHealth Cognitive-Behavioural Intervention to Improve Urinary Incontinence Symptoms and Self-Management

Abstract

Background: Urinary incontinence (UI) is a prevalent yet underdiagnosed and undertreated condition that significantly impacts the quality of life of 20–30% of middle-aged women. Although conservative eHealth interventions can be effective, poor adherence remains a significant challenge. To address this gap, structured and theory-informed digital approaches that integrate multidisciplinary support are needed. Thus, this trial aims to evaluate the effectiveness of an eHealth cognitive-behavioural intervention in improving UI symptoms, reducing maladaptive coping strategies, and altering illness perceptions to enhance long-term self-management.

Methods: This study is a two-arm, parallel-group, assessor-blinded randomised controlled trial (RCT) with 40 women aged 40–65 years who self-reported UI. Participants will be randomised (1:1) to the intervention or control groups. The intervention consists of an eight-week eHealth cognitive-behavioural program delivered via weekly Zoom sessions, guided by the Health Action Process Approach (HAPA), the Common-Sense Model (CSM), and Cognitive Behavioural Therapy (CBT). Behaviour Change Techniques (BCTs) will be embedded to enhance long-term adherence. The intervention will incorporate pelvic floor muscle exercises (PFME), bladder control strategies, and lifestyle modifications facilitated by a psychologist and physiotherapist. The control group will receive a single health literacy leaflet on melanoma prevention. Data will be analysed using Conditional Latent Growth Curve Modelling (LGCM) to assess change trajectories, with intention-to-treat analyses. Mediation models will explore the role of HAPA socio-cognitive variables in behaviour and cognitive change.

Discussion: This eHealth intervention uses evidence-based behaviour change models to reduce UI symptoms and promote adaptive coping. It supports long-term adherence to pelvic floor muscle exercises, lifestyle changes, and healthy bladder habits. If effective, the intervention will be offered to control group participants to ensure equitable access. The program fills a key gap in digital UI care, especially for women in remote areas. It provides a scalable, accessible solution with potential population-level health benefits.

Trial registration: PURI-PRO trial was prospectively registered under the Unique Protocol ID: D-022-11-2019 in July 2024. https://clinicaltrials.gov/ct2/show/NCT06527638

Keywords: Urinary Incontinence; Self-Management; Randomised Controlled Trial; eHealth Intervention.

Introduction

Urinary incontinence (UI) is a significant yet frequently underdiagnosed and undertreated public health issue affecting 20–30% of middle-aged women (Hannestad et al., 2000; Irwin et al., 2006). This condition may profoundly impact quality of life across multiple domains, including physical (e.g., low level of physical activity or inactivity, skin infections and urinary tract infections, poorer sleep quality), psychological (e.g., diminished self-esteem, stigma, and embarrassment associated with leakage or odour), social (e.g., social withdrawal and social isolation), sexual (e.g., avoidance of intimate relationships due to fear of urine loss), productivity (e.g., poor quality of life, work disability, intention to quit), and economic (e.g., high expenses in absorbent products and other health aids) (Hannestad et al., 2000; Molinuevo & Batista-Miranda, 2012). Beyond the individual level, UI places a substantial economic burden on society. In the European Union, the economic cost of UI is projected to rise from €69.2 billion in 2023 to €86.7 billion by 2030. Similarly, in the United States, the estimated economic burden of UI has reached USD $82.6 billion in recent years (European Association of Urology, 2025; Hannestad et al., 2000; Molinuevo & Batista-Miranda, 2012; Smith, 2016).

Despite the prevalence of UI and its significant impact, fewer than half of women with UI seek treatment. This reluctance is often rooted in maladaptive beliefs about the condition, as well as the adoption of dysfunctional self-management behaviours, such as concealment and defensive strategies (Diokno et al., 2004). Even among those who pursue conservative treatment, only 23% of women achieve and sustain long-term symptom improvement (Cho & Kim, 2021).

Given the above-mentioned evidence, there is a pressing need for targeted, effective, low-cost, and evidence-based conservative interventions to enhance access to care for women with UI and restore confidence in controlling bladder function (Burgio, 2009; Todhunter-Brown et al., 2022; WHO, 2016). Behavioural interventions, including (1) lifestyle changes (e.g., smoking cessation, low-impact physical activity, weight management, reduction of caffeine and alcohol intake, constipation management, regular fluid intake) (Wyman et al., 2009), (2) healthy bladder habits (e.g., relaxation when urinating), (3) urge and stress suppression techniques (e.g., the Knack technique) (Fitz et al., 2021); and (4) pelvic floor muscle exercises (PFME or Kegel exercises, Level of Evidence 1), are the first-line recommended treatments for UI (Dumoulin et al., 2016; Nambiar et al., 2018). These interventions are non-invasive, low-cost, and highly effective, often reducing the need for further procedures, such as invasive surgical procedures. Behavioural

treatments have demonstrated high rates of symptomatic improvement, with success rates ranging between 50% and 70% (Huang et al., 2020).

Among these interventions, pelvic floor muscle exercise (PFME) has proven effective in all types of UI. PFME strengthens and enhances endurance and improves relaxation of the pelvic floor muscles, thereby addressing both stress and urge incontinence (Cho & Kim, 2021). Stress urinary incontinence (SUI) (i.e., urine leakage during activities such as coughing, sneezing, or exercise, where increased bladder pressure exceeds urethral or sphincter resistance) behavioural treatments teach women to actively contract their pelvic floor muscles to occlude the urethra to prevent leakage (Cho & Kim, 2021).

For urge urinary incontinence (UUI) (i.e., involuntary bladder muscle contractions leading to a sudden and intense need to urinate), behavioural interventions focus on reflexive or voluntary inhibition of detrusor contractions through pelvic floor muscle activation. This voluntary contraction would remove urgency and stress responses, offering a valuable method for managing mixed urinary incontinence (MUI) symptoms, a mixture of both SUI and UUI characteristics (Cho & Kim, 2021).

Face-to-face PFME supervised by specialised health professionals demonstrates superior outcomes owing to tailored guidance and real-time feedback (Dumoulin et al., 2016). However, home-based PFME programs, when supported by clear and detailed instructions, have also proven effective in reducing leakage episodes by up to 50% (Huang et al., 2020; Sjöström et al., 2013). Both group and individual sessions yield significant benefits, particularly when guided by professional instructions, ensuring proper technique and adherence (Cho & Kim, 2021). Remarkably, 83.4% of women were able to correctly contract their pelvic floor muscles on their first attempt (Henderson et al., 2013).

With over 70% of adults regularly using online resources, eHealth and mHealth interventions have emerged as cost-benefit solutions with a broad geographical reach (WHO, 2016). Evidences indicate that conservative treatment would minimise or diminish symptoms, reduce the stigma surrounding UI, and allow women to multitask regularly, providing them with a sense of self-control and empowerment (Verhoeks et al., 2019), promoting efficient symptom management, and fostering health behaviour changes at a low cost (Dufour et al., 2019; Firet et al., 2019; Firet et al., 2022; Goode et al., 2020; Wadensten et al., 2021; WHO, 2016). This is

particularly impactful, given the reluctance of many women with UI to seek professional treatment or engage in face-to-face consultations due to shame and embarrassment.

Despite these benefits, non-use of attrition remains a significant barrier to the success of eHealth interventions (Firet et al., 2022). Many women face difficulties in consistently practising PFME and integrating lifestyle modifications into their daily routines, thereby undermining the long-term effectiveness of eHealth treatment (Firet et al., 2022). Sustained long-term PFME adherence to behavioural/conservative interventions, including (1) lifestyle changes (2) healthy bladder habits, (3) urge and stress suppression techniques/bladder control techniques; and (4) PFME, is critical for achieving meaningful and long-term symptom improvement. Addressing long-term adherence to adaptive UI self-management strategies is essential for reducing UI symptoms, maximising the potential of eHealth interventions, optimising treatment outcomes, and improving QoL (Verhoeks et al., 2019). One possible reason for this lack of long-term behaviour change may be the lack of integration of these treatment programs with robust theoretical frameworks that systematically address behavioural predictors at each stage of the change process (Dumoulin et al., 2014).

Thus, there is a need for structured, theory-informed eHealth treatment approaches supported by multidisciplinary teams (MDT) that address psychosocial, cognitive, and physiotherapy variables and effectively integrate them based on the biopsychosocial model (Bohlen et al., 2020). The 2014 Consensus Statement on Improving PFME Adherence highlights the need for theoretically grounded interventions to enhance adherence [e.g., Health Belief Model, Theory of Planned Behaviour, Social Cognitive Theory, and Health Action Process Approach (HAPA)] (Dumoulin et al., 2014).

Despite the recognised importance of behaviour change frameworks, research on their direct application in PFME adherence remains limited. Hence, studies should explicitly map the theoretical underpinnings, evaluate adherence-related outcomes, and investigate the mediators and moderators of adherence. Given the significant attrition during the early behavioural stages, targeted strategies are essential to facilitate initial engagement and long-term adherence. Understanding behaviour change dynamics across all phases is critical (McClurg et al., 2015).

Hence, a paradigm shift toward structured interventions grounded in established behavioural modification theories and enhanced by evidence-based taxonomies is essential. One

such taxonomy, Behaviour Change Technique (BCT) Taxonomy version 1 (BCTTv1), includes 93 distinct BCTs, providing a systematic and reliable framework for specifying, interpreting, and implementing the active ingredients of behaviour change interventions, and facilitating the replication of studies (Carey et al., 2019; Connell et al., 2019). The BCT taxonomy has been widely applied to identify effective behavioural strategies in various health domains, including UI management (Chester et al., 2023). A key evidence-based BCT is behavioural self-monitoring (e.g., systematic tracking and recording behaviours to facilitate long-term change) (Connell et al., 2019).

Moreover, by targeting both the socio-cognitive and behavioural aspects of UI management, interventions can more effectively foster sustained behaviour change, optimise long-term health outcomes, and ultimately improve the quality of life for women suffering UI (Bohlen et al., 2025). Hence, therapists should focus on motivating patients to engage in treatment and bridge the intention-behaviour gap by actively interacting with their therapist (Borello-France et al., 2013).

The Health Action Process Approach (HAPA; Schwarzer, 2016) provides a robust and comprehensive framework for understanding and facilitating health behaviour change (i.e., adaptive UI self-manage through (daily and long-term) adherence to behavioural/conservative interventions, including (1) lifestyle changes (2) healthy bladder habits, (3) urge and stress suppression techniques/bladder control techniques; and (4) PFME (Burkert et al., 2012). The model has been widely validated as an effective theoretical foundation in numerous health interventions, offering a structured approach to behaviour changes by distinguishing between two distinct phases: motivational (goal setting) and volitional (goal pursuit) (Zhang et al., 2019). Each phase is driven by specific self-efficacy beliefs, defined as a woman's confidence in her ability to successfully manage UI (Bandura, 2004), which is a determinant of health behaviour changes and subsequent adherence to PFME (Dumoulin et al., 2016).

The motivational phase focuses on developing a strong intention for change. Outcome expectancies are critical during this stage because women are more likely to form an intention when they perceive that behaviour change (i.e., behavioural interventions, lifestyle changes, healthy bladder habits, urge and stress suppression techniques, and PFME) would result in positive outcomes (Schwarzer, 2016). This process involves weighing perceived benefits against potential costs. Additionally, risk perception, which includes awareness of the health threat and perceived susceptibility and severity, plays a significant role in motivating women to take action by

highlighting the consequences of inaction (Schwarzer, 2008). Finally, action self-efficacy, or confidence in one's ability to initiate the desired behaviour (i.e., adaptative UI self-management), is essential for forming strong intentions to change (Zhang, 2019). The volitional phase centres on translating intentions into actions and maintaining behaviour change (i.e., adaptive UI self-management) over time. Action planning involves creating detailed and concrete plans that specify when, where, and how the behaviour (i.e., lifestyle changes, healthy bladder habits, urge and stress suppression techniques, and PFME) will be performed, facilitating successful behaviour initiation. In contrast, coping planning prepares women to address potential barriers (Zhang, 2019). Once initiated, maintenance self-efficacy, or confidence in overcoming obstacles and sustaining behaviour in the face of challenges, becomes crucial for long-term adherence to treatment regimens (Schwarzer, 2008). Furthermore, recovery self-efficacy, the belief in one's ability to resume adaptive behaviour following setbacks or lapses, helps prevent relapses and fosters consistent progress in behaviour maintenance (Schwarzer, 2016).

Integrating HAPA with BCTs enhances UI interventions by addressing both the motivational and volitional processes that are critical for sustained adherence to UI adaptive self-management (Zhang, 2019).

Beyond addressing the intention-behaviour gap, understanding how women cognitively and emotionally respond to UI, their coping strategies, and how they evaluate these strategies is crucial for tailoring effective interventions (Alewijnse et al., 2002; Leventhal et al., 2016). The Common-Sense Model (CSM) of Self-Regulation offers a robust and comprehensive framework for understanding the dynamic interactions among perceptual, cognitive, behavioural, and emotional processes involved in health behaviours and self-management, addressing the interconnected factors underlying these health behaviours (Hagger & Orbell, 2003, 2022). The model conceptualises women as active problem-solvers in health self-management and self-regulation (Hagger & Orbell, 2022).

According to the CSM framework (Hagger & Orbell, 2003), UI management can be conceptualised as encompassing three distinct stages, each involving critical cognitive and emotional mechanisms. In the first stage, two parallel processing systems operate concurrently: one generates an objective cognitive representation of the UI (UI Cognitive Representations), whereas the other elicits the corresponding emotional response (UI Emotional Representations).

This dual representation provides the foundation for subsequent decision-making processes. In the second stage, based on cognitive and emotional representations, women select and implement coping strategies to manage their UI. Finally, in the third stage, an evaluative process occurs in which women assess the effectiveness of the implemented coping strategies, leading to potential adjustments or reinforcement of their chosen approach (Leventhal et al., 2016). This sequential and dynamic framework underscores the interplay between representation, emotional regulation, coping behaviours, and appraisal in UI self-management (Hagger & Orbell, 2022).

The CSM highlights the critical impact of dysfunctional illness perceptions (e.g., beliefs about UI being an incurable and uncontrollable condition) on health behaviour (i.e., seeking treatment and employment of dysfunctional coping strategies), which might lead to delayed treatment seeking and reliance on potentially ineffective and dysfunctional self-management strategies (Sacomori et al., 2015). Moreover, the CSM underscores the interplay between emotional responses and symptom severity (McAndrew et al., 2008), indicating that negative emotional responses may lead to exacerbating symptoms (e.g., urge episodes) and impact self-management coping strategies (e.g., avoidance by ignoring or minimising symptoms) (Alewijnse et al., 2002).

Interventions grounded in the CSM framework have proven effective, yet scarce, in reframing dysfunctional UI representations, mitigating threatening illness perceptions, and enhancing treatment adherence, ultimately improving long-term health outcomes. CSM-based interventions also aim to help women process their emotional responses to UI, promoting a shift from avoidance and defensive strategies to functional and proactive self-management approaches (e.g., PFME and lifestyle modifications) (Hagger & Orbell, 2022).

Cognitive Behavioural Therapy (CBT) provides a scientifically grounded framework for cognitive and behavioural adjustments in the management of urinary incontinence (UI), particularly through urge suppression techniques (Funada et al., 2020), and has been applied in UI conservative treatment interventions, both in person and online platforms (Asklund et al., 2017; Funada et al., 2020; Garley & Unwin, 2006; Reisch et al., 2021). Cognitive-based strategies include restructuring maladaptive thoughts, such as reshaping malformed beliefs (“UI is the worst thing that can happen to a woman”) by application of motivational statements (“If I have managed to hold on this far, I can wait a few more seconds”) and reinforcing self-motivating affirmations like “I can do it”. Behaviourally, individuals are encouraged to adopt techniques such as pausing,

performing a pelvic floor muscle contraction (the “Knack”) to suppress the urge, and walking slowly and deliberately to the toilet, countering the urge to urinate. In addition, relaxation techniques have been incorporated as a complementary approach to reduce bladder reflex activity and alleviate tension during urgency episodes, particularly when the goal is to decrease bladder overactivity and promote self-control over urgent responses (Garley & Unwin, 2006).

Thus, it is plausible to state that theory-driven UI, incorporating multidisciplinary expertise such as physiotherapy, behavioural science, and digital innovation, may offer sustainable and effective solutions for UI. Despite the effectiveness of theoretically grounded interventions, research on conservative and online UI treatments using evidence-based behaviour change models remains limited. As stated before, the HAPA framework has demonstrated efficacy in promoting long-term adherence and behaviour change. At the same time, CSM has proven valuable in targeting illness representations and fostering adaptive coping strategies. CBT complements these models by addressing maladaptive cognition and behaviour during urge episodes.

To address these gaps, the PURI-PRO Intervention with an MDT, “The Bladder Control is Mine” was developed as a structured, accessible, low-cost, eHealth cognitive-behavioural intervention. This program integrates the above-mentioned evidence-based behaviour change models to reduce self-reported UI symptoms, mitigate threatening illness representations, and foster adaptive coping strategies (decreased reliance on defensive and avoidance coping strategies) while promoting long-term adherence to PFME, lifestyle modifications and healthy bladder strategies.

Objectives

This study aims to present the Protocol for the PURI-PRO Randomised Controlled Trial (RCT). This protocol outlines a structured eHealth cognitive-behavioural intervention and its physiotherapeutic components, developed explicitly for middle-aged women with self-reported UI. This protocol follows the SPIRIT (Standard Protocol Items: Recommendations for Interventional Trials) guidelines (see SPIRIT Guidelines Checklist; Appendix M).

Trial Design

The PURI-PRO intervention will follow a low-cost eHealth (Internet-based) cognitive-behavioural intervention designed to promote improvement in self-reported urinary incontinence (UI) symptoms, decrease defensive and avoidance coping strategies, and mitigate threatening

illness representations related to UI, while being theoretically based on HAPA, CSM and CBT in middle-aged women (for details see the Interventions section), using BCT's supported by an MDT. This intervention will follow an experimental design (1:1 randomised, controlled, parallel-arm trial [RCT]) with two groups: the Experimental Group (EG), which will receive the UI intervention, and the Control Group (CG), which will receive a single health literacy leaflet on melanoma prevention. Delivered information will be done through the internet. The study will be comparative, with the sample randomly distributed across two groups (EG vs. CG), and longitudinal, as all outcome measures will be evaluated at four distinct time points (see Appendix N for the RCT Assessment Protocol).

Moreover, this study is interventional and has a treatment purpose, crossover assignment, two-arms, single masking, and randomised allocation. The effectiveness of the intervention will be evaluated through a longitudinal RCT.

Methods/Design

Study Setting

Participants in the PURI-PRO trial will be recruited through online platforms and selected through an initial screening process. A targeted ad campaign will be launched on Instagram and Facebook (see Appendix O), directed at women aged 40–65, the target demographic for the study. Interested women will be asked to complete an online screening questionnaire that will be used to assess their eligibility based on the study's inclusion and exclusion criteria. Once screening is completed, eligible participants will be contacted via email and informed of their eligibility. Participants who do not meet the inclusion criteria will be excluded from the study. The recruitment period is scheduled for at least a month.

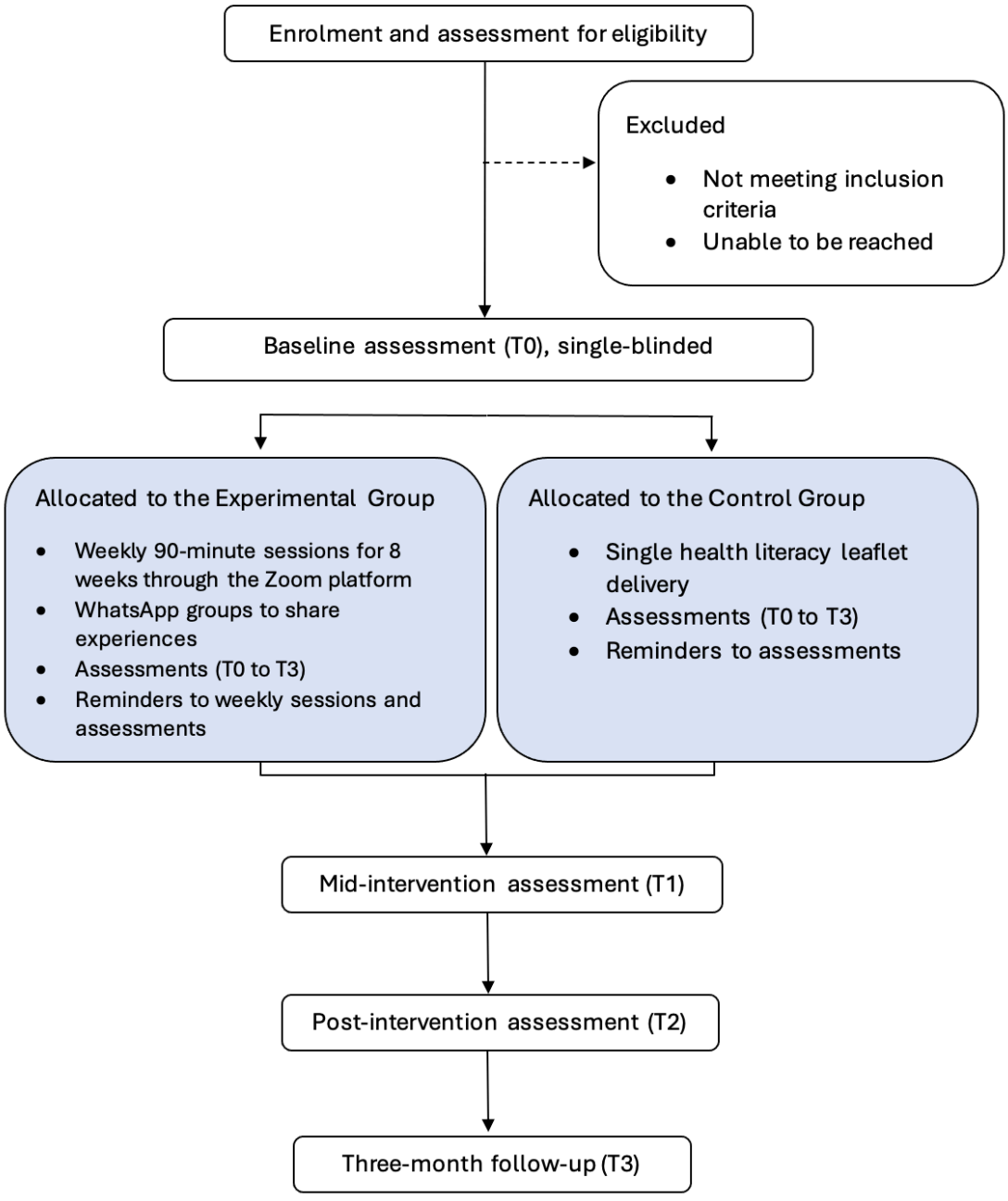
The recruitment and evaluation will be completed through online questionnaires, and the intervention group sessions will be conducted through the Zoom platform, led by the principal investigator (i.e., clinical psychologist) and a physiotherapist [Session 2: Conservative Treatment (Part II)] (see Table 35 for the complete intervention outline program). The data will only be collected in Portugal.

As an incentive, participants from both groups who complete all phases of the study (including all evaluation moments) will receive Tena Lady vouchers as compensation. To

acknowledge the time and effort of the participants, these vouchers will be provided at the end of the study. The intervention flowchart is illustrated in Figure 13.

Figure 13

Planned Flowchart of Participants through the Trial



Eligibility Criteria

Women aged between 40 and 65 years with Portuguese or dual nationality, self-reported urine leakage (not associated with pregnancy and/or up to six months post-partum), and access to the internet and to the 'Zoom' platform (technical support available if needed), who sign the informed consent (see Appendix P and Appendix Q), will be included. Pregnancy or being within six months post-partum, previous surgical procedures related to UI, active suicidal ideation, neurological disorders that could affect bladder control, known malignancy in the lower abdomen, substance abuse, and a history of pelvic prolapse were excluded.

Interventions

Eligible participants will be randomised to the EG or the CG leaflet delivery.

CG: Delivery of a Health Literacy single leaflet

Participants in the control group will receive a single health literacy leaflet on melanoma awareness and prevention (see Appendix R) delivered via email during the first week of the intervention. Additionally, participants will receive emails with links to the assessments at the four evaluation time points (i.e., baseline, mid-intervention, post-intervention, and follow-up). Beyond this, there will be no further interaction with this group.

EG: eHealth intervention for UI symptoms improvement

Participants in the experimental group will receive an eHealth cognitive-behavioural intervention to foster adaptive UI self-management based on the HAPA and CSM Model, structured through compatible BCTs.

The PURI-PRO eHealth Cognitive-Behavioural Group Self-Management Intervention includes the following physiotherapeutic components, based on International Guidelines for the Conservative Management of Female UI (Dumoulin et al., 2016; Nambiar et al., 2018): 1) Healthy Bladder Habits Education (providing foundational knowledge about bladder health and management); 2) Lifestyle Modifications (emphasising strategies, such as healthy eating, low-impact physical activity, weight management, reducing caffeine and alcohol intake, managing constipation, and regulating fluid and dietary habits); 3) Effective Toileting Techniques (guidance on optimal toileting practices); 4) Urge Suppression Techniques (using the "counterbracing" or "Knack manoeuvre", incorporating CBT relaxation techniques and cognitive restructuring

strategies for managing urgency episodes); 5) Pelvic Floor Home Training Intensity Increase Program based on Sjöström et al. (2013) who gave their full permission to translate and adapt it to our RCT – participants will have access to all PFME levels from the start (see Appendix S – PFME Steps Leaflet). A training exercise report (based on Sjöström et al., 2013) of PFME contractions will be sent to the participants for continuous registration throughout the treatment period for self-monitoring purposes (see Appendix T – Training Exercise Report); 6) Stress Management Techniques (utilising "Knack manoeuvre"). It will provided UI literacy and all EG participants will also be given a three-day bladder diary to better understand which drinks and foods cause urine loss (see Appendix U – Three-Day Bladder Diary). The intervention will be structured by a multidisciplinary team (two psychologists, one physiotherapist, and one gynaecologist) and applied by one of the psychologists and the physiotherapist (see Table 35 for a detailed program outline).

Regarding socio-cognitive variables and their role in enhancing adherence, participants will be guided through key behaviour change techniques (BCTs) aligned with HAPA and CSM. For example, they will select when, where, and how to practice PFME; implement lifestyle changes; adopt healthy bladder habits; and apply urge and stress suppression techniques (action planning), reinforcing these behaviours as part of their daily routine. Additionally, participants will engage in coping planning by identifying potential barriers to adherence and developing strategies to overcome them (e.g., 'If I do not have a lunch break, I will do my PFME when I get home'). They will also be advised on self-monitoring strategies (e.g., using an exercise report). These are just a few examples of how the program will integrate socio-cognitive variables with BCTs to optimise adherence and reshape dysfunctional UI representations (see Table 35).

The intervention will consist of eight 90-minute weekly sessions, each with a specific theme and accompanied by weekly challenges (see Appendix V). All group intervention sessions conducted through the Zoom platform will be led by the psychologist responsible for the study, except for the second session, which the physiotherapist will lead. The whole intervention program is shown in Table 35.

The structured intervention was designed to empower middle-aged women with self-reported UI, providing them with a practical and evidence-based theoretical framework for behaviour change in conservative treatment to promote long-term adherence to adaptive UI self-management.

To enhance adherence, 1) participants will receive a TENA voucher at the end of the intervention; 2) a WhatsApp group will be created to provide support, experience sharing, and community building; 3) reminder texts will be sent on session days with the meeting link to improve attendance; 4) five schedules at different times and days of the week and weekend will be provided at the start of the intervention; and 5) participants will remain in their assigned groups throughout the intervention to ensure consistency and group cohesion.

The only established criterion for discontinuation is the voluntary dropout of participants. Regarding concomitant care, in addition to the exclusion criteria, we will control whether the participants contact other healthcare providers for UI during the intervention.

Suppose the intervention proves effective at the conclusion of the study. In that case, participants in the control group (CG) will be invited to participate in a subsequent phase, gaining access to the same eHealth intervention offered to the experimental group (EG). This phase will allow the control group participants to benefit from the intervention, aiming to reduce UI severity and improve their quality of life, ensuring that all participants, regardless of their initial group allocation, can experience the potential positive effects of the intervention. After the intervention, all participants will receive an email advising them to seek professional support if they do not observe the desired results. This recommends continued care and encourages appropriate next steps for their well-being.

The groups in the PURI-PRO study will be dissimilar, since the EG will receive an eHealth cognitive-behavioural intervention. In contrast, the CG will receive a health literacy leaflet on melanoma awareness and prevention.

Table 35

PURI-PRO's Structured eHealth Cognitive-Behavioural Group Self-Management Intervention with a Physiotherapeutic Component for Conservative Treatment of Self-reported Urinary Incontinence "The Bladder Control is Mine"

Session	Objectives	HAPA Constructs	CSM Constructs	BCT
Session 1 – Presentation and Conservative Treatment (Part I)	**1. Presentation and Creation of a Safe and Supportive Space, explicitly referring to privacy and confidentiality.** Foster an environment of trust and respect by emphasising the importance of privacy and confidentiality within the group. Establish clear group rules (e.g., criteria for receiving vouchers). **2. Psychoeducation: Introduce the Role of Health Psychology in UI Management** Highlight how socio-cognitive variables influence urinary incontinence (UI) management and adherence to treatment. *Cognitive restructuring:* Provide examples of how changing thoughts and beliefs can improve adherence to healthy practices and empower participants to manage UI effectively. **3. Address Lifestyle Risk Factors and Conservative Treatments – Change UI Representations** Briefly outline key lifestyle risk factors associated with UI (e.g., diet, fluid intake, obesity, and constipation) and their impact on symptoms. Present evidence-based conservative treatment options, including pelvic floor muscle exercises (PFME) and behavioural strategies (e.g., Lifestyle changes, Healthy Bladder Habits, Effective toileting techniques), citing guidelines from the European Association of Urology (Nambiar et al., 2018) and	Intention; Outcome Expectations; Risk Perception; Action Self-efficacy; Action Planning (Lifestyle Changes)	UI Cognitive Representations Coping Strategies	3.1. Social support (unspecified) 9.1. Credible source 5.1. Information about health consequences 4.3. Re-attribution 1.4. Action planning 1.1. Goal Setting 13.2. Framing/reframing

	the International Consultation on Incontinence (Dumoulin et al., 2016). Provide success rates for conservative treatments to set expectations and encourage commitment. **4. Discuss UI's Impact on Quality of Life** Explore the possible emotional, physical, and social impacts of UI. Include information on the prevalence of UI in Portugal and globally, emphasising its common nature in middle-aged women, while addressing the behavioural changes which can facilitate symptoms' attenuation. **5. Facilitate Social Support Through a Social Network** Ask if the group agrees on creating of a Social Network Group: Establish a WhatsApp group to enable ongoing peer support, resource sharing, and share progress between sessions, which could have an impact in motivation. Facilitate disclosure/communication **6. Individual Intervention Journal** Ask each participant to have an intervention journal as a personalised tool for tracking their journey, and writing session exercises and homework. **7. Homework Assignment (HA)** - *Commitment to Lifestyle Changes* - Ask participants to identify one lifestyle risk factor (e.g., reducing intake of bladder irritative fluids) they are willing to change and commit to monitoring progress during the following week - Reinforce this activity by connecting it to the group discussion on the impact of small, consistent changes in improving bladder health.	

	8. Take Home Message (THM) "There are things we consume that irritate and harm our bladder according to the EAU and ICS. Let's change that!" - motivator to inspire participants to adopt healthier habits and take active steps to reduce bladder irritants.			
Session 2 – Conservative Treatment (Part II) – Session with Physiotherapist	**1. Ask for Homework Feedback** Review *Commitment to Lifestyle Changes*: Ask participants about their efforts to reduce bladder irritants (e.g., caffeine, acidic foods, alcohol) and their impact on urinary symptoms. **2. Educational Component lead by Physiotherapist** Explain the functioning of the urinary tract and pelvic floor anatomy, emphasising their role in continence. Discuss UI risk factors (e.g., constipation, weight management, diet) and the importance of consistent fluid intake throughout the day. Genitourinary Syndrome of Menopause (GSM) and its relationship to UI. Present healthy bladder practices (e.g., importance of monitoring the urge to urinate, consistent fluid intake throughout the day, post-void dribbling strategy) Highlight the importance of regular PFME. **3. Session Exercise 1 - How to Perform PFME** Guide participants to practice pelvic floor contractions. Facilitate questions and provide personalised tips for proper technique, emphasising body awareness and isolating the correct muscles.	Intention; Action Self-efficacy; Action Planning; Outcome Expectations	Cognitive Representations of UI; Coping Strategies	5.5. Anticipated regret 5.1. Information about health consequences 5.1. Verbal persuasion about capabilities 4.1 Instruction on how to perform a behaviour 1.2. Problem Solving 15.1. Verbal persuasion about capability 8.3. Habit formation 13.2. Framing/reframing 1.4. Action Planning 15.2. Mental rehearsal of successful performance 1.9. Commitment 2.3. Self-monitoring on behaviour 4.3. Re-attribution

	Postural Awareness: Demonstrate how posture enhances the effectiveness of PFME. **4. Provide Strategies for Controlling Urine Loss** *Stress Suppression Techniques - Knack Technique*: Teach participants to contract pelvic floor muscles before and during activities that increase intra-abdominal pressure (e.g., coughing, sneezing). *Urge Suppression Techniques* (e.g., do not rush into the toilet, do a strong pelvic contraction and walk slowly). **5. Psychoeducation:** importance of Planning in advance a behaviour (what, when, where, how), to better implement it. **6. SE 2: Guide participants to create detailed plans** for where, when, and how to perform PFME. **7. Homework Assignments (HA) – Exercise Report** Encourage participants to self-monitor the planned behaviour (PFME) daily implementation, using an exercise report given by the therapist and note any challenges to discuss during the next session.			
Session 3 – Integration of Physiotherapeutic Strategies into Daily Life	**1. Homework Feedback on PFME Self-Monitoring** *Review of Self-Monitoring:* Discuss participants' experiences tracking PFME frequency, challenges, and successes. *Identify Patterns:* Highlight any trends or patterns participants observed through self-monitoring (e.g., days with better adherence). *Reinforcement:* Emphasise the importance of self-monitoring in building awareness and creating accountability for progress.	Risk Perception; Outcome Expectations; Introduction to Coping Planning; Action Panning; Maintenance Self-efficacy; Action Self-efficacy	Coping Strategies; Cognitive Representations of UI; Coping Strategies	1.2. Problem solving 8.3. Habit formation 7.1. Prompts/Cues 15.1. Verbal Persuasion about capabilities 8.3. Habit formation 8.6. Generalisation of a target behaviour 13.5. Identity associated with changed behaviour

	Provide a Summary of the strategies provided in the Physiotherapy Session. **2. Psychoeducation** *Habits and Behavioural Automation:* Discuss how automating behaviours (e.g., frequent repetition of PFME) supports long-term success. Explore strategies for creating and reinforcing habits, such as setting reminders and linking PFME with daily routines. *Cognitive Restructuring:* Encouraged rethinking unhelpful thoughts during urgency episodes. *Action Self-Efficacy:* Boost confidence in participants' ability to overcome barriers and integrate PFME and other bladder control strategies into daily life. *Benefits of Self-Monitoring:* Highlight how tracking progress increases awareness of changes, identifies setbacks, and enhances motivation. *Benefits of Planning:* Discussed how detailed planning anticipates potential challenges and increases the likelihood of adherence. **3. SE1: Imagery Exercise** Use guided visualisation to promote body awareness, focusing on the correct activation of pelvic floor muscles. **4. SE2: Cognitive Restructuring During Urgency Episodes** Facilitate group sharing of thoughts and feelings during urgency episodes. **5. HA: Bladder Diary** Task participants with a three-day voiding diary, starting during the session - Focus on tracking fluid and food intake patterns,	15.1. Verbal persuasion about capability 2.3. Self-monitoring of behaviour 4.1. Instruction on how to perform a behaviour 1.8. Behavioural contract 5.5. Anticipation Regret 4.3. Re-attribution

	Postural Awareness: Demonstrate how posture enhances the effectiveness of PFME. **4. Provide Strategies for Controlling Urine Loss** *Stress Suppression Techniques - Knack Technique*: Teach participants to contract pelvic floor muscles before and during activities that increase intra-abdominal pressure (e.g., coughing, sneezing). *Urge Suppression Techniques* (e.g., do not rush into the toilet, do a strong pelvic contraction and walk slowly). **5. Psychoeducation:** importance of Planning in advance a behaviour (what, when, where, how), to better implement it. **6. SE 2: Guide participants to create detailed plans** for where, when, and how to perform PFME. **7. Homework Assignments (HA) – Exercise Report** Encourage participants to self-monitor the planned behaviour (PFME) daily implementation, using an exercise report given by the therapist and note any challenges to discuss during the next session.			
Session 3 – Integration of Physiotherapeutic Strategies into Daily Life	**1. Homework Feedback on PFME Self-Monitoring** *Review of Self-Monitoring:* Discuss participants' experiences tracking PFME frequency, challenges, and successes. *Identify Patterns:* Highlight any trends or patterns participants observed through self-monitoring (e.g., days with better adherence). *Reinforcement:* Emphasise the importance of self-monitoring in building awareness and creating accountability for progress.	Risk Perception; Outcome Expectations; Introduction to Coping Planning; Action Panning; Maintenance Self-efficacy; Action Self-efficacy	Coping Strategies; Cognitive Representations of UI; Coping Strategies	1.2. Problem solving 8.3. Habit formation 7.1. Prompts/Cues 15.1. Verbal Persuasion about capabilities 8.3. Habit formation 8.6. Generalisation of a target behaviour 13.5. Identity associated with changed behaviour

	Provide a Summary of the strategies provided in the Physiotherapy Session. **2. Psychoeducation** *Habits and Behavioural Automation:* Discuss how automating behaviours (e.g., frequent repetition of PFME) supports long-term success. Explore strategies for creating and reinforcing habits, such as setting reminders and linking PFME with daily routines. *Cognitive Restructuring:* Encouraged rethinking unhelpful thoughts during urgency episodes. *Action Self-Efficacy:* Boost confidence in participants' ability to overcome barriers and integrate PFME and other bladder control strategies into daily life. *Benefits of Self-Monitoring:* Highlight how tracking progress increases awareness of changes, identifies setbacks, and enhances motivation. *Benefits of Planning:* Discussed how detailed planning anticipates potential challenges and increases the likelihood of adherence. **3. SE1: Imagery Exercise** Use guided visualisation to promote body awareness, focusing on the correct activation of pelvic floor muscles. **4. SE2: Cognitive Restructuring During Urgency Episodes** Facilitate group sharing of thoughts and feelings during urgency episodes. **5. HA: Bladder Diary** Task participants with a three-day voiding diary, starting during the session - Focus on tracking fluid and food intake patterns,	15.1. Verbal persuasion about capability 2.3. Self-monitoring of behaviour 4.1. Instruction on how to perform a behaviour 1.8. Behavioural contract 5.5. Anticipation Regret 4.3. Re-attribution

	urination frequency, and urgency episodes to raise awareness of correlations and potential triggers. Remember PFME Report – Address the importance of logging PFME practice during the intervention and self-monitoring **6. Take-Home Message (THM)** "Repeat until it becomes automatic." Emphasise the role of repetition and consistency in transforming behaviours into habits.			
Session 4 – Overcoming Barriers to Behavioural Change	**1. Ask for Homework Feedback** *Reflection on Patterns:* Ask participants if they noticed a connection between urinary leaks, fluid intake, and acid food consumption based on their observations. Encourage participants to share insights about specific times or triggers that increase symptoms. **2. Psychoeducation** *Coping Planning and Maintenance Self-Efficacy:* Reinforce that conservative techniques like PFME may take about 4 weeks to show results and that individual progress may vary. Emphasise the long-term benefits of maintaining a healthy bladder routine and adherence to PFME. *Identify Barriers to PFME adherence:* Facilitate group discussion to identify personal (e.g., lack of time, forgetting) and contextual (e.g., environmental distractions, stress) barriers to consistent PFME practice. Explore challenges faced during self-monitoring. *Group Discussion on Overcoming Barriers:* Share strategies used by participants to overcome barriers and sustain motivation for PFME.	Coping Planning; Maintenance Self-efficacy; Outcome Expectations; recovery self-efficacy	Cognitive Representations; Coping Strategies; Emotional Representations	2.3. Self-monitoring on behaviour 9.3. Comparative imagining of future outcomes 13.4. Valued self-identity 3.1. Social support (unspecified)

Provide additional guidance for creating reminders, linking exercises to daily routines, and seeking support from others.
Promote awareness of temporary setbacks during periods of heightened stress, anxiety, or illness. Normalise these experiences as part of the recovery process.
Strategies to Sustain Motivation:
Discuss ways to stay motivated, such as celebrating small milestones and visualising long-term goals.
Resilience: Emphasise the importance of persistence and adaptability in creating healthy habits. Highlight the need for alternative plans to maintain consistency when life circumstances change.

3. SE 1: Reorganising the Day
Ask participants to develop coping plans to reinforce PFME practice even during busy or stressful periods.

4. SE 2: Ask participants to rate their level of regret (1–10) if they do not adopt the recommended changes.

5. SE 3: Pros-and-Cons Exercise
Encourage participants to imagine a future where UI no longer impacts their lives and list activities they would like to resume and the opposite. Use this exercise to reinforce motivation for change.
Evaluate the benefits of sustaining healthy bladder habits by weighing the pros and cons.

6. SE 4: Facilitate group sharing to identify common benefits (e.g., fewer embarrassing situations)

7. Take-Home Message (THM)

	"Always have a Plan B" No homework.			
Session 5 – Beliefs About Oneself	**1. Engaging Participants in Reflective Exercises** Facilitate reflective discussions to help participants identify and articulate the strengths they have developed through the program. Encouraged them to explore how these strengths contribute to a new sense of self in managing UI. **2. Psychoeducation** *Adaptative Individual Narratives:* Discussed the concept of creating personal narratives that emphasise growth and adaptation. Reinforce a positive identity shift to maintain motivation and long-term adherence. Highlight the importance of acknowledging challenges while focusing on progress and achievements. **3. Strengthening Positive/adaptative Self-Beliefs** Reinforced participants' confidence in managing UI effectively. Facilitate emotional disclosure to encourage open communication about experiences and emotions. **4. SE 1: Imagetic Exercise** Guided participants through a visualisation exercise regarding bladder control. **5. SE 2: "Now it seems to me that you have a path."** *Expand cognitive processing:* Prompt participants to reflect on the tools and strategies they have gained: "How do these new strategies shape who you are now?" "In which areas of your life are you noticing recovery and control?"	Maintenance Self-efficacy; Risk Perception; Outcome Expectations	Assessment of Coping Strategies; Cognitive and Emotional Representations	13.4. Valued self-identity 13.5. Identity associated with changed behaviour 13.2. Framing/reframing 4.3. Re-attribution

	6. Homework Assignment (HA) *Exercise to Practice Positive Inner Monologue:* Participants were tasked with reflecting on their daily challenges in maintaining the routine - Acknowledge feelings of frustration or discouragement without judgment. Practice reframing negative thoughts into positive affirmations to strengthen self-compassion and motivation. **7. Take-Home Message (THM)** "Now I am someone who takes care of my bladder."			
Session 6 – Self-Care and Self-Esteem	**1. Reflection on Self-Compassion Homework** Ask participants if adopting non-judgmental thoughts about instances where they did not meet expectations helped them to approach behaviour more positively and effectively. **2. Psychoeducation** Discuss whether self-acceptance facilitated motivation to make changes or sustain healthier habits. Emphasise the role of self-care practices in maintaining both physical well-being and emotional balance. Encourage participants to see self-care as a foundation for resilience and long-term health. **3. Emotion Self-Regulation and Relaxation Techniques** Explain the link between anxiety and urinary incontinence worsening. *Shared CBT-based relaxation technique – Diaphragmatic Breathing:* Guide participants through a demonstration of the technique,	Maintenance Self-efficacy; Outcome Expectations; Action Self-efficacy	Assessment of Coping Strategies; Cognitive and Emotional Representations	13.4. Valued self-identity 13.5. Identity associated with changed behaviour 4.3. Re-attribution

emphasising slow, deep breaths to engage the diaphragm and promote relaxation.
Facilitating Emotional Disclosure: Encourage participants to openly share their experiences and emotions, fostering a supportive group environment.

4. SE 1: What Does Self-Care Mean to You?

Facilitated a group discussion to explore personal definitions of self-care, current habits, and areas for improvement.
Asked reflective questions: What self-care habits do you currently practice? What can you adjust to take even better care of yourself?

5. SE 2: Self-Care Checklist

Guide participants to create a personalised checklist of self-care habits – Action Planning (Where, When, How)

6. SE 3: Identifying Strengths

Instruct participants to reflect in their journal:
2 compliments they have received.
2 features they like about their physical appearance.
2 situations where they made others happy.
2 challenges they have overcome.
Emphasise how recognising strengths builds confidence and fosters emotional resilience.

7. Homework Assignment (HA)

Practice Diaphragmatic Breathing Once Daily:
Incorporate this technique into their daily routine, noting its effects on anxiety and focus.

8. Take-Home Message (THM)

"The only person I know who is always there is me."

Session 7 – Possible Deviations Along the Way	**1. Homework Review Diaphragmatic Breathing Experiences** Engage participants in discussing their experiences with diaphragmatic breathing What effects did they notice on anxiety or focus? Were there any challenges in incorporating this practice into their routine? **2. Psychoeducation: What to do in case of relapse** Emphasise that there are people who maintain a sustained behaviour change path and that others do not. *Understanding Relapses:* Normalise the possibility of relapses, emphasising that setbacks are a common part of behaviour change. Highlight that recovery self-efficacy is a key factor in long-term success. *Possible Redefinition of Objectives in case of relapse:* Encourage participants to revisit their goals in case of a possible relapse and, if necessary, redefine them to be more realistic and achievable considering their experiences. *Preventing Possible Relapse:* Provide strategies to prevent relapses, such as creating reminders, setting small milestones, and seeking support from others. **3. SE 1: Coping Plan for Possible Relapse** *Guide participants in creating a personalised plan outlining specific actions for handling potential relapses:* Identify warning signs of a setback (e.g., doing less PFME); Outline immediate actions to take when facing challenges (e.g., specify who they can reach out to for support). **4. SE2: Imagining Future Challenges**	Recovery Self-efficacy; Coping Planning	Coping Strategies; Assessment of Coping Strategies	5.1. Information about health consequences 1.5. Review behaviour goal(s) 11.2. Reduce negative emotions 1.2. Problem solving

	Facilitate a visualisation exercise: Ask participants to imagine an unforeseen event in the future that causes a temporary regression in their adherence to healthy bladder habits. *Discuss:* What personal strengths will help you overcome this challenge? What resources can you rely on? Who will you talk to for guidance or support? **5. HA: *Message to Future Self*** *Have participants write a message to their future self when feeling less motivated, reflecting on:* The importance of staying committed to managing urinary incontinence effectively – How far they have come in building new habits – Words of encouragement when facing potential challenges. **6. Take-Home Message (THM)** "You have the tools, strengths, and support to overcome challenges and stay committed to your goals."			
Session 8 – Consolidating Gains and Sustaining Bladder Control	**1. Ask for homework feedback** Ask if someone wants to share a paragraph from their "Message for Future Self" **2. SE 1**: **Ask participants to share their experiences throughout the program** What strategies have worked best for them? What challenges have they overcome? How have they noticed improvements in bladder control? *Foster Confidence*: Facilitate a discussion on how participants feel about their progress and newfound confidence in managing urinary incontinence. *Reinforce Lifelong Self-Management - Sustaining Habits:* Emphasise that bladder control strategies	Maintenance Self-efficacy; Outcome Expectations	Cognitive and Emotional Representations	15.2. Mental rehearsal of successful performance 15.1. Verbal persuasion about capabilities

	and pelvic floor exercises are lifelong habits that require consistent practice. Reinforce the importance of maintaining daily self-monitoring tools (e.g., voiding diaries) to stay aware of PFME practice. Reiterate that occasional setbacks are normal and Emphasise the effectiveness of coping plans in regaining control. *Ask Feedback on the Program:* Invite participants to provide feedback on the program's effectiveness and areas for improvement and reinforce the value of their input and *Acknowledge Successes and Strengthening Confidence:* Recognise individual and group accomplishments, highlighting participants' dedication and progress. Acknowledge both large and small milestones to inspire continued commitment. *Confidence in Coping Plans:* Revisit coping strategies and ask participants to reflect on how they can adapt these plans to future situations. **3. Take-Home Message (THM):** "You've taken important steps toward better bladder control. These tools are now yours to use for life, empowering you to live confidently and independently."	

Note. PFME = Pelvic Floor Muscle Exercise; SE = Session Exercise; HA = Home Assignment; THM = Take Home Message.

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Outcomes

All primary and secondary outcome measures will be assessed at baseline, mid-intervention (one month later), post-intervention (two months after baseline), and at a three-month follow-up after the intervention. A list of the outcomes, including the measurement time points, is provided in Figure 14.

Figure 14

Schedule of Enrollment, Intervention, and Assessments (SPIRIT Figure)

STUDY PERIOD	**Enrolment**	**Allocation**	**Post-allocation**			
TIMEPOINT	**$-t_1$**	**0**	**Baseline**	**Mid-intervention (1 month later)**	**Post-intervention (2 months after baseline)**	**3-month follow-up**
ENROLMENT						
Inclusion/ Exclusion Criteria	X					
Contact Details	X					
Demographics		X				
Eligibility screen	X					
Informed consent		X				
Allocation (randomisation)		X				
INTERVENTIONS						
Control group, Melanoma prevention pamphlet			♦——	——♦		
Intervention group, eHealth intervention				♦——	——♦	
ASSESSMENTS						
KHQ			X	X	X	X
ICIQ-UI SF			X	X	X	X
WHOQOL-Bref			X	X	X	X
HAPA Questionnaire			X	X	X	X
Brief IPQ			X	X	X	X
UI-related coping strategies			X	X	X	X
RSES			X	X	X	X
UI-SIQ			X	X	X	X
PIKQ-UI (EG)			X	X	X	X
Group cohesion (EG)				X	X	X
Medical help				X	X	X
Questionnaire Return			X	X	X	X
Trial withdrawals			X	X	X	X
Questionnaire Reminder			X	X	X	X

Participant Measures

Sociodemographic characteristics (i.e., age, nationality, education level, professional status, sexual-affective relationship, and number of biological children), clinical characteristics (i.e., number of vaginal and cesarean deliveries, presence of perineal laceration, diagnosed physical and mental illnesses, menopausal status, and BMI status), lifestyle factors (i.e., intake of coffee, hot and cold beverages, and engagement in high-impact physical activity), and UI-related information (i.e., seeking medical help for UI, prior UI treatment, prescribed UI medication, and participation in pelvic floor muscle exercise) will be collected, through questions like: "Are you currently in a sexual-affective relationship?", "How many vaginal deliveries have you had?", "How many cups of coffee do you drink per day?", and "Have you taken any prescribed UI medication?".

Primary outcomes

The Portuguese vesion of the **International Consultation Questionnaire Urinary Incontinence Short Form (ICIQ-UI SF**; Avery et al., 2004; Guerra et al., 2023) will be used to assess the frequency and amount of urinary leakage and its overall impact on daily life (symptom-specific QoL), through items such as "How often do you leak urine?" or "Overall, how much does leaking urine interfere with your everyday life?". The responses sum to an overall score between 0 and 21 points, with a higher score indicating more severe UI symptoms. A fourth unscored question asks when leakage occurs. The global score can be divided into severity categories (i.e., 1–5 = slight, 6–12 = moderate, 13–18 = severe, and 19–21 = very severe) (Klovning et al., 2009). The internal consistency reliability was excellent in both the original validation (α = .95; Avery et al., 2004) and the Portuguese version (α = .85; Guerra et al., 2023).

The Portuguese version of the **Brief Illness Perception Questionnaire (Brief IPQ)** will be used in this study to assess participants' UI-related beliefs (Broadbent et al., 2005; Figueiras et al., 2012). The Brief IPQ contains eight questions about UI symptoms' perception and representation (e.g., consequences, timeline, control, impact, concern), such as "How concerned are you about your illness?" or "How long do you think your urinary incontinence will continue?". The global score can be divided into threatening perception categories (< 42 = low experienced threat; 42–49 = moderate experienced threat; ≥ 50 = high experienced threat). The Brief IPQ showed good reliability in our previous work with this sample (α = .92; ω = .86; Porto et al., 2023).

The **Hiding and Defensive UI Strategies Instrument**, developed by this research team (Porto et al., 2023), employs a two-factor structure for evaluating coping strategies related to UI management, drawing from the research of Diokno et al. (2004). The hiding coping dimension includes five strategies aimed at hiding urine stains (e.g., "using feminine hygiene pads", "wearing dark clothes to conceal urine stains"). Conversely, the defensive coping dimension consists of eight strategies focused on limiting urine loss (e.g., "limiting fluid intake" and "limiting physical exercise" and "limiting physical exercise"). Responses are collected using a Likert scale ranging from "1 – Never" to "5 – Always". The total score varies between 13 and 65, with higher scores reflecting greater dysfunctionality in coping strategies. Both subscales exhibited good internal consistency and reliability (defensive: $\alpha = .94$, $\omega = .92$; hiding: $\alpha = .80$, $\omega = .83$; Porto et al., 2025a).

Secondary outcomes

The Portuguese version of the **King's Health Questionnaire (KHQ)** was used to assess the impact of UI symptoms on quality of life (condition-specific QoL; Kelleher et al., 1997; Viana et al., 2015). The KHQ contains 28 items that are scored in nine domains (i.e., general health perception, incontinence impact, role limitations, physical limitations, social limitations, personal relationships, emotions, sleep/energy, severity of urinary symptoms), containing questions such as "Does your bladder problem limit your social life?" or "Does your bladder problem make you feel worn out and tired?". The nine domains are scored between 0 and 100, with higher scores indicating a higher impact on the quality of life. The symptom severity scale is scored from 0 to 30, with higher scores indicating higher severity of UI symptoms. The KHQ showed good internal consistency in both the original validation ($\alpha = .73$–$.89$; Kelleher et al., 1997) and the Portuguese version ($\alpha = .72$–$.91$; Viana et al., 2015).

The **Questionnaire for Urinary Incontinence Diagnosis (QUID)**, tailored explicitly for identifying UI in women, will be administered to assess different UI types (Bradley et al., 2005). The questionnaire consists of six items, with three assessing stress UI (SUI), which evaluates urine leakage during activities that increase abdominal pressure, such as coughing or exercising, and three assessing urge UI (UUI), which measures leakage associated with a sudden and intense urge to urinate. The scores are calculated in an additive manner, ranging from 0 to 15. Responses are recorded on a Likert-type scale ranging from 0 ("none of the time") to 5 ("all of the time"). The diagnostic thresholds for stress and urge UI are set at scores of ≥ 4 and ≥ 6, respectively ($\alpha = .85$

and .87, respectively). Thus, the classification of mixed UI (MUI) depends on meeting both criteria concurrently (≥ 4 for SUI and ≥ 6 for UUI). Since no European Portuguese versions of the QUID are available, our team will translate and culturally adapt it in accordance with international guidelines (Beaton et al., 2000; Wild et al., 2005). The psychometric properties will be assessed within this study.

The Portuguese version of the **WHO Quality-of-Life-Bref (WHOQOL-Bref)** containing 26 items that assess self-reported quality of life (generic QoL), such as "How satisfied are you with your health?" or "How well are you able to concentrate?", will be used (Canavarro et al., 2007; Harper & Power, 1998). This scale is divided into four quality of life domains (i.e., physical, psychological, environmental, and social) and scored according to these domains. The scores range between 0 and 100 points, with higher scores indicating a higher self-reported quality of life in each specific domain. Regarding consistency reliability, the four subscales showed adequate reliability in our previous work with this sample (physical: α = .87; psychological: α = .84; social relationships: α = .64; environmental: α = .78; Porto et al., 2024).

The **HAPA Questionnaire (tailored to UI symptoms)**, based on Renner's and Schwarzer's RACK study, will be used to assess determinants of HAPA behaviour change (Renner & Schwarzer, 2007). This questionnaire contains 45 items about: 1) risk perception, assessed by two items, for example "What do you consider to be the likelihood of one day developing more severe urinary incontinence or related issues if you do not adopt strategies to effectively manage your current urinary incontinence (e.g., doing pelvic floor strengthening exercises)?, "How serious a threat to your health is having urinary incontinence (in middle-age)?"; 2) action and coping planning, assessed by 10 items, which all had the stem, "I already have concrete plans about..." followed by statements such as, ''(…) which specific strategies I will adopt to manage my urinary incontinence (e.g., doing pelvic floor strengthening exercises)'' or "(…) what to do in difficult situations in order to maintain my urinary incontinence management strategies"; 3) positive outcome expectancies, assessed by eight items, which all had the stem, "What do you think will be the consequences if you adopt strategies that help you to better manage your urinary incontinence (e.g., doing pelvic floor strengthening exercises)?" followed by positive consequences such as, "I will reduce my urine losses" or "I will feel better psychologically"; 4) action, maintenance and recovery self-efficacy, assessed by 18 items, which all had the stem, "I can do something/maintain my strategies/re-implement my strategies to manage my urinary incontinence even if (...)", followed by statements

such as, "(…) I have to learn much about urinary incontinence", "(…) it takes me long to make it a habit" or " (…) I have already paused for several weeks"; 5) intention, assessed by three items, which all had the stem, "Over the next week, what is your intention to adopt urinary incontinence management strategies (e.g., doing pelvic floor strengthening exercises)?", followed by positive intentions, such as "I intend to start implementing Urinary Incontinence management strategies from now on" or "I intend to start implementing urinary incontinence management strategies every day"; and 6) action control, assessed by four items, which all had the stem, "Some people can control their behaviour in order to achieve their intentions of adopting urinary incontinence management strategies (e.g., doing pelvic floor exercises), while other people can't. What about you?", followed by statements, such as "Currently, I evaluate my behaviour daily to check if I am implementing urinary incontinence management strategies" or "I strive to act in accordance with my intentions to adopt urinary incontinence management strategies". Higher scores indicate more behaviours/cognitions congruent with UI adaptive self-management. Since no European Portuguese versions of the HAPA Questionnaire are available, our team will translate and culturally adapt it in accordance with international guidelines (Beaton et al., 2000; Wild et al., 2005). The psychometric properties will be assessed within this study.

The Portuguese version of the **Rosenberg Self-Esteem Scale (RSES)** will be used to assess self-esteem (Pechorro et al., 2011; Rosenberg, 1965). The RSES contains ten items regarding self-satisfaction, self-perception, and self-worth, such as "I feel that I have a number of good qualities" and "I wish I could have more respect for myself". The global score ranges from 0 to 30 points, with higher scores indicating higher self-esteem. Internal consistency reliability was excellent in the original validation (α = .92; Rosenberg, 1965) and good in the Portuguese version (α = .79; Pechorro et al., 2011).

The **Urinary Incontinence Social Isolation Questionnaire (UI-SIQ)**, a brief Portuguese five-item questionnaire, will be used to assess social isolation (SI) in women with UI in research and clinical contexts (Porto et al., 2025b). It was developed by this team (health psychologists, data analysis expert and a gynecologist), and created based on emotional, cognitive and behavioural aspects of SI in urological conditions: (1) "Having incontinence makes me decline invitations to go out, or be with friends/family"; (2) "I often feel isolated from others"; (3) "Urine loss makes me feel bad about myself"; (4) "I feel misunderstood by others"; and (5) "I avoid meeting new people". A Likert scale will be used ranging from "1 – Strongly Disagree" to "4 – Strongly Agree". The total

score ranges from 4 to 20, with higher scores indicating increased SI levels. The internal consistency reliability was excellent (α = .95; ω = .90; Porto et al., 2025b).

The **Prolapse and Incontinence Knowledge Questionnaire (PIKQ-UI)** will be used to evaluate pelvic floor and UI knowledge (Shah et al., 2008). The PIKQ-UI contains twelve items regarding pelvic floor exercises and urinary incontinence regarding UI aetiology, treatment, and diagnosis, containing affirmations such as "Women are more likely to leak urine than men" or "Surgery is the only treatment for urinary loss". The Prolapse dimension was removed, and the rating scale was adapted from the original binary "yes" or "no" scale to a five-point Likert scale (1 – "Strongly Disagree" to 5 – "Strongly Agree"). Consequently, the global score ranges from 12 to 60 points, with higher scores indicating greater knowledge and understanding. Additionally, seven items regarding body awareness were added, focusing on pelvic floor muscles awareness, such as "When I want to contract my pelvic floor muscles, I squeeze my glutes and my glutes feel more toned" or "When I'm contracting my pelvic floor and abdominal muscles, it feels like I'm closing a zipper", with scores ranging between 7 and 35 points, where higher scores indicate greater awareness of pelvic floor muscle engagement. Internal consistency reliability (α = .83) was excellent (Shah et al, 2008). Since no European Portuguese versions of the PIKQ-UI are available, our team will translate and culturally adapt it according to international guidelines (Beaton et al., 2000; Wild et al., 2005). The psychometric properties will be assessed within this study.

The **Training Exercise Report for Self-Monitoring**, based on Sjöström et al. (2013) and designed by our team to facilitate self-moitoring, will be used to track participation in Pelvic Floor Muscle Exercises (PFME). Beginning in the second session of the intervention, participants will be required to record the number of contractions performed daily for a total duration of seven weeks. This report serves as a self-monitoring tool to encourage adherence to the planned PFME routine. Participants will be asked to document their daily exercises and note any challenges they encounter. The completed reports will be reviewed in subsequent sessions, allowing for discussions of progress, potential difficulties, and necessary adjustments. This structured self-monitoring approach aims to enhance accountability, reinforce engagement, and support behavioural implementation throughout the intervention (Session 2 Home Assignment; see Table 33 and Appendix T).

Three-Day Bladder Diary for Self-Monitoring Liquid Consumption and Urine Leakage, designed by our team and completed by participants during the third week of the intervention, will be used to assess the relationship between liquid consumption and urine leakage. This diary serves as a self-monitoring tool that helps participants track their fluid intake and urinary patterns. Participants will be required to record the types of beverages consumed and their frequency per hour, number of bathroom visits, intensity of the urge to urinate (slight or intense), and frequency of urine leakage episodes per hour. By systematically documenting these patterns, participants can gain insight into their fluid intake habits and urinary symptoms, facilitating discussions with the therapist for personalised guidance and intervention adjustments (Session 3 Home Assignment; see Table 33 and Appendix U).

The primary and secondary outcomes will be analysed using intention-to-treat, including all participants who complete the four assessment points. The results for the primary and secondary outcomes will be presented for both groups at all time points. Effect sizes and 95% confidence intervals will be reported. If binary outcomes are assessed, both the absolute and relative effect sizes are reported. Changes made to the trial's prespecified primary and secondary outcomes will be reported.

Sample Size Calculations

Minimum sample size was estimated according to the commonly cited rule of approximately 10 participants per estimated parameter (Kline, 2016).

Allocation

An external researcher will generate a random allocation sequence using IBM SPSS Statistics software (v.28). The sequence will be created to ensure random distribution of participants between the experimental and control groups.

The randomisation process used in the PURI-PRO study will be simple, with no restrictions, blocking, or stratification. Since the study will follow an open-label design, no specific mechanism will be employed to conceal the allocation sequence from researchers or participants. Each participant will receive an email informing them of their assigned group and providing instructions on how to access the baseline questionnaire (T0).

The research team will screen participants for eligibility and assign them to their respective groups based on a randomisation sequence. All the EG participants will be scheduled to receive the intended intervention. To facilitate participation, five different schedules will be available, and participants will be registered according to their order of preference. This flexibility is aimed at accommodating individual availability and increasing adherence to the program.

Any losses or exclusions after randomisation will be documented along with the reasons for dropout. An email will be sent to all dropouts to advise them to contact a health professional expert in UI.

Data Collection Methods

Data will be obtained at four different time points using an online questionnaire. In order to start the intervention, the following data will be required: 1) telephone contact, in order to send written messages (SMS) to notify each participant of the evaluation moments, and to include the participants in a WhatsApp group, if desired, as a space for sharing and exchanging experiences; 2) email address, in order to send the link to access the 'Zoom' platform for the weekly meetings, as well as to share the materials presented in each session of the intervention, to send the link to access the evaluation moments and to send any necessary information about the intervention. To ensure participant retention and complete follow-up, emails and SMS will be sent with requests to complete each evaluation, reminding participants of the associated benefits (e.g., reducing urine losses and a TENA voucher).

Data Management

All personal data acquired during this study will be processed in full compliance with the legislation provided by Regulation (EU) 679/2016, entitled "General Data Protection Regulation (GDPR)", which came into force on May 25, 2018. Personal and research data (participation forms, consent forms, and questionnaires) will be stored by the researcher in charge for as long as necessary to achieve the purpose of the study, for a maximum period of up to five years after the completion of the study.

Statistical Methods

Statistical analysis will be conducted using R software. Descriptive statistics will be calculated, and latent growth models will be applied to examine changes over time between the experimental and control groups across the four assessment points.

Descriptive statistics (means [*M*] and standard deviations [*SD*]) and item sensitivity analyses (skewness [*Sk*] and kurtosis [*Ku*]) will be conducted to confirm if there are no severe deviations from a normal distribution (*Sk* ≥ three and *Ku* ≥ 10 values) (Marôco, 2021). The Chi-Square test will be employed to check for differences in dropout rates between the EG and the CG.

All analyses will be conducted in accordance with the intention-to-treat principle. Baseline sociodemographics and initial scores (i.e., ICIQ-scores, Kegel Scores, KHQ, WHOQOL-BREF, HAPA, Brief IPQ, Dysfunctional Coping Strategies, RSES, UI-SIQ, PIKQ-UI) will be compared between the intervention and control groups using T-Student and Chi-Square tests. Statistical significance will be set at *P* value < .05.

Conditional LGCM will allow for estimation of inter- and intra-individual variation over time. Repeated measurements collected at four time points (i.e., at baseline and mid-intervention, post-intervention, and three-month follow-up) will be included as observed indicators, with the latent intercept (i.e., initial status) and slope (i.e., rate of change) factors being estimated. With longitudinal data, the LGCM will allow exploration of the effects of the intervention on changes in variables of interest, or the growth rates (i.e., slopes) of the variables of interest. The analysis will be conducted to examine the effects of the intervention on primary and secondary outcomes. The intervention condition (i.e., eHealth intervention vs. control) will be explored as a predictor of changes in primary and secondary outcomes (i.e., predicting the slope factor). A dummy variable will be created to represent group assignments. The eHealth intervention group will be coded as one, and the control group as 0. A significant path from the intervention condition to the slope of the variable of interest will possibly indicate a significantly larger change in that variable over time in the intervention group than in the control group.

The point of maximum growth (1) will be anchored when the variable's mean value is the highest, while all other parameters will remain flexible. Model parameters will be estimated using established fit thresholds: Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) > .90, Root Mean Square Error of Approximation (RMSEA) within a 90% confidence interval, and

Standardised Root Mean Square Residual (SRMR) values < .08. Additionally, the chi-square statistic (χ^2/df) must be < 5 (Marôco, 2021). It should be noted that RMSEA and SRMR tend to be overestimated in models with few degrees of freedom. Given the reduced degrees of freedom, some models will probably approach saturation. In these cases, the goodness-of-fit indices will be conservatively adjusted to 1 (Marôco, 2021).

Model estimation will be conducted using the Maximum Likelihood Robust (MLR) estimator within the *lavaan* R package, employing the Full Information Maximum Likelihood (FIML) method to handle missing data (Enders & Bandalos, 2001; Marôco, 2021).

Analyses will be performed using IBM SPSS Statistics software (v.28) and R (v.4.2.3; R Core Team, 2020), and RStudio (v.2023.06.1+524; RStudio Team, 2020). The R-Lavaan package (v.0.6.15; Rosseel, 2012) and the semTools package (v.0.5-7; Jorgensen et al., 2025) will be used for model fitting. A significance level of .05 will be applied.

Regarding the analysis of the population in relation to protocol nonadherence, an intention-to-treat approach will be applied to dropouts. This means that all participants originally assigned to their respective treatment groups will be included in the analysis, regardless of their adherence to the protocol. This approach preserves the benefits of randomisation and reflects real-world scenarios in which participants may not fully comply with the protocol.

To handle missing data, the Maximum Likelihood Method (ML) from the R Lavaan package will be used to adjust the model. More specifically, ML activates the Full Information Maximum Likelihood (FIML) method, which is a Lavaan pattern approach for estimating parameters in the presence of missing data.

In addition to primary analyses, PURI-PRO RCT aims to explore the mediators of behaviour change/socio-cognitive variables, based on the HAPA through Latent Growth Mediation Models (e.g., Risk Perception, Action control, Action and Coping planning, Positive outcomes expectations).

Data Monitoring

The Data Monitoring Committee (DMC) was considered unnecessary because it is a low-risk, non-invasive, and short-duration intervention.

The results will be published in peer-reviewed international journals and at national and international conferences. The dissemination of results in journals complies with the Consolidated Standards of Reporting Trials. No stopping guidelines were established for the PURI-PRO trial, and the study is scheduled to proceed without predetermined criteria for early termination based on the interim results.

Harms

Some of the topics addressed may cause emotional discomfort to participants. However, the lead researcher is a health psychologist with CBT intervention training and experience who can provide appropriate support and identify any problem that might benefit from further professional guidance, if necessary. Also, weekly supervision will be held with the team's senior health psychologist. Any adverse events will be documented and reported in the final analysis, following the CONSORT guidelines (Schulz et al., 2010) for reporting harm in clinical trials.

Limitations

This study presents several limitations that should be acknowledged. First, technical challenges may arise, such as internet disruptions during Zoom sessions, which could affect intervention delivery and participant engagement. Second, reliance on self-reported UI symptoms without objective clinical verification (e.g., 24-hour pad test) introduces a risk of reporting bias. Given the stigmatised and sensitive nature of UI, participants may underreport or misrepresent symptom severity, compromising the validity of symptom classification and potentially obscuring associations with illness representations and coping variables. Third, the exclusive use of online data collection restricts participation to individuals with consistent internet access and adequate digital literacy, thereby introducing potential socio-economic bias and reducing the representativeness of the sample. Fourth, recruitment through social media (e.g., Facebook, Instagram) and reliance on a convenience sampling strategy may further constrain generalizability, excluding less digitally engaged or lower-educated populations. Fifth, a high attrition rate—anticipated to be approximately 50%—may limit statistical power and introduce bias if dropouts differ systematically from completers. Finally, no pilot study was conducted to assess feasibility and acceptability prior to full implementation. This omission limits insights into potential barriers to recruitment, adherence, and delivery, and underscores the importance of preliminary feasibility testing in future trials to optimise both design and methodological rigour.

Generalisability

The results will primarily apply to Portuguese middle-aged women with Internet access and self-reported UI and will also be generalised according to the predominant UI severity level and type observed in the sample.

Interpretation

The final interpretation will consider the balance between benefits and harms while comparing the findings with other evidence in the field of UI interventions.

Patient and Public Involvement

Patients or the public will not be involved in the design, conduct, reporting or dissemination plans of our research.

Ethics and Dissemination

Ethics of approval statement

This study is part of a research project (PURI-PRO: Portuguese Urinary Incontinence Project) that aims to promote a healthier life and well-being for middle-aged women (specifically, middle-aged women), meeting the United Nations 2030 Agenda. This study was approved by the Ethical Committee for Research of the Ispa – Instituto Universitário (D/022/11/2019; Appendix A) and followed the ethical guidelines and standards of the Order of Portuguese Psychologists (2024) and American Psychological Association (2024). This study will also be conducted in accordance with the internationally defined "Standards of Good Clinical Practice" and in compliance with the ethical principles established in the "Declaration of Helsinki" (1964) and subsequent revisions.

Protocol amendments

Important protocol modifications will be reported to relevant parties (e.g., trial participants, trial registries, and journals).

Consent or assent

Only the principal researcher will be responsible for collecting the informed consent of each participant.

Confidentiality

All stored information will be protected with a password to ensure data security and confidentiality. The data provided during the evaluation will be made non-identifiable, i.e., the material collected will be anonymous and not linked to the identity of any participant in the intervention (an alphanumeric code will be created for each participant). Personal data that are no longer required will be destroyed.

Access to data

The data supporting this study's findings will be available from the corresponding author (MP) upon reasonable request, without undue reservation.

Dissemination plan

This study protocol is the first to publish this RCT. The findings of this RCT will be published in peer-reviewed international journals, and at national and international conferences. The dissemination of results in journals will comply with CONSORT guidelines. Important protocol modifications will be reported.

The Principal Researcher will obtain informed consent, and participants can withdraw their consent at any time. TENA (an intimate hygiene products company) will offer a voucher (€25) to all participants who complete all stages of the intervention/assessment, including the three-month follow-up evaluation. TENA will not have access to the study data and will play no role in structuring the intervention. Additionally, participants will not be exposed to any advertising or product suggestions related to intimate hygiene from any specific brand. TENA will have no commercial or other contact with participants beyond providing brand vouchers. All participants in the Experimental Group and the Control Group who complete all stages of the intervention/assessment will be eligible to receive the Voucher. Only the study team (investigators) will have access to the final trial dataset. An anonymised data set will be used for publications. The WJCR and Ispa – Communication Office, along with TENA's website, will disclose the intervention results, which will be available to all participants.

Discussion

Acknowledging adherence challenges in prior eHealth UI interventions (e.g., Firet et al., 2022; Verhoeks et al., 2019; Wadensten et al., 2021), PURI-PRO specifically targets illness

perceptions and applies BCTs within a multidisciplinary team. Unlike other eHealth studies (e.g., Asklund et al., 2017; Firet et al., 2019; Wadensten et al., 2021) that primarily evaluated apps for UI symptom management—mainly focused on PFME—PURI-PRO is not an app but a multidisciplinary, theory-driven programme (CSM, HAPA, CBT) supported by structured BCTs. It delivers synchronous weekly group sessions via Zoom, with peer support maintained through WhatsApp, and is co-facilitated by psychology and physiotherapy. Session content addresses bladder training and healthy toileting, action planning, and coping for PFME and lifestyle changes. In this way, PURI-PRO was designed to address not only UI symptom severity but also illness perceptions, coping, social isolation, self-esteem, and UI literacy.

Whereas app-based interventions have clear advantages in terms of accessibility, scalability, low cost, anonymity, and flexible use, they often suffer from reduced engagement and adherence, limited personalisation, and a predominant focus on PFME, without sufficiently addressing psychosocial and lifestyle dimensions. By contrast, PURI-PRO offers synchronous professional guidance, structured peer support, and a broader scope of intervention targets—including illness representations, coping strategies, lifestyle changes, and healthy toileting—which are essential for sustained behaviour change. Nevertheless, this comprehensive and resource-intensive approach requires stable internet access, active participation, and professional time, which may reduce scalability compared to fully automated apps.

Nevertheless, the PURI-PRO program addresses a critical gap in the current literature by offering an accessible and theoretically informed digital solution for UI management. If proven efficacious, this intervention could enhance health outcomes at the population level, particularly among women residing in geographically underserved or remote regions, by facilitating remote delivery of evidence-based care. The program also aligns with the United Nations 2030 Sustainable Development Goals by promoting good health and well-being (Goal 3), reducing disparities in access to healthcare services (Goal 10), and contributing to sustainable innovation in digital health (Goal 9).

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Empirical Study 9. PURI-PRO: A Randomised Controlled Trial of a Multidisciplinary eHealth Cognitive-Behavioural Intervention for Midlife Women with Urinary Incontinence, Exploring Behaviour Change Mechanisms

Abstract

Introduction: Urinary incontinence (UI) affects up to 30% of middle-aged women, often leading to treatment avoidance due to stigma and maladaptive beliefs and coping strategies. This randomised controlled trial RCT evaluated the effectiveness of PURI-PRO, a eHealth UI self-management intervention, in reducing UI symptom severity, threatening illness representations, and hiding/defensive coping. It also aimed to identify the volitional mechanisms through which the intervention exerted its effects.

Method: Ninety-eight women with self-reported UI symptoms were randomised in a 1:1 ratio to either an experimental group (EG), receiving the PURI-PRO intervention, or a control group (CG). Primary outcomes included UI severity, illness representations, and hiding/defensive coping strategies. Secondary outcomes included condition-specific and global quality of life, volitional and motivational constructs from the Health Action Process Approach, social isolation, self-esteem and pelvic floor knowledge. Outcomes were assessed using validated self-report instruments and measured at baseline, mid-intervention (one month), post-intervention (two months) and three months follow-up. Conditional latent growth curve modelling (CLGM) and mediation analyses were used to estimate change trajectories and change mechanisms.

Results: The PURI-PRO intervention produced significant improvements in all three primary outcomes. Reductions were observed in UI symptom severity ($\beta = -.671$, $p < .001$, $R^2 = .28$), threatening illness representations ($\beta = -.538$, $p < .001$, $R^2 = .25$), and hiding/defensive coping strategies ($\beta = -.418$, $p = .002$, $R^2 = .17$). Among secondary outcomes, significant improvements were found in social isolation ($\beta = -.784$, $p = .003$, $R^2 = .61$) and condition-specific quality of life ($\beta = .210$, $p = .018$, $R^2 = .22$). Volitional self-regulation constructs also improved significantly, including action planning ($\beta = .529$, $p < .001$, $R^2 = .53$), coping planning ($\beta = .480$, $p < .001$, $R^2 = .48$), and action control ($\beta = .628$, $p < .001$, $R^2 = .50$). No significant improvements were observed in general quality of life, self-esteem, or self-efficacy measures (action, maintenance, recovery). Mediation analyses supported partial indirect effects of coping planning, action planning, and

action control on the relationship between motivational HAPA and primary outcomes. Dropout rates were 27.27% in both EG and CG (15 of 55 participants in each).

Conclusion: This short-term theory-based digital intervention effectively reduced symptom severity and maladaptive beliefs and improved volitional self-regulation and social outcomes in women with UI. The findings highlight the importance of implementing volitional strategies early in interventions to prevent internalisation of maladaptive representations and disengagement.

Trial Registration: The PURI-PRO trial was prospectively registered with ClinicalTrials.gov under NCT06527638 on September 5, 2024.

Introduction

Urinary incontinence (UI) is a prevalent yet underdiagnosed and undertreated condition, affecting an estimated 20–30% of middle-aged women globally and significantly impairing physical, psychological, social, occupational, and sexual well-being (Hannestad et al., 2000; Irwin et al., 2006). Beyond its personal toll, UI imposes a substantial economic burden, with healthcare costs projected to escalate in both the European Union and the United States (European Association of Urology, 2023; Smith, 2016).

Despite its well-documented negative impact on quality of life (QoL; Bartoli et al., 2010), fewer than half of women experiencing UI actively seek treatment. This treatment avoidance is frequently driven by stigma, embarrassment, and dysfunctional beliefs about UI—cognitive factors that often foster concealment behaviours and the adoption of dysfunctional self-management strategies aimed at symptom suppression (Bush et al., 2001; Hägglund et al., 2003; Schreiber Pedersen et al., 2017). While these strategies may offer short-term relief or social concealment, they ultimately contribute to the chronicity and exacerbation of symptoms over time (Diokno et al., 2004).

Although behavioural interventions—such as lifestyle modification, bladder training, and pelvic floor muscle exercises (PFME)—are recommended as first-line treatments for all UI subtypes (Dumoulin et al., 2016; Nambiar et al., 2018), adherence and long-term symptom relief remain inconsistent. Structured home-based programs—with clear instructions—have also been shown to reduce leakage episodes by up to 50% (Huang et al., 2020; Sjöström et al., 2013). The rise of eHealth and mHealth platforms presents a promising, scalable approach to delivering conservative UI care (Firet et al., 2022; Plaete et al., 2015; Nyström, 2018); yet high dropout rates and limited long-term adherence continue to undermine their effectiveness (Firet et al., 2022).

This gap highlights the urgent need for structured, theory-driven digital interventions that not only deliver evidence-based behavioural content but also sustain engagement and behaviour change over time (McClurg et al., 2015). Health psychology models such as the Health Action Process Approach (HAPA) offer a compelling framework to guide intervention development by addressing the cognitive and volitional mechanisms that underlie behaviour adoption and maintenance (Schwarzer, 2016). By integrating such models into UI management—particularly within digital platforms—there is significant potential to enhance adherence, improve patient

outcomes, and reduce the broader burden of UI (Dumoulin et al., 2015).

The HAPA provides a robust, evidence-based framework for understanding and facilitating adaptive health behaviour change. It is particularly well-suited for guiding conservative interventions in urinary incontinence (UI), where long-term adherence to self-management behaviours such as pelvic floor muscle exercise (PFME) is critical yet often suboptimal (Dumoulin et al., 2015; Hay-Smith et al., 2015; McClurg et al., 2015). HAPA distinguishes between two core phases in the behavioural change process: a motivational phase, in which intentions are formed, and a volitional phase, where those intentions are translated into sustained behavioural action (Schwarzer, 2008, 2016). Each phase is supported by distinct psychosocial determinants that influence the initiation and maintenance of health-promoting behaviours, including lifestyle modification, PFME, healthy bladder habits, and urge/stress suppression techniques (Clark & Bassett, 2014; Zhang et al., 2019).

In this context, the goal of the motivational phase (i.e., goal setting) is to foster a strong behavioural intention, understood as a deliberate and conscious commitment to initiate a specific health behaviour (e.g., forming the intention to engage in a PFME home-based program; Dumoulin et al., 2015; Schwarzer, 2016). However, intention alone is rarely sufficient (Schwarzer, 2016). Meta-analytic evidence suggests that intention accounts for only 20–25% of the variance in behaviour, underscoring the well-documented intention–behaviour gap (Zhang et al., 2019). To foster intention formation, the HAPA framework highlights three critical cognitive antecedents. The first is risk perception, which requires that women acknowledge both the severity of the clinical condition and their personal susceptibility (Schwarzer, 2016; Schwarzer et al., 2011). Importantly, risk perception exerts its influence primarily during the early motivational phase and therefore needs to be complemented by outcome expectancies, that is, the perceived benefits of adopting the protective behaviour relative to its potential costs or barriers. The third antecedent is action self-efficacy, defined as the individual's confidence in her ability to initiate the protective behaviour. Collectively, these constructs form the foundation for a meaningful intention to act, thereby setting the stage for volitional processes that translate motivation into sustained behavioural change (Schwarzer, 2016).

Once a behavioural intention is formed, the volitional phase becomes critical for successful behaviour enactment. This phase encompasses the processes of goal pursuit, behavioural initiation,

execution, and long-term maintenance (Zhang et al., 2019). The target behaviour must be strategically planned, actively initiated, consistently maintained, and reinitiated when setbacks occur. Throughout this phase, sustained self-regulatory efforts are essential to bridge the intention–behaviour gap, ensuring that intentions are effectively translated into sustained behavioural engagement. These efforts must be applied continuously until the behaviour becomes internalised and habitual, thereby reducing the need for conscious control and enhancing the likelihood of long-term adherence.

Within this framework, action planning refers to the development of specific, time-bound, and contextually anchored implementation intentions—often articulated in terms of when, where, and how the behaviour will be performed. For example: "*I will do PFME every morning after brushing my teeth for five minutes in the bathroom*". Such planning is most effective when the behaviour is linked to existing routines or environmental cues, thereby minimising cognitive load and promoting automaticity (Clark & Bassett, 2014). Coping planning, in turn, complements action planning by helping individuals anticipate potential obstacles and formulate adaptive responses in advance. For instance: "*If I am unable to do PFME in the morning, I will complete them during my lunch break at work*". This strategy enhances behavioural flexibility and resilience, particularly in the face of daily disruptions or lapses, and plays a critical role in maintaining engagement over time. Forward-thinking approach improves resilience and helps maintain behaviour under suboptimal conditions, being particularly effective in managing contextual challenges such as fatigue, social embarrassment, or time constraints (Zhang et al., 2019). Maintenance and recovery self-efficacy are vital volitional constructs that facilitate behavioural persistence in the face of difficulties and re-engagement following lapses. Together, these beliefs support both sustained adherence and relapse recovery, key components in managing chronic conditions. Action control, often operationalised through self-monitoring, is a core regulatory process involving the continuous comparison of actual behaviour against personal standards and goals (Schwarzer et al., 2011). For example, tracking PFME in a diary or mobile app enhances accountability and generates internal feedback. Action control comprises three components: awareness of goals, investment of effort, and ongoing behavioural tracking, being essential during the maintenance phase, reinforcing daily self-management behaviours critical to long-term success in UI symptom reduction (i.e., adherence to PFME, healthy bladder habits, and urge/stress suppression techniques) (Clark & Bassett, 2014; Sacomori et al., 2015).

This conceptualisation allows the HAPA to bridge continuum-based theories (e.g., Health Belief Model) and stage-based models (e.g., the Transtheoretical Model), offering both flexibility and specificity in modelling health behaviour change (Schwarzer, 2008).

To optimise HAPA-based urinary incontinence (UI) interventions, integrating the Behaviour Change Technique Taxonomy v1 (BCTTv1; Michie et al., 2013) is crucial, as it enhances the clarity, replicability, and theoretical grounding of behaviour change interventions (Carey et al., 2019). Embedding these within the HAPA framework helps bridge the intention–behaviour gap and supports sustained self-management, significantly improving patient engagement with conservative UI treatments and leading to better clinical outcomes and enhanced quality of life (Carey et al., 2019; Chester et al., 2023).

Indeed, the 2014 International Continence Society (ICS) Consensus Statement on PFME adherence (Dumoulin et al., 2015) has likewise emphasised the critical role of behavioural theory in optimising treatment engagement, recommending frameworks such as the HAPA to inform conservative UI intervention design.

The relevance of HAPA is further amplified through its integration with complementary theoretical frameworks:

The Common-Sense Model (CSM) of Self-Regulation (Achstetter et al., 2019; Hagger & Orbell, 2022) conceptualises self-regulation as a cyclical process involving the formation of illness representations, the selection of coping strategies, and the ongoing appraisal of their effectiveness. In the context of UI, women form cognitive and emotional representations of their condition, which guide their coping behaviours and treatment engagement. Maladaptive representations—such as perceiving UI as untreatable or inevitable—can undermine self-management by reducing motivation for change. Conversely, adaptive representations foster greater behavioural activation and adherence to interventions (Alewijnse et al., 2002). Importantly, the appraisal phase involves evaluating whether these coping strategies have successfully reduced distress or symptoms, feeding back into the representation system. This feedback loop influences whether individuals persist with, modify, or abandon their current behaviours, making it a critical target for intervention refinement and sustained self-regulation. Cognitive Behavioural Therapy (CBT) adds further depth by targeting dysfunctional cognitions (e.g., catastrophic thinking during urgency episodes) and incorporating evidence-based techniques, such as the "Knack" manoeuvre and relaxation training

to enhance behavioural control and reduce anxiety associated with UI symptom episodes (Garley & Unwin, 2006).

Despite strong theoretical foundations and promising empirical support, theory-informed multidisciplinary UI interventions in mid-age (Davis et al., 2003; Ferrari et al., 2023; Pandeva et al., 2019)—especially in digital or eHealth formats—remain limited and many existing eHealth interventions are characterised by high dropout rates, undermining their long-term efficacy and scalability.

To address this critical gap, the PURI-PRO intervention ("The Bladder Control Is Mine") was developed as a multidisciplinary, digitally delivered, theory-driven program. The intervention is conceptually grounded in the HAPA and further informed by the CSM, principles of CBT, and driven by the UI International Guidelines for Conservative UI Treatment (Dumoulin et al., 2016; Todhunter-Brown et al., 2022). PURI-PRO was designed to: (1) reduce self-reported UI symptom severity; (2) decrease threatening/ dysfunctional illness beliefs; (3) reduce defensive/hiding self-management coping strategies with adaptive alternatives; (4) strengthen self-efficacy; (5) enhance behaviour change through targeted HAPA constructs; (6) reduce social isolation; (7) improve quality of life; and (8) enhance self-esteem.

This study had two primary aims: (1) to evaluate the effectiveness of the PURI-PRO intervention in improving clinical, psychosocial, and volitional outcomes related to urinary incontinence (UI) management through a randomised controlled trial (RCT); and (2) to examine the mediating role of core constructs from the HAPA in the observed intervention effects.

Method

The study protocol has been published elsewhere. For comprehensive details regarding the research design, procedures, measures, and the intervention program, please refer to the *Intervention Program in the Protocol* (page 289).

Ethic Approval

This study has received ethical approval from the Instituto Universitário Ethical Committee (D/022/11/2019; Appendix A) and complies with the Declaration of Helsinki and Good Clinical Practice guidelines. Informed consent was obtained from all participants. Participants were warned that some topics addressed may cause some emotional discomfort. However, the lead researcher, a

health psychologist supervised by a trained psychotherapist, was available to provide tailored support if needed. No significant harms or unintended effects were reported; hence, no tailored support was required.

Study Design

The PURI-PRO study followed a low-cost eHealth (internet-based) cognitive-behavioural intervention designed to promote improvement in self-reported urinary incontinence (UI) symptoms, reduce defensive and avoidance coping strategies, and minimise threatening illness representations related to UI in middle-aged women, while being theoretically based on HAPA, CSM and CBT (for details see Interventions section), and using BCT's supported by a multidisciplinary team (MDT). This intervention followed an experimental design (1:1 randomised, controlled, parallel-arm trial [RCT]) with two groups: the Experimental Group (EG), which received the UI intervention, and the Control Group (CG), which received a single health literacy leaflet on melanoma prevention. All the information was delivered through the internet to both groups. The study was comparative, with the sample distributed across two groups (EG vs. CG), and longitudinal, as all outcome measures were evaluated at four distinct time points.

Moreover, this study was interventional, had a treatment purpose, a crossover assignment, two-arms, single masking, and a simple randomised allocation with no restrictions, blocking, or stratification. The random allocation sequence was generated using IBM SPSS Statistics software (v.28) by an external researcher. The sequence was created to ensure a random distribution of participants between the EG and CG. Since the study followed an open-label design, no specific mechanism was employed to conceal the allocation sequence from researchers or participants. The research team enrolled the participants, screened them for eligibility, and assigned them to their respective groups based on the randomisation sequence. Each participant received an email informing them of their assigned group and providing instructions on how to access the baseline questionnaire (T0). CONSORT guidelines for reporting RCTs were followed (Schulz et al., 2010).

No changes to methods were made after trial commencement.

Sample Size

Minimum sample size was estimated according to the commonly cited rule of approximately 10 participants per estimated parameter (Hair et al., 2009).

Participants

Participants for the PURI-PRO trial were recruited over a one-month period via targeted Instagram and Facebook ads. Interested individuals completed an online screening questionnaire to determine eligibility based on predefined inclusion and exclusion criteria. Eligible participants were contacted by email, while ineligible individuals were excluded from the study.

Participants for the PURI-PRO trial were women aged 40-65 with self-reported urine leakage (not pregnancy/post-partum related) and internet access. Exclusion criteria included UI-related surgical history, neurological disorders affecting bladder control, lower abdominal malignancy, substance abuse, active suicidal ideation, and pelvic prolapse.

Data collection was administered through the Qualtrics platform, and all intervention sessions were delivered synchronously via Zoom. The sessions were facilitated by the principal investigator, a licensed clinical psychologist, with the support of a physiotherapist for the module focused on conservative treatment (Session 2). The study was conducted entirely in Portugal. Participants who completed all study assessments received compensation in the form of Tena Lady product vouchers.

Interventions

CG: Delivery of a health literacy single leaflet

Participants in the control group received a single health literacy leaflet on melanoma awareness and prevention (i.e., a general health topic unrelated to the study's outcomes), delivered via email during the first week of the intervention.

Additionally, participants received emails with links to the assessments at the four evaluation time points (i.e., baseline, mid-intervention, post-intervention, and follow-up). Beyond this, there was no further interaction with this group.

EG: eHealth intervention for UI symptom improvement

The PURI-PRO intervention was guided by International Guidelines for conservative management

of female UI (Dumoulin et al., 2016; Nambiar et al., 2018) and was structured considering five main areas, namely: 1) Education on Healthy Bladder Habits; 2) Lifestyle Modifications (healthy eating, low-impact physical activity, weight management, reduced caffeine/alcohol, constipation management, regulated fluid/dietary intake); 3) Effective Toileting Techniques; 4) Stress and Urge Suppression Techniques (counterbracing/"Knack" maneuver, CBT relaxation and cognitive restructuring); 5) Pelvic Floor Muscle Exercise (PFME) Home Training, adapted with permission from Sjöström et al. (2013).

The eHealth intervention included eight weekly 90-minute Zoom sessions, each focused on a specific theme and accompanied by weekly challenges. Sessions were led by a psychologist, except for one session, which a physiotherapist delivered. Participants chose from five flexible group time slots and remained in the same group throughout to maintain cohesion and group-based confidentiality. To support adherence in the experimental group (EG), participants who completed all assessments received a TENA voucher as a non-monetary incentive. Additionally, all EG participants consented to join a closed WhatsApp peer-support group, which was limited to members within their respective allocation. A licensed psychologist minimally moderated this group to provide structure while avoiding therapeutic influence that could compromise internal validity. To further promote compliance, participants received automated text message reminders containing direct links to Zoom sessions and Qualtrics surveys at each timepoint.

Participants in the control group (CG) received email reminders with Qualtrics links and were also provided with a TENA voucher after completing all assessments, thereby ensuring equivalent retention incentives across groups.

Participation was voluntary, and engagement with concurrent UI treatments during the study was tracked through self-report. Upon completion of the randomised controlled trial (RCT), control group participants were granted access to the intervention materials as part of a delayed-intervention protocol. All participants subsequently received follow-up communication encouraging them to consult qualified health professionals if they perceived ongoing symptoms or unmet clinical needs.

Participant Measures

Sociodemographic characteristics, clinical characteristics, lifestyle factors and UI-related information were collected.

Primary outcomes

Urine leakage characteristics and impact on everyday life. The International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF; Avery et al., 2004) was used to assess the frequency and amount of urinary leakage and its overall impact on daily life. The responses sum to an overall score between 0 and 21 points, with a higher score indicating more severe UI symptoms. A fourth unscored question asks when leakage occurs. The global score can be divided into severity categories (i.e., 1–5 = slight, 6–12 = moderate, 13–18 = severe, and 19–21 = very severe) (Klovning et al., 2009).

UI Cognitive and Emotional Representations. The Portuguese version of the Brief Illness Perception Questionnaire (IPQ-Brief) was used in this study to assess UI-related beliefs. The IPQ-Brief contains eight questions about UI symptoms' representations. The responses sum to an overall score between 0 and 80 points, and the global score can be divided into threatening perception categories (< 42 = low experienced threat; 42–49 = moderate experienced threat; ≥ 50 = high experienced threat).

Hiding and Defensive Coping Strategies. The Hiding and Defensive UI Strategies Instrument, developed by this research team (Porto et al., 2025a), employs a two-factor structure to evaluate evaluating maladaptive coping strategies related to UI management, drawing on the research of Diokno et al. (2004). The hiding coping dimension encompasses five strategies designed to conceal urine stains. Conversely, the defensive coping dimension comprises eight strategies aimed at limiting urine loss. Responses were collected using a Likert scale ranging from "1 – Never" to "5 – Always". The total score ranged from 13 to 65 (Defensive: 9–45; Hiding: 4–20), with higher scores indicating greater dysfunctionality in coping strategies.

Secondary outcomes

UI impact on Quality of Life. The King's Health Questionnaire (KHQ) was used to assess the impact of UI symptoms on quality of life. The KHQ contains 21 items that are scored in nine domains (i.e., general health perception, incontinence impact, role limitations, physical limitations, social limitations, personal relationships, emotions, sleep/ energy, severity measures), with higher scores indicating a more impaired QoL. Each domain score was calculated by summing the individual item scores within the domain and transforming the total to a scale from 0 to 100. In this scale, higher scores indicate greater impairment or lower quality of life**.**

Self-Reported General Quality of Life. The Portuguese version of the WHO Quality of Life-BREF (WHOQOL-BREF-PT; Vaz Serra et al., 2006) was employed to assess general quality of life across four theoretically derived domains: Physical Health, Psychological Well-being, Social Relationships, and Environment. This 26-item self-report instrument comprises 24 items distributed across four domains, along with two global items that assess overall quality of life and general health satisfaction (Skevington et al., 2004). Each item is rated on a five-point Likert scale, reflecting the intensity, capacity, frequency, or evaluation of the item's content. Raw domain scores were linearly transformed to a 0–100 scale, where higher scores indicate more favourable perceptions of quality of life. While the WHOQOL-BREF is typically analysed at the domain level, in the current study, we adopted the total score as a global indicator of perceived quality of life, as has been tested in previous studies. This decision was theoretically and empirically grounded, as confirmed by confirmatory factor analysis (CFA), which supported a second-order factor structure in our sample (unpublished data).

HAPA Motivational and Volitive Variables. Socio-cognitive behaviour change constructs were assessed with nine dimensions of the HAPA Questionnaire adapted specifically for urinary incontinence (UI) symptoms, based on Renner and Schwarzer's RACK study (2007). All items used a five-point Likert scale, and higher scores indicate stronger endorsement of motivational and volitional constructs. Subscale scores were computed as the sum of item responses. The nine dimensions were: Risk Perception (5 items; range 5–25), Action Planning (5 items; 5–25), Coping Planning (5 items; 5–25), Positive Outcome Expectancies (8 items; 8–40), Action Self-Efficacy (10 items; 10–50), Maintenance Self-Efficacy (5 items; 5–25), Recovery Self-Efficacy (3 items; 3–15), Intention (3 items; 3–15), and Action Control (4 items; 4–20).

Self-Esteem. The Rosenberg Self-Esteem Scale (RSE) was used to assess self-esteem. The RSE comprises ten items related to self-satisfaction, self-perception, and self-worth. The global score ranges from 0 to 30 points, with higher scores indicating higher self-esteem (Rosenberg, 1965).

Social Isolation. The Urinary Incontinence Social Isolation Questionnaire (UI-SIQ; Porto et al., 2025c), a brief five-item questionnaire, was used to assess social isolation (SI) in women with UI in research and clinical contexts. It was developed by this team (health psychologists, data analysis expert, and a gynaecologist), and created based on emotional, cognitive, and behavioural

aspects of SI in urological conditions. The total score ranges from 5 to 25, with higher scores indicating increased SI levels.

Pelvic floor and UI knowledge. Pelvic floor and UI knowledge were initially evaluated using a modified version of the Prolapse and Incontinence Knowledge Questionnaire (PIKQ-UI). The original PIKQ (Shah et al., 2008) contains items assessing knowledge regarding pelvic floor exercises, UI aetiology, treatment, and diagnosis (e.g., "Women are more likely to leak urine than men", "Surgery is the only treatment for urinary loss").

For this study, the Prolapse dimension of the PIKQ was removed. The total score for this modified scale ranged from 12 to 60 points, with higher scores indicating greater knowledge. Additionally, seven items focused on body awareness, specifically pelvic floor muscle awareness, were added to this section. These items (e.g., "When I want to contract my pelvic floor muscles", "I squeeze my glutes and my glutes feel more toned", "When I'm contracting my pelvic floor and abdominal muscles, it feels like I am closing a zipper") yielded scores ranging from 7 to 35 points, with higher scores indicating a greater amount of body sensations. Despite these modifications and extensive efforts, the UI Knowledge (PIKQ-UI) variable was ultimately excluded from the main analyses due to consistently suboptimal model fit. This poor fit persisted both with and without the inclusion of the seven added body awareness items, even after multiple re-specifications. The instrument consistently demonstrated poor model-data fit, as evidenced by the following indicators: CFI = .837, TLI = .843, RMSEA = .145, SRMR = .075; $\chi^2(4) = 14.201$, $p = .003$. This indicated that the adapted instrument did not adequately measure the intended construct within our sample, preventing its reliable use in the hypothesised models.

UI Types. The Questionnaire for Urinary Incontinence Diagnosis (QUID), tailored explicitly for identifying UI in women, was administered to assess different UI types. The questionnaire consists of six items, with three assessing Stress UI (SUI) and three assessing Urge UI (UUI). The diagnostic thresholds for stress and urge UI are set at scores of ≥ 4 and ≥ 6, respectively. Thus, the classification of Mixed UI (MUI) depended on meeting both criteria concurrently (≥ 4 for SUI and ≥ 6 for UUI).

Participation in Pelvic Floor Muscle Exercises. The Training Exercise Report based on Sjöström et al. (2013), was designed to facilitate self-monitoring and track participation in Pelvic Floor Muscle Exercises (PFME). Beginning in the second session of the intervention, participants

were required to record the number of contractions performed daily for a total duration of seven weeks. This report served as a self-monitoring tool to encourage adherence to the planned PFME routine. Participants were asked to document their daily exercises and note any challenges they encountered.

Liquid consumption in association with urine leakage. To assess the relationship between liquid consumption and urine leakage, participants completed a Three-Day Bladder Diary during the third week of the intervention. This diary served as a self-monitoring tool, helping participants track their fluid intake and urinary patterns. Participants were required to record the types of beverages consumed, their frequency per hour, the number of bathroom visits, the intensity of the urge to urinate (slight or intense), and the frequency of urine leakage episodes per hour. By systematically documenting these patterns, participants were able to gain insight into their fluid intake habits and urinary symptoms (Session 3 Home Assignment in Protocol Article).

Group Cohesion. Perceived group cohesion was assessed at T1 using a single-item measure that captured participants' subjective evaluation of the group's importance to their intervention outcomes.

Statistical Analyses

Baseline and Preliminary Analyses

The total sample at baseline comprised 98 participants. Descriptive statistics (Means [*M*], Standard deviations [*SD*]) and item sensitivity analyses (Skewness [*Sk*] and Kurtosis [*Ku*]) were conducted. These analyses showed no severe deviations from a normal distribution, with $Sk \leq 3$ and $Ku \leq 7$ values (Marôco, 2021).

A Chi-square test of independence was conducted to examine whether attrition rates differed significantly between the experimental and control groups. Group allocation (experimental *vs.* control) and follow-up completion status (retained *vs.* dropped out) were treated as categorical variables. This analysis examined the relationship between intervention assignment and participant retention throughout the study period, providing insight into potential differential dropout that could impact the trial's internal validity.

Baseline sociodemographic characteristics (e.g., age, education level), clinical variables (e.g., menopausal status, UI types), and primary and secondary outcome measures (i.e, ICIQ-UI

SF, KHQ, WHOQOL-BREF, HAPA behaviour change constructs, IPQ, Dysfunctional Coping Strategies, RSE, UI-SIQ) were compared between the experimental and control groups at T0. Independent samples *t*-tests were used to analyse continuous variables, and chi-square tests were employed for categorical variables to assess baseline group equivalence. A *p*-value of $< .05$ was considered statistically significant.

Measures' Validity based on Internal Structure

Following the Standards for Educational and Psychological Testing (American Educational Research Association et al., 2014), internal structure was examined as a source of validity evidence, focusing on dimensionality and internal consistency. Confirmatory Factor Analyses (CFAs) were conducted using diagonally weighted least squares (DWLS), a method suitable for ordinal data that relies on polychoric correlations, via the Lavaan package (v0.6-14) in R (Finney & DiStefano, 2016; Marôco, 2021).

Model refinement was guided by modification indices (MI > 11, $p < .001$) and theoretical considerations. Acceptable fit was defined as $\chi 2/df$ (ratio Chi-Square and Degrees of Freedom) < 5 CFI and TLI $\geq .90$, RMSEA (with its 90% confidence interval also examined) and SRMR $\leq .08$ (Byrne, 2016; Marôco, 2021) and factorial weights above .50. Internal consistency was assessed via ordinal α and McDonald's ω, with values $\geq .70$ deemed acceptable, estimated using the semTools package. All primary and secondary outcome measures presented good psychometric properties (see Table 36).

Table 36

Validity Evidence Based on the Internal Structure of Primary and Secondary Outcome Measures

Measure (n)	χ^2/df (p)	CFI	TLI	RMSEA	SRMR	Min λ	Max λ	Ordinal α	McDonald's ω
UI-SIQ (*n* = 1538)	1.00 (*p*=.31)	.996	.992	.039	.020	.72	.93	.95	.90
UI-SMCSI (*n* = 1538)	1.02 (*p*=.22)	.989	.987	.072	.039	.47	.95	Def: .94 / Hid: .80	Def: .92 / Hid: .83
IPQ-Brief (*n* = 1538)	—	.994	.990	.111	.024	.54	.89	.92	.86
ICIQ-SF (*n* = 1538)	1.02 (*p*=.11)	.95	.93	.06	.07	.68	.95	.80	.71
Self-Esteem (*n* = 98)	1.26 (*p*=.17)	.97	.95	.03	.09	.50	.87	.91	.88
Risk Perception (*n* = 98)	1.78 (*p*=.19)	.97	.95	.07	.04	.58	.85	.75	.76
Action Planning (*n* = 98)	1.32 (*p*=.12)	.92	.96	.08	.04	.61	.90	.88	.86
Coping Planning (*n* = 98)	1.37 (*p*=.14)	.92	.95	.04	.06	.70	.85	.92	.85
Outcome Expectancies (*n* = 98)	1.43 (*p*=.11)	.94	.93	.06	.04	.74	.89	.93	.85
Action Self-Efficacy (*n* = 98)	1.52 (*p*=.08)	.95	.96	.03	.06	.50	.95	.90	.84
Maintenance Self-Efficacy (*n* = 98)	1.72 (*p*=.06)	.96	.96	.06	.08	.50	.97	.88	.84
Recovery Self-Efficacy (*n* = 98)	1.92 (*p*=.15)	.98	.93	.05	.06	.53	.93	.96	.82
Intention (*n* = 98)	1.33 (*p*=.10)	.93	.97	.06	.04	.68	.88	.98	.84
Action Control (*n* = 98)	1.67 (*p*=.13)	.93	.91	.04	.07	.73	.92	.92	.89
KHQ (*n* = 1538)	—	.971	.961	.058	.044	.503	.92	.88	.93
WHOQOL-Bref	—	.919	.907	.101	.065	.503	.92	Phys: .94 / Psy: .86	Phys: .92 / Psy: .80 /

(*n* = 1538)								/ Soc: .85 / Env: .87	Soc: .80 / Env: .80
QUID (*n* = 1538)	—	.931	.924	.053	.042	.47	.87	SUI: .78 / URG: .79	SUI: .81 / URG: .83

Note. Model fit indices and internal consistency estimates are reported for all psychometric measures. Model fit was evaluated using the comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR). Internal consistency was assessed using ordinal alpha (α) and McDonald's omega (ω). Min λ and Max λ represent the minimum and maximum standardised factor loadings, respectively. Psychometric validation of the UI-SIQ is based on a submitted manuscript. Results for the IPQ-Brief are reported in Porto et al. (2023), and those for the UI-SMCSI are drawn from Porto et al. (2025b). Additional data come from the authors' unpublished dataset.
Def = Defensive; Hid = Hiding; Phys = Physical; Psy = Psychological; Soc = Social; Env = Environmental. QUID domain reliabilities: SUI = Stress Urinary Incontinence; URG = Urgency Urinary Incontinence.

The analyses adhered to the intention-to-treat principle and were conducted using IBM SPSS (v.28) and R (v.4.2.3) with RStudio (v.2023.06.1+524). Unconditional Latent Growth Models (LGM) and Conditional Latent Growth Models (CLGM) were estimated using the lavaan package (v.0.6.15; Rosseel, 2012) with robust maximum likelihood (MLR) to handle missing data effectively. Model fit evaluation was conducted using the semTools package (v.0.5-7; Jorgensen et al., 2025).

Model fit was evaluated according to established structural equation modelling (SEM) criteria. Adequate fit was indicated by a χ^2/df ratio less than 5, Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values greater than .90, a Root Mean Square Error of Approximation (RMSEA) below .08 with a 90% confidence interval, and a Standardised Root Mean Square Residual (SRMR) below .08 (Marôco, 2021). It is noted that due to low degrees of freedom in some models, RMSEA and SRMR values may be inflated and should be interpreted with caution.

Missing data were handled using Full Information Maximum Likelihood (FIML) via the missing = "ML" argument in lavaan, a widely recommended method for SEM and longitudinal models (Enders & Bandalos, 2001; Marôco, 2021). FIML assumes data are Missing at Random (MAR), utilising all available observations without imputing values.

Inter-group Change Analysis: CLGM Across Experimental and Control Groups

All primary and secondary outcome measures were assessed at baseline (T0), mid-intervention (T1, one month later), post-intervention (T2), and in a three-month follow-up (T3) after the intervention (see Table 41 in Results). CLGM were employed to analyse repeated measures collected at these four timepoints. In these models, observed scores were treated as indicators of underlying latent intercepts (representing initial status) and latent slopes (representing the rate of change over time). Group assignment was dummy-coded (0 = control, 1 = eHealth intervention) and included as a predictor of the slope factor to assess whether the intervention produced differential change trajectories. To enhance the interpretability of the growth curve and ensure that the slope factor captured the total relative change from baseline to the final assessment, we employed a specific factor loading configuration. For the slope factor, its loading was fixed at 0 at the first timepoint (T0) and at 1 at the final timepoint (T3).

Importantly, intermediate factor loadings (at T1 and T2) were freely estimated, allowing the model to adapt to and capture both linear and non-linear patterns of change over time. This approach, consistent with methodologies described by Stoolmiller (1995), effectively represents the construct as being at 0% completeness at the initial measurement and 100% completeness at the final measurement, with the slope representing the total progression between these two points, regardless of whether that progression is steady or fluctuates. The key parameter of main interest was the effect of group assignment on the slope, which indicates whether the intervention significantly influenced change over time. This analytic framework supports investigation of both intra-individual change (captured by person-specific intercepts and slopes) and inter-individual variability (variance in intercepts/slopes), while enabling conditional modelling to explore predictors such as intervention group. By estimating latent intercept (initial status) and slope (rate of change) factors from four repeated assessment points, CGLM offer a robust framework to:

1. Quantify intra-individual change: Each individual receives an estimated intercept and slope, delineating their own unique trajectory over time, capturing intra-individual changes through the intercept (i) and slope (s), representing baseline levels and rates of change, respectively;

2. Reveal inter-individual variability: The variances of the intercept (Var(i)) and slope (Var(s)) indicate the extent to which individuals differ in their starting points and rates of change;

3. Explain inter-individual differences: The "conditional" nature of these models allows researchers to include time-invariant covariates or predictors (e.g., group assignment) to explain variability among participants. This is particularly valuable for identifying the mechanisms or contextual factors that influence response to intervention

The flexibility and power of Conditional LGM make it a gold standard approach in longitudinal intervention research, particularly when exploring dynamic behavioural and psychological constructs over time (Thakkar, 2021).

R^2 values obtained were interpreted as indicators of effect size, in line with the guidelines proposed by Cohen (1988). Effect sizes were interpreted using Cohen's (1988) guidelines. For the coefficient of determination (R^2), values of .01, .09, and .25 were considered to reflect small, medium, and large explanatory power, respectively. These thresholds served as benchmarks to assess the practical significance of the explained variance in each model, thereby complementing statistical significance with a consideration of meaningful effect magnitude (Cohen, 1988).

Behaviour Change Mechanisms

Prior to conducting mediation analyses, Pearson correlation coefficients (see Table 42 in Results) were calculated to assess the strength and direction of the bivariate associations among the study variables.

Mediation analyses pursued two primary objectives. First, to examine the mediating roles of Intention (T1 – mid-intervention), Action Planning (T2 – post-intervention; T3 – follow-up), Coping Planning (T2, T3), and Action Control (T2, T3) in the relationship between Risk Perception (T1) and the primary outcomes assessed at T3: urinary incontinence (UI) severity, UI-related illness representations, and hiding and defensive coping strategies. Second, to test whether Action Planning, Coping Planning, and Action Control (measured at both T2 and T3) mediated the relationship between Intention (T1) and the same set of T3 outcomes (see Table 43 in Results).

Following Ferguson's (2009) guidelines, correlations were interpreted as low when below .20, moderate between .20 and .50, and high when exceeding .50. Only HAPA constructs, as well as primary outcomes, demonstrating significant group × time interactions (i.e., intervention slopes) were considered, and mediations were limited to participants in the intervention group. All mediators and outcomes were drawn from validated psychometric instruments exhibiting strong internal consistency, justifying the use of summed scale scores as

reliable indicators of underlying constructs (Marôco, 2021).

Interpretation of R^2 values adhered to Cohen's (1988) conventional benchmarks, where values exceeding .01, .09, and .25 are typically classified as indicative of small, medium, and large proportions of explained variance, respectively. All mediation analyses were conducted using maximum likelihood estimation with robust standard errors (MLR) via the Lavaan package in R.

Mediational Analyses

The first analytic approach involved testing a latent growth-based multiple mediation model, aimed at investigating whether changes in motivational (e.g., risk perception) and volitional (e.g., coping planning, action control) factors mediated the effects of the intervention on longitudinal trajectories of the primary outcomes across all time points (T0, T1, T2, T3). However, this model proved infeasible due to sample size limitations and restricted degrees of freedom.

As an alternative, a second mediation strategy was adopted using a series of simple mediation models based on manifest variables, examining whether HAPA-derived constructs mediated the association between primary outcomes measured at baseline (T0) and at follow-up (T3). Although more parsimonious, they proved infeasible due to sample size limitations and restricted degrees of freedom.

The third analytic strategy represented a more targeted and theory-driven approach. Again using manifest variables, this method allowed for focused testing of specific mediation pathways aligned with the distinct motivational and volitional phases of the HAPA model. Importantly, this approach respected the temporal sequencing and theoretical logic of the framework while avoiding model overfitting.

Although the HAPA acknowledges that health behaviour change is often non-linear (Schwarzer, 2008), structuring the mediation paths by phase allowed us to conceptually differentiate mechanisms underlying intention formation versus those guiding action implementation.

Specifically, we tested whether volitional variables (Action Planning, Coping Planning, and Action Control at T2 and T3) mediated the effects of motivational variables (Risk Perception and Intention at T1) on primary behavioural outcomes at T3. This third mediation model yielded significant indirect effects, providing meaningful insight into the volitional mechanisms required

to translate risk perception and intention into sustained behaviour change. These findings support the HAPA's core proposition that motivation must be actively transformed into action through planning and regulatory strategies.

Independent/Predictive Variables (T1): Motivational-phase constructs central to the HAPA—specifically, risk perception and behavioural intention—were assessed at mid-intervention (T1), immediately following their targeted activation through the intervention (see PURI-PRO Intervention Program – Protocol article). This timing was deliberately chosen to capture these constructs at their peak activation rather than as static predispositions at baseline (T0), thereby reflecting the HAPA model "in action". From a theoretical perspective, this approach aligns with HAPA's assertion that behavioural initiation depends on the activation of motivational precursors. Pragmatically, it also accommodates the structural constraints of latent change modelling by optimising degrees of freedom while maximising construct validity. The timing at T1 is thus expected to better capture individual transitions from pre-intender to intender stages, enhancing the predictive validity of downstream volitional mechanisms and behavioural outcomes.

Mediators (T2 and T3): Mediators were selected based on their theoretical relevance to the volitional phase of the HAPA, particularly within the "intender" status. At Times 2 and 3 (T2 and T3), constructs such as action planning and coping planning—identified in prior CLGM analyses as differing significantly between experimental and control groups—were assessed. These variables reflect core volitional processes, including behavioural regulation, execution, and relapse prevention. Their inclusion at both T2 and T3 captures the temporal dynamics of planning and behavioural maintenance, consistent with the phased structure of the HAPA model.

Dependent Variables (T3): Primary outcomes—UI symptom severity, threatening representations about UI, and defensive or avoidance-based coping strategies—were measured at T3 to evaluate the cumulative impact of the intervention and its underlying mechanisms.

This motivational (T1) → volitional (T2/T3) → outcome (T3) configuration permitted the testing of theoretically and temporally ordered mediation pathways, reflecting both the conceptual progression of the HAPA and recommended practices in mediation modelling.

Results

Participants

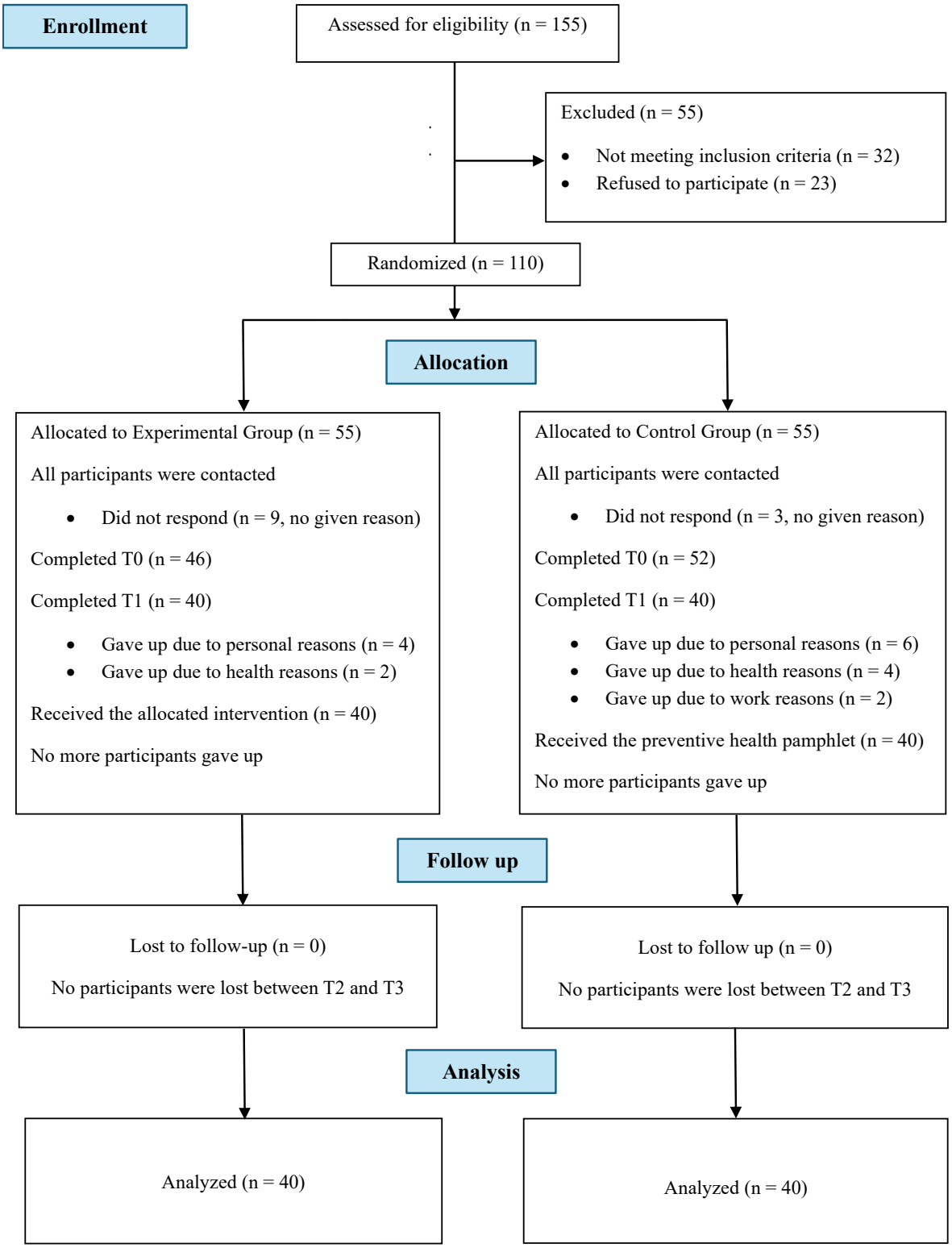
Sample characteristics

From April 2024 to May 2024, a total of 98 women were randomly assigned to either the experimental group (EG; n = 46) or the control group (CG; n = 52). Following exclusions and attrition at Time 1 (T1), 80 participants continued the intervention/control condition, with 40 in each group. However, consistent with the ITT principle, all randomised participants were analysed according to their originally assigned groups, regardless of treatment adherence. This approach preserved the integrity of randomisation and enhanced the study's validity by reflecting real-world patterns of adherence (Bell et al., 2013).

Dropout rates were assessed by analysing dropout rates in both groups. In the EG, which originally included 55 participants, the dropout rate was 27.27% (15 participants), identical to that of the CG (27.27%, 15 of 55 participants). Given that the dropout rates were identical across both groups, a chi-square test of independence was not conducted. The flow of participants throughout the study is summarised in Figure 15.

Figure 15

CONSORT Flow Diagram



There was no evidence of violation of the normality assumption for any variables. Sociodemographic and clinical characteristics of the sample are presented in Tables 37, 38, and 39.

Table 37

Sociodemographic Characteristics of Participants

Characteristics	Experimental Group (n = 46)		Control Group (n = 52)	
	N	%	N	%
Age range				
40–44	8	17.4	10	19.2
45–49	9	19.6	15	28.8
50–54	13	28.3	12	23.1
55–59	5	10.9	5	9.6
60–65	11	23.9	10	19.2
Nationality				
Portuguese	46	100.0	52	100.0
Other	—	—	—	—
Level of Education				
9th grade	3	6.5	3	5.8
12th grade	11	23.9	10	19.2
Bachelor's degree	21	45.7	27	51.9
Postgraduate degree	9	19.6	9	17.3
Doctorate	3	6.5	3	5.8
Professional Status				
Active	39	84.8	41	78.8
Inactive	7	15.2	11	21.2
Sexual-Affective Relationship				
Yes	36	78.3	39	75.0
No	10	21.7	13	25.0
Number of Biological Children				
0	6	13.0	10	19.2
1	13	28.3	12	23.1
2	20	43.5	23	44.2
3	6	13.0	6	11.5
4	1	2.2	1	1.9

The analyses revealed no statistically significant differences between groups in any of the sociodemographic, clinical, and lifestyle characteristics. Chi-square tests of independence revealed no statistically significant group differences, with chi-square values ranging from .00 to 2.01, degrees of freedom ranging from 1 to 4, and p-values ranging from .24 to 1.00. In addition, an

independent samples t-test revealed no significant difference in age, $t(96) = .83$, $p = .41$. The mean age in the experimental group was 52.22 years ($SD = 6.47$), and 51.04 years ($SD = 6.43$) in the control group.

Table 38

Clinical Characteristics and Lifestyle Habits of Participants

Characteristics	Experimental Group ($n = 46$)		Control Group ($n = 52$)	
	N	%	N	%
Number of vaginal deliveries				
0	15	32.6	18	34.6
1	12	26.1	12	23.1
2	16	34.8	16	30.8
3	3	6.5	5	9.6
≥ 4	—	—	1	1.9
Number of caesarean deliveries				
0	30	65.2	39	75.0
1	11	23.9	9	17.3
2	4	8.7	4	7.7
3	1	2.2	—	—
≥ 4	—	—	—	—
Perineal laceration				
Yes	10	21.7	18	34.6
No	36	78.3	34	65.4
Physical Illness Diagnosis				
No	42	91.3	50	96.2
Yes	4	8.7	2	3.8
Asthma	1	2.2	—	—
Hypothyroidism	1	2.2	—	—
Diabetes	2	4.3	1	1.9
Hypertension	—	—	1	1.9
Mental Illness Diagnosis				
No	44	95.7	49	94.2
Yes	2	4.3	3	5.8
Depression	2	4.3	2	3.8
Anxiety Disorder	—	—	1	1.9
Menopausal Status				
Premenopause	15	32.6	16	30.8

Perimenopause	11	23.9	16	30.8
Postmenopause	20	43.5	20	38.5
Coffee Intake				
Yes	37	80.4	45	86.5
No	9	19.6	7	13.5
Smoker				
Yes	2	88.2	5	9.6
No	44	11.8	47	90.4
High Impact Physical Activity				
Yes	7	15.2	9	17.3
No	39	84.8	43	82.7
BMI Status				
Underweight	—	—	—	—
Healthy Weight	14	30.4	18	34.6
Overweight	32	69.6	34	65.4
UI Types				
Stress	20	43.48	23	44.23
Urgency	17	36.96	19	36.54
Mixed	9	19.57	10	19.23
Medical help for UI				
Yes	29	63.0	38	73.1
No	17	37.0	14	26.9
Treatment for UI				
Yes	33	71.7	38	73.1
No	13	28.3	14	26.9
Prescribed UI medication				
Yes	1	2.2	5	9.6
No	45	97.8	47	90.4
Pelvic Floor Muscle Training				
Yes	8	17.4	10	19.2
No	38	82.6	42	80.8

Note. UI = Urinary Incontinence.

Table 39

Clinical Information regarding Participants' UI Severity Levels

ICIQ-UI SF	T0 – Baseline Pre-intervention		T1 Mid-intervention (1 month)		T2 Post-intervention (2 months)		T3 Follow-up (3 months)	
	n	%	*n*	%	*n*	%	*n*	%
Total	98	100.00	83	86.69	81	82.65	81	82.65
Slight (1–5)	2	2.04	5	6.02	17	20.99	21	25.93
Moderate (6–12)	38	38.78	41	49.40	40	49.38	36	44.44
Severe (13–18)	38	38.78	30	36.14	13	16.05	17	20.99
Very Severe (18–21)	20	20.41	7	8.43	11	13.58	7	8.64
EG	46	100.00	41	89.13	41	89.13	41	89.13
Slight (1–5)	—	—	4	9.76	14	34.15	19	46.34
Moderate (6–12)	21	45.65	24	58.54	20	48.78	15	36.59
Severe (13–18)	16	34.78	13	31.71	6	14.63	7	17.07
Very Severe (18–21)	9	19.57	—	—	1	2.44	—	—
CG	52	100.00	42	80.77	40	76.92	40	76.92
Slight (1–5)	2	3.85	1	2.38	3	7.50	2	5.00
Moderate (6–12)	17	32.69	22	52.38	20	50.00	23	57.50
Severe (13–18)	22	42.31	16	38.10	9	22.50	13	32.50
Very Severe (18–21)	11	21.15	3	7.14	8	20.00	2	5.00

In both the experimental and control groups, Stress UI was the most prevalent type, affecting 43.48% and 44.23% of participants, respectively. A chi-square test of independence revealed no significant association between the variables, $\chi^2(2, N = 98) = .006$, $p = .99$. This suggests that the distribution of urinary incontinence types was similar across both groups at baseline. Both groups presented severe UI levels. A chi-square test of independence revealed no statistically significant association between group (EG vs. CG) and UI severity classification at baseline, $\chi^2(3) = 3.21$, $p = .36$.

Preliminary Analyses and Data Integrity

Descriptive statistics and item distributional properties for PURI-PRO intervention variables across all time points for both groups are provided in Table 40. All analyses were conducted using the intention-to-treat approach, which included both completers and dropouts across the four measurement occasions.

Table 40

Descriptive Statistics and Items Sensitivity of PURI-PRO Intervention Variables in both Groups (Experimental and Control Groups) at all Measurement Times

Variables	T0 – Baseline Pre-intervention		T1 Mid-intervention (1 month)		T2 Post-intervention (2 months)		T3 Follow-up (3 months)	
	n	*M* ± *SD*	*n*	*M* ± *SD*	*n*	*M* ± *SD*	*n*	*M* ± *SD*
ICIQ-UI SF: Frequency and amount of urinary leakage *(-.39 ≤ Sk ≤ .47; -1.72 ≤ Ku ≤ -.78)*								
Total	98	17.41 ± 4.50	80	11.64 ± 4.17	80	10.52 ± 5.10	80	9.46 ± 5.45
EG	46	17.26 ± 4.14	40	10.32 ± 3.93	40	8.32 ± 4.17	40	7.02 ± 4.64
CG	52	17.54 ± 4.83	40	12.40 ± 3.62	40	12.78 ± 5.02	40	11.20 ± 4.40
KHQ: UI impact on QoL *(-.64 ≤ Sk ≤ 2.66; -1.42 ≤ Ku ≤ 7.16)*								
Total	98	34.67±19.77	80	30.80±20.40	80	27.78 ±20.59	80	27.15±23.77
EG	46	32.51±17.26	40	25.45±17.04	40	21.72 ±17.22	40	15.80±13.45
CG	52	36.82±22.03	40	35.48±22.16	40	33.02 ±22.07	40	37.80±26.47
UI-related coping strategies *(-.49 ≤ Sk ≤ 2.66; -1.17 ≤ Ku ≤ 6.36)*								
Total	98	33.38±12.04	80	32.30 ±11.77	80	31.48 ±12.83	80	30.35±12.53
EG	46	32.13±10.73	40	29.00 ± 9.04	40	27.71 ±10.34	40	25.46±8.47
CG	52	34.48±13.09	40	35.52±13.25	40	35.35 ±14.06	40	35.35±14.06
WHOQOL Bref: Self-reported quality of life *(-1.56 ≤ Sk ≤ 1.26; -1.26 ≤ Ku ≤ 2.06)*								
Total	98	34.90± 15.18	80	34.15± 16.95	80	31.50 ±13.41	80	33.46± 12.85
EG	46	35.87± 15.98	40	35.08± 14.49	40	30.90 ±13.48	40	35.60± 14.28
CG	52	34.05± 14.55	40	33.25± 19.18	40	32.11 ±13.49	40	31.26± 10.94
HAPA Questionnaire: Behaviour changes *(-2.36 ≤ Sk ≤ .28; -1.26 ≤ Ku ≤ 09.39)*								
Risk Awareness								
Total	98	24.89 ± 2.81	80	25.05 ± 3.27	80	25.27 ± 3.60	80	25.38 ± 3.57
EG	46	25.33 ± 2.15	40	26.12 ± 2.98	40	26.59 ± 2.87	40	27.02 ± 2.34
CG	52	24.50 ± 3.26	40	24.00 ± 3.24	40	23.93 ± 3.81	40	23.70 ± 3.84
Action Planning								
Total	98	16.14 ± 5.60	80	19.43 ± 5.84	80	19.57 ± 5.14	80	19.42 ± 5.65
EG	46	15.91 ± 5.97	40	22.51 ± 3.44	40	22.37 ± 2.76	40	22.15 ± 3.87
CG	52	16.35 ± 5.30	40	16.43 ± 6.16	40	16.70 ± 5.45	40	16.63 ± 5.87
Coping Planning								
Total	98	14.40 ± 5.41	80	18.24 ± 5.10	80	18.78 ± 5.64	80	18.49 ± 5.49
EG	46	14.35 ± 5.96	40	20.88 ± 3.98	40	21.44 ± 4.63	40	20.68 ± 5.00
CG	52	14.44 ± 4.93	40	15.67 ± 4.77	40	16.05 ± 5.32	40	16.25 ± 5.10
Outcome Expectancies								
Total	98	35.41 ± 4.69	80	35.90 ± 5.14	80	35.83 ± 5.92	80	35.42 ± 6.07
EG	46	36.63 ± 3.01	40	38.00 ± 3.98	40	38.10 ± 2.22	40	37.78 ± 3.17
CG	52	34.33 ± 5.59	40	33.86 ± 6.35	40	33.50 ± 7.47	40	33.00 ± 7.31

Action Self-efficacy								
Total	98	39.02 ± 6.98	80	39.98 ± 7.31	80	40.58 ± 7.26	80	39.65 ± 8.71
EG	46	40.70 ± 6.15	40	43.20 ± 5.57	40	43.02 ± 6.48	40	41.88 ± 8.52
CG	52	37.54 ± 7.38	40	36.83 ± 7.50	40	38.08 ± 7.24	40	37.38 ± 8.40
Maintenance Self-efficacy								
Total	98	19.11 ± 4.53	80	19.46 ± 4.57	80	19.93 ± 4.76	80	19.65 ± 4.99
EG	46	19.76 ± 3.63	40	21.20 ± 3.67	40	21.37 ± 4.52	40	21.15 ± 4.53
CG	52	18.54 ± 5.15	40	17.76 ± 4.76	40	18.45 ± 4.60	40	18.13 ± 5.03
Recovery Self-efficacy								
Total	98	12.65 ± 2.72	80	13.11 ± 2.63	80	13.12 ± 2.75	80	13.19 ± 2.68
EG	46	13.30 ± 2.31	40	13.90 ± 2.00	40	13.88 ± 2.22	40	14.10 ± 2.12
CG	52	12.08 ± 2.94	40	12.33 ± 2.94	40	12.35 ± 3.05	40	12.25 ± 2.90
Intention								
Total	98	13.00 ± 2.48	80	12.86 ± 3.27	80	12.67 ± 3.28	80	12.16 ± 3.36
EG	46	13.59 ± 2.30	40	14.56 ± 1.03	40	14.34 ± 1.62	40	13.78 ± 2.20
CG	52	12.48 ± 2.53	40	11.19 ± 3.83	40	10.95 ± 3.67	40	10.50 ± 3.55
Action Control								
Total	98	12.54 ± 4.71	80	15.30 ± 4.62	80	16.16 ± 4.37	80	14.84 ± 4.82
EG	46	12.28 ± 5.18	40	17.93 ± 2.50	40	18.37 ± 2.80	40	16.88 ± 3.82
CG	52	12.77 ± 4.29	40	12.74 ± 4.79	40	13.90 ± 4.55	40	12.75 ± 4.89
IPQ-Brief: UI-related beliefs *(-.84 ≤ Sk ≤ 2.23; -1.16 ≤ Ku ≤ 5.51)*								
Total	98	38.31 ±11.68	80	36.11 ±11.81	80	33.44 ±14.01	80	31.68± 15.31
EG	46	42.30 ±11.66	40	31.32± 12.65	40	27.24 ±14.15	40	23.51± 14.84
CG	52	40.83 ±11.50	40	40.79 ± 8.80	40	39.80 ±10.76	40	40.05± 10.64
RSE: Self-esteem *(-1.24 ≤ Sk ≤ 1.26; -1.18 ≤ Ku ≤ 1.93)*								
Total	98	15.86 ± 2.26	80	15.69 ± 2.03	80	15.94 ± 1.81	80	15.95 ± 2.01
EG	46	15.70 ± 2.47	40	15.90 ± 1.63	40	16.22 ± 1.98	40	16.24 ± 2.14
CG	52	16.00 ± 2.07	40	15.48 ± 2.36	40	15.65 ± 1.58	40	15.65 ± 1.83
UI-SIQ: Social isolation *(-.12 ≤ Sk ≤ 1.63; -1.41 ≤ Ku ≤ 1.46)*								
Total	98	9.59 ± 4.80	80	8.90 ± 5.00	80	8.77 ± 5.56	80	9.48 ± 5.89
EG	46	9.43 ± 4.71	40	8.83 ± 5.30	40	7.59 ± 4.88	40	7.98 ± 5.13
CG	52	9.73 ± 4.91	40	8.98 ± 4.77	40	9.98 ± 5.99	40	11.03 ± 6.28
PIKQ-UI: Pelvic floor and UI knowledge *(-2.06 ≤ Sk ≤ 1.24; -1.13 ≤ Ku ≤ 3.99)*								
Aetiology								
Total	98	17.72 ± 2.10	80	18.58 ± 3.25	80	18.85 ± 2.76	80	19.22 ± 2.70
EG	46	17.67 ± 2.12	40	18.44 ± 3.15	40	18.88 ± 2.98	40	20.07 ± 2.23
CG	52	17.77 ± 2.11	40	18.71 ± 3.39	40	18.83 ± 2.56	40	18.35 ± 2.89
Treatment								
Total	98	21.30 ± 3.67	80	21.94 ± 3.48	80	22.52 ± 3.06	81	22.16 ± 3.88
EG	46	21.85 ± 3.52	40	22.88 ± 3.35	40	24.10 ± 1.58	41	23.95 ± 2.36

CG	52	20.81 ± 3.76	40	21.02 ± 3.39	40	20.90 ± 3.37	40	20.33 ± 4.29
Diagnosis								
Total	98	8.51 ± 1.47	80	8.55 ± 1.74	80	8.78 ± 1.42	81	8.46 ± 1.53
EG	46	8.59 ± 1.53	40	8.39 ± 1.84	40	8.76 ± 1.36	41	8.56 ± 1.53
CG	52	8.44 ± 1.43	40	8.71 ± 1.64	40	8.80 ± 1.51	40	8.35 ± 1.53
PIKQ-UI								
Total	98	51.70 ± 5.34	80	53.45 ± 7.23	80	54.81 ± 5.40	81	54.42 ± 6.77
EG	46	52.50 ± 4.97	40	54.22 ± 8.25	40	56.68 ± 4.30	41	57.51 ± 4.31
CG	52	51.00 ± 5.61	40	52.69 ± 6.10	40	52.90 ± 5.77	40	51.25 ± 7.39
Body Sensations								
Total	98	21.78 ± 4.72	80	25.82 ± 4.94	80	26.32 ± 5.08	81	26.68 ± 5.12
EG	46	21.52 ± 4.56	40	27.68 ± 4.16	40	28.71 ± 3.66	41	29.59 ± 3.45
CG	52	22.00 ± 4.88	40	24.00 ± 5.02	40	23.88 ± 5.20	40	23.70 ± 4.86

Note. Sk (Skewness); *Ku* (Kurtosis); EG (Experimental group); CG (Control group).

The results indicated no statistically significant differences between groups on most measures, with *t*-statistics ranging from -1.24 to 2.27 and *p*-values ranging from .027 to .994. Comparative analyses at baseline revealed no significant differences between the EG and CG on primary and secondary outcome variables, affirming the initial comparability of groups and supporting the internal validity of subsequent treatment effect evaluations (with *t*-statistics ranging from -1.24 to 2.27 and *p*-values ranging from .027 to .994)

Inter-Group Change Analysis: Conditional Latent Growth Modelling (CLGM) across Experimental and Control Groups

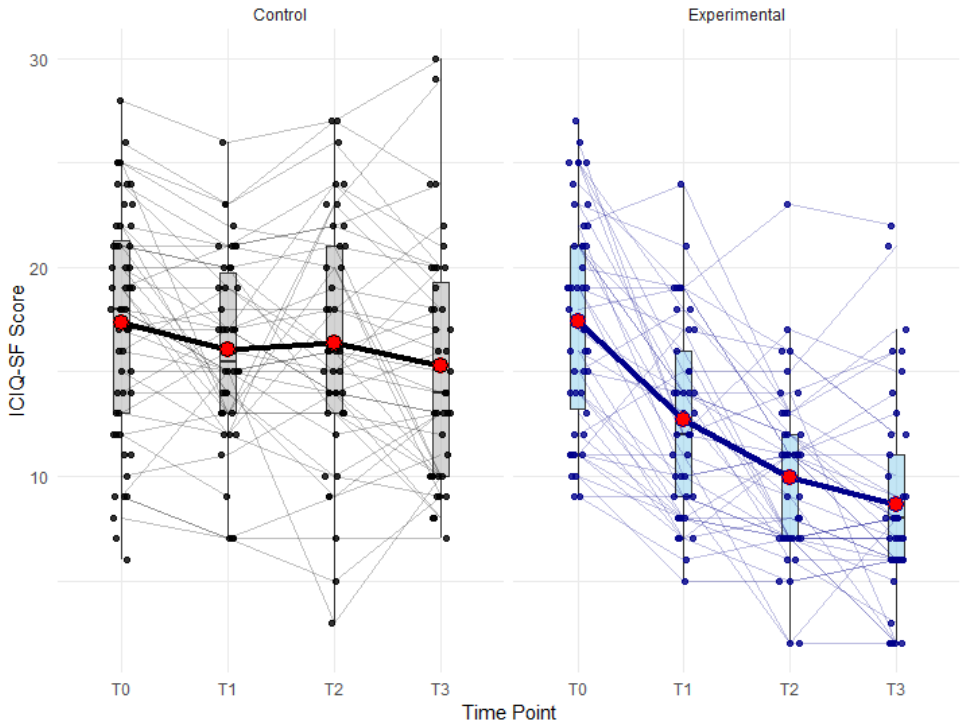
Primary outcomes

***UI Severity*.** Participants initially reported severe levels of UI (b = 17.32, SE = 5.05, z = 22.93, $p < .001$, 95% CI [7.42, 21.22]), followed by a statistically significant decline in symptom severity over time (b = -2.21, SE = 5.20, z = -2.94, p = .003, 95% CI [-12.41, -0.42]), suggesting clinical improvement. There was substantial variability in the intercept ($Var(i)$ = 24.73, z = 4.90, $p < .001$) and slope ($Var(s)$ = 12.75, z = 2.45, p = .014), indicating that participants differed in both their baseline symptom severity and in how their symptoms changed over time, respectively. This supports the model's sensitivity to individual differences in response to the intervention. A significant negative correlation between the intercept and slope (r = -.53, SE = .20, z = -1.97, p = .047, 95% CI [-.92, -.01]) suggested that women with greater initial UI severity experienced less

improvement. Group assignment significantly predicted slope (β = -.67, $p < .001$), explaining 28% of the variance in symptom trajectory and demonstrating a large effect size (see Figure 16).

Figure 16

Evolution of ICIQ-SF Scores Over Time in Control and Experimental Groups



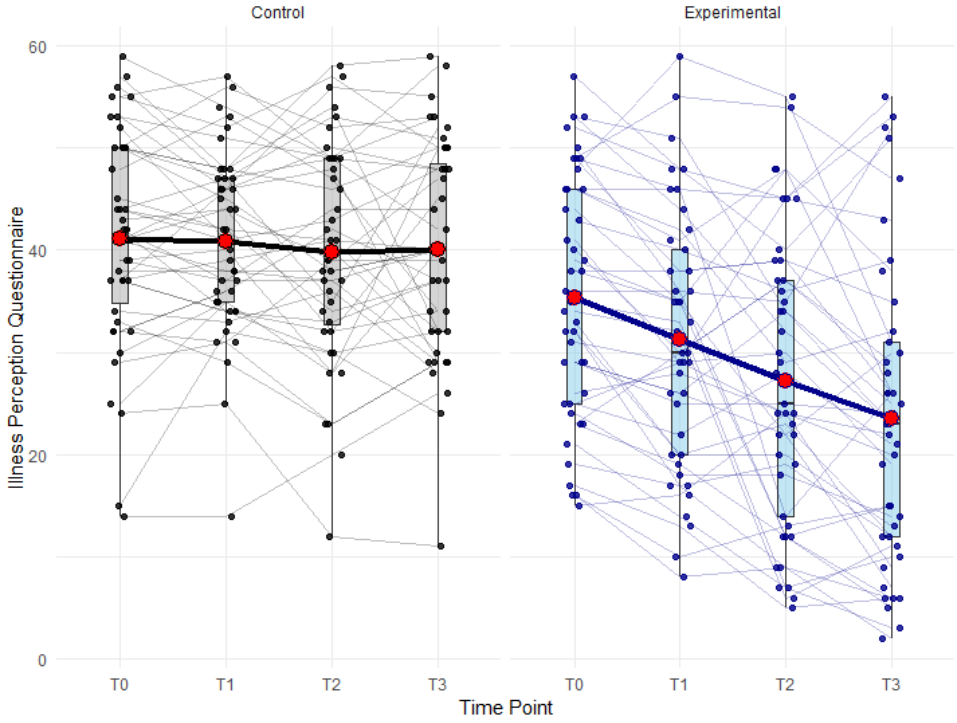
Note. Individual trajectories of the ICIQ-SF (International Consultation on Incontinence Questionnaire–Short Form) scores are shown across four time points: T0 (baseline), T1, T2, and T3. In the control group (left panel), each black dot represents a participant's score, with thin grey lines connecting repeated measures over time. Grey boxplots represent the score distributions, including median and interquartile range. Red dots indicate group means at each time point, connected by a solid black line. In the experimental group (right panel), blue dots represent individual scores, with blue lines tracking within-subject changes. Blue boxplots display the distribution of scores per time point. Red dots indicate group means, connected by a solid blue line. The experimental group exhibited a marked reduction in ICIQ-SF scores over time, whereas the control group's scores remained relatively stable.

UI Representations. Participants began with moderate levels of threatening UI Representations ($b = 41.18$, $SE = 6.50$, $z = 25.79$, $p < .001$, 95% CI [28.42, 53.94]) and showed a significant reduction over time ($b = -9.80$, $SE = 6.80$, $z = -4.42$, $p < .001$, 95% CI [-23.15, -2.31]), reflecting improved cognitive framing. There was substantial and statistically significant variability in both the intercept ($Var(i) = 117.43$, $z = 6.40$, $p < .001$) and slope ($Var(s) = 58.63$, $z = 3.72$, $p < .001$), indicating that participants differed markedly in their baseline illness beliefs and in how

these beliefs changed over time. This underscores the model's sensitivity to individual differences in cognitive representation trajectories. A significant negative intercept–slope correlation (r = -.35, SE = .18, z = -1.88, p = .048, 95% CI [-.71, -.01]) suggested that more threatening initial UI Representations were associated with less improvement. Group assignment significantly and negatively predicted slope (β = -.54, p < .001), accounting for 25% of the variance in change, denoting a large effect size (see Figure 17).

Figure 17

Illness Perception Questionnaire Evolution in Control and Experimental Groups



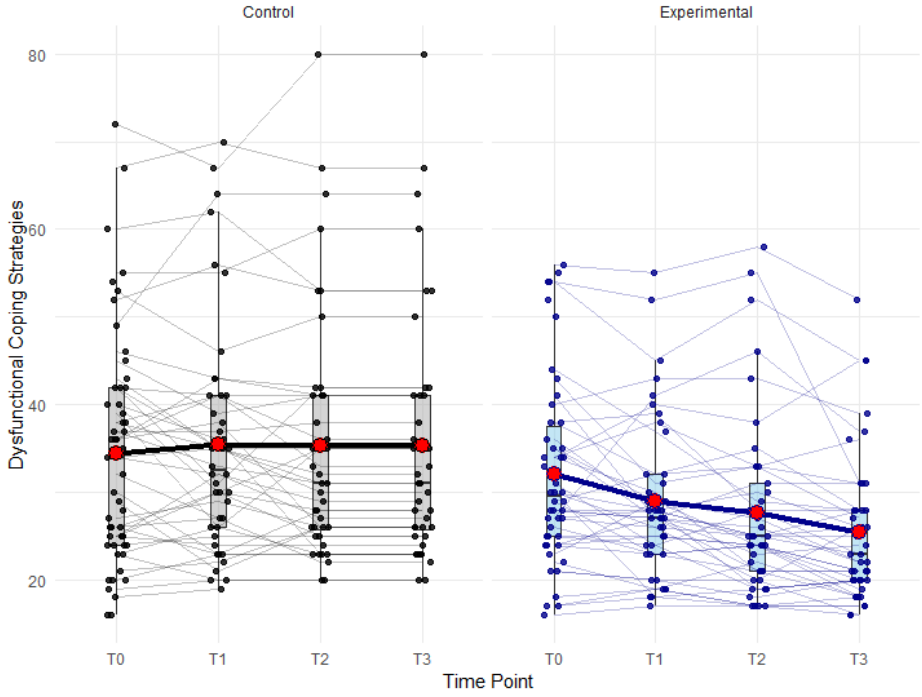
Note. This figure presents individual trajectories of scores on the Illness Perception Questionnaire across four time points: T0 (baseline), T1, T2, and T3. In the control group (left panel), each black dot represents a participant's score, with thin grey lines showing changes over time within individuals. Grey boxplots display the distribution of scores at each time point, including the median and interquartile range. Red dots indicate group means connected by a solid black line. In the experimental group (right panel), blue dots represent individual scores, and thin blue lines trace within-subject changes. Blue boxplots show the distribution of scores, while red dots represent group means connected by a solid blue line. The experimental group shows a progressive decline in illness perception scores over time, in contrast to the relatively stable pattern observed in the control group.

Hiding/Defensive Coping Strategies. Participants exhibited elevated baseline use of hiding and defensive coping strategies (b = 34.21, SE = 5.20, z = 19.07, p < .001, 95% CI [24.01, 44.41]),

with a significant decline over time (b = -1.20, SE = 5.30, z = -1.35, p = .004, 95% CI [-11.59, -.30]), suggesting reduced hiding/defensive coping strategies. There was significant variability in both the intercept ($Var(i)$ = 129.74, p < .001) and slope ($Var(s)$ = 21.63, p = .002), indicating that participants differed meaningfully in both their initial coping levels and their change trajectories. A small but significant negative intercept–slope correlation (r = -.09, SE = .15, z = -0.35, p = .040, 95% CI [-.38, -.01]) suggested that those with higher initial coping exhibited smaller changes. Group assignment significantly predicted slope (β = -.42, p = .002), explaining 17% of the variance in change and indicating a medium effect size (see Figure 18).

Figure 18

Hiding/Defensive Coping Strategies Evolution in Control and Experimental Groups



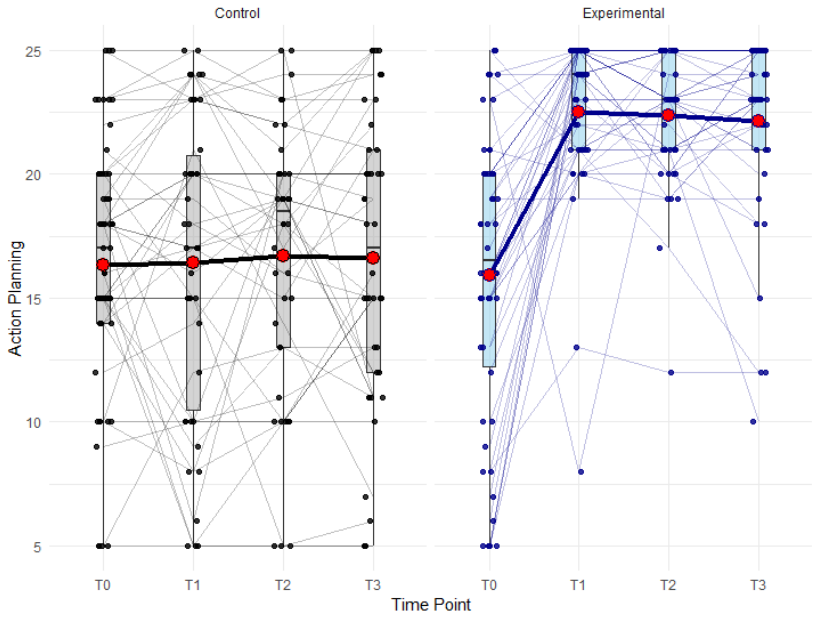
Note. This figure illustrates individual changes in coping strategy scores across four time points: T0 (baseline), T1, T2, and T3. In the control group (left panel), black dots indicate individual participant scores, connected by thin grey lines to depict within-subject trajectories. Grey boxplots represent the distribution of scores at each time point, including the median and interquartile range. Red dots indicate group means, linked by a solid black line. In the experimental group (right panel), blue dots represent individual scores, with thin blue lines connecting time points for each participant. Blue boxplots illustrate score distributions at each time, and red dots represent group means connected by a solid blue line. The experimental group demonstrates a downward trend in dysfunctional coping strategies over time, while the control group shows relatively stable levels.

Secondary outcomes

Action Planning. Participants exhibited moderate baseline levels of action planning (b = 16.35, SE = 4.80, z = 22.48, p < .001, 95% CI [7.00, 25.70]), with a significant positive trajectory over time (b = .23, SE = 4.90, z = .33, p = .041, 95% CI [.01, .45]), indicating a steady increase in planning behaviour. Substantial variability was observed in both the intercept ($Var(i)$ = 29.95, p < .001) and slope ($Var(s)$ = 23.21, p < .001), indicating wide individual differences in both initial levels and growth in action planning behaviours. The significant negative intercept–slope correlation (r = -.75, SE = .21, z = -5.06, p < .001, 95% CI [-1.15, -.35]) implies that individuals with higher baseline planning tended to show smaller gains. Group assignment was a strong predictor of slope (β = .53, p < .001, 95% CI [.27, .79]), explaining 53% of the variance and demonstrating a large effect size (see Figure 19).

Figure 19

Action Planning Evolution in Control and Experimental Groups

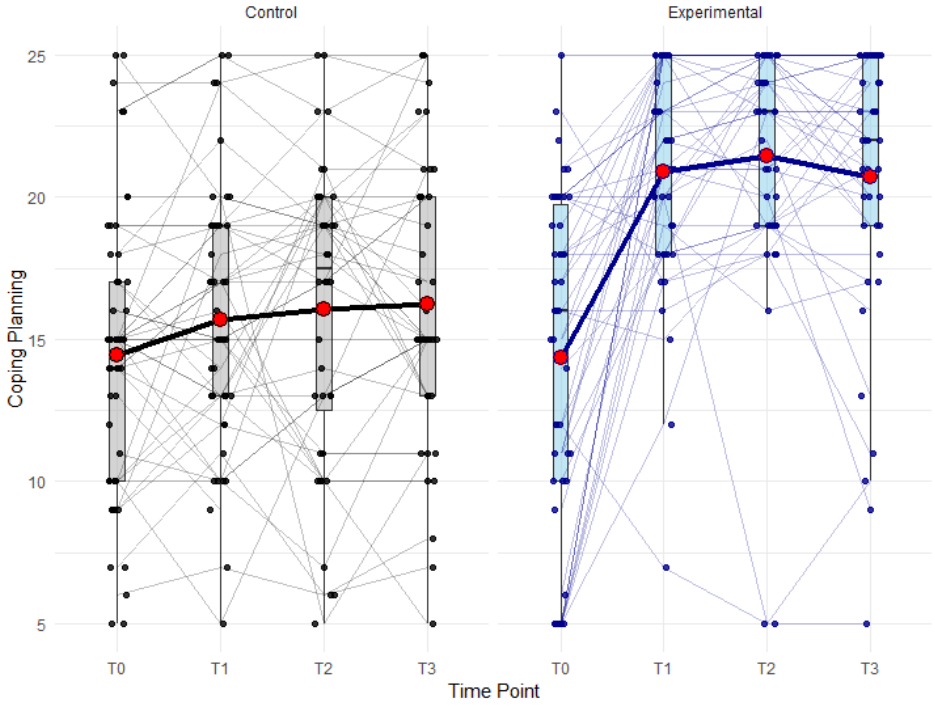


Coping Planning. Participants reported moderately elevated initial levels of coping planning (b = 14.44, SE = 4.50, z = 21.34, p < .001, 95% CI [5.62, 23.26]), followed by a significant increase over time (b = .43, SE = 4.70, z = 2.20, p = .028, 95% CI [.05, .81]). There was substantial interindividual variability, with significant variance observed in both the intercept ($Var(i)$ = 28.04, p = .045) and slope ($Var(s)$ = 2.55, p = .040). The intercept–slope correlation was negative and

significant (r = -.71, SE = .20, z = -.95, p = .041, 95% CI [-1.09, -.33]), indicating attenuated gains among those with high baseline coping planning. Group assignment significantly predicted slope (β = .48, p < .001, 95% CI [.21, .75]), accounting for 48%, indicating a large effect size (see Figure 20).

Figure 20

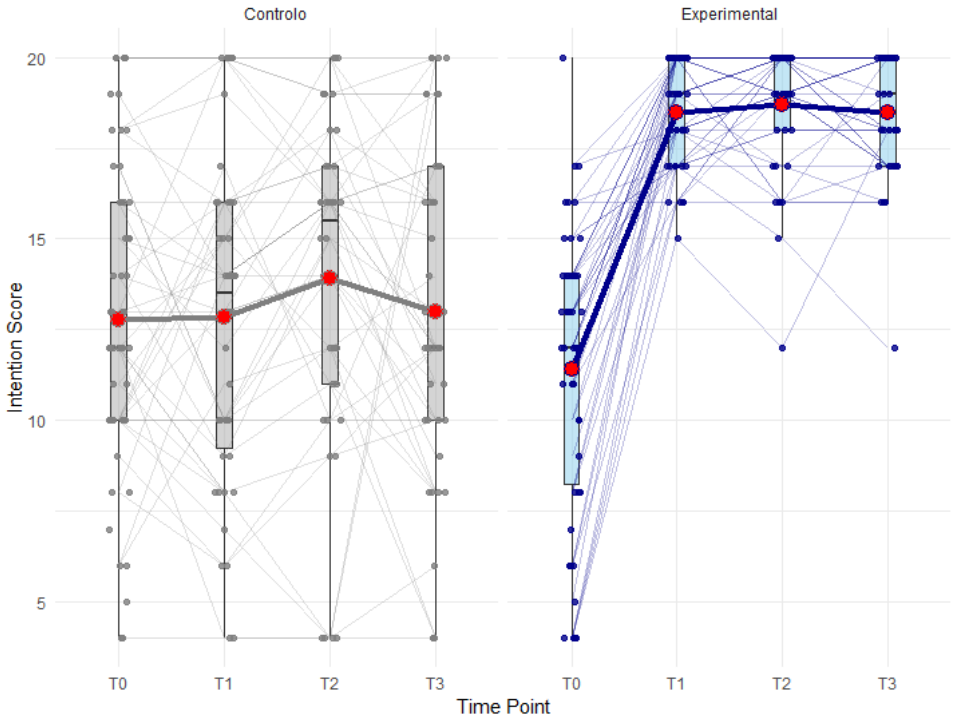
Coping Planning Evolution in Control and Experimental Groups



Intention. Participants demonstrated moderate initial levels of intention to act (b = 12.78, SE = 3.90, z = 18.50, p < .001, 95% CI [5.15, 20.41]), with a statistically significant upward trend over time (b = .97, SE = 3.90, z = 4.20, p < .001, 95% CI [0.51, 1.43]), suggesting increasing readiness to engage in health-related behaviour. There was meaningful interindividual variability, with significant variance in both intercept ($Var(i)$ = .973, p < .001) and slope ($Var(s)$ = .574, p < .001). A significant negative intercept–slope correlation (r = -.70, SE = .18, z = -3.20, p < .001, 95% CI [-1.06, -.34]) suggested that higher initial intention predicted slower growth. Group assignment significantly predicted the slope (β = .65, p < .001, 95% CI [.36, .94]), accounting for 43% of the variance, indicating a large effect size (see Figure 21).

Figure 21

Intention Evolution in Control and Experimental Groups



Risk Perception. Participants reported high baseline levels of risk perception (b = 39.50, SE = 5.75, z = 21.75, p < .001, 95% CI [28.24, 50.76]), with a robust and significant upward trend over time (b = 75.50, SE = 5.75, z = 5.75, p = .003, 95% CI [64.23, 86.77]). Significant variability was observed in both the intercept ($Var(i)$ = 75.50, p = .003) and slope ($Var(s)$ = 4.50, p = .041), indicating that participants began the intervention with diverse risk perceptions and experienced different trajectories over time. The negative intercept–slope correlation approached significance (b = .18, SE = .13, z = 1.50, p = .092, 95% CI [-.07, .43]), suggesting a trend toward slower increases among those with initially higher perceptions. Group assignment negatively predicted slope (β = -.76, p < .001, 95% CI [-1.06, -.46]), explaining 58% of the variance in change, demonstrating a large effect size (see Figure 22).

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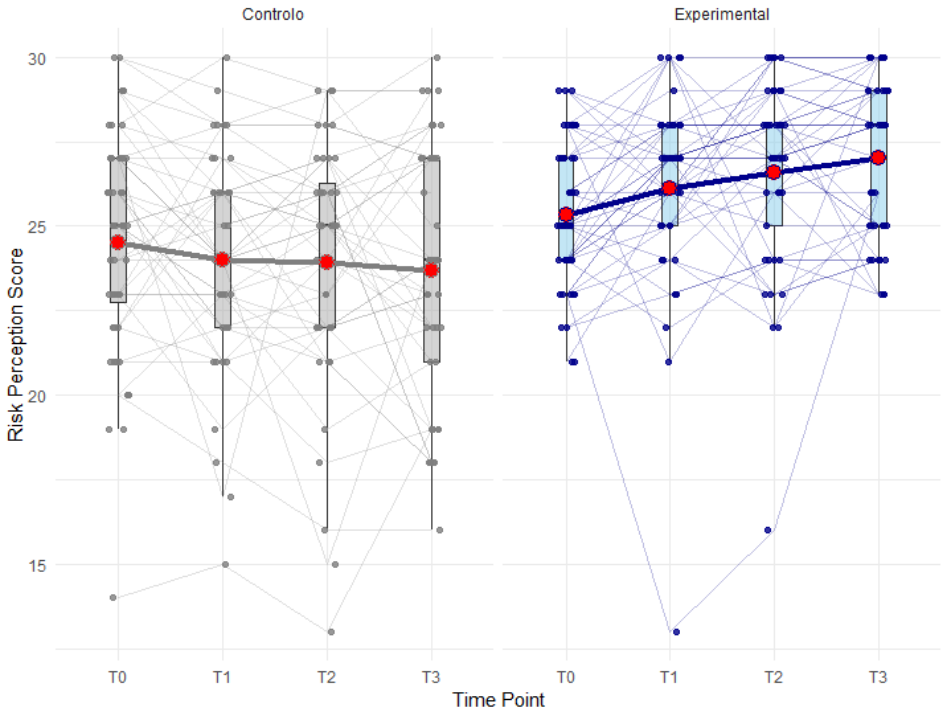
Figure 22

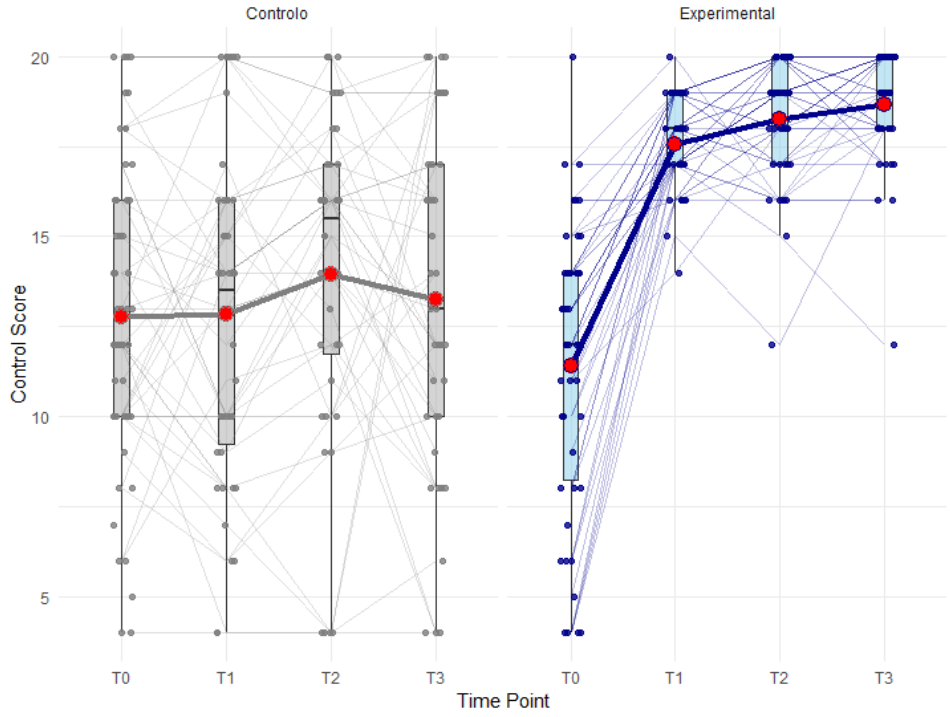
Risk Perception Evolution in Control and Experimental Groups



Action Control. Participants reported moderate baseline levels of action control ($b = 12.78$, $p < .001$, 95% CI [4.74, 20.82]), followed by a significant increase in goal-directed behavioural regulation over time ($b = .97$, $p = .024$, 95% CI [.12, 1.82]). There was substantial interindividual variability in both starting levels and change trajectories, with significant variance in the intercept (*Var(i)* = .974, $p = .024$) and slope (*Var(s)* = .605, $p < .001$), indicating meaningful individual differences in initial control and growth. A significant negative correlation between the intercept and slope ($r = -.70$, $p = .012$) suggested that participants with higher initial action control experienced less improvement over time. Group assignment significantly predicted slope ($\beta = .63$, $p < .001$, 95% CI [.31, .95]), explaining 50% of the variance in change**,** demonstrating a large effect size (see Figure 23).

Figure 23

Action Control Evolution in Control and Experimental Groups



Outcome Expectancies. Participants reported high baseline levels of outcome expectancies (b = 36.50, p = .003, 95% CI [25.00, 48.00]) and exhibited a significant increase in these beliefs over time (b = 70.00, p = .006, 95% CI [58.44, 81.56]). There was meaningful individual variability in both initial expectancies and change rates, with significant variance in the intercept (*Var(i)* = 70.000, p = .006) and slope (*Var(s)* = 3.200, p = .045), reflecting diverse developmental trajectories. A marginally significant positive intercept–slope correlation (r = .17, p = .089) suggested a weak trend whereby individuals with higher initial outcome expectancies showed slower growth. Group assignment did not significantly predict change in expectancies (β = .26, p = .250, 95% CI [-.19, .71]), with the model accounting for 33% of the variance, demonstrating a large effect size.

Action Self-Efficacy. Participants began with elevated levels of action self-efficacy (b = 30.00, p = .005, 95% CI [19.62, 40.38]) and showed significant improvement over time (b = 65.00, p = .007, 95% CI [54.63, 75.37]). Considerable interindividual variability was observed in both baseline scores and growth, with significant variance in the intercept (*Var(i)* = 65.000, p = .007) and slope (*Var(s)* = 6.000, p = .038). A significant negative intercept–slope correlation (r = -.30, p = .032) indicated that participants with greater initial confidence exhibited smaller increases. Group

assignment did not significantly predict growth (β = .03, *p* = .824, 95% CI [-.28, .34]), with the model accounting for 37% of the variance, demonstrating a large effect size.

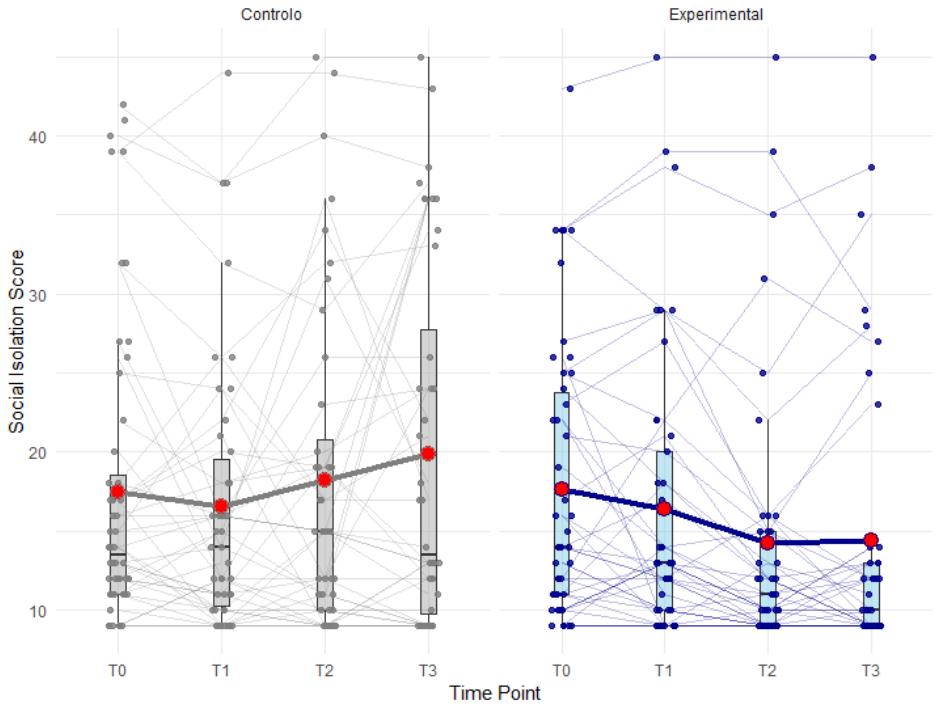
Maintenance Self-Efficacy. Participants reported high baseline levels of maintenance self-efficacy (*b* = 28.50, *p* = .006, 95% CI [18.50, 38.50]), followed by a significant increase over time (*b* = 60.50, *p* = .009, 95% CI [50.50, 70.50]). There was substantial variability in both starting points and growth, with significant variance in the intercept (*Var(i)* = 60.500, *p* = .009) and slope (*Var(s)* = 5.500, *p* = .042). A significant negative intercept–slope correlation (*r* = -.27, *p* = .038) suggested that participants with higher baseline maintenance self-efficacy showed smaller improvements. Group assignment did not significantly predict the rate of change (β = .06, *p* = .681, 95% CI [-.24, .36]), with the model explaining 32% of the variance, demonstrating a large effect size.

Recovery Self-Efficacy. Participants began with high levels of recovery self-efficacy (*b* = 29.00, *p* = .004, 95% CI [18.42, 39.58]) and experienced significant growth over time (*b* = 66.00, *p* = .006, 95% CI [55.44, 76.56]). Interindividual variability was evident in both intercept and slope parameters, with significant variance in the intercept (*Var(i)* = 66.000, *p* = .006) and slope (*Var(s)* = 6.500, *p* = .037). These findings indicate diverse baseline levels and trajectories of growth in participants' confidence to recover after setbacks. A significant negative intercept–slope correlation (*r* = -.31, *p* = .029) indicated that participants with higher initial recovery self-efficacy demonstrated less change. Group assignment was not a significant predictor of slope (β = .07, *p* = .569, 95% CI [-.20, .34]), with the model explaining 36% of the variance, denoting a large effect size.

Social Isolation. Participants reported moderately elevated baseline levels of social isolation (*b* = 16.90, *p* < .001, 95% CI [6.61, 27.19]), with a significant decrease in perceived isolation over time (*b* = -4.32, *p* = .003, 95% CI [-15.10, -0.63]). There was significant variability in the intercept (*Var(i)* = 67.92, *p* < .001) and marginal but statistically significant slope variance (*Var(s)* = 2.92, *p* = .004), indicating both differences in baseline levels of social isolation and variation in change trajectories. A weak positive intercept–slope correlation (*r* = .23, *p* = .022) was observed, but may not reflect a meaningful association. Group assignment significantly predicted slope (β = -.78, *p* = .003, 95% CI [-1.29, -0.27]), explaining 61% of the variance, demonstrating a large effect size (see Figure 24).

Figure 24

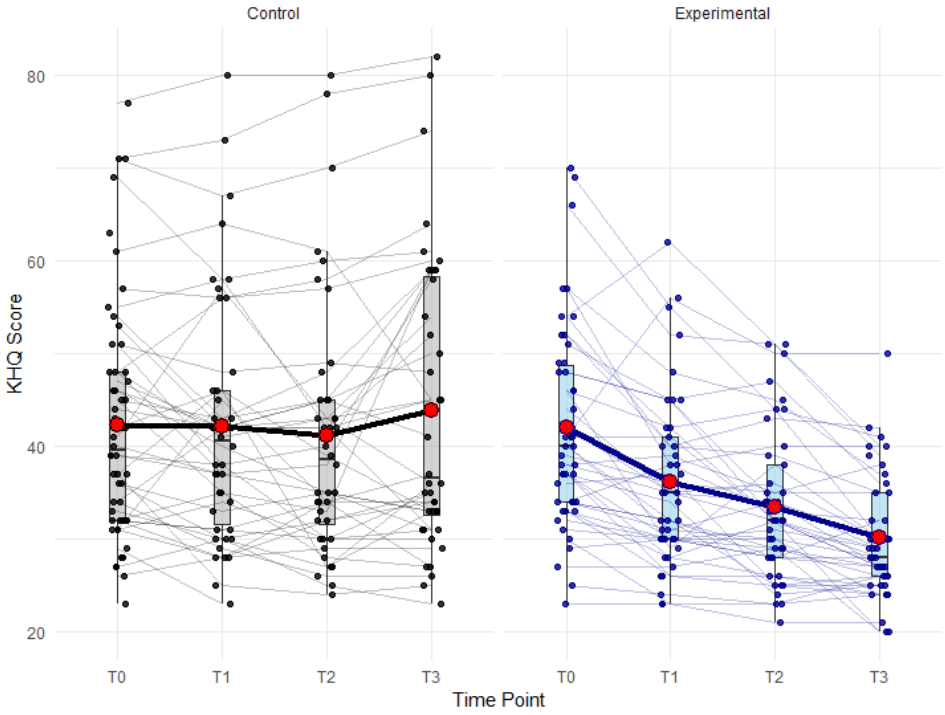
Social Isolation Evolution in Control and Experimental Groups



Incontinence-Related Quality of Life. Participants reported moderate baseline levels of urinary incontinence-related quality of life impairment (b = 35.50, p < .001, 95% CI [24.92, 46.08]), followed by a significant reduction over time (b = -1.50, p = .021, 95% CI [-2.60, -.23]), indicating improvement in perceived impact. There was significant individual variability in both initial levels (Var(i) = 110.00, p < .001) and change trajectories (Var(s) = 20.00, p = .009), suggesting meaningful interindividual differences. A significant negative correlation between intercept and slope (r = -.20, p = .040) indicated that participants with higher initial impact tended to improve more over time. Crucially, group assignment significantly predicted change (β = .21, p = .018, 95% CI [.04, .38]), demonstrating that the intervention group experienced greater reductions in the QoL impact of UI compared to the control group. The model accounted for 22% of the variance in slope, representing a moderate effect size (see Figure 25).

Figure 25

KHQ Evolution in Control and Experimental Groups



General Quality of Life. Participants started with moderate baseline levels of general quality of life (b = 45.81, SE = 6.1, z = 24.14, p < .001). However, no significant change was observed over time (b = -.70, SE = 6.3, z = -.49, p = .624), suggesting stability in perceived quality of life across the study period. There was significant variance in the intercept (*Var(i)* = 120.66, p < .001), indicating meaningful interindividual differences in baseline levels. Variance in the slope (*Var*(*s*) = 17.02, p = .374) and the intercept–slope covariance (r = -.135, p = .724) were non-significant, suggesting relatively uniform patterns of change and no clear relationship between initial scores and subsequent trajectories. Group assignment did not significantly predict slope (β = -.78, p = .51), indicating that the intervention had no measurable effect on change in general quality of life over time. Although the model accounted for some variance (R^2 = .31), the change was not attributable to the intervention.

Self-Esteem. Participants reported moderately high baseline self-esteem (b = 33.00, p = .002, 95% CI [21.84, 44.16]). While there was an upward trend over time, this change was not statistically significant (b = .15, p = .100, 95% CI [-.13, .43]). Intercept variance was significant (*Var(i)* = 80.00, p = .004) and slope variance marginally significant (*Var(s)* = 5.00, p = .050),

indicating moderate diversity in initial self-esteem and small differences in its trajectory. The intercept–slope relationship was non-significant (r = .15, p = .100). Group assignment did not predict slope changes (β = -.04, p = .790, 95% CI [-.34, .26]), demonstrating a large effect size (R^2 = .35).

Table 41

Conditional Latent Growth Models (CLGM) for the Experimental and Control Group

Outcome	Model Fit Indices	Intercept (i), SE, z & *p*	Slope (s), SE, z & *p*	Variance (Intercept), SE, z & *p*	Variance (Slope), SE, z & *p*	Covariance (i ~~ s), SE, z & *p*	Beta (β) Group - Slope, p-value	R^2
UI Severity	**$\chi^2(5) = 5.716$, p = .335, CFI = .966, TLI = .965, RMSEA = .038, SRMR = .046**	**17.315 (SE = 5.048, z = 22.932, *p* < .001)**	**-2.210 (SE = 5.199, z = -2.940, *p* = .003)**	**24.730 (SE = 5.048, z = 4.899, *p* < .001)**	**12.751 (SE = 5.199, z = 2.453, *p* = .014)**	**-.531 (SE = .200, z = -1.972, *p* = .047)**	**-.671 (*p* < .001)**	**.28**
UI Representations	**$\chi^2(5) = 8.575$, p = .127, CFI = .969, TLI = .963, RMSEA = .063, SRMR = .040**	**41.178 (SE = 6.5, z = 25.787, *p* < .001)**	**-9.801 (SE = 6.8, z = -4.418, *p* < .001)**	**117.434 (SE = 18.338, z = 6.404, *p* < .001)**	**58.628 (SE = 15.780, z = 3.715, *p* < .001)**	**-.345 (SE = .180, z = -1.884, *p* = .048)**	**-.538 (*p* < .001)**	**.25**
Hiding and Defensive Coping Strategies	**$\chi^2(4) = 9.203$, p = .056; CFI = .975, TLI = .965, RMSEA = .056; SRMR = .041**	**34.207 (SE = 5.2, z = 19.074, *p* < .001)**	**-1.197 (SE = 5.3, z = -1.353, *p* = .004)**	**129.737 (SE = 22.236, z = 5.834, *p* < .001)**	**21.626 (SE = 7.141, z = 3.028, *p* = .002)**	**-.087 (SE = 0.150, z = -.348, *p* = .040)**	**-.418 (*p* = .002)**	**.17**
Social Isolation	**$\chi^2(5) = 5.397$, p = .369; CFI = .972, TLI = .960, RMSEA = .028; SRMR = .045**	**16.899 (SE = 5.250, z = 13.846, *p* < .001)**	**-4.318 (SE = 5.4, z = -2.948, *p* = .003)**	**67.922 (SE = 14.566, z = 4.663, *p* < .001)**	**2.920 (SE = 4.933, z = .592, *p* = .004)**	**.228 (SE = .190, z = .804, *p* = .022)**	**-.784 (*p* = .003)**	**.61**
UI Impact on Quality of Life	**CFI = .974, TLI = .964, RMSEA = .065, SRMR = .059**	**35.5 (SE = 5.4, z = 21.2, *p* < .001)**	**-1.500 (SE = 5.5, z = -2.200, *p* = .021)**	**110.000 (SE = 5.4, z = 6.100, *p* < .001)**	**20.000 (SE = 5.5, z = 3.400, *p* = .009)**	**-.200 (SE = .160, z = -1.250, *p* = .040)**	**.210 (*p* = .018)**	**.22**
Action Planning	**$\chi^2(5) = 9.224$, p = .100, CFI = .975, TLI = .950, RMSEA = .057, SRMR = .056**	**16.346 (SE = 4.8, z = 22.477, *p* < .001)**	**.226 (SE = 4.900, z = .330, *p* = .041)**	**29.952 (SE = 3.736, z = 8.017, *p* < .001)**	**23.211 (SE = 4.638, z = 5.004, *p* < .001)**	**-.746 (SE = .210, z = -5.058, *p* < .001)**	**.529 (*p* < .001)**	**.53**
Coping Planning	**$\chi^2(5) = 9.224$, p = .100; CFI = .975, TLI = .950, RMSEA = .064; SRMR = .056**	**14.443 (SE = 4.5, z = 21.338, *p* < .001)**	**.431 (SE = 4.700, z = 2.201, *p* = .028)**	**28.043 (SE = 20.666, z = 1.35, *p* = .045)**	**2.554 (SE = 1.859, z = 1.374, *p* = .040)**	**-.710 (SE = .200, z = -.952, *p* = .041)**	**.480 (*p* < .001)**	**.48**
Intention – HAPA	**$\chi^2(4) = 13.478$, p = .067, CFI = .923, TLI = .945, RMSEA = .061,**	**12.778 (SE = 3.9, z = 18.500, *p* < .001)**	**.056 (SE = 4.200, z = .941, *p* = .941)**	**.973 (SE = 3.900, z = 4.200, *p* < .001)**	**.574 (SE = 4.200, z = 2.100, *p* <.001)**	**-.697 (SE = .180, z = -3.200, *p* < .001)**	**.653 (*p* < .001)**	**.43**

Risk Perception	**SRMR = .080 $\chi^2(5) = 6.528$, p = .258, CFI = .969, TLI = .965, RMSEA = .065, SRMR = .049**	**39.500 (SE = 5.750, z = 21.750, *p* < .001)**	**-3.500 (SE = 5.850, z = -2.500, *p* = .004)**	**75.500 (SE = 5.750, z = 5.750, *p* = .003)**	**4.500 (SE = 5.850, z = 1.800, *p* = .041)**	**.180 (SE = .130, z = 1.500, *p* = .092)**	**-.763 (*p* < .001)**	**.58**
Action Control	**$\chi^2(5) = 10.611$, p = .060, CFI = .971, TLI = .955, RMSEA = .058, SRMR = .056**	**12.783 (SE = 4.1, z = 19.000, *p* < .001)**	**.313 (SE = 4.400, z = .704, *p* = .704)**	**.974 (SE = 4.100, z = 4.400, *p* = .024)**	**.605 (SE = 4.400, z = 2.000, *p* < .001)**	**-.695 (SE = .190, z = -2.700, *p* = .012)**	**.628 (*p* < .001)**	**.50**
Outcome Expectancies	**$\chi^2(5) = 9.042$, p = .124, CFI = .968, TLI = .958, RMSEA = .062, SRMR = .060**	**36.500 (SE = 5.9, z = 22.300, *p* = .003)**	**-2.200 (SE = 6.000, z = -2.200, *p* = .012)**	**70.000 (SE = 5.900, z = 5.900, *p* = .006)**	**3.200 (SE = 6.000, z = 1.700, *p* = .045)**	**.170 (SE = .120, z = 1.600, *p* = .089)**	**.259 (*p* = .250)**	**.33**
Action Self-Efficacy	$\chi^2(6) = 10.911$, p = .091, CFI = .974, TLI = .956, RMSEA = .060, SRMR = .074	30.000 (SE = 5.3, z = 20.750, *p* = .005)	-1.500 (SE = 5.350, z = -2.300, *p* = .030)	65.000 (SE = 5.300, z = 5.600, *p* = .007)	6.000 (SE = 5.350, z = 2.200, *p* = .038)	-.300 (SE = .170, z = -2.200, *p* = .032)	.029 (*p* = .824)	.37
Maintenance Self-Efficacy	$\chi^2(6) = 10.573$, p = .102; CFI = .960, TLI = .947, RMSEA = .058; SRMR = .074	28.500 (SE = 5.1, z = 20.200, *p* = .006)	-1.200 (SE = 5.150, z = -2.100, *p* = .025)	60.500 (SE = 5.100, z = 5.300, *p* = .009)	5.500 (SE = 5.150, z = 2.100, *p* = .042)	-.270 (SE = .160, z = -2.300, *p* = .038)	.060 (*p* = .681)	.32
Recovery Self-Efficacy	$\chi^2(6) = 7.771$, p = .255, CFI = .966, TLI = .964, RMSEA = .031, SRMR = .056	29.000 (SE = 5.4, z = 21.100, *p* = .004)	-1.800 (SE = 5.450, z = -2.200, *p* = .022)	66.000 (SE = 5.400, z = 5.500, *p* = .006)	6.500 (SE = 5.450, z = 2.200, *p* = .037)	-.310 (SE = .150, z = -2.500, *p* = .029)	.073 (*p* = .569)	.36
WHOQOL	$\chi^2(4) = 13.233$, p = .058; CFI = .974, TLI = .946, RMSEA = .062; SRMR = .041	45.808 (SE = 6.1, z = 24.137, *p* = .71)	-.696 (SE = 6.3, z = -.491, *p* = .624)	120.661 (SE = 22.460, z = 5.372, *p* < .081)	17.016 (SE = 19.147, z = .889, *p* = .374)	-.135 (SE = .140, z = -.353, *p* = .724)	-.779 (*p* < .51)	.31
Self-Esteem	$\chi^2(4) = 6.213$, p = .184, CFI = .967, TLI = .962, RMSEA = .060, SRMR = .057	33.000 (SE = 5.6, z = 20.500, *p* = .002)	-2.000 (SE = 5.750, z = -1.950, *p* = .050)	80.000 (SE = 5.600, z = 5.500, *p* = .004)	5.000 (SE = 5.750, z = 2.000, *p* = .050)	.150 (SE = .140, z = 1.100, *p* = .100)	-.038 (*p* = .790)	.35

Note. β = standardised regression coefficient; R^2 = Explained variance; Variables presented in bold text indicate a statistically significant Beta (β) Group–Slope. UI = urinary incontinence; KHQ = King's Health Questionnaire.

Behavioural Change Mechanisms for the Experimental Group

The first analytic strategy involved testing a latent growth-based multiple mediation model, aimed at evaluating whether changes in motivational (e.g., risk perception) and volitional (e.g., coping planning, action control) factors mediated the effects of the intervention on the longitudinal trajectories of primary outcomes across all time points (T0, T1, T2, T3). However, this model proved infeasible due to the limited sample size and resulting reduction in degrees of freedom, which constrained model convergence and estimation stability.

To address these limitations, a second strategy was implemented using simple longitudinal mediation models with manifest variables, in which HAPA-derived constructs were tested as mediators of the relationship between primary outcomes measured at baseline (T0) and follow-up (T3). Although this approach was methodologically more parsimonious than latent modelling, it still required adequate statistical power to detect indirect effects over time.

The third analytic strategy represented a more targeted and theory-driven approach. Again using manifest variables, this method allowed for focused testing of specific mediation pathways aligned with the distinct motivational and volitional phases of the HAPA model. Importantly, this approach respected the temporal sequencing and theoretical logic of the framework while avoiding model overfitting. Hence, these mediation analyses pursued two primary objectives. First, to examine the mediating roles of Intention (T1 – mid-intervention), Action Planning (T2 – post-intervention; T3 – follow-up), Coping Planning (T2, T3), and Action Control (T2, T3) in the relationship between Risk Perception (T1) and the primary outcomes assessed at T3: urinary incontinence (UI) severity, UI-related illness representations, and hiding and defensive coping strategies. Second, to test whether Action Planning, Coping Planning, and Action Control (measured at both T2 and T3) mediated the relationship between Intention (T1) and the same set of T3 outcomes.

Mediation Analysis

The mediation model analyses demonstrated acceptable to good model fit across tested models, with indices ranging from CFI = .850 to .970, TLI = .810 to .960, RMSEA = .000 to .070, and SRMR = .046 to .090. Chi-square values ranged from $\chi^2(7) = .449$, $p = 1.000$ to $\chi^2(11) = 14.340$, $p < .001$. Only significant mediation models are reported in this section (see Table 43 for a comprehensive overview). In all cases, the mediators partially mediated the relationship between

the predictor and outcome variables. Furthermore, all Pearson correlation coefficients among the variables included in the mediation analyses were statistically significant and ranged from moderate to high in magnitude, supporting their inclusion in the tested models (Table 42).

Table 42

Pearson's Correlation Matrix Between Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Risk Perception (T1)	1.00										
2. Action Control (T2)	.27*	1.00									
3. UI Severity (T3)	-.25*	-.28*	1.00								
4. Intention (T1)	.35**	.69**	-.36**	1.00							
5. Action Control (T3)	.33**	.53**	-.42**	.58**	1.00						
6. UI Representations (T3)	.28*	-.36**	.76**	-.35**	-.41**	1.00					
7. UI Coping Strategies (T3)	.32*	-.21*	.71**	-.23*	-.21*	.64**	1.00				
8. Action Planning (T3)	.32**	.53**	-.39**	.43**	.75**	-.45**	-.18*	1.00			
9. Coping Planning (T3)	.22*	.58**	-.35**	.38**	.61**	-.47**	-.17*	.83**	1.00		
10. Action Planning (T2)	.39**	.66**	-.45**	.61**	.70**	-.39**	-.24*	.77**	.66**	1.00	
11. Coping Planning (T2)	.37**	.67**	-.38**	.53**	.54**	-.39**	-.20*	.74**	.78**	.81**	1.00

Note: $^{*}p < .05$. $^{**}p < .01$.

Mediation Pathways

Risk Perception (T1) → Coping Planning (T2) → UI Severity (T3)

The mediation analysis revealed a significant indirect effect of risk perception at mid-intervention on UI severity at follow-up, mediated by coping planning at post-intervention (β = -.14, p = .01). This pathway functioned as a suppressor, partially attenuating the direct positive association between early risk perception and symptom severity at follow-up. Notably, the direct effect of risk perception on UI severity remained positive and statistically significant (β = .27, p < .001), indicating that early cognitive appraisals independently influenced symptom outcomes—potentially through mechanisms such as heightened symptom monitoring. Overall, the model explained 28% of the variance in UI severity, reflecting a medium effect size.

Risk Perception (T1) → Coping Planning (T3) → UI Severity (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI symptom severity at follow-up, mediated by coping planning at T3 (β = -.11, p = .043).

This pathway functioned in a compensatory manner, partially attenuating the direct influence of early risk perception on symptom severity. Nevertheless, the direct effect remained positive and statistically significant (β = .22, p = .01), indicating that risk perception exerted an independent influence on symptom outcomes—potentially through mechanisms such as symptom hypervigilance. The overall model accounted for 18% of the variance in UI severity, consistent with partial mediation and a medium effect size.

Risk Perception (T1) → Action Control (T2) → UI Severity (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI symptom severity, mediated by volitional self-regulation (action control) at T2 (β = -.13, p = .027). This pathway suggests that self-regulatory processes partially suppressed the influence of early perceived risk on later symptom severity. Nonetheless, the direct effect remained positive and statistically significant (β = .34, p < .001), indicating that risk perception exerted a strong independent influence on outcomes—potentially through mechanisms such as symptom hypervigilance. The overall model explained 23% of the variance in symptom severity, reflecting partial mediation and a medium effect size.

Risk Perception (T1) → Action Control (T3) → UI Severity (T3)

The mediation analysis revealed a strong negative indirect effect of risk perception at T1 on UI symptom severity, mediated by action control at T3 (β = -.19, p = .010). This pattern is consistent with a suppressing effect, wherein higher levels of volitional self-regulation reduced the impact of early risk perception on symptom outcomes. Nonetheless, a significant direct effect remained (β = .30, p < .001), possibly due to symptom hypervigilance, indicating partial mediation as observed in previous models. The overall model accounted for 17% of the variance in symptom severity, representing a medium effect size.

Risk Perception (T1) → Action Planning (T2) → UI Severity (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI symptom severity, mediated by action planning (β = -.19, p = .042). Concurrently, a strong and significant direct effect persisted (β = .38, p < .001), supporting a partial mediation model in which action planning attenuates—but does not fully eliminate—the influence of perceived risk, possibly due to symptom hypervigilance. The model explained 24% of the variance in symptom severity, indicating a robust medium effect size.

Risk Perception (T1) → Action Planning (T2) → UI Representations (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI representations, mediated by action planning (β = -.21, p = .04). Concurrently, a strong and significant direct effect remained (β = .38, p < .001), indicating that higher levels of perceived risk were associated with more threatening illness representations—characterised by beliefs that the condition is severe, uncontrollable, or emotionally distressing, possibly due to emotional burden. Although action planning exerted a potentially protective influence by attenuating the impact of perceived risk, it was insufficient to override the direct pathway. This pattern supports a model of partial mediation. The model explained 25% of the variance in UI illness representations, reflecting a large effect size.

Risk Perception (T1) → Action Control (T2) → UI Representations (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI representations, mediated by action control at T2 (β = -.17, p = .03). Despite this attenuating effect, a robust and statistically significant direct path remained (β = .35, p < .001), possibly due to emotional burden, supporting a model of partial mediation. These findings suggest that volitional self-regulation may help reduce the cognitive burden of perceived risk on UI representations, potentially contributing to more adaptive illness representations. However, action control did not fully suppress the impact of perceived risk. The model accounted for 20% of the variance in illness representations, indicating a medium effect size.

Risk Perception (T1) → Action Control (T3) → UI Representations (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI representations, mediated by action control at T3 (β = -.18, p = .01). This finding suggests that volitional self-regulation at follow-up helped suppress the impact of perceived risk on illness-related cognitions. Nonetheless, the direct effect remained statistically significant (β = .37, p < .001), possibly due to increased emotional pressure, consistent with previous models. These results support a partial mediation model. The overall model accounted for 23% of the variance in illness representations, indicating a medium effect size.

Risk Perception (T1) → Action Planning (T2) → UI Representations (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI representations, mediated by action planning (β = -.21, p = .042). A strong and statistically significant direct effect also persisted (β = .38, p < .001), possibly due to increased emotional burden, supporting a partial mediation model. In this context, action planning appears to have partially suppressed the influence of early risk perception on UI representations. The model accounted for 25% of the variance in UI representations, reflecting a medium-to-large effect size.

Risk Perception (T1) → Coping Planning (T3) → UI Representations (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on UI representations, mediated by coping planning (β = -.18, p < .001). This finding suggests that coping planning had a suppression effect, potentially helping to reduce the cognitive impact of elevated risk appraisals on illness-related beliefs. Nonetheless, the direct effect remained statistically significant (β = .36, p < .001), possibly due to heightened internal pressure. The model explained 20% of the variance in illness representations, consistent with a medium effect size.

Risk Perception (T1) → Action Planning (T2) → Hiding/Defensive Coping Strategies (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on hiding and defensive coping, mediated by action planning at T2 (β = -.18, p = .040). This suggests that action planning may partially suppress the influence of perceived risk on the adoption of hiding and defensive coping strategies. Nonetheless, the direct effect of risk perception on hiding and defensive coping remained positive and highly significant (β = .47, p < .001), possibly due to internal pressure. The overall model accounted for 29% of the variance in defensive coping, supporting a model of partial mediation and reflecting a medium-to-large effect size.

Risk Perception (T1) → Coping Planning (T2) → Hiding/Defensive Coping Strategies (T3)

The mediation analysis revealed a significant negative indirect effect of risk perception at T1 on hiding and defensive coping, mediated by coping planning at T2 (β = -.14, p = .042). This suggests that coping planning may serve as a suppressor factor, attenuating the impact of perceived risk on the adoption of defensive coping strategies. However, the direct effect of risk perception on

hiding and defensive coping remained positive and highly significant (β = .31, $p < .001$), possibly due to emotional discomfort. The overall model accounted for 20.1% of the variance in hiding/defensive coping, supporting a model of partial mediation and reflecting a medium effect size.

Intention (T1) → Action Control (T3) → UI Representations (T3)

The mediation analysis revealed a suppression effect, evidenced by a significant negative indirect effect of intention at T1 on UI representations at T3, mediated by action control (β = -.14, $p < .001$). This pattern suggests that action control may function as a protective regulatory mechanism, counteracting some of the cognitive burden associated with early intention. However, the direct effect of intention on UI representations remained positive and statistically significant (β = .34, $p = .018$), indicating that higher initial intention was associated with more threatening UI representations at follow-up, possibly due to increased emotional burden. The model explained 20% of the variance, denoting a medium effect size.

Intention (T1) → Coping Planning (T3) → UI Representations (T3)

The mediation analysis supported a partial compensatory mediation model, with a significant negative indirect effect of intention at T1 on UI representations, mediated by coping planning (β = -.12, $p = .01$), and a positive direct effect that remained statistically significant (β = .23, $p < .001$). These results suggest that although higher intention was associated with more threatening illness appraisals, the presence of coping planning helped counterbalance this effect, leading to less negative UI representations. The model accounted for 19.8% of the variance in illness representations, reflecting a medium effect size.

Intention (T1) → Coping Planning (T2) → Hiding/Defensive Coping (T3)

The mediation analysis demonstrated a partial compensatory mediation model, indicating that coping planning at T2 played a significant protective role in attenuating the relationship between early intention and the subsequent use of hiding or defensive coping strategies. The indirect effect was negative and statistically significant (β = -.14, $p = .04$), suggesting that engagement in coping planning helped buffer against hiding and defensive coping responses. Nonetheless, the direct effect of intention on hiding and defensive coping remained positive and significant (β = .31, $p < .001$), possibly reflecting internal pressure. The model accounted for 20.1% of the variance in defensive coping, consistent with a medium effect size.

Intention (T1) → Coping Planning (T3) → Hiding/Defensive Coping (T3)

A similar pattern emerged with coping planning at T3, which partially mediated the relationship between intention at T1 and hiding/defensive coping strategies. The indirect effect was negative and statistically significant ($\beta = -.16$, $p = .035$), while the direct effect remained positive and significant ($\beta = .30$, $p < .001$). These results suggest higher levels of intention were associated with greater reliance on hiding and defensive coping strategies, potentially reflecting internal pressure. However, coping planning at T3 served as a suppressing mechanism, mitigating—but not fully eliminating—this effect. The model accounted for 17.5% of the variance, consistent with a medium effect size.

Table 43

Mediation Analyses for the Experimental Group

Predictor	Mediator	Dependent Variable	Indirect (β , *p*)	Direct (β , *p*)	Total (β , *p*)	R^2
Intention	**Action Control (T3)**	**UI Representations**	**-.14, *p* < .001**	**.34, *p* = .018**	**.20, *p* = .01**	**.20**
Intention	**Coping Planning (T3)**	**UI Representations**	**-.12, *p* = .012**	**.23, *p* < .001**	**.11, *p* = .02**	**.20**
Intention	**Coping Planning (T2)**	**Hiding/Defensive Coping**	**-.14, *p* = .042**	**.31, *p* < .001**	**.17, *p* = .02**	**.20**
Intention	**Coping Planning (T3)**	**Hiding/Defensive Coping**	**-.16, *p* = .035**	**.29, *p* < .001**	**.13, *p* = .02**	**.18**
Risk Perception	**Coping Planning (T2)**	**UI Severity**	**-.14, *p* = .010**	**.27, *p* < .001**	**.13, *p* = .02**	**.28**
Risk Perception	**Coping Planning (T3)**	**UI Severity**	**-.11, *p* = .043**	**.22, *p* = .010**	**.11, *p* = .02**	**.18**
Risk Perception	**Action Control (T2)**	**UI Severity**	**-.13, *p* = .027**	**.34, *p* < .001**	**.21, *p* = .01**	**.23**
Risk Perception	**Action Control (T3)**	**UI Severity**	**-.19, *p* = .010**	**.30, *p* < .001**	**.11, *p* = .02**	**.17**
Risk Perception	**Action Planning (T2)**	**UI Severity**	**-.19, *p* = .040**	**.38, *p* < .001**	**.19, *p* = .02**	**.24**
Risk Perception	**Action Planning (T2)**	**UI Representations**	**-.21, *p* = .042**	**.38, *p* < .001**	**.17, *p* = .02**	**.25**
Risk Perception	**Action Control (T2)**	**UI Representations**	**-.17, *p* = .030**	**.35, *p* < .001**	**.18, *p* = .02**	**.20**
Risk Perception	**Action Control (T3)**	**UI Representations**	**-.18, *p* = .010**	**.37, *p* < .001**	**.19, *p* = .02**	**.23**
Risk Perception	**Coping Planning (T3)**	**UI Representations**	**-.18, *p* < .001**	**.36, *p* < .001**	**.17, *p* = .02**	**.20**
Risk Perception	**Action Planning (T2)**	**Hiding/Defensive Coping**	**-.18, *p* = .040**	**.47, *p* < .001**	**.29, *p* = .01**	**.29**
Risk Perception	Coping Planning (T3)	UI Severity	-.08, *p* = .090	.28, *p* < .001	.20, *p* = .01	.24
Risk Perception	**Coping Planning (T2)**	**Hiding/Defensive Coping**	**-.14, *p* = .042**	**.31, *p* < .001**	**.17, *p* = .02**	**.20**
Risk Perception	Action Control (T2)	Hiding/Defensive Coping	-.07, *p* = .110	.25, *p* < .001	.18, *p* = .02	.20
Risk Perception	Action Control (T3)	Hiding/Defensive Coping	-.08, *p* = .130	.27, *p* < .001	.19, *p* = .02	.24
Intention	Action Control (T2)	Hiding/Defensive Coping	-.10, *p* = .060	.28, *p* < .001	.18, *p* < .001	.20
Intention	Action Control (T2)	UI Representations	-.12, *p* = .080	.24, *p* < .001	.12, *p* = .020	.21
Intention	Action Control (T2)	UI Severity	-.09, *p* = .090	.25, *p* < .001	.16, *p* = .010	.22
Intention	Action Planning (T2)	UI Severity	-.07, *p* = .130	.23, *p* < .001	.16, *p* = .010	.27
Intention	Coping Planning (T2)	UI Representations	-.06, *p* = .130	.24, *p* < .001	.18, *p* = .010	.23
Intention	Coping Planning (T2)	UI Severity	-.05, *p* = .110	.23, *p* < .001	.17, *p* = .020	.24
Intention	Action Control (T3)	Hiding/Defensive Coping	.08, *p* = .120	.06, *p* = .030	.14, *p* = .120	.17
Intention	Action Planning (T2)	Hiding/Defensive Coping	.05, *p* = .110	.09, *p* = .020	.14, *p* = .110	.17
Intention	Action Planning (T2)	UI Representations	.05, *p* = .190	.14, *p* = .020	.19, *p* = .190	.29

Intention	Action Planning (T3)	Hiding/Defensive Coping	.05, $p = .110$	.09, $p = .020$	.14, $p = .110$	.29
Intention	Action Planning (T3)	UI Representations	.09, $p = .150$	-.32, $p = .040$	-.23, $p = .150$	.27
Intention	Action Planning (T3)	UI Severity	-.06, $p = .090$	.25, $p < .001$	.19, $p = .010$	.20
Risk Perception	Action Control (T3)	UI Severity	-.18, $p = .010$	.37, $p < .001$	.19, $p = .010$	.17
Risk Perception	Coping Planning (T3)	Hiding/Defensive Coping	-.09, $p = .080$	.29, $p < .001$	.20, $p = .010$	.29
Risk Perception	Action Control (T2)	UI Severity	-.13, $p = .030$	.34, $p < .001$	.21, $p = .030$	.23
Risk Perception	Action Planning (T2)	UI Representations	-.09, $p = .090$	.32, $p < .001$	.23, $p = .010$	.28
Risk Perception	Action Planning (T3)	UI Representations	-.08, $p = .110$	.30, $p < .001$	.22, $p = .020$	.19
Risk Perception	Action Planning (T3)	UI Severity	-.07, $p = .120$	.28, $p < .001$	.21, $p = .010$	.17
Risk Perception	Coping Planning (T1)	UI Representations	-.07, $p = .120$	.25, $p < .001$	.17, $p = .010$	.21
Risk Perception	Coping Planning (T2)	UI Representations	-.07, $p = .120$	.24, $p < .001$	.17, $p = .020$	.20
Risk Perception	Coping Planning (T2)	UI Severity	-.09, $p = .100$	.27, $p < .001$	.18, $p = .020$	.28
Risk Perception	Coping Planning (T3)	UI Representations	-.08, $p = .100$	.28, $p < .001$	.20, $p = .010$	.23
Risk Perception	Coping Planning (T3)	UI Severity	-.08, $p = .090$	.28, $p < .001$	.20, $p = .010$	.24

Note. β = standardised regression coefficient; R^2 = Explained variance; UI = Urinary Incontinence. Variables presented in bold text indicate a statistically indirect effect.

Discussion

This randomised controlled trial provides robust evidence for the effectiveness of the PURI-PRO eHealth intervention in improving clinical, psychological/cognitive/emotional and behavioural outcomes among women with UI. At the follow-up, the intervention yielded significant positive effects across all primary outcomes: UI Severity, UI Representations, and Hiding and Defensive Coping Strategies. These effects were supported by statistically significant standardised regression coefficients (β) and characterised by large effect sizes, indicating robust associations with the intervention. Additionally, multiple secondary outcomes also showed significant improvements. Specifically, Social Isolation, UI Impact on Quality of Life, Action Planning, Coping Planning, Intention, Risk Perception, and Action Control all demonstrated significant medium to large group-level effects (β), with substantial explanatory power in each corresponding model.

Furthermore, mediation analyses revealed that action planning, coping planning, and action control had statistically significant indirect effects, partially mediating the influence of risk perception and behavioural intention on the primary outcomes: symptom severity, defensive/hiding coping strategies, and UI-related illness representations. In addition to their mediating role, these volitional constructs acted as suppressors, mitigating the emotional and cognitive impact of heightened risk awareness and intention.

RCT Effectiveness

As highlighted in the results, the PURI-PRO intervention generated meaningful improvements across both clinical (symptom severity) and psychosocial outcomes (illness representations and coping strategies).

The relatively higher proportion of variance explained in symptom severity may reflect the impact of the physiotherapeutic core components, which included PFME, effective toileting techniques, and urge/stress suppression strategies—all grounded in International Guidelines for Conservative UI Management (Dumoulin et al., 2016; Nambiar et al., 2018). These strategies were delivered through an eHealth format that systematically incorporated volitional variables from the HAPA model (e.g., action planning and coping planning) alongside evidence-based behaviour change techniques (BCTs) such as goal setting, action planning, and self-monitoring, thereby operationalising key constructs outlined in HAPA (Schwarzer, 2008).

The model predicting changes in illness representations showed stronger explanatory power than the one predicting defensive or hiding-based coping, indicating that psychoeducational content and cognitive restructuring techniques were effective in modifying participants' beliefs about the nature, controllability, and consequences of UI. From a Common-Sense Model of Self-Regulation (Leventhal et al., 1984) perspective, these cognitive shifts are crucial, as they influence emotional responses and coping behaviour. Reflective exercises and structured informational content likely supported participants in reframing UI as treatable clinical condition (Alewijnse et al., 2002). While avoidance-based coping strategies showed significant reductions, the comparatively lower R^2 implies that such behaviours—often emotionally ingrained—may require more time or deeper therapeutic engagement to change meaningfully.

These findings reinforce the value of integrating cognitive restructuring into health behaviour interventions and support the theoretical relevance of both the Common-Sense Model—particularly in targeting emotional and cognitive representations of UI (Alewijnse et al., 2002) —and CBT-based approaches (Garley & Unwin, 2006; Steenstrup et al., 2022) in UI-focused programs. The combination of these frameworks with traditional conservative strategies (e.g., PFME, lifestyle modifications, suppression techniques) appears essential for producing change across both symptom-based and psychosocial outcomes, offering a comprehensive and person-centred model for UI management.

Consistent with this, the secondary outcome models also demonstrated encouraging results, particularly in domains related to volitional self-regulation, motivational engagement, and social functioning. Higher variance explained in constructs such as action control, coping planning, and intention suggests that the HAPA-informed BCTs were successful in strengthening participants' ability to translate motivation into sustained action. Similarly, the substantial variance in perceived isolation may reflect the intervention's ability to validate UI experiences, reduce stigma, and foster a more inclusive narrative, which helped mitigate concealment behaviours and enhance re-engagement in social contexts.

Together, these findings underscore the effectiveness of integrating theory-driven constructs with active UI behaviour change strategies (Chester et al., 2023) to influence not only health behaviours, but also the cognitive and social dimensions of adjustment in UI. They also reinforce the crucial role of health psychologists within multidisciplinary teams delivering

conservative UI treatment—an approach increasingly emphasised in recent literature for its contribution to patient-centred care, behavioural adherence, and improvements in psychosocial outcomes (Davis et al., 2003; Ferrari et al., 2023). The PURI-PRO intervention exemplifies how bio-psycho-socially informed and evidence-based programs can enhance the reach and depth of UI care in middle-aged women, particularly when delivered in accessible and scalable formats such as eHealth.

Non-Significant Outcomes

Despite positive effects on multiple behavioural and psychosocial outcomes, no significant changes were observed in global QoL, self-esteem, or self-efficacy (across action, maintenance, and recovery domains). While global quality of life and self-esteem are frequently conceptualised as more stable**,** dispositional constructs—influenced by long-standing experiences and therefore less amenable to short-term interventions—self-efficacy is not a trait-like characteristic. Rather, it is a dynamic, context- and task-specific belief system that reflects individuals' perceived capabilities to perform particular behaviours under defined conditions (Bandura, 1997; Bandura & Adams, 1977).

In behaviour change models such as HAPA, self-efficacy plays a pivotal role across both the motivational and volitional phases, influencing risk perception, goal setting, planning, and the maintenance of behavioural engagement (Schwarzer, 2008). The development of self-efficacy is grounded in four primary sources: mastery experiences, vicarious learning (i.e., modelling), verbal persuasion, and the regulation of emotional and physiological states (Bandura, 1997; Bandura & Adams, 1977). Although the PURI-PRO intervention demonstrated effectiveness in strengthening task-specific volitional processes—such as action planning and action control—its fully digital format may have constrained opportunities for real-time feedback, peer modelling, and guided reinforcement. These mechanisms may be fundamental to strengthening self-efficacy beliefs (Bandura, 1997; Bandura & Adams, 1977).

Therefore, future iterations of similar digital health interventions should prioritise embedding more self-efficacy-enhancing strategies to achieve broader and more sustained psychosocial outcomes. Recommended enhancements include: (1) remote supervision by physiotherapists via video calls, (2) structured training programs with asynchronous supervision (e.g., through weekly email feedback), (3) virtual coaching or clinician-delivered feedback, (4)

video modelling by peers or healthcare professionals, (5) adaptive performance tracking with real-time feedback, and (6) interactive platforms for personalised goal setting; (7) weekly self-evaluated PFME; (8) digital training diaries to be submitted to a urotherapist or physiotherapist (Asklund et al., 2017; Huang et al., 2020; Papanikolaou et al., 2023; Sacomori et al., 2015; Sjöström et al., 2013; Wadensten et al., 2021). Such features have the potential to more effectively engage the mechanisms of mastery experience and vicarious learning—thereby enhancing self-efficacy and promoting improvements in both behavioural adherence and perceived control over urinary incontinence (Sacomori et al., 2015).

Moreover, the measurement tools employed assessed general self-efficacy regarding several strategies, rather than specific beliefs related to behaviours like pelvic floor muscle exercise (PFME), urge and stress suppression techniques, and other bladder control strategies employed in separate. As Bandura (2006) emphasised, self-efficacy should be evaluated in relation to clearly defined behavioural tasks to yield valid and sensitive estimates of change. This measurement mismatch, combined with a relatively short follow-up period, may have contributed to the absence of observable change, as self-efficacy often consolidates gradually through repeated behavioural success and reinforcement.

Interestingly, this dissociation between observed behavioural improvements and unchanged self-efficacy mirrors findings from prior research. For example, Sacomori et al. (2015) found that while motivational supports such as reminders and testimonials facilitated adherence to PFME, self-efficacy did not significantly predict behaviour change—suggesting that performance-based mechanisms may override belief-based predictors in certain contexts.

In the present study, volitional constructs such as coping planning and action control, which are more cognitively structured and closely tied to execution, may have been more proximal drivers of change than generalised efficacy beliefs. Taken together, these findings suggest that behavioural adherence can occur through structured behavioural guidance and motivational scaffolding, even in the absence of measurable gains in self-efficacy. From a theoretical standpoint, this supports the value of integrating concrete action strategies in the early phases of self-management.

Although no significant improvements were observed in global quality of life as measured by the WHOQOL-BREF, it is important to note that condition-specific quality of life, assessed using the King's Health Questionnaire (KHQ), did improve significantly. This distinction

reinforces the idea that the WHOQOL-BREF, being a broad and multidimensional instrument, captures general aspects of life—many of which were not directly addressed by the intervention (e.g., financial stability, environmental factors). In contrast, the KHQ focuses on UI-related limitations and their impact on daily functioning, making it more sensitive to the types of changes targeted by PURI-PRO. These findings suggest that while general QoL remained stable, the intervention meaningfully improved participants' perceived QoL in areas directly affected by UI, supporting its clinical and psychosocial relevance.

Furthermore, no significant changes were observed in self-esteem, which may be explained by both the stable nature of the construct and the limited focus on it within the intervention. Self-esteem, as conceptualised by Rosenberg (1965), reflects a global and relatively enduring evaluation of self-worth, often shaped by long-term experiences and interpersonal dynamics. It is typically less sensitive to short-term or narrowly focused interventions, especially when not a primary target of the program. Moreover, in the PURI-PRO intervention, only one session (see Intervention Program in Empirical Study 9) briefly addressed themes related to self-esteem.

Overall, these findings highlight both the strengths and boundaries of self-guided digital interventions, emphasising their value in delivering scalable, accessible UI care, while also pointing to areas where psychological support structures may need to be bolstered to fully realise long-term psychosocial gains.

Mediators of Behaviour Change in the PURI-PRO Trial

An important methodological feature of the present study is that the mechanisms of change—i.e., the volitional constructs hypothesised to mediate intervention effects—were also operationalised as secondary outcomes. This dual-role design is consistent with contemporary approaches to behavioural intervention science (e.g., Liang et al., 2022), as it permits the simultaneous examination of intervention efficacy and theoretical process evaluation.

Although both the HAPA and the CSM informed the intervention's design, the HAPA framework was selected for the mediation analyses due to its emphasis on intentional and prospective self-regulatory mechanisms. Constructs such as action planning, coping planning, and action control align directly with the intervention's volitional focus and its use of evidence-based behaviour change techniques (e.g., goal setting). In contrast, CSM constructs—while essential for shaping illness representations and addressing emotional responses to UI—are not as directly

aligned with the proximal, action-oriented processes that were targeted during intervention delivery.

Our findings offer novel insights into how volitional mechanisms influenced self-reported UI symptoms, UI representations and hiding and defensive coping strategies. Specifically, mediation models revealed that several HAPA-based constructs mediated the relationship between early-stage motivational variables (e.g., risk perception, intention) and follow-up outcomes, including UI symptom severity**,** illness representations, and defensive/hiding coping strategies**.** Among these, coping planning emerged as the most consistent and reliable mediator, underscoring its importance in helping participants translate intentions into sustained behaviour, especially in the context of self-managed conservative care.

Direct Effects

Regarding direct effects, risk perception emerged as a direct and cognitively salient factor influencing women's appraisal and reporting of UI symptoms. Specifically, heightened perceptions of health risk correlated with amplified symptom reporting. This likely reflects increased internal salience and an intensified attentional focus on bodily sensations, a phenomenon consistent with cognitive-behavioural frameworks. Within these models, symptom hypervigilance, particularly when accompanied by health-related worry, is known to exacerbate the subjective intensity of symptoms and contribute to psychological distress, even in the absence of objective clinical worsening (Wermes et al., 2018).

Furthermore, risk perception significantly shaped the emotional and cognitive representations of UI, profoundly influencing how women interpreted its broader meaning and personal implications. Many participants initially normalised and under-recognised UI, perceiving it as an expected consequence of normative life transitions, such as childbirth, menopause, or ageing—a belief consistently reported across the literature (e.g., Waetjen et al., 2018). While this normalisation may temporarily mitigate perceived psychological threat, it frequently delays crucial symptom recognition and fosters maladaptive coping responses, including concealment and defensive self-management strategies (Shaw et al., 2019; Wu et al., 2015).

In UI interventions, cognitive reframing typically occurs when individuals are informed—often based on international clinical guidelines—that UI constitutes a treatable medical condition rather than a natural occurrence (Garley & Unwin, 2006; Steenstrup et al., 2022). While this

reframing is clinically imperative for promoting help-seeking behaviour and facilitating therapeutic engagement, it can concurrently elicit adverse emotional responses, including fear, anxiety, or general discomfort. This is particularly true for women who previously viewed UI as benign or an inevitable aspect of ageing. This pivotal shift from a normative experience to a clinical diagnosis can elevate psychological burden, leading to more threatening UI representations and activating defensive coping strategies, such as dysfunctional hiding and a reluctance to disclose symptoms.

These findings resonate with existing literature suggesting that risk perception does not universally facilitate health-promoting behaviour. A recent meta-analysis (Priolo et al., 2025) of 67 studies, for instance, revealed that while a majority (55.22%) demonstrated a positive association between perceived risk and safety behaviours, a notable minority (nearly 6%) reported negative correlations, and over 38% found no or mixed effects. Maladaptive responses, such as fatalism, habituation, or psychological disengagement, often surface when individuals perceive themselves as overwhelmed in their efforts toward change. Empirical evidence supports this, with studies showing perceived disease risk failing to predict long-term changes in physical activity, BMI, or glucose regulation (Vornanen et al., 2021), or seat belt use (Wolfe et al., 2020). Similarly, Ferrer et al. (2013) found risk perception insufficient to predict healthy eating or exercise without high affective engagement (e.g., cancer-related worry). Crucially, affective dimensions of risk perception (e.g., worry, emotional salience) appear more influential than deliberative components (e.g., statistical likelihood), which have demonstrated limited predictive value for behaviour change (Magnan et al., 2021; Slovic et al., 2005). Therefore, although cognitive reframing effectively enhances symptom awareness and health engagement, it must be meticulously complemented by psychosocial strategies that foster volitional planning. This approach is essential to prevent unintended increases in defensive coping and self-stigmatisation.

Direct Effect of Intention: A Potential for Distress

Despite its established role as a motivational driver within frameworks like the HAPA (Sutton, 2008), higher intention was consistently associated with more negative outcomes. This included more dysfunctional illness representations and a greater reliance on defensive coping strategies, particularly when intentions were not complemented by volitional variables like action control or coping planning. Forming an intention, especially when recognising UI as a clinical condition that might worsen without treatment, can generate significant emotional distress.

Individuals may feel overwhelmed or anxious if they perceive a lack of skills, resources, or support to enact the intended change. This gap between intention and perceived capacity can lead to psychological discomfort, self-doubt, and ultimately disengagement from health-promoting behaviours.

Indirect Effects: The Buffering Role of Volitional Variables

Our data indicate that risk perception, when unaccompanied by volitional scaffolding, can also lead to maladaptive outcomes. Crucially, volitional constructs such as coping planning and action control counteract these effects, mitigating the emotional and attentional consequences of heightened risk awareness. These results underscore that risk perception must be accompanied by volitional strategies—such as coping planning and action control—to support sustained behaviour change. The observed negative indirect effects suggest that, without these volitional suppressors, heightened risk awareness may lead to emotional overload, avoidance, or disengagement (Turner et al., 2006).

Furthermore, according to our results, intention itself is not also inherently adaptive, particularly in the context of UI. Its impact heavily depends on whether it is supported by concrete, volitional mechanisms. Coping planning and action control not only facilitate behaviour enactment but also counterbalance the psychological burden associated with intention. This aligns with HAPA's emphasis on the crucial transition from motivational to volitional phases for effective behaviour change.

One must also note that coping planning was the most frequent mediator and risk perception was much more frequent predictor variable than intention in mediation pathways. Furthermore, the finding that several T3-based mediators failed to yield significant indirect effects suggests that volitional strategies initiated late in the intervention may be insufficient to counteract emotional and cognitive processes that have already consolidated since T1. When early perceptions of risk or elevated intention are not adequately regulated throughout the intervention, their psychological impact may become internalised over time, manifesting as heightened symptom severity, maladaptive illness representations, or defensive coping strategies. In such cases, volitional regulation introduced only at the final stage may lack the strength or duration needed to reverse entrenched cognitive-affective trajectories. These results underscore the importance of timing in the delivery of volitional self-regulation strategies, highlighting the potential advantage of

introducing such mechanisms during the mid-intervention phase—when psychological processes remain more malleable and amenable to change.

Practical Implications for UI Interventions

To maximise effectiveness, interventions for UI must extend beyond mere risk communication and place greater emphasis on developing volitional competencies. Embedding self-regulatory strategies can help reframe perceived vulnerability as a catalyst for active engagement rather than a source of emotional burden. Thus, over-reliance on fear-based messaging or excessive emphasis on risk may inadvertently trigger avoidance, concealment, or psychological disengagement, particularly without tools enabling individuals to act on their intentions. Conversely, structured volitional supports can reshape dysfunctional illness representations, foster sustained self-management, promote a stronger sense of control and translating intention into meaningful, sustained engagement with health behaviour change.

Programs aiming to increase intention without equipping women with implementation planning tools may paradoxically heighten distress, reinforce maladaptive beliefs, and undermine long-term adherence.

It is crucial to underscore that, despite these nuanced findings on specific mediation pathways, the intervention demonstrated overall efficacy, with significant improvements observed across all primary outcomes. The current analysis focuses on these particular mediation pathways, which represent one component of a broader, successful intervention framework.

Hence, the mediation models indicated that women reporting higher levels of risk perception and behavioural intention—targets of the intervention at Time 1—were more likely to exhibit threatening illness representations, hiding/defensive coping strategies, and increased symptom amplification at follow-up. Importantly, this does not suggest the intervention was harmful or exacerbated participants' conditions since women undergoing the intervention improved in all main outcomes and some secondary ones. Rather, it highlights specific psychological mediators and the importance of carefully tailoring certain intervention components, particularly those related to risk perception and behavioural intention. When inadequately regulated, these elements can inadvertently provoke fear responses, emotional disengagement, or hypervigilance, all of which could potentially undermine therapeutic outcomes.

Therefore, risk perception and intention should not be conceptualised as the sole primary

drivers of change in behavioural interventions, nor should interventions culminate with an excessive focus on perceived risk. Risk perception and Intention, if over emphasised or mismanaged, they may contribute to elevated anxiety or reduced engagement (Turner et al., 2006). These findings offer a valuable opportunity to refine intervention delivery by balancing cognitive activation with emotional regulation.

Furthermore, these mediation pathways do not capture the breadth of positive impacts documented elsewhere in the study, such as reductions in social isolation and improvements in urinary incontinence–related quality of life (QoL-UI). Accordingly, the intervention was effective, but specific cognitive mechanisms may require recalibration to mitigate unintended emotional repercussions.

These results align with and expand upon prior research demonstrating the mediating role of action planning, coping planning and action control in the intention–behaviour relationship across various health domains (e.g., Chiu et al., 2011; Godinho et al., 2014; Koring et al., 2012; Lee et al., 2025), extending this evidence base to the under-researched context of female UI.

Strengths

A notable strength of the present randomised controlled trial is the complete retention of participants throughout the follow-up period, despite some attrition occurring prior to follow-up initiation. This high level of retention substantially enhances the internal validity and reliability of the longitudinal outcomes, minimising the risk of attrition bias. Such methodological rigour strengthens confidence in the causal inferences drawn from the intervention effects.

Moreover, this study advances theoretical understanding by illustrating the potential detrimental role of heightened risk perception and strong behavioural intentions when these are not supported by effective self-regulation strategies—thereby underscoring the necessity of embedding volitional components within behaviour change models. A notable strength of the present trial is its explicit grounding in the volitional phase of the HAPA model, through the integration of both action planning and coping planning. These components served as protective mechanisms against possible adverse effects of elevated risk perception and intention, such as anxiety, frustration, or disengagement, by equipping participants with concrete strategies for goal pursuit and recovery from setbacks. This integration not only enhances the intervention's capacity to convert risk-related motivation into adaptive and sustainable self-management behaviours but also demonstrates the

practical value of operationalising volitional constructs in the design of behavioural health interventions. Importantly, the intervention was designed not only to address the physiological symptoms of UI through evidence-based physiotherapeutic strategies, but also to target illness representations and maladaptive coping mechanisms, such as hiding and defensive avoidance. This dual focus reflects a short-term and efficacious multidisciplinary intervention, with theoretically informed approach to UI management, aligned with socio-cognitive theory and contemporary models of chronic illness adaptation.

Limitations and Directions for Future Research

This study presents several limitations that warrant careful consideration. Regarding sample characteristics and generalisability, the sample was recruited using a snowball sampling method, which may constrain the generalisability of findings. Participants were Portuguese middle-aged women with internet access—characteristics that limit representativeness across socio-economic, cultural, and technological access groups. Broader sampling frameworks are needed to extend conclusions to the wider population of women with UI.

Regarding data analysis limitations, although only the third mediation strategy yielded significant and estimable results, it is important to acknowledge that the two initial analytic strategies would have offered important theoretical and methodological advantages had they been feasible. First, a latent growth-based multiple mediation model was initially planned to examine whether changes in motivational and volitional constructs over time mediated the effects of the intervention on the primary outcomes. This approach would have enabled the modelling of intraindividual change trajectories, offering valuable insight into the temporal dynamics of behaviour change, consistent with the HAPA. Second, a series of simpler longitudinal mediation models using manifest variables were considered to test whether early shifts in HAPA constructs (e.g., intention at T1) explained outcomes at follow-up (T3). Despite being analytically less complex, this strategy also respects temporal sequencing and supports causal inference.

However, both approaches proved analytically unfeasible due to sample size constraints and limited degrees of freedom. While a third strategy—using phase-specific, cross-time mediation models—was successfully implemented, the inability to test the initial models limited a more comprehensive understanding of dynamic change mechanisms. Future studies with larger samples will be essential to fully test these theoretically robust pathways.

Moreover, the reduced sample size led to model near-saturation in several cases. This was reflected in minimal degrees of freedom and near-perfect fit indices (e.g., CFI, TLI), which—while suggesting excellent model fit—limit parsimony and constrain the interpretability of structural findings. Such near-saturated models require cautious theoretical inference and replication with larger samples.

Furthermore, the study's longitudinal design enabled the examination of temporal and mediational relationships; however, the three-month follow-up period may have been insufficient to capture the long-term sustainability of behavioural change. While this timeframe allows for assessment of initial post-intervention effects, it limits conclusions about maintenance, relapse, or enduring public health impact. Future trials should include extended follow-up intervals (e.g., 6–12 months) to examine long-term effectiveness and behavioural consolidation.

Regarding measurement and self-report bias, the study relied exclusively on self-reported measures, which may be vulnerable to reporting biases, particularly in domains such as symptom severity. To enhance accuracy and behavioural monitoring, future studies should incorporate objective assessment tools of PFME strength and endurance.

Concerning the procedure, the absence of an independent evaluator to oversee intervention fidelity—such as an external psychologist—constitutes a methodological limitation. No data were collected on platform usability, feasibility, user satisfaction, or perceived barriers, which may have offered valuable insights into the real-world acceptability and scalability of the PURI-PRO eHealth intervention. Notably, no pilot testing was conducted prior to the randomised controlled trial, and no formal feasibility analysis was planned. These gaps should be addressed in subsequent trials.

Due to the behavioural and group-based nature of the PURI-PRO intervention, participants were necessarily aware of their treatment allocation. This lack of blinding may have introduced expectancy effects, a well-recognised limitation in psychological and behavioural trials. International guidelines (CONSORT: Schulz et al., 2010; SPIRIT: Chan et al., 2013) recommend transparent reporting of such methodological constraints, and results should therefore be interpreted with this potential bias in mind. Additionally, the inclusion of PIKQ-UI as a measured variable may provide valuable mechanistic insights—provided the construct demonstrates robust psychometric properties.

Importantly, although the intervention produced statistically significant improvements in

behavioural and psychosocial outcomes, no significant changes were observed in action, maintenance, or recovery self-efficacy. This may reflect the stable nature of efficacy beliefs over short durations, particularly in the absence of experiential learning mechanisms such as more guided practice or real-time feedback, as mentioned above. Consistent with social cognitive theory, mastery experiences are a key determinant of self-efficacy development. The digital delivery format, while scalable, may have constrained opportunities for such experiences.

Ethically, participants who withdrew during recruitment should have been sent a follow-up email encouraging them to seek appropriate treatment and providing relevant referral information. Such procedures align with ethical standards for digital health research and should be embedded in future trials.

The partial mediation effects observed suggest that the intervention impacted key psychological processes, but that additional mechanisms—such as affect regulation, social support, or structural barriers—may have concurrently shaped outcomes. To enhance both intervention efficacy and theoretical explanatory power, future research should consider integrating personalised components, such as brief individualised sessions or digital tailoring, to address specific emotional, cognitive, and contextual barriers. This may be particularly relevant for behaviours involving stigma or internalised distress, where individualised emotional support could serve as a critical complement to theory-based volitional strategies.

Regarding the measurement of group cohesion, since a single item was used to assess perceived group cohesion, the measure should be interpreted as an exploratory indicator rather than a comprehensive assessment of group dynamics and does not capture the full complexity of group cohesion. Future research should consider incorporating validated, multidimensional instruments to assess core constructs such as trust, interpersonal support, emotional connectedness, and shared goals. Additionally, it would be valuable to examine the moderating role of group processes on key intervention outcomes, including participant engagement, adherence, and perceived efficacy. Such inquiry could elucidate the mechanisms through which relational dynamics shape the effectiveness of group-based digital interventions, particularly in health domains involving stigma and self-management, such as UI.

Future studies should systematically monitor key behavioural and lifestyle factors associated with the self-management of UI. This includes the weekly tracking of bladder irritants, dietary fibre

intake, hydration routines, and the use of personalised reminders to encourage optimal fluid consumption. Regular monitoring would allow for a more accurate understanding of adherence patterns and their relationship with symptom progression. Importantly, the implementation and consistent application of pelvic floor strategies, such as the Knack technique should also be monitored regularly. Assessing both frequency and technique quality would help determine its contribution to symptom reduction and long-term behavioural maintenance. In addition, the monitoring of urge suppression strategies (e.g., stopping momentarily and proceeding calmly to the toilet) would offer valuable insights into coping mechanisms and their efficacy in real-life contexts.

Conclusion

Conservative UI management must move beyond physiotherapy and adopt a comprehensive biopsychosocial approach, integrating physical, socio-cognitive (e.g., illness beliefs, coping planning), and psychosocial factors (e.g., stigma, emotional distress). This includes the application of behaviour change techniques and theoretical frameworks that address both illness representations and self-regulation.

In this context, the CSM is essential for understanding how women with UI interpret and emotionally respond to UI. These illness representations directly influence motivation, coping, and help-seeking behaviour. On the other hand, the HAPA offers a structured, socio-cognitive framework bridging the gap between intention and sustained behaviour change. Together, these psychological processes are pivotal for optimising treatment engagement and sustaining behavioural change in middle-aged women with UI. Thus, a paradigm shift toward psychologically informed, integrated care is urgently needed to improve outcomes and enhance quality of life for those affected by this condition.

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Chapter 5

General Discussion

Urinary incontinence (UI) is increasingly recognised as a significant global health challenge, given its considerable psychosocial and economic burden and the persistently low rates of treatment-seeking (Abrams et al., 2003, 2015; EAU Guidelines Office, 2023; Manso et al., 2023; Million et al., 2021; Minassian et al., 2003; Molinuevo & Batista-Miranda, 2012; Porto et al., 2024; Subak et al., 2006). Against this backdrop, the central relevance of this thesis lies in the urgent need to strengthen continence care, a priority repeatedly underscored in recent evidence and consistently endorsed by leading international scientific societies on UI (e.g., EAU Guidelines Office, 2023). A review of the existing evidence further revealed several critical research gaps that directly shaped the development of the PURI-PRO's phases and respective objectives.

In the sections that follow, the objectives of each stage of the research, as introduced in Chapter 1, are revisited in turn. For each phase, the specific research gap is identified and its significance established, accompanied by a synthesis of the main findings. The discussion integrates these results, with a section examining their contributions to continence care. Limitations inherent to the empirical studies are then acknowledged, and directions for future research are outlined. The chapter concludes with reflections on the overall contributions of the PURI-PRO, considering its implications for clinical practice, health psychology research, and public health policy.

Summary of Findings

This programme of research advanced across three phases—qualitative exploration, quantitative modelling, and experimental intervention—tracing a progression from description to explanation to intervention in understanding how midlife women adapt to UI.

Phase 1 – Illness Representations and Self-Regulation in Women Living with Urinary Incontinence

In Phase 1, the objective was to obtain an in-depth understanding of the subjective illness experiences of women with UI, adopting a mixed-methods design informed by the Common-Sense Model of Self-Regulation (CSM). Beyond the description of symptoms, the aim was to explore how women appraise and represent their condition, the emotional responses that these representations evoke, and the behavioural strategies they mobilise, particularly hiding and defensive self-management strategies. Directed Content Analysis revealed that 64.7% of women perceived UI as manageable and 68% considered it controllable, although many attributed it to

non-modifiable causes such as vaginal delivery (41.2%) or heredity (32.4%). UI was generally perceived as chronic only in the absence of treatment. Emotional representations were dominated by fear of detection (82.3%), sadness (80%), insecurity (67%), and anger (64.7%). Coping centred largely on absorbent products (82.4%) and pelvic floor exercises (64.7%), but only 10% of participants practised exercises consistently. Despite these limitations, most women perceived their coping strategies as effective across cognitive (67.6%), emotional (76.5%), and behavioural (61.8%) domains.

The Descending Hierarchical Classification reinforced the centrality of cognitive processing, as negative cognitive processing accounted for 20.3% of the variance, while identity and causal attributions accounted for 19.8%. Emotional coping, however, was not statistically significant (p = .112). The Multiple Correspondence Analysis confirmed this pattern: only control and timeline beliefs were moderately associated with coping, while emotional representations appeared independent within the Cartesian plane. Textual analysis highlighted the prominence of cognitive classes in structuring the UI experience and further indicated that emotional coping processes were marginal. Taken together, these findings provided only partial support for the CSM. The model's assumption of parallel processing of cognitive and emotional representations leading to coping and appraisal was only weakly corroborated. Behavioural Coping emerged as relatively autonomous, shaped more strongly by situational appraisals than by illness beliefs, while emotions were not structurally bound to either cognition or behaviour. This suggested that the CSM should be refined to conceptualise behavioural coping as an explanatory domain in its own right, operating alongside cognitive and emotional representations, in the context of UI and with women who share similar characteristics to those participating in this study.

The Portuguese version of the Brief Illness Perception Questionnaire was validated in Phase 1. Factor analyses supported a stable factorial solution with adequate internal consistency; however, items concerning personal control, treatment control, and comprehensibility loaded weakly, limiting the measure's capacity to capture the granularity of CSM pathways in the UI context. At baseline, ICIQ-UI SF scores showed that 38.5% of women were categorised as having slight symptoms, 40.6% as moderate, 15.2% as severe, and 5.8% as very severe, indicating that most participants experienced symptoms in the slight-to-moderate range. Participants reported high perceived chronicity but low personal control, treatment control, and comprehensibility.

Phase 2 – Coping Strategies and the Functional and Psychosocial Impact of Urinary Incontinence

Phase 2 moved from description to explanation by modelling the mechanisms linking severity, beliefs, and coping to psychosocial outcomes. The King's Health Questionnaire Symptom Severity Subscale (KHQ-SSS) was validated as a concise yet comprehensive measure of symptom burden, capturing domains such as nocturia and recurrent infections that are often overlooked in other instruments. The UI Self-Management Coping Strategies Inventory (UI-SMCSI) was developed and validated, confirming the predominance of hiding (concealment, pad use) and defensive coping (anticipatory behaviours such as toilet mapping, fluid restriction, and pre-emptive voiding).

Quantitative modelling clarified the role of coping and beliefs in determining psychosocial outcomes. Analyses showed that coping significantly buffered the impact of severity on sexual function, while illness beliefs did not. For Quality of Life, severity exerted a substantial direct effect, but maladaptive beliefs (low perceived control, normalisation of UI as untreatable) and maladaptive coping (concealment, avoidance) each independently lowered QoL. The Urinary Incontinence Social Isolation Questionnaire (UI-SIQ) was developed and validated, enabling the first direct measurement of isolation in this context. Using this measure, it was shown that there was no direct association between severity and social isolation; instead, the effect was fully mediated by hiding and defensive coping strategies. Coping thus emerged as the proximal mechanism through which severity translated into social isolation.

Occupational outcomes were also examined, revealing that severity significantly impaired workplace productivity, particularly when combined with sleep disruption and low socio-economic status. The model explained a meaningful proportion of variance, but also made clear that contextual determinants absent from the CSM—such as fatigue, occupational environment, and literacy—exert decisive influence on functional outcomes.

Phase 3 – Translating Health Psychology into Practice: Development and Evaluation of a Theory-Based eHealth Intervention Informed by the Health Action Process Approach and the Common-Sense Model of Self-Regulation

Phase 3 translated these concepts into practice through the design and testing of PURI-PRO, an eHealth, multidisciplinary intervention that integrates cognitive-behavioural therapy with

conservative physiotherapy, explicitly grounded in the CSM and the Health Action Process Approach (HAPA). The intervention was tested in a randomised controlled trial. At baseline, 54% of women in the intervention arm were classified as having severe or very severe symptoms; by post-intervention, 49% had improved to moderate, and 34% to slight, and nearly half (46%) remained slight at follow-up. The control group showed minimal change, with 95% still in the moderate-to-severe range. Conditional latent growth models confirmed significant reductions in symptom severity, improvements in illness representations, and a decrease in reliance on hiding and defensive coping, all with large effect sizes. Specifically, UI severity explained 28% of the variance in symptom trajectory; illness representations accounted for 25% of the variance in change; and reliance on hiding and defensive coping explained 17% of the variance in change, indicating a medium effect size.

Secondary outcomes also improved, including social isolation, condition-specific QoL, coping planning, action control, and motivational engagement. However, global QoL, self-esteem, and self-efficacy did not change significantly.

Mediation analyses informed by HAPA showed that coping planning, action planning, and action control mediated the effects of risk perception and intention on outcomes, with coping planning emerging as the strongest mediator. However, direct pathways indicated that heightened risk perception increased symptom salience and threatening beliefs, while strong intention without volitional scaffolding predicted distress and defensive coping. Thus, PURI-PRO provided only partial support for HAPA: volitional processes functioned as predicted, but motivational constructs had paradoxical effects, underscoring the importance of sequencing volitional supports early to prevent maladaptive trajectories.

General Discussion and Significant Implications

This programme of research advanced across three phases—qualitative exploration, quantitative modelling, and experimental intervention—marking a systematic progression from description, to explanation, to intervention in advancing understanding of how midlife women experience UI, construct illness representations, engage with treatment, mobilise coping strategies, and adapt psychosocially to its consequences.

Phase 1 yielded detailed qualitative insights into women's experiences of living with UI, providing only partial support for the Common-Sense Model of Self-Regulation (CSM). Contrary

to what the model predicts (McAndrew et al., 2008), no direct relationship was found between illness representations and coping strategies. Only control and timeline dimensions from Illness Representations showed moderate associations with behavioural coping, and even these were filtered through appraisal processes, suggesting that coping was shaped more strongly by situational appraisals than by core illness representations. Emotion was highly salient but not structurally bound to cognitive or behavioural domains, pointing to a pragmatic bias towards logistical management of symptoms at the expense of emotional processing. Hiding and defensive self-management coping strategies—concealment of leakage, avoidance of social and intimate contexts - and minimisation of symptoms—functioned as pragmatic, short-term responses that preserved daily functioning but reinforced stigma, curtailed sexual function (SF), and entrenched psychosocial burden.

These findings, which reveal only partial support for the CSM and highlight the primacy of appraisal processes, are congruent with a growing body of literature advocating for a more dynamic interpretation of the model (e.g., Hagger & Orbell, 2022). The observation that coping strategies were more strongly shaped by situational appraisals than by core illness representations resonates with earlier research in different health contexts. For instance, a prospective study by Bishop et al. (2010) on adherence to complementary and alternative medicine (CAM) similarly concluded that the CSM's predictive power was significantly enhanced by operationalising the 'appraisal' element. They found that 'treatment appraisals,' such as a patient's positive perception of their therapist, were independent predictors of adherence, suggesting that the immediate, evaluative experience of treatment can override or mediate more stable illness beliefs. The theoretical convergence of these two studies—despite their distinct contexts and timelines—underscores a critical limitation in the conventional CSM framework.

A key implication of our findings is therefore the need to refine the Common-Sense Model by moving beyond its strict cognition-emotion dichotomy, a conceptual constraint also highlighted by Postolica et al. (2017). We propose that behavioural coping, fundamentally shaped by appraisal processes, should be conceptualised as an a priori dimension that operates alongside, rather than downstream of, cognitive and emotional domains. Failure to do so risks maintaining a binary framework that obscures the complex, enacted behaviours central to managing stressors such as UI (Molinuevo & Batista-Miranda, 2012).

Another important finding concerns the contrasting illness representations that emerged from the qualitative interviews versus those assessed in the Illness Perception Questionnaire (IPQ) validation study. In the qualitative interviews, women typically perceived urinary incontinence (UI) as controllable and non-chronic when treated—a representation that diverges from some prior reports in similarly symptomatic groups (Bush et al., 2001; Shaw et al., 2019) but aligns with evidence linking stronger perceived control to lower chronicity beliefs (Hagger & Orbell, 2003). Causal attributions most often referenced childbirth and heredity; however, these were framed as vulnerabilities rather than inevitabilities, underscoring the role of cognitive appraisal in shaping openness to intervention and readiness to seek care. Emotional representations revealed a substantial affective burden—particularly fear of public detection—along with sadness, insecurity, and stigma, consistent with previous syntheses (John et al., 2010; Toye & Barker, 2020). This pattern exposes a paradox: women frequently appraised themselves as capable of managing symptoms, yet continued to conceal the condition, perpetuating psychological, relational, sexual, social, and occupational costs.

By contrast, the quantitative validation study suggested a different constellation of illness cognitions within the Common-Sense Model of Self-Regulation (CSM). Beyond psychometric properties, the data indicated strong beliefs in chronicity (timeline) coupled with low perceived control (personal and treatment) and weak illness coherence (understanding). Many women conceptualised UI as a long-term condition yet reported little confidence in treatment efficacy or their own capacity to manage symptoms; illness understanding was similarly limited.

This configuration revealed a paradoxical dissociation: UI was widely perceived as persistent and enduring, yet simultaneously minimised in terms of consequences and emotional representation. Such minimisation suggests that the condition is often normalised and cognitively downplayed relative to everyday disruption, a pattern previously noted in the literature (e.g., Toye & Barker, 2020).

Taken together, these patterns align with what may be termed “minimally disruptive chronicity”—a representation in which UI is cognitively acknowledged as persistent but regarded as emotionally neutral, thereby attenuating motivational pathways for help-seeking or behaviour change (Hägglund & Ahlström, 2003; John et al., 2010). Within this framework, low perceived

consequences, weak control beliefs, and poor coherence converge to sustain the status quo and reduce urgency for reappraisal or coping adaptation.

Such normalisation represents a key barrier to care (Hägglund et al., 2003). When UI is not categorised as a clinical condition or as modifiable, treatment becomes cognitively irrelevant, and self-regulatory processes that would otherwise support coping or help-seeking are disengaged, which is congruent with previous research in CMS that states that beliefs about illness and treatment play a central role in shaping health behaviour and adherence (Bishop et al., 2010). Importantly, these patterns should not be interpreted as helplessness but rather as a form of adaptive normalisation, in which symptoms are reframed as an expected or "taken-for-granted" feature of ageing. Consistent with prior research, women often defer help-seeking due to stigma, concealment, and beliefs about inevitability (Shaw et al., 2001).

This perspective also helps reconcile the discrepancy between quantitative and qualitative findings regarding UI representations. Our results suggested low perceived consequences and emotional representation, whereas interviews elicited narratives of fear, shame, insecurity, and stigma, alongside limited knowledge of UI, as concluded by Davidson et al. (2019). The absence of a coherent illness schema likely reduces salience in structured questionnaires, resulting in attenuated responses despite a substantial hidden burden. Responding to a standardised questionnaire—where low salience and normalisation guide item appraisal—differs from interacting with a health professional, where UI is explicitly reframed as a clinical condition and emotional exploration is facilitated. In such contexts, women feel more able to articulate the stigma, fear, and frustration that remain concealed in survey measures (Manso et al., 2023). Moreover, the presence of a health professional may function as a reappraisal cue, legitimising UI as a clinical concern and creating opportunities for de-normalisation that can activate motivational pathways toward coping reconfiguration and professional care (e.g., Ezzy, 2010).

In the context of the CSM, this setup likely maintains the current situation by reducing the perceived necessity to alter coping mechanisms or seek medical assistance. Previous research has shown that many women do not label urinary incontinence as a clinical condition, and this lack of illness attribution contributes to low levels of treatment-seeking. Studies have consistently demonstrated that failure to frame UI as a medical problem delays help-seeking and perpetuates concealment (Koch, 2006; Shaw, 2001; Waetjen et al., 2018).

Given the generally mild to moderate symptom severity in the sample, women may invest limited cognitive effort in evaluating control or understanding, as the perceived need for reflection or behaviour change is attenuated. Prior work indicates that higher symptom severity is the strongest predictor of help-seeking (Kinchen et al., 2003); these representations may become more salient only when symptoms intensify or existing strategies fail to maintain daily functioning, with QoL impact being one factor that also promotes help-seeking.

In short, what appears as low perceived impact in quantitative questionnaires may reflect attenuated salience, poor coherence, and adaptive normalisation. In contrast, clinical or interview settings that activate reappraisal processes reveal the hidden emotional and social burden of UI (Ezzy, 2010). As argued by Adamson et al. (2004), embedding standardised questionnaire items within qualitative interviews provides an analytic bridge between the structured measurement of illness cognitions and the interpretive exploration of meaning-making. By inviting elaboration on ostensibly closed responses, mixed-format interviews expose contradictions, ambiguities, and contextualised beliefs that remain obscured in survey data alone. In the case of UI, this integrated questionnaire–interview approach can illuminate the paradox of strong chronicity beliefs coexisting with low reported impact: while standardised scales may suggest minimal disruption, qualitative elaboration around the same items often uncovers affective experiences of shame, fear, and insecurity. In this way, mixed-format interviews offer a pragmatic methodological pathway for capturing the coexistence of normalisation, low salience, and concealed burden within women's illness representations of UI.

Phase 2 advanced from description to explanation by testing mechanistic models with validated PROMs. Pragmatic self-management routines, including pad use, fluid regulation, and precautionary voiding, moderated the link between symptom severity and Sexual Function (FSFI). Women adopting these strategies buffered the disruptive impact of severity and preserved sexual function in the short term. Again, this pattern is partially congruent with the CSM: the model anticipates that cognitive representations may buffer outcomes, but in practice, it was behavioural strategies—not beliefs—that played the moderating role. This points to the need to extend the CSM to recognise that coping behaviours themselves can function as moderators, filtering the impact of symptoms on specific life domains, being congruent with findings Phase 1, which point to the need to extend the model and make it more dynamic.

In contrast, Quality of Life (QoL), as measured by KHQ-QoL and WHOQOL-BREF, was directly predicted by symptom severity, as concluded by previous research (Bartoli et al., 2010; Krhut et al., 2018; Riss & Kargl, 2011), with neither coping nor beliefs moderating this relationship. However, maladaptive illness beliefs—such as low perceived control and normalisation of UI as untreatable—and maladaptive coping in the form of hiding and defensive strategies each exerted direct negative effects on QoL. This pattern suggests a psychosocial burden in which symptom severity disrupts functioning while maladaptive cognitions and coping compound the decline in well-being. Collectively, these findings provided only partial support for the CSM, indicating that illness beliefs influenced outcomes indirectly by shaping behavioural repertoires, while coping strategies played their expected mediating role. Importantly, coping also demonstrated a moderating effect, though only in relation to sexual functioning, suggesting that its role may extend beyond mediation in specific domains.

Previous studies in health psychology have also highlighted the moderating role of coping. For example, Yip et al. (2008) found that coping strategies moderated the relationship between role overload and burnout, and Ngamake et al. (2016) reported that internalisation moderated the association between discrimination and symptoms of depression and anxiety. While these studies address different health contexts, they align with our findings by demonstrating that coping can modify the strength of associations between stressors and psychosocial outcomes. Moreover, Hagger et al. (2020) have argued for a more dynamic and reciprocal formulation of the CSM, noting that the traditional linear pathway from illness representations to coping and outcomes may be overly simplistic. In this sense, our results suggest that refining the model to acknowledge coping not only as a mediator but also, in some contexts, as a moderator may provide a more nuanced understanding of psychosocial outcomes in UI.

Mediation analyses further highlighted this dynamic: hiding and defensive coping strategies (UI-SMCSI) mediated the association between UI Symptom Severity (KHQ-SSS) and Social Isolation. Symptom severity did not directly predict isolation; instead, its effects were channelled through reliance on hiding and defensive coping strategies, confirming coping as the proximal mechanism translating symptom burden into SI.

Crucially, this interpretation is consistent with prior research situating coping as a central mediator of psychosocial outcomes in UI. Xu et al. (2016) demonstrated that avoidant and palliative

coping styles were strongly associated with poorer QoL and accounted for nearly 73% of the adverse impact of symptom severity, highlighting the explanatory power of coping mechanisms. Similarly, Chin et al. (2017) found, in a longitudinal analysis of LUTS, that fluctuations in mental health mediated the relationship between changes in symptom severity and condition-specific HRQoL, providing evidence of a psychological pathway through which somatic symptoms exert an everyday functional impact. Lin and Liao (2025) reported that social isolation and sleep quality mediated the association between incontinence and subjective well-being, underscoring the broader relevance of psychosocial mediators. According to a recent meta-analysis, Hinch and Sirois (2024) found that, in the context of rheumatic arthritis, maladaptive—but not adaptive—coping strategies were significantly associated with greater psychological distress.

Taken together, these studies reinforce the value of mediation and moderation models for clarifying how symptom burden is translated into psychosocial outcomes, positioning coping and related processes as central, modifiable mechanisms that represent concrete targets for intervention to change health behaviours (Kiviniemi et al., 2018).

Our findings also confirmed that UI severity significantly undermines women's work productivity, consistent with previous but still limited evidence (e.g., Ciconelli et al., 2006; Lin et al., 2018), particularly when compounded by sleep disruption and lower educational attainment. This result is congruent with broader literature identifying low education as a risk factor for the onset and persistence of UI (e.g., Manso et al., 2023), underscoring the importance of strengthening health literacy initiatives in this domain to improve prevention, self-management, and treatment uptake.

While the CSM highlights illness representations and coping as the primary determinants of psychosocial outcomes (McAndrew et al., 2008), our findings indicate that contextual and functional variables, which fall outside the model's core dimensions, exert a substantial influence on occupational functioning. In particular, factors such as educational attainment, health literacy, and workplace constraints interact with symptom severity to magnify impairment and constrain coping options. This partial discrepancy points to the need for an extension of the CSM that incorporates resource-related and contextual determinants, recognising that adaptation to chronic conditions is not driven solely by cognitive and behavioural processes but also by the material, social, and functional environments within which individuals manage their illness.

Phase 3 assessed the effectiveness of the PURI-PRO eHealth program, which integrates cognitive–behavioural therapy with conservative physiotherapy. The intervention produced significant improvements in UI symptom severity. It elicited positive shifts in illness representations, providing robust experimental evidence that structured eHealth can successfully translate physiotherapeutic and psychological content into measurable clinical and psychosocial outcomes. These improvements in symptom severity are consistent with prior eHealth interventions targeting UI (e.g., Firet et al., 2019b; Goode et al., 2020; Wadensten et al., 2021), but PURI-PRO extends this evidence base by demonstrating broader psychosocial benefits.

A defining feature of PURI-PRO is its multidimensional scope. Unlike earlier eHealth programs, it incorporates synchronous multidisciplinary professional guidance (Ferrari et al., 2023), peer support, and a wider range of intervention targets. Beyond PFME, the program directly addressed illness representations, coping strategies, lifestyle modification, and healthy toileting behaviours. These components are essential for sustaining behavioural change and may account for the intervention's broader psychosocial impact relative to prior UI programs.

Model testing further highlighted that program effects were more pronounced for illness beliefs than for coping strategies. Psychoeducation and cognitive restructuring were particularly effective in recalibrating threatening representations of UI—a process that, within the CSM, cascades from cognition into emotion and behaviour. Structured information and reflective exercises facilitated the reappraisal of UI as a manageable clinical condition, reducing stigma and distress. In contrast, coping strategies such as concealment and defensive routines were more resistant to change, reflecting their entrenchment in stigma and habitual practice. This resistance suggests that maladaptive coping may require more prolonged exposure, repeated rehearsal, or more intensive therapeutic scaffolding to shift meaningfully.

Nevertheless, several secondary outcomes improved, including volitional self-regulation (coping planning, action control), motivational engagement, and social functioning. These results provide strong support for embedding socio-cognitive interventions within continence care, aligning with the conclusions of Alewijnse et al. (2002), who emphasised that cognitive and social determinants are pivotal for adherence and long-term outcomes—particularly when operationalised through CSM-informed approaches.

By contrast, no significant changes were observed in global QoL, self-esteem, or self-efficacy. Evidence from clinical psychology and health behaviour research supports this interpretation: self-esteem typically requires prolonged, intensive therapeutic engagement to change, with structured interventions necessitating long-term strategies to consolidate the change (Bhattacharya et al., 2023). Similarly, QoL is strongly influenced by broad and distal determinants—including life roles, relationships, and socio-economic stability—that are unlikely to change in the context of short-term, condition-specific interventions (Mahamoud et al., 2013). In parallel, self-efficacy may not have shifted because, although the PURI-PRO intervention enhanced task-specific volitional processes (e.g., planning, action control), its fully digital delivery limited opportunities for mastery experiences, peer modelling, and real-time feedback—mechanisms fundamental to strengthening efficacy beliefs (Bandura & Adams, 1977). Within the field of UI, the available literature for comparative analysis remains limited, as most eHealth and face-to-face RCTs continue to concentrate on proximal clinical and functional outcomes—such as symptom reduction, pelvic floor muscle performance, and continence-related functioning (Firet et al., 2019a; Funada et al., 2020; Sjöström et al., 2023; Wadensten et al., 2021)—while psychosocial domains like QoL, self-esteem, and self-efficacy remain comparatively underexplored.

Interpreted through the lens of the Health Action Process Approach (HAPA), the findings reveal partial congruence. On the one hand, coping planning and action control emerged as central volitional processes, mediating improvements in symptom severity, illness representations, and coping, and buffering maladaptive trajectories. This finding supports HAPA's proposition that volitional mechanisms bridge the intention–behaviour gap. In doing so, the present study extends prior evidence of the mediating roles of action planning, coping planning, and action control in diverse health domains (e.g., Chiu et al., 2011; Godinho et al., 2014; Koring et al., 2012; Lee et al., 2025) to the under-researched context of female UI.

On the other hand, motivational constructs such as risk perception and intention produced paradoxical effects. Elevated risk perception was associated with heightened distress and hypervigilance, while strong intention, when not scaffolded by planning and action control, amplified defensive coping. This pattern diverges from HAPA's assumption that motivation uniformly facilitates adaptation (Sutton, 2008) and resonates with broader literature demonstrating that risk perception does not consistently promote health behaviour. For instance, a recent meta-analysis of 67 studies (Priolo et al., 2025) reported that while 55.2% of studies found positive

associations between perceived risk and safety behaviours, 6% found negative associations and 38% reported null or mixed findings. Maladaptive responses such as fatalism, habituation, and psychological disengagement often emerge when individuals feel overwhelmed by perceived risk. Empirical evidence corroborates this interpretation, showing that risk perception alone fails to predict long-term behavioural change in physical activity, BMI, glucose regulation (Vornanen et al., 2021), or seat belt use (Wolfe et al., 2020). Likewise, Ferrer et al. (2013) demonstrated that risk perception was insufficient to predict healthy eating and exercise without high affective engagement (e.g., cancer-related worry). Critically, affective components of risk perception (e.g., emotional salience, worry) appear to exert greater predictive power than deliberative, statistical estimates, which show limited behavioural impact (Magnan et al., 2021; Slovic et al., 2005).

Taken together, the Phase 3 findings provide strong empirical support for the effectiveness of a multidimensional eHealth intervention for UI. They also advance theoretical understanding by demonstrating that while proximal cognitive and volitional processes are highly malleable and responsive to structured intervention, global psychosocial constructs such as QoL and self-esteem remain resistant to short-term change. Furthermore, they highlight the complex and sometimes paradoxical role of motivational constructs, underscoring the need to embed risk perception and intention within volitional scaffolds if they are to contribute adaptively to behaviour change.

Significant Implications for Continence Care

Since theoretical implications have been addressed, we decided to separate clinical findings in order to emphasise PURI-PRO's possible translational contribution to continence care. The integration of findings across the three phases demonstrates that continence care requires a comprehensive, interdisciplinary approach. Clinical assessment must move beyond symptom severity to systematically capture defensive coping strategies such as concealment, avoidance, and minimisation, which undermine social and sexual participation and perpetuate stigma. Interventions should therefore prioritise reducing defensive coping, with cognitive–behavioural and psychoeducational components directed at replacing concealment and avoidance with adaptive strategies such as disclosure, problem-solving, and engagement with conservative treatments (Borello-France et al., 2013; Funada et al., 2020; Reisch et al., 2021; Wadensten et al., 2021).

Psychoeducation and cognitive restructuring can recalibrate threatening illness beliefs (Dowd & Dowd, 2006), but their effectiveness is maximised when integrated with behavioural

practice (Funada et al., 2020; Garley & Unwin, 2006; Reisch et al., 2021). Given that QoL in UI is jointly shaped by symptom severity, maladaptive beliefs, and coping, care must address all three dimensions simultaneously (Alewijnse et al., 2003). Moreover, motivational constructs alone proved insufficient and even counterproductive: elevated risk perception and strong intention, without volitional scaffolding, exacerbated distress and defensive coping (Turner et al., 2006). Thus, risk communication should be paired with coping planning and action control to ensure intention translates into effective self-management. Moreover, sleep quality and occupational context, coupled with tailored advice on workplace accommodations, such as scheduled voiding, flexible breaks, and access to restrooms. Embedding CBT-informed techniques to reduce avoidance and stigma alongside physiotherapy-led conservative care can help women shift from concealment-only management towards adaptive strategies. At the organisational level, employer education and stigma-reduction initiatives are essential to normalise continence support. Together, these measures underscore that productivity loss is not inevitable but a modifiable outcome that can be mitigated through coordinated, multidisciplinary continence care and occupational health strategies.

Ultimately, continence care should be delivered through an interdisciplinary model. Physiotherapy and medical treatment remain essential but are insufficient to produce psychosocial improvements in isolation. The integration of psychological interventions to reshape beliefs, behavioural training to reduce defensive coping, and social components to counteract stigma (Southall et al., 2017) is required. Such a model moves continence care beyond symptom reduction toward re-engagement in occupational, social, and intimate life, addressing both the clinical and psychosocial consequences of UI in midlife women.

PURI-PRO Limitations and Future Directions

Sampling and Generalizability

Across phases, non-probability digital recruitment methods (through social media and snowball sampling) constrain external validity (Rothwell, 2005). Samples likely overrepresented women who are digitally literate, employed in roles compatible with online participation, and relatively resourced, while underrepresenting those with severe UI, lower health literacy, limited internet access, or more complex comorbidity profiles. This selection pattern may downwardly bias psychosocial burden among underrepresented groups and upwardly bias adherence-related constructs. Future studies should diversify recruitment sources (primary care lists, community

health centres, employer partnerships, registries) and, where feasible, apply post-stratification weights or propensity scores to approximate population parameters (Austin, 2011) Importantly, this limitation underscores that coping and health literacy—as contextual resources—require stronger integration into explanatory models, since their absence in the CSM limits its capacity to account for differential occupational and psychosocial outcomes.

Measurement Approach and Method Bias

UI severity and diagnosis were self-reported without clinical corroboration (e.g., 24-hour pad test), which elevated the risks of recall bias, social desirability, and misclassification. Nevertheless, the use of gold-standard questionnaires ensured inclusive classification across UI subtypes and severity levels, and this approach is consistent with epidemiological research practice, as extensive population-based studies (e.g., Hannestad et al., 2000) frequently rely on brief questionnaire items or self-administered survey measures to evaluate UI. Future research should incorporate convergent clinical indicators (e.g., three-day bladder diaries, pad-weight tests, cough stress tests, validated PFME performance indices) to triangulate symptom burden and refine severity estimates. The exclusive reliance on self-report for coping and psychosocial outcomes similarly underscores the need for multimethod assessment (e.g., behavioural logs; ecological momentary assessment of urges, leakage, concealment, and activity restriction). Embedding objective PFME indices—ideally via app-based logs of practice frequency and quality, and where available, brief biofeedback or manometry indicators—would further support a robust linkage between adherence and outcomes. Such multimethod data streams will enable more credible inferences about how adherence to PFME and bladder strategies translates into symptom reduction and functional gains.

To support clinical decision-making, measures must be demonstrably responsive to change and anchored to minimally important differences (MCIDs) (e.g., Nyström et al., 2024). Accordingly, the KHQ-SSS and UI-SIQ should be examined for longitudinal responsiveness using both anchor-based methods (patient or clinician global ratings of change) and distribution-based indices (e.g., one-half standard deviation, standard error of measurement), supplemented by ROC analyses to identify clinically meaningful cut points (Doebler & Holling, 2015). Invariance and differential item functioning (DIF) should be tested across education, employment status, menopausal/parity status, and neurodivergence to ensure that score differences reflect actual

differences rather than measurement bias. Establishing these properties will convert the measures into practical tools for stepped care decisions and fair comparisons across groups.

Digital Information-Seeking and Online Health Resources

Although help-seeking behaviours were controlled for, the study did not account for participants' use of online information sources. Given the increasing reliance on the internet for health-related information, this represents a potential limitation, as it may significantly shape women's illness representations and coping responses. Future studies should investigate how women with UI access, evaluate, and integrate online information into their understanding of the illness and self-management strategies. Particular attention should be given to the credibility of the sources consulted, as reliance on trustworthy versus non-trustworthy information may differentially affect psychological adaptation, perceived severity, and QoL. This has direct theoretical implications: illness beliefs in the CSM may be less stable than assumed, as digital health resources of varying quality continuously recalibrate them.

Temporal Context: COVID-19 Pandemic

Data collection for several studies coincided with the COVID-19 pandemic, introducing time-bound confounding that warrants caution in interpretation. Lockdowns were associated with worsening UI symptoms in women (Barbosa da Silva et al., 2022), which could inflate severity estimates relative to non-pandemic periods. Plausible mechanisms include persistent cough and dyspnea, which elevate intra-abdominal pressure and induce pelvic-floor fatigue, as well as reduced physical activity, weight changes, and stress-related sleep disruptions—all of which are relevant to urgency and nocturia. The digital, stay-at-home context may also have shaped selection (with greater availability among those with flexible schedules/remote work) and behavioural baselines (e.g., altered restroom access and hydration routines), potentially biasing associations with QoL, SI, SF, and WP. Recommendations include: (a) recording COVID infection status, respiratory symptom load (cough frequency), and changes in activity/weight/sleep; (b) including policy stringency/time of survey indicators; (c) conducting sensitivity analyses stratified by lockdown phase and infection history; and (d) replicating models in post-pandemic cohorts to establish temporal stability of estimates, as recommended by Barbosa da Silva et al. (2022).

Theoretical Scope of Illness Representation Measures (Empirical Study 1)

BRIEF IPQ scores were modelled using the original five CSM dimensions, omitting personal vs. treatment control differentiation and illness coherence. These omissions reduce granularity for testing CSM-consistent pathways (e.g., whether perceived personal controllability vs. treatment controllability differentially predicts adaptive coping, or whether coherence buffers threat appraisals). Future work should (a) separate personal from treatment control, (b) add illness coherence, and (c) model cognitive, emotional, and behavioural appraisals as primary constructs, with hypothesised paths Control/Timeline → Appraisal → Behaviour rather than assuming direct emotion → Behaviour effects. This refinement is crucial to address the partial congruence with the CSM with women with UI observed in Phases 1 and 2.

Item-Level Psychometrics (Empirical Study 2)

Three Brief IPQ items—personal control (Item 3), treatment control (Item 4), and illness comprehensibility (Item 7)—showed weak or negative loadings, with Item 4 performing particularly poorly. Similar item-level fragility has appeared in other clinical contexts, suggesting context-sensitive semantics for control and coherence. We recommend cognitive interviewing and item refining (e.g., clarifying locus of control, anchoring "treatment" to conservative—not surgical—care) prior to confirmatory testing.

Scale Responsiveness and Clinical Utility (Empirical Study 3)

For the KHQ-SSS refinement/validation, cross-sectional data precluded responsiveness and MCID estimation—both essential for monitoring therapeutic change. Future designs should pair the KHQ-SSS with anchor measures (patient global impression of change) and distributional methods to derive MCIDs, test longitudinal invariance, and embed the subscale in multimodal diagnostic frameworks to support risk stratification and treatment tailoring.

Coping Taxonomy and Functional Nuance (Empirical Studies 4 and 7)

The UI-SMCSI captured Defensive (preventive/avoidant) and Hiding (concealment) strategies, but the field needs contextual qualifiers. Strategies such as fluid regulation, toilet mapping, and pad use are not inherently maladaptive; their adaptiveness depends on their function and timing (i.e., whether they serve as adjuncts during treatment or delay care). We recommend considering the following factors: indexing setting (home vs. public), purpose (safety vs. rehabilitation), duration, and opportunity costs (e.g., displacement of PFME). Additionally, we suggest measuring readiness for help-seeking, stigma, and knowledge of options to adjudicate

adaptiveness and guide stepped care. Future studies could further refine the categorisation of coping strategies by subdividing Defensive Coping into two distinct subtypes: anticipatory/pragmatic defensive coping (preventive behaviours aimed at minimising the likelihood of leakage) and avoidant defensive coping (restrictive behaviours involving the avoidance of social or environmental situations perceived as risky). This refinement directly addresses the Phase 2 finding that coping can act both as mediator and moderator, expanding the explanatory power of the CSM.

Sexuality and Relationship Metrics (Empirical Study 6)

SF was primarily captured with the FSFI-6; however, relationship satisfaction and menopausal symptoms (e.g., vaginal dryness) were not concurrently measured. Given their confounding potential, future studies should add relationship/sexual satisfaction, menopause-specific metrics, and UI-specific sexual cognitions (anticipatory shame, partner rejection fears) (e.g., Su et al., 2015). For the UI-SIQ, validity evidence benefited from internal structure and convergent relations; however, content and response process validity were not examined. Future work should incorporate cognitive interviews and think-aloud protocols to ensure item clarity, cultural fit, and accessibility (including for women with neurodivergent profiles, such as those with ADHD/autistic traits), and then evaluate test–retest reliability and responsiveness in both clinical and community samples.

WP Modelling (Empirical Study 8)

The structural model explained moderate variance in WP; unmeasured occupational determinants (restroom access, shift work, travel, time pressure, hydration policies) likely carry explanatory weight. Future studies should incorporate job demands/resources and test subtype-specific pathways (e.g., urgency-driven unpredictability → presenteeism/absenteeism) and estimate minimal important differences for WP to inform clinical/occupational decision making. Future research should test these pathways longitudinally to clarify causal mechanisms linking severity, sleep disruption, coping, and productivity. Incorporating job demand and job resource variables—such as autonomy, schedule predictability, and physical workload—will provide a more nuanced account of occupational moderators. Subtype-specific analyses are also warranted, as urgency and mixed UI may exert stronger effects on presenteeism and absenteeism due to unpredictability and stigma. Clinical trials should evaluate whether improving sleep and reducing

urgency through conservative treatments yields measurable productivity gains and should establish minimally important differences for WP outcomes to guide occupational and clinical decision-making. This aligns with Phase 2's demonstration that productivity loss is not inevitable but a modifiable outcome, and highlights the need to extend CSM-based models to include contextual determinants.

Design and Modelling Constraints (Empirical Studies 2–9)

Cross-sectional designs limit causal inference. Several SEMs were nearly saturated (df ~ 0–3), producing a superficially excellent fit but limited parsimony. Planned latent-growth multiple mediation and early-shift longitudinal mediation were underpowered; consequently, we implemented phase-specific, cross-time models. Future trials should increase sample sizes to enable growth curve mediation and time-varying effects and extend follow-up to 6–12 months to evaluate maintenance/relapse.

Intervention Delivery and Mechanisms (Empirical Study 9)

In the RCT, there was no independent fidelity monitoring, and no feasibility/usability metrics were collected—both essential for implementation science. Despite significant gains in primary and several secondary outcomes, self-efficacy did not change, likely reflecting the absence of mastery and modelling opportunities (Bandura & Adams, 1977) typical of face-to-face care. Future eHealth iterations should incorporate guided practice (e.g., video-supervised PFME), structured asynchronous feedback, peer/clinician modelling, adaptive progress dashboards, and relapse-recovery planning, and measure these processes to test mechanistic hypotheses a priori (e.g., Sacomori et al., 2015). Self-efficacy was assessed at a global level, focusing on the maintenance of overall UI management strategies (e.g., PFME, lifestyle changes), rather than through task-specific measures. This methodological choice may have limited the sensitivity of the assessment, as general self-efficacy may fail to capture more fine-grained variations in confidence to perform particular techniques such as PFME, the knack technique, or urge suppression strategies.

Where group processes are relevant, validated multi-item cohesion scales should replace single-item proxies, and the impact of group dynamics on moderation should be examined. The PURI-PRO intervention prioritised symptom reduction, illness belief change, and coping; SF was not directly targeted. Future iterations should consider adding sexuality-specific psychoeducation and belief change, given the well-documented sexual sequelae of UI and the moderating role of

maladaptive sexual beliefs (Chu et al., 2015; Shaw, 2002). This links back to the partial support for HAPA: motivational constructs alone proved insufficient, and future programmes must more explicitly scaffold volitional mechanisms and domain-specific beliefs to achieve sustained gains.

Although help-seeking behaviour was controlled for in this programme of research, online information-seeking was not investigated. This represents an important direction for future studies, as health information seeking is a key self-regulatory process that can shape illness representations, appraisals of control, and coping choices, consistent with predictions of the CSM. Exploring what information women access, the perceived credibility of those sources, and how they navigate online health content would clarify whether their representations are being reinforced by evidence-based guidance or distorted by non-validated, potentially stigmatising messages. Prior work using a CSM framework has shown that illness perceptions and distress significantly predict online information seeking, underscoring its role as an adaptive (or maladaptive) coping strategy (Oh & Song, 2017). Such insights would inform both the refinement of digital interventions and the development of public health strategies aimed at supporting accurate appraisal, reducing stigma, and promoting timely engagement with effective care (Oh & Song, 2017).

Ethical and Procedural Considerations

Participants who discontinued during recruitment were not proactively provided with referrals or resources—a fixable oversight in digital trials. Future protocols should incorporate standardised recontact/referral procedures, as well as document uptake.

Conclusion

Clinically, the findings underscore the value of psychological assessment in complementing medical evaluation by surfacing internal barriers such as shame, stigma, defensive and hiding coping strategies, and dysfunctional beliefs. At the service-delivery level, embedding psychologists within multidisciplinary teams (MDTs) enhances outcomes by aligning symptom control with psychosocial functioning and by directly targeting coping patterns that translate severity into disability. Emerging digital health solutions extend this integration, offering scalable, stigma-reducing platforms that preserve fidelity to evidence-based principles of behaviour change while addressing women's needs for flexibility, anonymity, and accessibility. Moreover, although not examined at the population level in this study, the findings suggest a potential central role for health psychology in shaping public messaging, influencing health policy, and developing stepped-care

pathways that prioritise equity, accessibility, and responsiveness. As part of multidisciplinary healthcare teams, psychologists are well-positioned to make significant contributions to the design and development of outreach and evidence-based interventions that counteract stigma, challenge resignation, and reduce the prolonged delays that currently characterise care-seeking for UI, thereby promoting behaviour change and long-term adherence to treatment.

Taken together, PURI-PRO advances a replicable, evidence-informed blueprint for psychologically integrated continence care. By embedding health psychology within continence services, PURI-PRO demonstrates how theoretically grounded and digitally scalable approaches can reduce UI symptom severity, recalibrate threatening illness representations, and disrupt harmful normalisations that perpetuate resignation and delay. It further illustrates how coping planning and action control, when scaffolded early, can sustain behaviour change and protect against the maladaptive trajectories identified in this research. Anchored in accessibility and patient-centredness, PURI-PRO provides a structured framework for aligning symptom management with psychosocial care, thereby enhancing participation, well-being, and dignity for women living with UI.

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Chapter 6

Appendices

Appendix A. Ethical Approval from the Ethical Committee for Research at Ispa – Instituto Universitário

Comissão de Ética de Investigação
ISPA - Instituto Universitário de Ciências Psicológicas, Sociais e da Vida
Rua Jardim do Tabaco, 34,
1149-041 Lisboa
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D/022/11/2019

COMISSÃO DE ÉTICA

PARECER

Título do projeto: "Puri-Pro (Portuguese Urinary Incontinence Project) - Qualidade de vida e Função Sexual em Mulheres com Incontinência Urinária".
Investigador responsável: Marta Monteiro da Silva Gonçalves Porto / Filipa Fernandes Pimenta (Orientadora)
Instituição/Curso: ISPA- Instituto Universitário

O protocolo do estudo apresenta objetivos relevantes. Foram descritos adequadamente os métodos e procedimentos a adotar e estes respeitam os direitos humanos e as recomendações constantes nos documentos nacionais e internacionais relativos à ética em investigação.

Assim, o parecer da Comissão de Ética do ISPA-Instituto Universitário é favorável à realização do estudo em epígrafe.

Qualquer alteração futura aos procedimentos descritos do estudo que possam colidir com os critérios éticos de investigação dos regulamentos acima referidos, exige uma reapresentação do pedido de apreciação a esta Comissão.

Comissão Ética do ISPA – Instituto Universitário

(Assinatura do Presidente da CE)

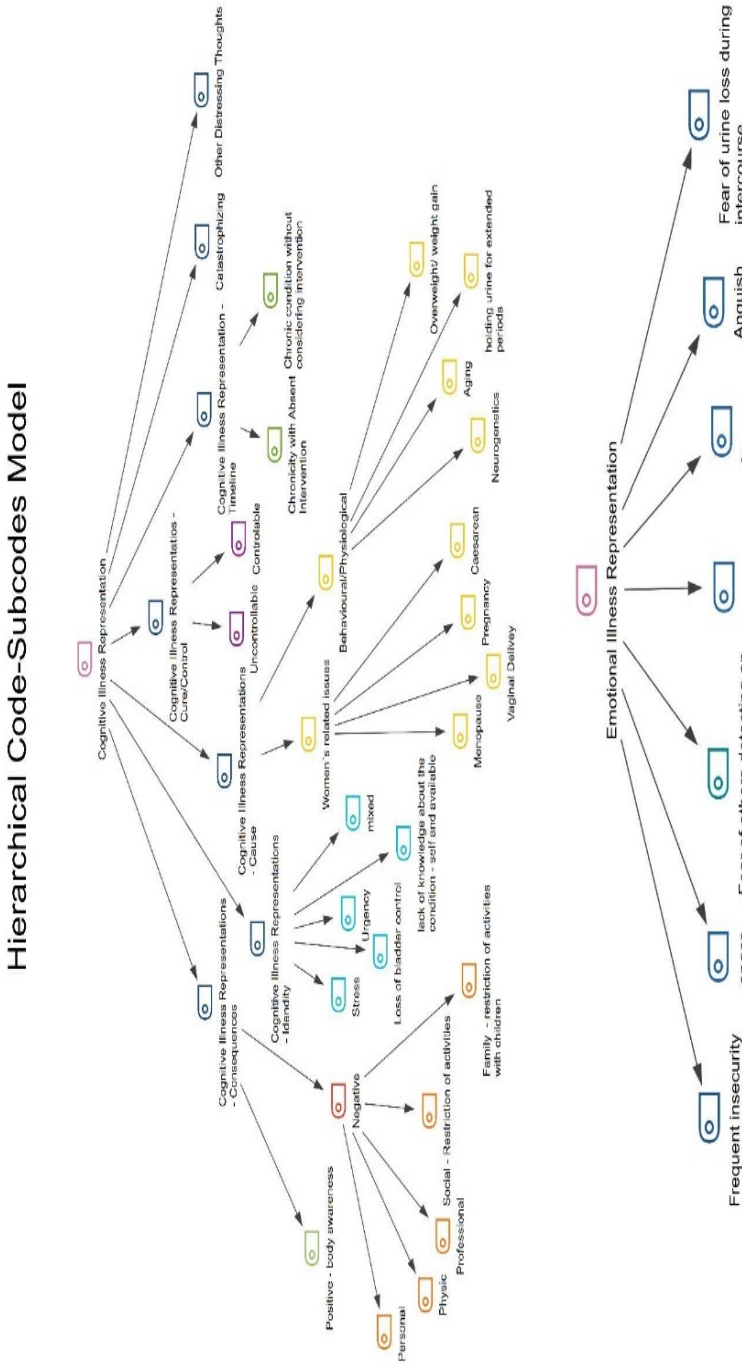
Lisboa, 19 de Novembro de 2019.

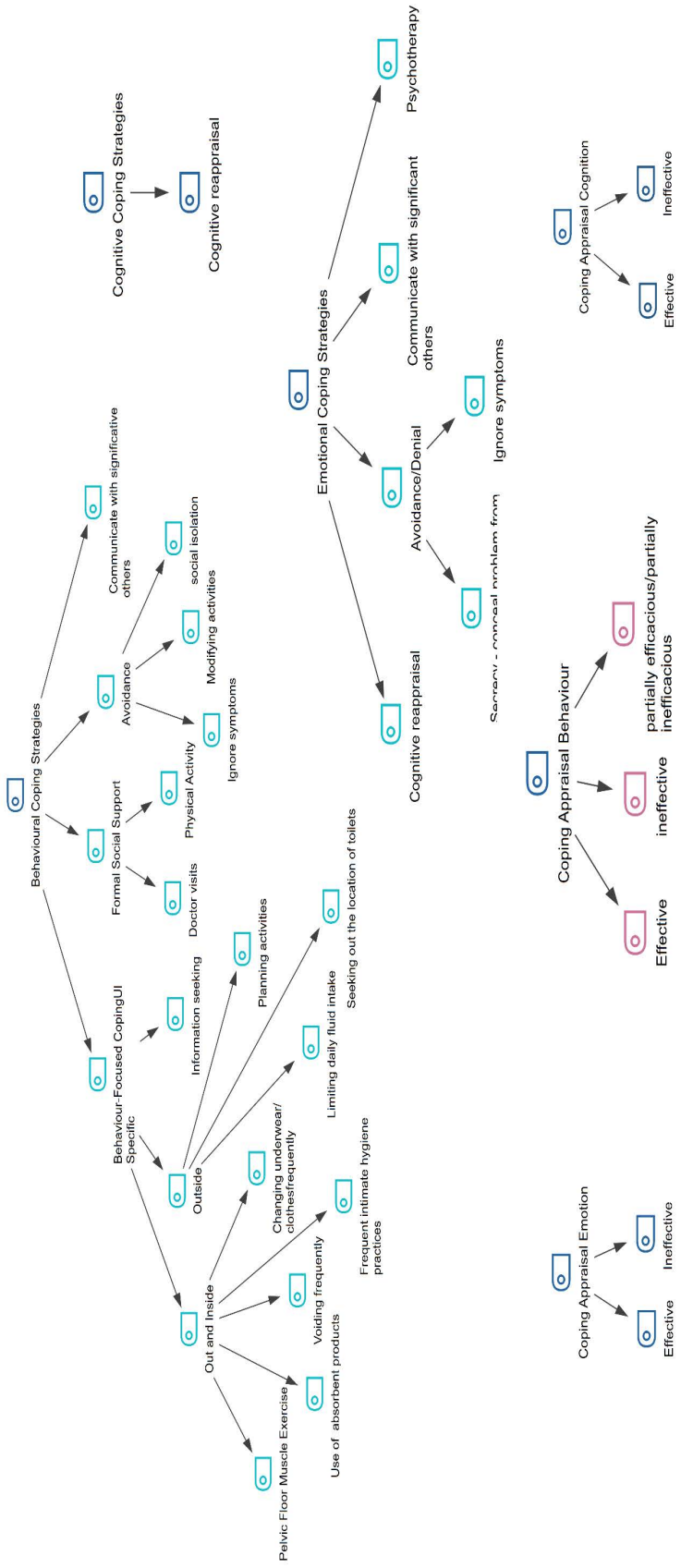
Appendix B. Semi-Structured Interview based on the Common-Sense Model

Construct	Question
Illness Representation: Health Threat	
Cognitive Illness Representation	
Identity	What do you think urinary incontinence (UI) is? What are the main characteristics and/or symptoms of UI for you?
Cause	What do you think may have caused the onset of your UI symptoms? Can you think of anything else that might have caused your UI symptoms? (Differentiate between origin and aggravation: "Was there a time when you had no symptoms?")
Duration	How long do you think your UI symptoms will last?
Consequences	I know this may be a strange question, but sometimes negative experiences can bring positive consequences. In your opinion, are there any positive consequences of having UI? If yes, what are they? Do you think there are any negative consequences of UI? If so, what are they?
Cure/Control	In your opinion, is there any effective treatment to improve your UI symptoms? If yes, what are they? In your opinion, is there anything you can do (any personal change/strategy) to minimise or alleviate your UI symptoms?
Emotional Illness Representation	
Emotional Response	Some people experience emotions associated with UI. Let's look at this emotion wheel. Focus on the center and outer rings, which reflect a range of emotions. Can you identify which emotions you feel when experiencing UI symptoms? Are there others you associate with UI?
Distressing Thoughts	We've just talked about the characteristics of your UI, your control over it, and its consequences. When you experience UI, do any difficult thoughts come to mind? If not, what usually crosses your mind during these episodes?
Coping Strategies	
Cognitive Coping Strategies	What do you do to manage these thoughts?

Behavioural Coping Strategies	What do you usually do to manage your UI at home? And when you are outside your home? (Follow-up: "Does it always happen this way? Can you describe a specific example?")
Emotional Coping Strategies	Earlier, we explored the emotion wheel, and you shared how UI makes you feel. What do you usually do to manage these emotions at home? And what do you do to manage them when you're outside your home?
Coping Appraisal	
Behavioural Coping Appraisal	What is your opinion about the strategies you use to manage UI? How effective are they? Why do you think they work, or why don't they?
Cognitive Coping Appraisal	You mentioned associating certain thoughts with your UI symptoms. Do you think the way you manage these thoughts has been effective? Has it been giving you the desired results?
Emotional Coping Appraisal	Do you think the strategies you use to manage your emotions at home and outside are effective? Are they giving you the results you want?

Appendix C. Conceptual Map of the Experience of Living with UI Theoretically based on Common-Sense Model




Behavioural Coping Strategies
Behaviour-Focused CopingUI Specific
Outside
Information seeking
Planning activities
Out and Inside
Changing underwear/ clothesfrequently
Limiting daily fluid intake
Seeking out the location of toilets
Pelvic Floor Muscle Exercise
Use of absorbent products
Voiding frequently
Frequent intimate hygiene practices
Formal Social Support
Doctor visits
Physical Activity
Avoidance
Ignore symptoms
Modifying activities
social isolation
Communicate with significative others
Cognitive Coping Strategies
Cognitive reappraisal
Emotional Coping Strategies
Cognitive reappraisal
Avoidance/Denial
Ignore symptoms
Communicate with significant others
Psychotherapy
Coping Appraisal Behaviour
Effective
ineffective
partially efficacious/partially inefficacious
Coping Appraisal Emotion
Effective
Ineffective
Coping Appraisal Cognition
Effective
Ineffective

Appendix D. Informed Consent and Assessment Protocol (Sociodemographic, Clinical, and Psychosocial Measures)

PURI-PRO:
Portuguese URinary Incontinence Project
Consentimento Informado (Fase I PURI-PRO)

A presente investigação tem o objetivo de estudar a Qualidade de Vida e a Função Sexual em mulheres entre os 45 e 65 anos de idade, com Incontinência Urinária e sem Incontinência Urinária. Este projeto é da responsabilidade da Doutoranda Marta Gonçalves Porto, sob a orientação da Professora Doutora Filipa Pimenta e coorientação do Professor Doutor João Marôco, ambos pertencentes ao William James Center for Research do ISPA- Instituto Universitário.
Convidamo-la a participar nesta investigação através do preenchimento de um questionário que encontrará nas páginas seguintes. Este questionário tem uma duração aproximada de 15-20 minutos. A sua participação é de elevada importância para que possamos conhecer de uma forma objetiva e abrangente como é que a Incontinência Urinária afeta a vida das mulheres durante a meia-idade. Sublinha-se que a participação é voluntária e que todos os dados são totalmente confidenciais e anónimos.
Posteriormente, poderá ter acesso aos resultados do estudo entrando em contato com a investigadora responsável por e-mail.
Agradecemos a sua participação.

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Telemóvel: 916013765
ISPA – Instituto Universitário
Rua Jardim do Tabaco, 34, 1149-041, Lisboa
Tel.: 218 811 700

Aceita participar nesta investigação? Sim ___ Não ___

Se aceita participar, por favor rubrique e coloque a data.

Data: ____/____/____

_____
(Rubrica da participante)
Responda, por favor, às seguintes questões:

1. Idade: ____
2. Nacionalidade: _____
3. Último grau de ensino completo: _____
4. Situação profissional atual: Ativa ____ Inativa ____
5. Relação Afetivo-sexual Atual: Sim ____ Não _____
6. Número de filhos biológicos: ____
7. Gravidez Atual: Sim ____ Não ____
8. Número Partos Vaginais: ____
9. Rompimento Não intencional do Períneo durante o parto: Sim ___ Não ___
10. Doença(s) diagnosticada: Sim ___ Não ___ Qual(ais)? _____
11. Problema psicológico diagnosticado: Sim ___ Não ___ Qual(ais)? _____
12. Cirurgias/tratamentos realizados:
Remoção do útero ___ Remoção do útero e dos 2 ovários ___ Radioterapia ___ Não realizei qualquer cirurgia ___
13. Nos últimos 12 meses teve ciclos menstruais mais curtos ou mais longos, isto é, com menos, ou mais, 7 dias que o habitual (por exemplo, ter o período de 24 em 24 dias em vez de 31 em 31 dias, como habitualmente)? Sim___ Não ___
14. Nos últimos 12 meses teve menstruações irregulares, isto é, permaneceu sem ter o período durante 60 dias consecutivos ou mais? Sim ___ Não ___
15. Já esteve 12 meses (ou mais tempo) sem ter menstruação? Sim ___ Não ___
16. Teve uma menopausa natural, isto é, sem ser consequência de intervenção médico-cirúrgica? Sim ___ Não ___ Ainda não estive 12 meses sem menstruação ___
17. Que idade tinha quando teve a última (ou mais recente) menstruação? _____
18. Fuma atualmente? Sim___ Não___
19. Bebe café? Sim ___ Não____ Quantos por dia? ___
20. Pratica atividade física de alto impacto (e.x., step, corrida)? Sim ____ Não ___
21. Altura ____cm Peso ____ kg

ICIQ-IU

Responda por favor às seguintes perguntas sobre como tem passado, em média, nas últimas 4 semanas.

	Nunca	Uma vez por semana ou menos	2 ou 3 vezes por semana	Uma vez por dia	Várias vezes por dia	Sempre

1. Com que frequência perde urina?	0	1	2	3	4	5

	Nada	Uma pequena quantidade	Uma quantidade moderada	Uma grande quantidade
2. Gostaríamos de saber a quantidade de urina que pensa que perde (quer use proteção ou não).	1	2	3	4

3. De que forma perder urina interfere com o seu quotidiano?

Nada 0 1 2 3 4 5 6 7 8 9 10 Extremamente

4. Quando é que perde urina?

	Nunca	Uma vez por semana	2 ou 3 vezes por semana	Uma vez por dia	Várias vezes por dia	Sempre
Perco urina quando tusso ou espirro.	0	1	2	3	4	5
Perco urina durante o sono.	0	1	2	3	4	5
Perco urina durante a atividade física/exercício.	0	1	2	3	4	5
Perco urina quando acabo de urinar e já estou vestida.	0	1	2	3	4	5
Perco urina por nenhuma razão óbvia.	0	1	2	3	4	5
Perco urina constantemente.	0	1	2	3	4	5

WHOQOL

Escolha a opção que melhor se adequa ao seu caso, considerando as **últimas duas semanas.**

	Muito Má	Má	Nem Boa nem Má	Boa	Muito Boa

1. Como avalia a sua qualidade de vida?	1	2	3	4	5

	Muito Insatisfeita	Insatisfeita	Nem Satisfeita nem Insatisfeita	Satisfeita	Muito Satisfeita
2. Até que ponto está satisfeita com a sua saúde?	1	2	3	4	5

	Nada	Pouco	Nem muito nem pouco	Muito	Muitíssimo
3. Em que medida as suas dores físicas a impedem de fazer o que precisa de fazer?*	1	2	3	4	5
4. Em que medida precisa de cuidados médicos para fazer a sua vida diária?*	1	2	3	4	5
5. Até que ponto gosta da vida?	1	2	3	4	5
6. Em que medida sente que a sua vida tem sentido?	1	2	3	4	5
7. Até que ponto se consegue concentrar?	1	2	3	4	5
8. Em que medida se sente segura no seu dia-a-dia?	1	2	3	4	5
9. Em que medida é saudável o seu ambiente físico?	1	2	3	4	5

	Nada	Pouco	Moderadamente	Bastante	Completamente
10. Tem energia suficiente para a sua vida diária?	1	2	3	4	5
11. É capaz de aceitar a sua aparência física?	1	2	3	4	5
12. Tem dinheiro suficiente para satisfazer as suas necessidades?	1	2	3	4	5
13. Até que ponto tem fácil acesso às informações necessárias para organizar a sua vida diária?	1	2	3	4	5

14. Em que medida tem oportunidade para realizar atividades de lazer?	1	2	3	4	5

	Muito Má	Má	Nem boa nem Má	Boa	Muito Boa
15. Como avaliaria a sua mobilidade [capacidade para se movimentar e deslocar por si própria]?	1	2	3	4	5

	Muito insatisfeita	Insatisfeita	Nem satisfeita nem insatisfeita	Satisfeita	Muito Satisfeita
16. Até que ponto está satisfeita com o seu sono?	1	2	3	4	5
17. Até que ponto está satisfeita com a sua capacidade de desempenhar as atividades do seu dia a dia?	1	2	3	4	5
18. Até que ponto está satisfeita com a sua capacidade de trabalho?	1	2	3	4	5
19. Até que ponto está satisfeita consigo própria?	1	2	3	4	5
20. Até que ponto está satisfeita com as suas relações pessoais?	1	2	3	4	5
21. Até que ponto está satisfeita com a sua vida sexual?	1	2	3	4	5
22. Até que ponto está satisfeita com o apoio que recebe dos seus amigos?	1	2	3	4	5
23. Até que ponto está satisfeita com as condições do lugar em que vive?	1	2	3	4	5
24. Até que ponto está satisfeita com o acesso que tem aos serviços de saúde?	1	2	3	4	5

25. Até que ponto está satisfeito com os transportes que utiliza?	1	2	3	4	5

	Nunca	Poucas vezes	Algumas vezes	Frequente mente	Sempre
26. Com que frequência tem sentimentos negativos, tais como tristeza, desespero, ansiedade ou depressão?*	1	2	3	4	5

FSFI

Considerando as últimas 4 semanas:

1. Como qualificaria o seu nível (grau) de desejo ou interesse sexual?				
Muito alto	Alto	Moderado	Baixo	Muito baixo ou nenhum
5	4	3	2	1

2. Como qualificaria o seu nível (grau) de excitação sexual durante a relação sexual ou penetração vaginal?					
Não tive atividade sexual nas últimas 4 semanas	Muito alto	Alto	Moderado	Baixo	Muito baixo ou nenhum
0	5	4	3	2	1

3. Com que frequência se sentiu lubrificada (notar mais secreção genital) durante a atividade sexual ou penetração vaginal?					
Não tive atividade sexual nas últimas 4 semanas	Sempre ou quase sempre	A maioria das vezes	Às vezes	Poucas vezes	Quase nunca ou nunca
0	5	4	3	2	1

4. Com que frequência alcançou o orgasmo quando teve estimulação sexual ou penetração vaginal?					
Não tive atividade sexual nas últimas 4 semanas	Sempre ou quase sempre	A maioria das vezes	Às vezes	Poucas vezes	Quase nunca ou nunca
0	5	4	3	2	1

5. Quão satisfeita se tem sentido com a sua atividade sexual?				
Muito Satisfeita	Moderadamente satisfeita	Nem satisfeita, nem insatisfeita	Moderadamente insatisfeita	Muito insatisfeita
5	4	3	2	1

6. Com que frequência sente incómodo ou dor vaginal com a penetração?					
Não experimentei penetração vaginal nas últimas 4 semanas	Quase nunca ou nunca	Poucas vezes	Às vezes	A maioria das vezes	Quase sempre ou sempre
0	5	4	3	2	1

EC

Por favor, assinale a frequência com que utilizou cada uma das estratégias indicadas para gerir perdas de urina.

	Nunca	Raramente	Algumas vezes	Muitas vezes	Todos os dias/Sempre
1. Ir muitas vezes à casa de banho, mesmo sem vontade, de forma a manter a bexiga vazia. (9-45)	0	1	2	3	4
2. Procurar de imediato onde é a casa de banho quando chega a um local desconhecido.	0	1	2	3	4
3. Reduzir a ingestão de líquidos.	0	1	2	3	4

4. Evitar ir a locais onde desconhece a localização das casas de banho.	0	1	2	3	4
5. Ficar mais tempo em casa de forma a evitar situações desconfortáveis.	0	1	2	3	4
6. Limitar a atividade física.	0	1	2	3	4
7. Antes de se deslocar a um local desconhecido, tentar saber onde se situam as casas de banho.	0	1	2	3	4
8. Limitar as saídas sociais.	0	1	2	3	4
9. Limitar atividades, como viajar, que requerem estar longe da casa de banho durante um longo período.	0	1	2	3	4

	Nunca	Raramente	Algumas vezes	Muitas vezes	Todos os dias/sempre
10. Usar cuecas-fralda. (4-20)	0	1	2	3	4
11. Usar pensos femininos. (higiénicos)	0	1	2	3	4
12. Usar outros materiais absorventes (tais como papel higiénico, lenços de papel ou toalhas de papel).	0	1	2	3	4
13. Usar cores ou roupas escuras que escondam as manchas.	0	1	2	3	4
14. Usar saias e casacos compridos para cobrir as manchas.	0	1	2	3	4
15. Usar fraldas de adultos.	0	1	2	3	4
16. Usar em excesso perfume ou água de colónia para disfarçar o cheiro da urina.	0	1	2	3	4

Tratamento para a Incontinência Urinária

1. Toma medicação para a Incontinência Urinária? Sim ___ Não ___ Qual? _____
2. Faz atualmente exercícios para fortalecimento do pavimento pélvico (ex., exercícios Kegel), para a Incontinência Urinária? Sim ___ Não ___
3. Já se submeteu a uma cirurgia para recuperação da Incontinência Urinária? Sim ___ Não ___
4. Já alguma vez falou com o seu médico sobre a sua incontinência urinária? Sim ___ Não ___
4.1. Se sim, qual foi a recomendação? _____

KHQ

Por favor marque com um círculo, como tem passado, em média, nas últimas 4 semanas.

1. Como descreveria o seu atual estado de saúde?

Muito bom	Bom	Neutro	Mau	Muito mau
1	2	3	4	5

2. De que modo o seu problema de bexiga afeta a sua vida?

Nada	Um Pouco	Moderadamente	Muito
1	2	3	4

Responda, por favor, a cada questão escolhendo a resposta que melhor se aplica a si.

	Nada	Um Pouco	Moderadamente	Muito
3. De que maneira o seu problema de bexiga afeta as suas tarefas domésticas, como limpar a casa, fazer compras, etc.?	1	2	3	4
4. De que modo o seu problema de bexiga afeta o seu trabalho ou suas atividades diárias fora de casa?	1	2	3	4
5. O seu problema de bexiga afeta as suas atividades físicas, tais como andar, correr, praticar desporto(s), fazer ginástica, etc.?	1	2	3	4
6. O seu problema de bexiga afeta as suas viagens?	1	2	3	4
7. O seu problema de bexiga limita a sua vida social?	1	2	3	4
8. O seu problema de bexiga limita os contactos estabelecidos com os seus amigos?	1	2	3	4

	Não se aplica	Nada	Um pouco	Moderadamente	Muito
9. O seu problema de bexiga afeta o relacionamento com o/a seu/sua parceiro/a?	1	2	3	4	5
10. O seu problema de bexiga afeta a sua vida sexual?	1	2	3	4	5
11. O seu problema de bexiga afeta a sua vida familiar?	1	2	3	4	5

	Nada	Um Pouco	Moderadamente	Muito
12. O seu problema de bexiga faz com que se sinta deprimida?	1	2	3	4
13. O seu problema de bexiga faz com que se sinta nervosa?	1	2	3	4
14. O seu problema de bexiga faz com que se sinta mal consigo mesma?	1	2	3	4

	Nunca	Às vezes	Frequentemente	Sempre
15. O seu problema de bexiga afeta o seu sono?	1	2	3	4
16. Sente-se esgotada ou cansada?	1	2	3	4

Alguma destes comportamentos corresponde ao que faz? Se sim, com que regularidade?

	Nunca	Às vezes	Frequentemente	Sempre
17. Usa forros ou pensos para se manter seca?	1	2	3	4
18. Tem cuidado com a quantidade de líquidos que ingere?	1	2	3	4
19. Troca a sua roupa interior porque está molhada?	1	2	3	4
20. Preocupa-se com a possibilidade de cheirar a urina?	1	2	3	4
21. Fica envergonhada por causa do seu problema de bexiga? (item adicionado)	1	2	3	4

Escolha apenas aqueles problemas que tem **atualmente**. Quanto é que os seguintes problemas a afetam?

	Não se Aplica	Um Pouco	Moderadamente	Muito
22. Frequência: Ir muitas vezes à casa de banho.	1	2	3	4
23. Noctúria: Levantar-se à noite para urinar.	1	2	3	4
24. Urgência: Uma forte dificuldade em controlar a vontade de urinar	1	2	3	4
25. Incontinência de Urgência: Perda de urina associada a uma vontade muito grande de urinar	1	2	3	4
26. Incontinência de Esforço: Perda de urina associada a atividade física (ex., tossir, correr).	1	2	3	4
27. Enurese nocturna: Molhar a cama à noite.	1	2	3	4
28. Incontinência Coital: Perda urinária durante relações sexuais.	1	2	3	4
29. Infeções urinárias.	1	2	3	4
30. Dor na bexiga.	1	2	3	4
31. Desconforto ao urinar.	1	2	3	4

IS

Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

	Discordo totalmente	Discordo	Concordo	Concordo totalmente
1. O medo de cheirar a urina limita as minhas atividades diárias fora de casa.	1	2	3	4
2.Ter Incontinência faz-me recusar convites para sair ou estar com amigos/família.	1	2	3	4
3. Sinto-me mais sozinha desde que comecei a ter Incontinência.	1	2	3	4
4. Sinto-me frequentemente isolada dos outros.	1	2	3	4
5. As perdas de urina fazem-me sentir mal comigo mesma.	1	2	3	4

6. Prefiro evitar sair de casa, por temer que os outros tenham reações negativas comigo por causa da Incontinência.	1	2	3	4
7. Os outros terão reações negativas se virem em mim sinais de Incontinência (ex., manchas, cheiro).	1	2	3	4
8**. Sinto-me incompreendida pelos outros.**	1	2	3	4
9. Evito conhecer pessoas novas.	1	2	3	4

IPQ

Coloque um círculo à volta do número que melhor corresponde à sua maneira de pensar**:**

1. Qual o grau em que a sua Incontinência Urinária afeta a sua vida? Não me afeta nada **0 1 2 3 4 5 6 7 8 9 10** Afeta gravemente a minha vida
2. Quanto tempo pensa que vai durar a sua Incontinência Urinária? Muito pouco tempo **0 1 2 3 4 5 6 7 8 9 10** Para sempre
3. Qual o grau de controlo que sente que tem sobre a sua Incontinência Urinária?* Nenhum controlo **0 1 2 3 4 5 6 7 8 9 10** Tenho muitíssimo controlo
4. Até que ponto pensa que um tratamento pode ajudar a sua Incontinência Urinária?* Não vai ajudar nada **0 1 2 3 4 5 6 7 8 9 10** Vai ajudar muitíssimo
5. Qual o grau em que sente sintomas da sua Incontinência Urinária? Nenhum sintoma **0 1 2 3 4 5 6 7 8 9 10** Muitos sintomas graves
6. Qual o grau de preocupação que tem com a sua Incontinência Urinária? Nada preocupada **0 1 2 3 4 5 6 7 8 9 10** Extremamente preocupada
7. Até que ponto sente que compreende a sua Incontinência Urinária?* Não compreendo **0 1 2 3 4 5 6 7 8 9 10** Compreendo muito bem
8. Até que ponto a sua Incontinência Urinária a afeta emocionalmente (ex., fá-la sentir-se zangada, assustada)? Não me afeta **0 1 2 3 4 5 6 7 8 9 10** Afeta-me muitíssimo emocionalmente

WPAI

1. **Nos últimos 7 dias, quantas horas de trabalho perdeu devido à sua Incontinência Urinária?**
   Inclua as horas perdidas por faltas ao trabalho por motivo de doença, atrasos, saídas antecipadas e qualquer outro impacto relacionado à sua saúde. _____ **horas**

2. Durante os últimos sete dias, quanto é que os seus sintomas de Incontinência Urinária afetaram a sua produtividade no trabalho?

Não afetou em nada 0 1 2 3 4 5 6 7 8 9 10 Afetou totalmente

<u>Segunda Fase do Estudo</u>

Brevemente, haverá uma 2ª fase onde será entregue via email uma intervenção para promoção de saúde (literacia de saúde ou estratégias para atenuação da Incontinência). Se estiver disponível para participar (breve entrevista telefónica, preenchimento de um questionário online, e envolvimento no programa de intervenção de 12 semanas) agradecíamos que deixasse um contacto e o melhor horário para ser contatada. <u>No entanto, deixar o seu contacto não implica qualquer compromisso em participar</u>. A sua participação será sempre <u>voluntária</u>, podendo desistir em qualquer momento, sem quaisquer consequências.

Agradecemos a sua participação.

Telefone: _____ Email:_____
Melhor horário para contato: _____

Appendix E. Frequency of Illness Representations Brief IPQ

Item	Absolute Frequency (n)	Relative Frequency (%)
1. "How much does your illness affect your life?"		
0 (No affect at all)	279	18.14
1	337	21.91
2	259	16.84
3	199	12.94
4	111	7.22
5	89	5.79
6	65	4.23
7	87	5.66
8	60	3.90
9	25	1.63
10 (Severely affects my life)	27	1.76
2. "How long do you think your illness will continue?"		
0 (A very short time)	137	8.91
1	121	7.87
2	77	5.01
3	68	4.42
4	65	4.23
5	147	9.56
6	70	4.55
7	72	4.68
8	126	8.19
9	81	5.27
10 (Forever)	574	37.32
3. "How much control do you feel you have over your illness?" *		
0 (Absolutely no control)	106	6.89
1	81	5.27
2	122	7.93
3	134	8.71
4	122	7.93
5	200	13.00
6	102	6.63
7	146	9.49
8	197	12.81
9	202	13.13
10 (Extreme amount of control)	126	8.19
4. "How much do you think your treatment can help your illness?" (*)		
0 (Not at all)	107	6.96
1	68	4.42
2	60	3.90

3	63	4.10
4	58	3.77
5	243	15.80
6	104	6.76
7	94	6.11
8	200	13.00
9	159	10.34
10 (Extremely helpful)	382	24.84
5. "How much do you experience symptoms from your illness?"		
0 (No symptoms at all)	144	9.36
1	298	19.38
2	275	17.88
3	206	13.39
4	132	8.58
5	164	10.66
6	103	6.70
7	70	4.55
8	78	5.07
9	39	2.54
10 (Many severe symptoms)	29	1.89
6. "How concerned are you about your illness?"		
0 (Not at all concerned)	145	9.43
1	216	14.04
2	204	13.26
3	145	9.43
4	118	7.67
5	177	11.51
6	106	6.89
7	101	6.57
8	117	7.61
9	81	5.27
10 (Extremely concerned)	128	8.32
7. "How well do you feel you understand your illness?"		
0 (Don't understand at all) *	91	5.92
1	77	5.01
2	108	7.02
3	106	6.89
4	92	5.98
5	196	12.74
6	119	7.74
7	137	8.91
8	185	12.03
9	147	9.56
10 (Understand very clearly)	280	18.21

8. "How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed)"		
0 (Not at all affected emotionally)	383	24.90
1	248	16.12
2	176	11.44
3	136	8.84
4	106	6.89
5	119	7.74
6	81	5.27
7	92	5.98
8	65	4.23
9	57	3.71
10 (Extremely affected emotionally)	75	4.88

Note. * reversed item.

Appendix F. Original Version of the King's Health Questionnaire Symptom Severity Scale (KHQ-SSS)

Please indicate your agreement or disagreement by selecting the number that best corresponds to your answer.

Items	Do not apply (1)	A little (2)	Moderately (3)	Very much apply (4)
21. Frequency: Going to the toilet often.				
22. Nocturia: Getting up at night to urinate.				
23. Urgency: Strong difficulty in controlling the urge to urinate. (*)				
24. Urge Incontinence: Loss of urine associated with a very strong urge to urinate.				
25. Stress Incontinence: Loss of urine associated with physical activity (e.g. Coughing, running).				
26. Nocturnal Enuresis: Bedwetting at night. (*)				
27. Intercourse Incontinence: Urine loss during sexual intercourse. (*)				
28. Frequent urinary infections.				
29. Bladder pain. (*)				
30. Difficulty passing urine. (*)				

Note. (*) Item deleted.

Appendix G. Portuguese Version of the King's Health Questionnaire Symptom Severity Scale (KHQ-SSS)

Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

Itens	Não se aplica (1)	Um pouco (2)	Moderadamente (3)	Aplica-se bastante (4)
21. Frequência: Ir muitas vezes à casa de banho.				
22. Noctúria: Levantar-se à noite para urinar.				
24. Incontinência de Urgência: Perda de urina associada a uma vontade muito grande de urinar.				
25. Incontinência de esforço: Perda de urina associada à actividade física (por exemplo, tossir, correr).				
28. Infeções urinárias.				

Appendix H. Frequency of Self-Management Coping Strategies

Items	Absolute Frequency (*n*)	Relative Frequency (%)
Defensive Coping		
1. Going to the toilet often, even if you don't feel like it, in order to keep your bladder empty.		
Never	511	33.22
Rarely	503	32.70
Sometimes	367	23.86
Often	125	8.13
Everyday/Always	32	2.08
2. Immediately look for the toilet when you arrive in an unfamiliar place.		
Never	578	37.58
Rarely	447	29.06
Sometimes	272	17.69
Often	136	8.84
Everyday/Always	104	6.76
3. Reduce your fluid intake.		
Never	568	36.93
Rarely	422	27.44
Sometimes	347	22.56
Often	157	10.21
Everyday/Always	45	2.93
4. Avoid going to places where you don't know the location of the toilets.		
Never	849	55.2
Rarely	401	26.07
Sometimes	170	11.05
Often	79	5.14
Everyday/Always	40	2.60
5. Staying at home longer to avoid uncomfortable situations.		
Never	973	63.26
Rarely	325	21.13
Sometimes	145	9.43
Often	63	4.10
Everyday/Always	32	2.08
6. Limit physical activity.		
Never	815	52.99
Rarely	365	23.73
Sometimes	196	12.74
Often	111	7.22
Everyday/Always	51	3.32
7. Before travelling to an unfamiliar place, try to find out where the toilets are located.		
Never	918	59.69
Rarely	321	20.87
Sometimes	161	10.47

Often	89	5.79
Everyday/Always	49	3.19
8. Limit social outings.		
Never	1058	68.79
Rarely	307	19.96
Sometimes	111	7.22
Often	42	2.73
Everyday/Always	20	1.30
9. Limit activities, such as travelling, that require you to be away from the toilet for a long period of time.		
Never	1025	66.64
Rarely	302	19.64
Sometimes	123	8.00
Often	58	3.77
Everyday/Always	30	1.95
Hiding Coping		
11. Use feminine (hygienic) pads.		
Never	339	22.04
Rarely	303	19.70
Sometimes	344	22.37
Often	186	12.09
Everyday/Always	367	23.86
12. Use other absorbent materials (such as toilet paper, tissues or paper towels).		
Never	869	56.50
Rarely	345	22.43
Sometimes	226	14.69
Often	64	4.16
Everyday/Always	35	2.28
13. Wear dark colours or clothes that hide the stains.		
Never	1068	69.44
Rarely	214	13.91
Sometimes	133	8.65
Often	80	5.20
Everyday/Always	42	2.73
14. Wear long skirts and coats to cover the stains.		
Never	1223	79.52
Rarely	152	9.88
Sometimes	89	5.79
Often	50	3.25
Everyday/Always	23	1.50

Appendix I. Original Version of the UI Self-Management Coping Strategies Instrument

Please tick how often you have used each of the strategies indicated to manage urine loss.

	Items	Never (0)	Rarely (1)	Sometimes (2)	Often (3)	Everyday/ Always (4)
Defensive	**1.** Going to the toilet often, even if you don't feel like it, in order to keep your bladder empty.					
	2. Immediately look for the toilet when you arrive in an unfamiliar place.					
	3. Reduce your fluid intake.					
	4. Avoid going to places where you don't know the location of the toilets.					
	5. Staying at home longer to avoid uncomfortable situations.					
	6. Limit physical activity.					
	7. Before travelling to an unfamiliar place, try to find out where the toilets are located.					
	8. Limit social outings.					
	9. Limit activities, such as travelling, that require you to be away from the toilet for a long period of time.					
Hiding	**10.** Wearing nappy pants (*)					
	11. Use feminine (hygienic) pads.					

	12. Use other absorbent materials (such as toilet paper, tissues or paper towels).					
	13. Wear dark colours or clothes that hide the stains.					
	14. Wear long skirts and coats to cover the stains.					
	15. Use adult nappies (*)					
	16. Use too much perfume or cologne to disguise the smell of urine. (*)					

Note. (*) Item deleted.

Additional Section:
Urinary Incontinence – Treatment and Management Questionnaire

1. Do you take any medication for urinary incontinence? Yes ___ No ___ If yes, which one? _____

2. Are you currently performing pelvic floor strengthening exercises (e.g., Kegel exercises) for urinary incontinence? Yes ___ No ___

3. Have you undergone surgery to treat urinary incontinence? Yes ___ No ___

4. Have you ever talked to your doctor about your urinary incontinence? Yes ___ No ___

4.1. If yes, what was the recommendation? _____

Appendix J. Portuguese Version of the UI Self-Management Coping Strategies Instrument

Por favor, assinale a frequência com que utilizou cada uma das estratégias indicadas para gerir perdas de urina.

	Nunca	Raramente	Algumas vezes	Muitas vezes	Todos os dias/Sempre
1. Ir muitas vezes à casa de banho, mesmo sem vontade, de forma a manter a bexiga vazia.	0	1	2	3	4
2. Procurar de imediato onde é a casa de banho quando chega a um local desconhecido.	0	1	2	3	4
3. Reduzir a ingestão de líquidos.	0	1	2	3	4
4. Evitar ir a locais onde desconhece a localização das casas de banho.	0	1	2	3	4
5. Ficar mais tempo em casa de forma a evitar situações desconfortáveis.	0	1	2	3	4
6. Limitar a atividade física.	0	1	2	3	4
7. Antes de se deslocar a um local desconhecido, tentar saber onde se situam as casas de banho.	0	1	2	3	4
8. Limitar as saídas sociais.	0	1	2	3	4
9. Limitar atividades, como viajar, que requerem estar longe da casa de banho durante um longo período.	0	1	2	3	4

	Nunca	Raramente	Algumas vezes	Muitas vezes	Todos os dias/Sempre
10. Usar cuecas-fralda.	0	1	2	3	4
11. Usar pensos femininos. (higiénicos).	0	1	2	3	4
12. Usar outros materiais absorventes (tais como papel higiénico, lenços de papel ou toalhas de papel).	0	1	2	3	4
13. Usar cores ou roupas escuras que escondam as manchas.	0	1	2	3	4
14. Usar saias e casacos compridos para cobrir as manchas.	0	1	2	3	4
15. Usar fraldas de adultos.	0	1	2	3	4
16. Usar em excesso perfume ou água de colónia para disfarçar o cheiro da urina.	0	1	2	3	4

Secção Adicional:
Urinary Incontinence – Treatment and Management Questionnaire

1. Toma medicação para a Incontinência Urinária? Sim ___ Não ___ Qual? _____

2. Faz atualmente exercícios para fortalecimento do pavimento pélvico (ex., exercícios Kegel), para a Incontinência Urinária? Sim ___ Não ___

3. Já se submeteu a uma cirurgia para recuperação da Incontinência Urinária? Sim ___ Não ___

4. Já alguma vez falou com o seu médico sobre a sua incontinência urinária? Sim ___ Não ___

4.1. Se sim, qual foi a recomendação? _____

Appendix K. Original Version of the Urinary Incontinence Social Isolation Questionnaire (UI-SIQ)

Please indicate your agreement or disagreement by selecting the number that best corresponds to your answer.

Items	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
1. The fear of smelling urine limits my daily activities outside the home. (*)				
2. Having Incontinence makes me turn down invitations to go out or be with friends/family.				
3. I feel more alone since I started having Incontinence. (*)				
4. I often feel isolated from others.				
5. Leaking urine makes me feel bad about myself.				
6. I prefer to avoid going out of the house, for fear that others will have negative reactions to me because of Incontinence. (*)				
7. Others will react negatively if they see signs of Incontinence in me (e.g., stains, odour). (*)				
8. I feel misunderstood by others.				
9. I avoid meeting new people.				

Note. (*) Item deleted.

Appendix L. Translated Version (i.e., Portuguese version) of the Urinary Incontinence Social Isolation Questionnaire (UI-SIQ)

Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

Itens	Discordo Totalmente (1)	Discordo (2)	Concordo (3)	Concordo Totalmente (4)
2. Ter Incontinência faz-me recusar convites para sair ou estar com amigos/família.				
4. Sinto-me frequentemente isolada dos outros.				
5. As perdas de urina fazem-me sentir mal comigo mesma.				
8. Sinto-me incompreendida pelos outros.				
9. Evito conhecer pessoas novas.				

Appendix M. SPIRIT Guidelines Checklist

SPIRIT | CONSORT OUTCOMES
Reporting Guidelines for Trial Outcomes

SPIRIT-Outcomes 2022 Checklist (for combined completion of SPIRIT 2013 and SPIRIT-Outcomes 2022 items)[a]

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
Administrative information				
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	-	Page 1
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	-	Page 1
	2b	All items from the World Health Organization Trial Registration Data Set	-	
Protocol version	3	Date and version identifier	-	Page 1
Funding	4	Sources and types of financial, material, and other support	-	Page 1
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	-	Page 1
	5b	Name and contact information for the trial sponsor	-	Page 1
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	-	Page 1
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	-	Pages 1-2
Introduction				
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	-	Pages 3-8
	6b	Explanation for choice of comparators	-	
Objectives	7	Specific objectives or hypotheses	-	Page 9

SPIRIT | CONSORT OUTCOMES
Reporting Guidelines for Trial Outcomes

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	-	Page 9
Methods: Participants, interventions, and outcomes				
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	-	Page 9
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	-	Page 10
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered (for specific guidance see TIDieR checklist and guide)	-	Page 10-12
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	-	Page 12
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	-	Page 12
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	-	Page 12
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	-	Pages 12-16

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
	12.1		Provide a rationale for the selection of the domain for the trial's primary outcome	
	12.2		If the analysis metric for the primary outcome represents within-participant change, define and justify the minimal important change in individuals	
	12.3		If the outcome data collected are continuous but will be analyzed as categorical (method of aggregation), specify the cutoff values to be used	
	12.4		If outcome assessments will be performed at several time points after randomization, state the time points that will be used for analysis	
	12.5		If a composite outcome is used, define all individual components of the composite outcome	
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	-	Page 12
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	-	Page 16
	14.1		Define and justify the target difference between treatment groups (eg, the minimal important difference)	
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	-	
Methods: Assignment of interventions (for controlled trials)				
Allocation:				
Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	-	Page 17

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	-	Page 17
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	-	Page 17
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	-	Page 17
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	-	
Methods: Data collection, management, and analysis				
Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	-	Page 17
	18a.1		Describe what is known about the responsiveness of the study instruments in a population similar to the study sample	
	18a.2		Describe who will assess the outcome (eg, nurse, parent)	
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	-	Page 17

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	-	Pages 17-18
Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	-	Pages 18-19
	20a.1		Describe any planned methods to account for multiplicity in the analysis or interpretation of the primary and secondary outcomes (eg, coprimary outcomes, same outcome assessed at multiple time points, or subgroup analyses of an outcome)	Pages 18-19
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	-	Page 19
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	-	Page 19
Methods: Monitoring				
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	-	Page 19
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	-	Page 19
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	-	Page 20

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	-	
Ethics and dissemination				
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	-	Pages 20-21
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	-	Page 21
Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	-	Page 21
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	-	
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	-	Page 21
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	-	Page 21
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	-	Page 21
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	-	
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	-	Pages 21-22
	31b	Authorship eligibility guidelines and any intended use of professional writers	-	

Section	Item No.	SPIRIT 2013 Item	SPIRIT-Outcomes 2022 item	Location Reported[b]
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	-	Page 22
Appendices				
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	-	Pages 37-52
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	-	

[a]It is strongly recommended that this checklist be read in conjunction with the SPIRIT (Standard Protocol Items: Recommendations for Interventional Trials) Statement paper for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT Group under the Creative Commons "Attribution-NonCommercial-NoDerivs 3.0 Unported" license and is reproduced with permission.
[b]Indicates page numbers and/or manuscript location: to be completed by authors.

Appendix N. RCT Assessment Protocol (Sociodemographic, Clinical, and Psychosocial Measures)

Por favor, preencha o seguinte questionário em tablet ou computador, uma vez que no telemóvel não é possível visualizar parte das escalas de resposta.
As próximas questões remetem para dados sociodemográficos e são de extrema importância para o sucesso do estudo. Por favor, leia atentamente cada questão e responda com os seus dados.

Qual é a sua idade? _____
Qual foi o último grau de ensino que completou? _____
Qual é a sua situação profissional atual? _____
Neste momento, encontra-se em alguma relação afetivo-sexual? _____
Quantos filhos biológicos tem? _____
Quantos partos vaginais teve? (Se não teve nenhum parto vaginal responda com "0"). _____

Durante o(s) parto(s), teve um rompimento não intencional do períneo? _____
Já se submeteu a alguma das seguintes cirurgias/tratamentos? _____
Nos últimos 12 meses, teve menstruações irregulares? Isto é, permaneceu sem ter o período durante 60 dias consecutivos ou mais? _____
Já esteve 12 meses (ou mais tempo) sem ter menstruação? _____
Teve uma menopausa natural? Isto é, sem ser consequência de intervenção médico-cirúrgica. ____
Que idade tinha quando teve a última (ou mais recente) menstruação? _____

Fuma atualmente? _____
Bebe café? _____
Quantos cafés bebe, por dia? (Se não beber café responda com “0”). _____
Pratica atividade física de alto impacto (ex., step, corrida)? _____
Costuma consumir fibras na sua alimentação? _____
Qual é a sua altura? (cm) _____
Qual é o seu peso? (kg) _____

Atualmente, toma medicação para a Incontinência Urinária? _____
Atualmente, faz exercícios para fortalecimento do pavimento pélvico (ex., exercícios Kegel) para a Incontinência Urinária? _____
Já se submeteu a uma cirurgia para recuperação da Incontinência Urinária? _____
Já alguma vez falou com o seu médico sobre a sua Incontinência Urinária? _____

Questão de controlo

Durante este tempo, contactou algum profissional de saúde para resolver o seu problema de Incontinência Urinária? (questão a partir do T1) _____

Coesão grupal

Quão importante foi este grupo (confiança, coesão, dinâmica e apoio entre colegas) para o seu resultado final? (a partir do T1) _____

Prolapse and Incontinence Knowledge Questionnaire—Urinary Incontinence (PIKQ-UI)
Questionário de conhecimento sobre a Incontinência Urinária

Instruções: Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

Dimensão	Item	Escala de resposta
Patogénese	**1.** A Incontinência Urinária (perda de urina involuntária) é mais comum em mulheres mais novas, do que em mulheres mais velhas. **2.** As mulheres têm mais probabilidade de perder urina do que os homens. **3.** Muitas situações podem causar perda urinária. **4.** Alguns medicamentos podem causar perda urinária. **5.** Ter muitos partos pode levar ao desenvolvimento de perdas urinárias.	Concordância *(0 – "discordo totalmente"; 1 – "discordo parcialmente"; 2 – "não concordo, nem discordo"; 3 – "concordo parcialmente"; 4 – "concordo totalmente")*
Tratamento	**6.** Para além do uso de pensos higiénicos e fraldas, não há muito que possa ser feito para tratar a perda de urina. **7.** A partir do momento em que as pessoas começam a perder urina, nunca conseguirão controlar a sua urina outra vez. **8.** A cirurgia é o único tratamento para a perda urinária. **9.** A maioria das pessoas que perdem urina podem ser tratadas ou podem melhorar com algum tipo de tratamento. **10.** Podem-se praticar alguns exercícios para ajudar a controlar a perda urinária.	Concordância *(0 – "discordo totalmente"; 1 – "discordo parcialmente"; 2 – "não concordo, nem discordo"; 3 – "concordo parcialmente"; 4 – "concordo totalmente")*

	11. A mudança de alguns comportamentos pode diminuir a gravidade das perdas urinárias.	
Diagnóstico	**12.** NÃO é importante diagnosticar o tipo de perda urinária antes de tentar tratá-la. **13.** Os médicos podem realizar testes especiais à bexiga para diagnosticar perdas urinárias.	Concordância *(0 – "discordo totalmente"; 1 – "discordo parcialmente"; 2 – "não concordo, nem discordo"; 3 – "concordo parcialmente"; 4 – "concordo totalmente")*

Subescala de Sensações Corporais

Instruções: Quando as mulheres fazem exercícios de fortalecimento do pavimento pélvico, algumas mulheres sentem sensações corporais, enquanto outras mulheres não. Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

Item	Escala de resposta
1. Quando estou a contrair os músculos do pavimento pélvico e abdominais, é como se estivesse a fechar um fecho *éclair*. **2.** Quando estou a contrair os músculos do pavimento pélvico, é como se estivesse a fechar as paredes vaginais e a sugar a vagina para dentro (puxar para dentro). **3.** Quando quero contrair os músculos do pavimento pélvico, aperto os glúteos e sinto os glúteos mais tonificados. **4.** Quando ando, estou frequentemente a contrair os abdominais um pouco como se tivesse umas calças de ganga um bocado apertadas. **5.** Quando tenho uma vontade súbita de urinar, paro durante 3-5 segundos, contraio os glúteos e sinto que a vontade abranda. **6.** Quando tenho uma vontade súbita de urinar, paro durante 3-5 segundos e descoloco-me até à casa de banho mais confiante e com menos urgência. **7.** Quando tenho uma vontade súbita de urinar, contraio os músculos do pavimento pélvico, abdominais e glúteos durante 3-5 segundos.	Concordância *(0=Não faço exercícios de fortalecimento do pavimento pélvico; 1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*

Por favor responda a cada uma das seguintes afirmações de acordo com a escala fornecida.

Health Action Process Approach – Urinary Incontinence (HAPA-UI)

Dimensão	Item	Escala de resposta
Perceção de Risco (para o self) (3-15)	**1.** Qual considera ser a sua probabilidade de um dia vir a ter uma Incontinência Urinária mais grave, ou problemas associados à mesma, se não adotar estratégias que ajudem a gerir eficazmente a sua Incontinência Urinária atual (ex., fazer exercícios de fortalecimento do pavimento pélvico)?	Probabilidade *(1 – "extremamente improvável"; 2 – "pouco improvável"; 3 – "nem improvável, nem provável"; 4 – "provável"; 5 – "extremamente provável")*
Perceção de Risco (para os outros)	**2.** Qual considera ser a probabilidade de uma mulher da sua idade, com o seu peso e altura, vir um dia a ter uma Incontinência Urinária mais grave, ou problemas associados à mesma, se não adotar estratégias que ajudem a gerir eficazmente a sua Incontinência Urinária atual (ex., fazer exercícios de fortalecimento do pavimento pélvico)?	
Perceção de Risco (vulnerabilidade relativa)	**3.** Comparando-se com mulheres da sua idade, com o seu peso e altura, qual considera ser a SUA probabilidade de um dia vir a ter uma incontinência urinária mais grave, ou problemas associados à mesma, se não adotar estratégias que ajudem a gerir eficazmente a sua Incontinência Urinária atual (ex., fazer exercícios de fortalecimento do pavimento pélvico)?	Probabilidade *(1 – "muito abaixo da média"; 2 – "abaixo da média"; 3 – "na média"; 4 – "acima da média"; 5 – "muito acima da média")*
Perceção de Gravidade – gravidade geral	**4.** Qual considera ser a gravidade da Incontinência Urinária na meia-idade sem a adoção de estratégias que a ajudem a gerir eficazmente (ex., fazer exercícios de fortalecimento do pavimento pélvico)?	Gravidade *(1 – "nada grave"; 2 – "pouco grave"; 3 – "moderadamente grave"; 4 – "grave"; 5 – "muito grave")*
Perceção de Gravidade – gravidade individual	**5.** Quão grave é, para a sua saúde, ter Incontinência Urinária (na meia-idade)?	Gravidade *(1 – "nada grave"; 2 – "pouco grave"; 3 – "moderadamente grave"; 4 – "grave"; 5 – "muito grave")*

Planeamento da Ação (5-25)	**6.** Algumas pessoas adotam estratégias para gerir a Incontinência Urinária (e.g., fazer exercícios de fortalecimento do pavimento pélvico), enquanto outras não. E você? Já tenho planos concretos sobre… **7.**..que estratégias específicas vou adotar para gerir a minha Incontinência Urinária (ex., fazer exercícios do pavimento pélvico). **8.**..onde vou implementar essas estratégias para gerir a minha Incontinência Urinária (ex., no trabalho, em casa, no trânsito). **9.**..quando vou adotar essas estratégias para gerir a minha Incontinência Urinária (ex., quando estiver na minha pausa da manhã, quando estiver na cama). **10.**..como vou implementar as estratégias para gerir a minha Incontinência Urinária (ex., em que posição devo contrair os músculos do pavimento pélvico, durante quanto tempo, quanto tempo devo esperar entre cada contração). **11…**com quem vou adotar as estratégias de gestão da minha Incontinência Urinária (ex., com amigas, com o meu parceiro/a, com a minha fisioterapeuta).	Concordância *(1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*
Planeamento de *Coping* (5-25)	Há diversas situações que dificultam a adoção/manutenção de estratégias de gestão da Incontinência Urinária (ex., fazer exercícios de fortalecimento do pavimento pélvico). Algumas pessoas fazem planos para lidar com estas situações, enquanto outras não. E você? Já tenho panos concretos sobre... **12.**..o que fazer em situações difíceis, para continuar a manter as estratégias de gestão da minha Incontinência Urinária. **13.**..como manter as estratégias de gestão da minha Incontinência Urinária (ex., se quando fizer os exercícios, ocorrer um imprevisto e não os conseguir fazer no horário planeado, arranjo um horário alternativo no mesmo dia).	Concordância *(1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*

	14...como organizar a minha rotina para minimizar o risco de não conseguir gerir eficazmente a minha Incontinência Urinária. **15.**..como deverei lidar com a recaída, ou seja, o que deverei fazer se deixar de aplicar as estratégias de gestão da minha Incontinência Urinária durante algum tempo. **16.**..o que fazer se as pessoas à minha volta não utilizarem também estratégias para gerirem a sua Incontinência Urinária.	
Expetativas de Resultados Positivas (8-45)	Se adotar estratégias que a ajudem a gerir melhor a sua Incontinência Urinária (ex., fazer exercícios de fortalecimento do pavimento pélvico) o que acha que poderá acontecer? **17.** Irei melhorar a minha saúde. **18.** Irei diminuir as minhas perdas de urina. **19.** Sentir-me-ei melhor psicologicamente. **20.** Irei irritar menos a minha bexiga. **21.** Sentirei satisfação e prazer ao fazê-lo. **22.** Irei prevenir que as perdas de urina se agravem. **23.** Sentir-me-ei melhor fisicamente. **24.** Os outros ao meu redor irão ver que me preocupo com a minha saúde.	Concordância *(1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*
Autoeficácia de Ação (10-50)	Algumas pessoas sentem que é difícil adotar estratégias de Incontinência Urinária (ex., fazer exercícios de fortalecimento do pavimento pélvico, mudar o estilo de vida) e outras pessoas acham que é fácil. E você? Acredito que consigo fazer algo para gerir a minha Incontinência Urinária numa fase inicial, mesmo se... **25.**..tiver de ter um plano de exercícios do pavimento pélvico detalhado. **26.**..tiver de procurar ajuda especializada (ex., ginecologista, fisioterapeuta). **27.**..estiver cansada e não me apetecer fazer os exercícios de fortalecimento do pavimento pélvico. **28.**..tiver de aprender muito sobre Incontinência Urinária.	Concordância *(1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*

	29...tiver de estar sempre atenta em diversas situações do meu quotidiano. **30.**..não tiver muito suporte social inicialmente. **31.**..tiver de mudar diversos hábitos enraizados. **32.**..for financeiramente dispendioso. **33.**..os outros ao meu redor não o façam. **34.**..isso implicar mudar de rotinas.	
Autoeficácia de Manutenção (5-25)	Depois de começar a adotar estratégias de gestão de Incontinência Urinária (ex., fazer os exercícios de fortalecimento do pavimento pélvico, mudar o estilo de vida), é importante manter este hábito ao longo do tempo. Sente-se confiante na sua capacidade para manter este hábito? Acredito que consigo manter as estratégias para gerir a minha Incontinência Urinária, mesmo se… **35.**..precisar de bastante tempo para desenvolver as rotinas necessárias. **36.**..tiver de recomeçar várias vezes até conseguir. **37.**..estiver preocupada com outros aspetos da minha vida. **38.**..os outros ao meu redor não alterarem os seus hábitos de prática de exercícios de fortalecimento do pavimento pélvico. **39.**..demorar muito tempo até ver os resultados desejados.	Concordância *(1– "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*
Autoeficácia de Recuperação (3-15)	Se ficasse algum tempo sem adotar estratégias de gestão de Incontinência Urinária (ex., fazer exercícios de fortalecimento do pavimento pélvico, mudança de estilo de vida), acredita que conseguiria voltar a implementá-las? Acredito que conseguiria voltar a implementar estratégias de gestão de Incontinência Urinária, mesmo se… **40.**..tivesse passado alguns dias sem o fazer. **41.**..tivesse passado muitos dias sem o fazer. **42.**..tivesse passado algumas semanas sem o fazer.	Concordância *(1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*
Intenção (3-15)	Durante a próxima semana, qual é a sua intenção de adotar estratégias de gestão de Incontinência Urinária (ex., fazer exercícios de fortalecimento do pavimento pélvico)?	Concordância *(1 – "discordo totalmente"; 2 – "discordo*

	43. Tenciono passar a implementar estratégias de gestão de Incontinência Urinária de hoje em diante. **44.** Daqui para a frente, tenho a intenção de implementar estratégias gestão de Incontinência Urinária regularmente. **45.** Pretendo implementar estratégias de gestão de Incontinência Urinária todos os dias.	*parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*
Controlo da Ação (4-20)	Algumas pessoas conseguem controlar o seu comportamento no sentido de concretizarem as suas intenções de adotarem estratégias de gestão de Incontinência Urinária (ex., fazer exercícios do pavimento pélvico), enquanto outras pessoas não. E você? **46.** Atualmente, avalio diariamente o meu comportamento para verificar se estou a implementar estratégias de gestão de Incontinência Urinária. **47.** Tenho sempre presente a intenção de adotar estratégias de Incontinência Urinária. **48.** Esforço-me por agir de acordo com as minhas intenções de adotar estratégias de gestão de Incontinência Urinária. **49.** Tenho tido sempre consciência das estratégias que são necessárias para conseguir gerir a minha Incontinência Urinária.	Concordância *(1 – "discordo totalmente"; 2 – "discordo parcialmente"; 3 – "não concordo, nem discordo"; 4 – "concordo parcialmente"; 5 – "concordo totalmente")*

Escala de Autoestima de Rosenberg (0-30)

Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

Item	Escala de resposta
1. De um modo geral, estou satisfeita comigo própria.	Concordância *(0 – "discordo totalmente"; 1 – "discordo parcialmente"; 2 – "não concordo, nem discordo"; 3 – "concordo parcialmente"; 4 – "concordo totalmente")*
2. Por vezes, penso que não presto.	
3. Sinto que tenho algumas boas qualidades.	
4. Sou capaz de fazer coisas tão bem como a maioria das outras pessoas.	

5. Sinto que não tenho motivos para me orgulhar de mim própria.	
6. Por vezes, sinto-me uma inútil.	
7. Sinto que sou uma pessoa de valor.	
8. Deveria ter mais respeito por mim própria.	
9. De um modo geral, sinto-me uma fracassada.	
10. Tenho uma boa opinião de mim própria.	

ICIQ-IU (0-21)

Responda por favor às seguintes perguntas sobre como tem passado, em média, nas últimas 4 semanas.

	Nunca	Uma vez por semana ou menos	2 ou 3 vezes por semana	Uma vez por dia	Várias vezes por dia	Sempre
1. Com que frequência perde urina?	0	1	2	3	4	5

	Nada	Uma pequena quantidade	Uma quantidade moderada	Uma grande quantidade
2. Gostaríamos de saber a quantidade de urina que pensa que perde (quer use proteção ou não).	0	2	4	6

3. De que forma perder urina interfere com o seu quotidiano?

Nada 0 1 2 3 4 5 6 7 8 9 10 Extremamente

4. Quando é que perde urina?

	Nunca	Uma vez por semana	2 ou 3 vezes por semana	Uma vez por dia	Várias vezes por dia	Sempre
Perco urina quando tusso ou espirro.	0	1	2	3	4	5
Perco urina durante o sono.	0	1	2	3	4	5
Perco urina durante a atividade física/exercício.	0	1	2	3	4	5
Perco urina quando acabo de urinar e já estou vestida.	0	1	2	3	4	5
Perco urina por nenhuma razão óbvia.	0	1	2	3	4	5
Perco urina constantemente.	0	1	2	3	4	5

WHOQOL (26-130)

Escolha a opção que melhor se adequa ao seu caso, considerando as **últimas duas semanas.**

	Muito Má	Má	Nem Boa nem Má	Boa	Muito Boa
1. Como avalia a sua qualidade de vida?	1	2	3	4	5

	Muito Insatisfeita	Insatisfeita	Nem Satisfeita nem Insatisfeita	Satisfeita	Muito Satisfeita
2. Até que ponto está satisfeita com a sua saúde?	1	2	3	4	5

	Nada	Pouco	Nem muito nem pouco	Muito	Muitíssimo
3. Em que medida as suas dores físicas a impedem de fazer o que precisa de fazer?	1	2	3	4	5
4. Em que medida precisa de cuidados médicos para fazer a sua vida diária?	1	2	3	4	5
5. Até que ponto gosta da vida?	1	2	3	4	5
6. Em que medida sente que a sua vida tem sentido?	1	2	3	4	5
7. Até que ponto se consegue concentrar?	1	2	3	4	5

8. Em que medida se sente segura no seu dia-a-dia?	1	2	3	4	5
9. Em que medida é saudável o seu ambiente físico?	1	2	3	4	5

	Nada	Pouco	Moderadamente	Bastante	Completamente
10. Tem energia suficiente para a sua vida diária?	1	2	3	4	5
11. É capaz de aceitar a sua aparência física?	1	2	3	4	5
12. Tem dinheiro suficiente para satisfazer as suas necessidades?	1	2	3	4	5
13. Até que ponto tem fácil acesso às informações necessárias para organizar a sua vida diária?	1	2	3	4	5
14. Em que medida tem oportunidade para realizar atividades de lazer?	1	2	3	4	5

	Muito Má	Má	Nem boa nem Má	Boa	Muito Boa
15. Como avaliaria a sua mobilidade [capacidade para se movimentar e deslocar por si própria]?	1	2	3	4	5

	Muito insatisfeita	Insatisfeita	Nem satisfeita nem insatisfeita	Satisfeita	Muito Satisfeita
16. Até que ponto está satisfeita com o seu sono?	1	2	3	4	5
17. Até que ponto está satisfeita com a sua capacidade de desempenhar as atividades do seu dia a dia?	1	2	3	4	5
18. Até que ponto está satisfeita com a sua capacidade de trabalho?	1	2	3	4	5
19. Até que ponto está satisfeita consigo própria?	1	2	3	4	5

20. Até que ponto está satisfeita com as suas relações pessoais?	1	2	3	4	5
21. Até que ponto está satisfeita com a sua vida sexual?	1	2	3	4	5
22. Até que ponto está satisfeita com o apoio que recebe dos seus amigos?	1	2	3	4	5
23. Até que ponto está satisfeita com as condições do lugar em que vive?	1	2	3	4	5
24. Até que ponto está satisfeita com o acesso que tem aos serviços de saúde?	1	2	3	4	5
25. Até que ponto está satisfeito com os transportes que utiliza?	1	2	3	4	5

	Nunca	Poucas vezes	Algumas vezes	Frequentemente	Sempre
26. Com que frequência tem sentimentos negativos, tais como tristeza, desespero, ansiedade ou depressão?	1	2	3	4	5

EC (13- 65)

Por favor, assinale a frequência com que utilizou cada uma das estratégias indicadas para gerir perdas de urina.

	Nunca	Raramente	Algumas vezes	Muitas vezes	Todos os dias/Sempre
Estratégias Defensivas (9-45)					
1. Ir muitas vezes à casa de banho, mesmo sem vontade, de forma a manter a bexiga vazia.	1	2	3	4	5
2. Procurar de imediato onde é a casa de banho quando chega a um local desconhecido.	1	2	3	4	5
3. Reduzir a ingestão de líquidos.	1	2	3	4	5
4. Evitar ir a locais onde desconhece a localização das casas de banho.	1	2	3	4	5

5. Ficar mais tempo em casa de forma a evitar situações desconfortáveis.	1	2	3	4	5
6. Limitar a atividade física.	1	2	3	4	5
7. Antes de se deslocar a um local desconhecido, tentar saber onde se situam as casas de banho.	1	2	3	4	5
8. Limitar as saídas sociais.	1	2	3	4	5
9. Limitar atividades, como viajar, que requerem estar longe da casa de banho durante um longo período.	1	2	3	4	5

	Nunca	Raramente	Algumas vezes	Muitas vezes	Todos os dias/sempre
Estratégias de ocultação (4-20)					
11. Usar pensos femininos. (higiénicos)	1	2	3	4	5
12. Usar outros materiais absorventes (tais como papel higiénico, lenços de papel ou toalhas de papel).	1	2	3	4	5
13. Usar cores ou roupas escuras que escondam as manchas.	1	2	3	4	5
14. Usar saias e casacos compridos para cobrir as manchas.	1	2	3	4	5

Tratamento para a Incontinência Urinária

1. Toma medicação para a Incontinência Urinária? Sim ___ Não ___ Qual? _____
2. Faz atualmente exercícios para fortalecimento do pavimento pélvico (ex., exercícios Kegel), para a Incontinência Urinária? Sim ___ Não ___
3. Já se submeteu a uma cirurgia para recuperação da Incontinência Urinária? Sim ___ Não ___
4. Já alguma vez falou com o seu médico sobre a sua incontinência urinária? Sim ___ Não ___
4.1. Se sim, qual foi a recomendação? _____

KHQ (range score 19-86)

Por favor marque com um círculo, como tem passado, em média, nas últimas 4 semanas.

1. Como descreveria o seu atual estado de saúde?

Muito bom	Bom	Neutro	Mau	Muito mau
1	2	3	4	5

2. De que modo o seu problema de bexiga afeta a sua vida?

Nada	Um Pouco	Moderadamente	Muito
0	2	4	6

Responda, por favor, a cada questão escolhendo a resposta que melhor se aplica a si.

	Nada	Um Pouco	Moderadamente	Muito
3. De que maneira o seu problema de bexiga afeta as suas tarefas domésticas, como limpar a casa, fazer compras, etc.?	1	2	3	4
4. De que modo o seu problema de bexiga afeta o seu trabalho ou suas atividades diárias fora de casa?	1	2	3	4
5. O seu problema de bexiga afeta as suas atividades físicas, tais como andar, correr, praticar desporto(s), fazer ginástica, etc.?	1	2	3	4
6. O seu problema de bexiga afeta as suas viagens?	1	2	3	4
7. O seu problema de bexiga limita a sua vida social?	1	2	3	4
8. O seu problema de bexiga limita os contactos estabelecidos com os seus amigos?	1	2	3	4

	Não se aplica	Nada	Um pouco	Moderadamente	Muito
9. O seu problema de bexiga afeta o relacionamento com o/a seu/sua parceiro/a?	1	2	3	4	5
10. O seu problema de bexiga afeta a sua vida sexual?	1	2	3	4	5
11. O seu problema de bexiga afeta a sua vida familiar?	1	2	3	4	5

	Nada	Um Pouco	Moderadamente	Muito
12. O seu problema de bexiga faz com que se sinta deprimida?	1	2	3	4
13. O seu problema de bexiga faz com que se sinta nervosa?	1	2	3	4
14. O seu problema de bexiga faz com que se sinta mal consigo mesma?	1	2	3	4

	Nunca	Às vezes	Frequentemente	Sempre
15. O seu problema de bexiga afeta o seu sono?	1	2	3	4
16. Sente-se esgotada ou cansada?	1	2	3	4

Alguma destes comportamentos corresponde ao que faz? Se sim, com que regularidade?

	Nunca	Às vezes	Frequentemente	Sempre
17. Usa forros ou pensos para se manter seca?	1	2	3	4
18. Tem cuidado com a quantidade de líquidos que ingere?	1	2	3	4
19. Troca a sua roupa interior porque está molhada?	1	2	3	4
20. Preocupa-se com a possibilidade de cheirar a urina?	1	2	3	4
21. Fica envergonhada por causa do seu problema de bexiga? (item adicionado)	1	2	3	4

Escolha apenas aqueles problemas que tem **atualmente**. Quanto é que os seguintes problemas a afetam?

	Não se Aplica	Um Pouco	Moderadamente	Muito
22. Frequência: Ir muitas vezes à casa de banho.	1	2	3	4
23. Noctúria: Levantar-se à noite para urinar.	1	2	3	4
24. Urgência: Uma forte dificuldade em controlar a vontade de urinar	1	2	3	4
25. Incontinência de Urgência: Perda de urina associada a uma vontade muito grande de urinar	1	2	3	4
26. Incontinência de Esforço: Perda de urina associada a atividade física (ex., tossir, correr).	1	2	3	4
27. Enurese nocturna: Molhar a cama à noite.	1	2	3	4
28. Incontinência Coital: Perda urinária durante relações sexuais.	1	2	3	4
29. Infeções urinárias.	1	2	3	4
30. Dor na bexiga.	1	2	3	4
31. Desconforto ao urinar.	1	2	3	4

IS (5-25)

Assinale a sua concordância ou discordância selecionado o número que melhor corresponde à sua resposta.

	Discordo totalmente	Discordo	Concordo	Concordo totalmente
1.Ter Incontinência faz-me recusar convites para sair ou estar com amigos/família.	1	2	3	4
2. Sinto-me frequentemente isolada dos outros.	1	2	3	4
3. As perdas de urina fazem-me sentir mal comigo mesma.	1	2	3	4
3. Sinto-me incompreendida pelos outros.	1	2	3	4
5. Evito conhecer pessoas novas.	1	2	3	4

IPQ (0-80)

Coloque um círculo à volta do número que melhor corresponde à sua maneira de pensar**:**

1. Qual o grau em que a sua Incontinência Urinária afeta a sua vida? Não me afeta nada **0 1 2 3 4 5 6 7 8 9 10** Afeta gravemente a minha vida
2. Quanto tempo pensa que vai durar a sua Incontinência Urinária? Muito pouco tempo **0 1 2 3 4 5 6 7 8 9 10** Para sempre
3. Qual o grau de controlo que sente que tem sobre a sua Incontinência Urinária? Nenhum controlo **0 1 2 3 4 5 6 7 8 9 10** Tenho muitíssimo controlo
4. Até que ponto pensa que um tratamento pode ajudar a sua Incontinência Urinária? Não vai ajudar nada **0 1 2 3 4 5 6 7 8 9 10** Vai ajudar muitíssimo
5. Qual o grau em que sente sintomas da sua Incontinência Urinária? Nenhum sintoma **0 1 2 3 4 5 6 7 8 9 10** Muitos sintomas graves
6. Qual o grau de preocupação que tem com a sua Incontinência Urinária? Nada preocupada **0 1 2 3 4 5 6 7 8 9 10** Extremamente preocupada
7. Até que ponto sente que compreende a sua Incontinência Urinária? Não compreendo **0 1 2 3 4 5 6 7 8 9 10** Compreendo muito bem
8. Até que ponto a sua Incontinência Urinária a afeta emocionalmente (ex., fá-la sentir-se zangada, assustada)? Não me afeta **0 1 2 3 4 5 6 7 8 9 10** Afeta-me muitíssimo emocionalmente

QUID

Escala de Frequência de Incontinência Urinária

Instruções: Assinale qual a frequência com que cada situação descrita ocorre consigo, considerando a seguinte escala:

0 – Nunca 1 – Raramente 2 – De vez em quando 3 – Frequentemente 4 – A maior parte do tempo 5 – Sempre

Item	Situação	0	1	2	3	4	5
1	Quando tosse ou espirra? *(Esforço)*						
2	Quando se curva ou levanta algo? *(Esforço)*						
3	Quando anda depressa, corre ou faz exercício? *(Esforço)*						
4	Enquanto se despe para usar o sanitário? *(Urgência)*						
5	Quando sente uma vontade súbita e forte de urinar e perde urina antes de chegar ao WC? *(Urgência)*						
6	Tem de correr para a casa de banho devido a uma vontade súbita de urinar? *(Urgência)*						

Pontuação total por subtipo:
- Esforço (Itens 1, 2, 3): pontuação de 0 a 15
- Urgência (Itens 4, 5, 6): pontuação de 0 a 15

Appendix O. Social Media Advertising

Appendix P. Informed Consent (Portuguese)

Intervenção PURI-PRO
Minimização/Tratamento da Incontinência Urinária

Consentimento Informado

Informação sobre o Estudo

O PURI-PRO (Portuguese URinary Incontinence PROject – Symptoms impact and eHealth Intervention for Menopausal Women with Urinary Incontinence) é um estudo no âmbito do Doutoramento na especialidade de Psicologia da Saúde, da responsabilidade da doutoranda Marta Porto (William James Center for Research, ISPA - Instituto Universitário), com a orientação da Prof. Doutora Filipa Pimenta (ISPA – Instituto Universitário), a coorientação da Prof. Doutora Teresa Mascarenhas (Faculdade de Medicina da Universidade do Porto) e do Prof. Doutor João Marôco (Ispa – Instituto Universitário), financiado a nível nacional pela Fundação para a Ciência e Tecnologia (2020.05710.BD). Esta investigação foi aprovada pela Comissão de Ética do Ispa – Instituto Universitário (referência D/022/11/2019). Este estudo tem como objetivo contribuir para um maior bem-estar em mulheres portuguesas com sintomas de Incontinência Urinária durante a pré, peri e pós-menopausa.

Natureza e objetivos da intervenção

A intervenção PURI-PRO "Portuguese URinary Incontinence PROject" é um estudo experimental, que tem por base dois modelos de mudança comportamental (Common-Sense Model e Health Action Process Approach) e técnicas de mudança comportamental (BCT´s). Os objetivos desta intervenção são (1) minimização e tratamento dos sintomas de Incontinência Urinária, (2) promover adaptação funcional à Incontinência Urinária no quotidiano, (3) promoção de bem-estar psicológico, (4) promoção de conhecimentos, competências e comportamentos relacionados com a gestão funcional e eficaz dos sintomas de Incontinência Urinária, (4) alteração de crenças e estratégias disfuncionais e promoção de estratégias comportamentais funcionais associadas à mudança comportamental e adesão terapêutica, e (5) promoção de autoeficácia e autoestima.
Esta será uma intervenção exclusivamente online (suportada através de canais digitais). Todo o delineamento da intervenção, assim como os materiais partilhados em cada sessão, estão suportados pela literatura científica.

Quem pode participar nesta intervenção

Podem participar nesta investigação todas as pessoas que preencham os seguintes critérios:
(1) Mulheres de nacionalidade portuguesa ou dupla nacionalidade;

(2) Mulheres com idades compreendidas entre os 40 e os 65 anos;
(3) Mulheres que tenham perdas de urina (sem estarem associadas a gravidez e/ou até 6 meses pós-parto);
(4) Mulheres que tenham acesso à internet e à plataforma Zoom (se necessário, a investigadora responsável pelo estudo poderá ajudar na instalação do programa Zoom).

É solicitado o preenchimento de um questionário inicial de triagem, para verificação de elegibilidade para a participação no estudo, de acordo com os critérios de inclusão acima mencionados. Estarão excluídas do estudo todas as mulheres que não preencham um ou mais dos critérios de inclusão e ainda mulheres que (1) tenham realizado cirurgia para Incontinência Urinária, (2) tenham alguma doença neurológica, (3) tenham alguma doença oncológica, (4) tenham alguma Perturbação de Abuso de Substâncias. Todas as participantes, preencham ou não os critérios de inclusão, serão contactadas por email (com a informação da inclusão ou exclusão na intervenção) e caso necessário serão encaminhadas.

O que é que acontece se preencher os critérios de inclusão e se decidir participar no estudo?
Receberá um email depois de preencher o questionário de triagem. Caso seja elegível para participar na intervenção e o queira fazer, o procedimento envolve a distribuição aleatória das participantes por um de dois grupos – grupo experimental e grupo de controlo.

Grupo Experimental e Grupo de Controlo
As participantes do grupo experimental terão acesso a todos os materiais informativos que serão partilhados (de forma gratuita), baseados em modelos teóricos e técnicas de mudança comportamental, assim como às 8 sessões de grupo (online, em horário combinado), com uma duração de 2 meses.
As participantes do grupo de controlo terão acesso a um folheto informativo sobre literacia em saúde. Assim que terminar o tempo de avaliação para ambos os grupos, todas as participantes do grupo de controlo poderão integrar a intervenção a que o grupo experimental teve acesso e beneficiar de todos os materiais informativos e das sessões de grupo, caso seja do seu interesse, e de forma gratuita.

Momentos de Avaliação
Sendo que se pretende avaliar a eficácia desta intervenção psicológica, o PURI-PRO tem vários momentos de avaliação ao longo do tempo (estudo longitudinal), que se dividem:
(1) Primeiro momento de avaliação – preenchimento de um questionário online com a duração de cerca de 20 minutos.
Intervenção:
Grupo experimental - Entrega da intervenção (8 sessões de grupo, online, durante 8 semanas – uma sessão de 90 minutos por semana em horário combinado).
Grupo de controlo - Entrega de folheto informativo

(2) Segundo momento de avaliação - preenchimento de um questionário online com a duração de cerca de 20 minutos, quatro semanas após o início da intervenção/entrega do folheto.
(3) Terceiro momento de avaliação – preenchimento de um questionário online com a duração de 20 minutos, nove semanas após o primeiro momento de avaliação.
(4) Quarto momento de avaliação – preenchimento de um questionário online com a duração de 20 minutos, três meses após o primeiro momento de avaliação.
(5) Quinto momento de avaliação – preenchimento de um questionário online com a duração de 20 minutos, seis meses após o primeiro momento de avaliação.
É esperado que todas as participantes de ambos os grupos, grupo experimental e grupo de controlo, participem em todos os momentos de avaliação.

Benefícios Associados à Participação
A intervenção PURI-PRO pretende melhorar o bem-estar psicológico das participantes, assim como a gestão dos seus sintomas de Incontinência Urinária, e promover uma maior auto-eficácia e auto-estima.

Voucher TENA
A TENA (empresa de produtos de higiene íntima) irá oferecer um Voucher (mínimo de 25 EUROS) a todas as participantes que completarem todas as fases desta intervenção, sendo a última fase a avaliação feita aos 6 meses após o término da intervenção.
Todas as participantes do Grupo experimental e do Grupo de controlo que participem em todos os momentos da avaliação estarão aptas a receber o Voucher.

Participação voluntária
A participação é totalmente voluntária e pode desistir de participar a qualquer momento, sem que isso tenha quaisquer consequências para si.
Se concordar em participar, ser-lhe-á pedido que assine este Consentimento Informado para a participação no estudo e processamento de dados, antes de começar no primeiro momento de avaliação. A assinatura deste Consentimento destina-se a assegurar que recebeu todas as informações e que expressa livremente a sua vontade de participar. Esta assinatura não implica qualquer compromisso da sua parte para continuar o estudo, não constitui uma obrigação contratual, nem representa uma renúncia aos direitos que lhe assistem. A participação no estudo é totalmente gratuita.

Riscos associados à participação na intervenção
Alguns temas abordados poderão causar-lhe algum desconforto emocional. No entanto, a investigadora responsável é psicóloga da saúde e estará à sua disposição para a escutar, dialogar e encaminhar, se necessário.

Tratamento de Dados Pessoais

Para dar início à intervenção, que será totalmente online para todas as participantes, serão necessários os seguintes dados:

Contacto telefónico: o contacto telefónico será necessário para se poder proceder ao envio de mensagens escritas (SMS) para notificar dos momentos de avaliação. Além disso, será também utilizado para incluir a participante num grupo de "WhatsApp" (um grupo que será criado pela investigadora responsável, com outros participantes, como um espaço de partilha e troca de experiências). Só será incluída no grupo se assim o desejar. Se não quiser, não será adicionada ao grupo, e isso não terá qualquer prejuízo para si. Se quiser integrar o grupo de "WhatsApp", mas, por algum motivo, quiser sair a qualquer momento (autoexclusão), poderá fazê-lo, sem que isso tenha algum tipo de consequência para si.

Endereço de email: o endereço de email será utilizado para o envio do link de acesso à plataforma Zoom (para as reuniões semanais), assim como para a partilha dos materiais apresentados em cada sessão da intervenção. Além disso, será também utilizado para o envio do link para aceder nos momentos de avaliação e para o envio de alguma informação necessária relativa à intervenção.

Para além disto, e no primeiro momento de avaliação, ser-lhe-ão pedidos alguns dados sociodemográficos (e.g., número de filhos, escolaridade). Esta informação é importante para o sucesso do estudo.

Todos os dados pessoais adquiridos durante este estudo serão processados em total conformidade com a legislação prevista pelo Regulamento (UE) 679/2016 intitulado "Regulamento geral sobre a proteção de dados (RGPD)" que entrou em vigor em 25 de maio de 2018.

Armazenamento dos Dados: Os dados pessoais e de investigação (formulários de participação, de consentimento e questionários) serão armazenados pela investigadora responsável apenas durante o tempo necessário para atingir os fins associados ao estudo (um período máximo até 5 anos após a conclusão do estudo). Dados pessoais que já não são necessários serão anonimizados ou destruídos.

Confidencialidade

Os dados são confidenciais e serão tratados em conformidade com a legislação em vigor acima referida. Os dados fornecidos nos momentos de avaliação serão tornados não-identificáveis, ou seja, o material recolhido será anónimo e não estará ligado à identidade do participante na intervenção (será criado um código alfanumérico para cada participante). Este material será analisado e divulgado apenas em contexto científico (em congressos e/ou publicações em revistas científicas), sem nunca divulgar a sua identidade.

A informação partilhada entre os participantes do grupo experimental e a investigadora responsável será confidencial, e apenas a equipa de investigação e os participantes do grupo em questão terão acesso à informação partilhada dentro do grupo. De igual modo, solicitamos que se comprometa a garantir a confidencialidade da identidade dos restantes participantes, bem como das informações por eles partilhadas no grupo/no decorrer da intervenção.

No caso de querer sair do estudo, não serão recolhidos mais dados que lhe digam respeito.
A participação não é anónima, pois dados pessoais como nome, email e contacto telefónico serão recolhidos para fins explicados no ponto anterior. No entanto, os dados de investigação recolhidos serão posteriormente anonimizados.

Outras informações importantes
Este estudo será conduzido de acordo com as "Normas de Boas Práticas Clínicas", definidas internacionalmente e em conformidade com os princípios éticos estabelecidos na "Declaração de Helsínquia" (1964) e subsequentes revisões.
A sua participação é de extrema importância, de forma a contribuirmos para o avanço e desenvolvimento do conhecimento científico, e para que possamos intervir de forma mais eficaz e bem-sucedida na gestão dos sintomas de Incontinência Urinária e promoção de bem-estar em mulheres em fase de meia-idade com perdas de urina.
Para quaisquer questões e/ou esclarecimentos adicionais, pode contactar a Psicóloga e Investigadora Responsável, Dra. Marta Porto.

Muito obrigada!
A Equipa PURI-PRO,
Dra. Marta Porto (mporto@ispa.pt)
Prof. Dra. Filipa Pimenta
Prof. Dra. Teresa Mascarenhas
Prof. Doutor João Marôco

PURI-PRO: Portuguese URinary Incontinence PROject
Email: puripro@gmail.com

Appendix Q. Informed Consent (English)

PURI-PRO Intervention
Urinary Incontinence Improvement/Treatment

Informed Consent

Study Details

PURI-PRO (Portuguese URinary Incontinence PROject – Symptoms impact and eHealth Intervention for Menopausal Women with Urinary Incontinence) is a PhD study within the specialty of Health Psychology, under the responsability of the doctoral sudent Marta Porto (William James Center for Research, ISPA – University Institute), the guidance of Prof. Doctor Filipa Pimenta (ISPA – University Institute), the co-supervision of Prof. Doctor Teresa Mascarenhas (Faculty of Medicine – University of Porto) and Prof. Doctor João Marôco (Ispa – University Institute), and funded nationally by the Foundation for Science and Technology (2020.05710.BD). This study was approved by the Ethics Committee of Ispa University Institute (ref. D/022/11/2019). This study aims to contribute to greater well-being in Portuguese women with Urinary Incontinence symptoms during pre-, peri-, and post-menopause.

Intervention goals and nature

The PURI-PRO "Portuguese URinary Incontinence PROject" intervention is an experimental study based on two behavioural change models (Common-Sense Model and Health Action Process Approach) and behavioural change techniques (BCT's). This intervention aims to reduce and treat Urinary Incontinence symptoms and promote knowledge, skills, and behaviours associated with the functional and effective management of Urinary Incontinence symptoms.

This is exclusively an online intervention (supported through digital channels). The entire design of the intervention, as well as the materials shared in each session, is supported by the scientific literature.

Who can participate in the intervention?

Anyone who meets the following criteria can participate in the intervention:

(1) Women of Portuguese or dual nationality

(2) Women aged 40–65 years

(3) Women with urine leakage (not associated with pregnancy and/or up to six months postpartum)

(4) Women who have access to the internet and to the 'Zoom' platform (if necessary, the researcher in charge of the study can help installing the 'Zoom' program).

Anyone interested in participating in this intervention will be asked to complete an initial screening questionnaire to check their eligibility to take part in the study, in accordance with the inclusion criteria mentioned above. All women who do not meet one or more of the inclusion criteria will be excluded from the study, as will women who (1) are pregnant or within six months postpartum; (2) have undergone surgery for urinary incontinence; (3) experience active suicidal ideation; (4) have a neurological disorder that can affect bladder control; (5) have a known malignancy in the lower abdomen; (6) have a substance abuse disorder; and (7) have pelvic prolapse. All participants, whether they met the inclusion criteria, will be contacted by email (with information on their inclusion or exclusion in the intervention) and will be referred if necessary.

What happens if you meet the inclusion criteria and decide to participate in this study?
You will receive an email after completing the screening questionnaire. If you are eligible to take part in the intervention and wish to do so, the procedure involves randomly assigning the participants to one of two groups - the experimental group and the control group.

Experimental Group and Control Group
Participants in the experimental group will have access to all the information materials that will be shared (free of charge), based on theoretical models and behavioural change techniques, as well as to eight group sessions (online, at an agreed time) lasting two months.
Participants in the control group will have access to an information leaflet on health literacy. Once the evaluation period is over for both groups, all the participants in the control group will be able to participate in the intervention to which the experimental group had access and benefit from all the information materials and group sessions, if they wish, free of charge.

Evaluation Moments
As the aim is to evaluate the effectiveness of this psychological intervention, PURI-PRO has several evaluation moments over time (longitudinal study):
(1) First evaluation moment: Completion of an online questionnaire lasting approximately 20 min.
Intervention:
Experimental group: Delivery of the intervention (eight group sessions, online, for eight weeks, one 90-minute session per week at an agreed time).
Control group: delivery of information leaflets.
(2) Second evaluation moment: Completion of an online questionnaire lasting around 20 minutes, four weeks after the start of the intervention/delivery of the leaflet.
(3) Third evaluation point: Completion of a 20-minute online questionnaire nine weeks after the first evaluation point.
(4) Fourth evaluation moment: Completion of a 20-minute online questionnaire three months after the first evaluation moment.
It is expected that all the participants in both groups, the experimental group and the control group, take part in all the evaluation moments.

Benefits Associated with Participation
The PURI-PRO intervention aims to improve the management of your urinary incontinence symptoms.

TENA Voucher
TENA (an intimate hygiene products company) will offer a voucher (minimum 25 EUROS) to all participants who complete all phases of this intervention, and the last phase is the evaluation carried out 3 months after the end of the intervention.
All participants in the Experimental Group and the Control Group who take part in all stages of the evaluation will be eligible to receive the Voucher.

Voluntary participation
Participation is voluntary, and you can withdraw at any time without any consequences.
If you agree to participate, you will be asked to sign this Informed Consent for participation in the study and data processing, before starting the first evaluation moment. Signing this Consent form is intended to ensure that you have received all the information and that you freely express your willingness to participate. This signature does not imply any commitment on your part to continue with the study; it does not constitute a contractual obligation, nor does it represent a waiver of your rights. Participation in this study is free of charge.

Risks associated with taking part in the intervention
Some of the topics covered may cause you some emotional discomfort. However, the researcher in charge is a health psychologist and will be available to listen to, talk to, and guide you if necessary.

Processing of Personal Data
To start the intervention, which will be completely online for all participants, the following data will be required.

Telephone contact: the telephone contact will be necessary in order to send written messages (SMS) to notify each participant of the evaluation moments. It will also be used to include the participants in a WhatsApp group (a group that will be created by the researcher in charge, with other participants, as a space for sharing and exchanging experiences). You will only be included in the group if you wish. If you do not want to, you will not be added to the group, and this will not jeopardise your participation in the intervention in any way. If you want to join the WhatsApp group, but for some reason want to leave at any time (self-exclusion), you can do so without any consequences.

Email address: The email address will be used to send the link to access the 'Zoom' platform (for weekly meetings), as well as to share the materials presented in each session of the intervention. It

will also be used to send the link to access the evaluation moments and to send any necessary information regarding the intervention.
In addition, at the first evaluation moment, you will be asked about sociodemographic data (e.g., number of children and education level). This information is important for the success of the study.
All personal data acquired during this study will be processed in full compliance with the legislation provided by Regulation (EU) 679/2016, entitled "General Data Protection Regulation (GDPR)" which came into force on May 25, 2018.

Data Storage: Personal and research data (participation forms, consent forms, and questionnaires) will be stored by the researcher in charge for as long as necessary to achieve the purpose of the study (a maximum period of up to five years after the completion of the study). Personal data that are no longer required will be anonymised or destroyed.

Confidentiality
The data are confidential and will be processed in accordance with the above-mentioned legislation. The data provided during the evaluation will be made non-identifiable, i.e., the material collected will be anonymous and will not be linked to the identity of any participant in the intervention (an alphanumeric code will be created for each participant). This material will only be analysed and disseminated in a scientific context (in congresses and/or publications in scientific journals), without ever disclosing their identity.
The information shared between the participants in the experimental group and the researcher in charge will be confidential, and only the research team and participants in the group in question will have access to the information shared within the group. Likewise, we ask you to commit to guaranteeing the confidentiality of the identity of the other participants, as well as the information shared by them in the group/during the intervention.
If you wish to leave the study, no further data will be collected.
Participation is not anonymous, as personal data such as name, email and telephone contact will be collected for the purposes explained in the previous section. However, the collected research data will subsequently be anonymised.

Other important information
This study will be conducted in accordance with the internationally defined "Standards of Good Clinical Practice" and in compliance with the ethical principles established in the "Declaration of Helsinki" (1964) and subsequent revisions.
Your participation is extremely important, allowing us to contribute to the advancement and development of scientific knowledge, and to intervene more effectively and successfully in the management of Urinary Incontinence symptoms and the promotion of well-being in middle-aged women with urine leakage.

For any questions and/or further clarification, please contact the Psychologist and Lead Researcher, Dr. Marta Porto.

Thank you so much!

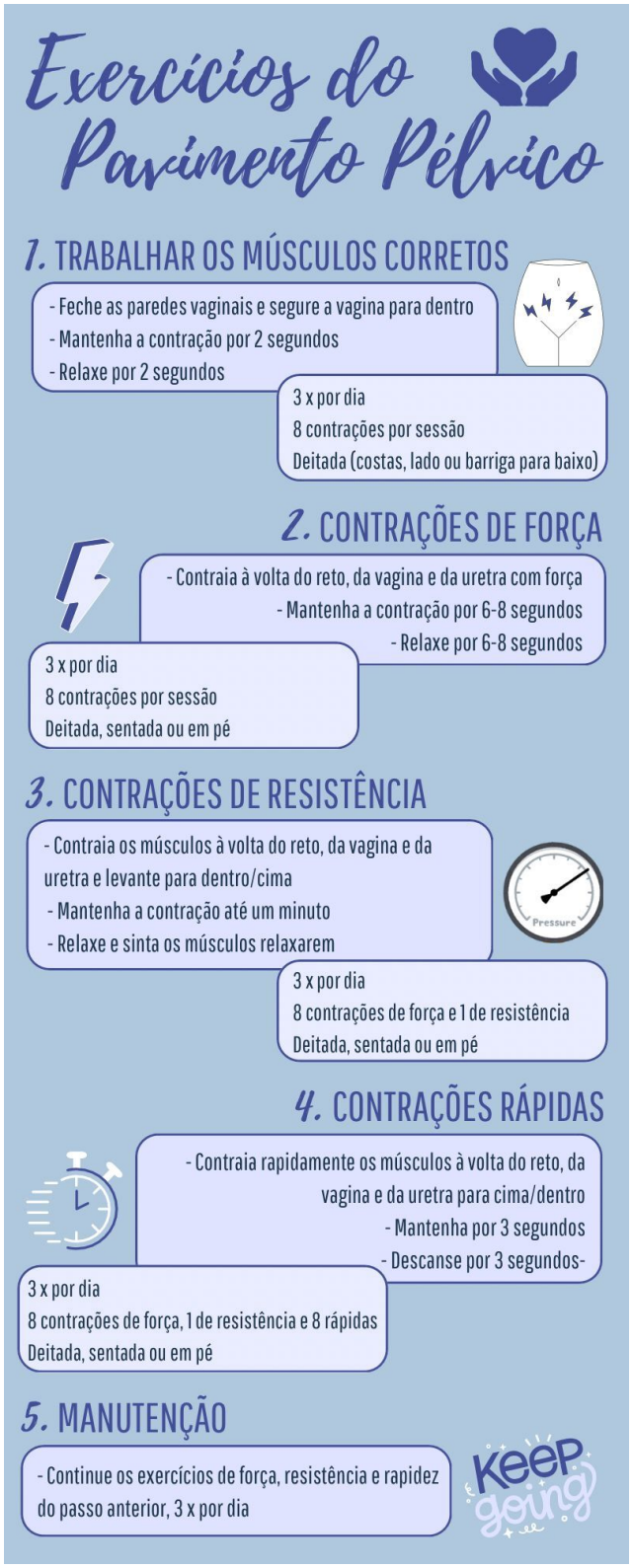
The PURI-PRO's Team,
Dra. Marta Porto (mporto@ispa.pt)
Prof. Doctor Filipa Pimenta
Prof. Doctor Teresa Mascarenhas
Prof. Doctor João Marôco

PURI-PRO: Portuguese URinary Incontinence PROject
Email: puripro@gmail.com

Appendix R. Melanoma Awareness Leaflet for the Control Group

Ferrara, G., & Argenziano, G. (2021). The WHO 2018 Classification of Cutaneous Melanocytic Neoplasms: Suggestions From Routine Practice. *Frontiers in Oncology*, *11*, 675296. https://doi.org/10.3389/fonc.2021.675296

Appendix S. Pelvic Floor Muscle Exercises (PFME) Steps Leaflet



Appendix T. Training Exercise Report

REGISTO DE EXERCICIOS

Neste registo de exercícios, pode anotar quantas vezes por dia realizou os exercícios de fortalecimento do pavimento pélvico.

Semana	Segunda	Terça	Quarta	Quinta	Sexta	Sábado	Domingo
1							
2							
3							
4							
5							
6							
7							
8							




Appendix U. Three-Day Bladder Diary

Data:

HORA	Bebidas consumidas		Número de idas à casa de banho durante a hora	Vontade intensa de urinar	Vontade ligeira de urinar	Perda acidental de urina
	Quais?	Quantidade				
Exemplo	Chá	1 chávena	-	-	1	-
	Água	2 copos	2	1	-	1
06-07h00						
07-08h00						
08-09h00						
09-10h00						
10-11h00						
11-12h00						
12-13h00						
13-14h00						
14-15h00						
15-16h00						
16-17h00						
17-18h00						
18-19h00						
19-20h00						
20-21h00						
21-22h00						
22-23h00						
23-00h00						
00-01h00						
01-02h00						
02-03h00						
03-04h00						
04-05h00						
05-06h00						

Appendix V. Experimental Group Intervention Slides