MENOPAUSE – REPRESENTATIONS, PREDICTORS AND MANAGEMENT OF VASOMOTOR SYMPTOMS, AND IMPACT ON THE COUPLE'S SEXUAL FUNCTION

Maria Rita Garoupa Albergaria Silva

Dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor in Psychology

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RESUMO

A experiência de menopausa, apesar de ser um fenómeno fisiológico natural e transversal a todas as mulheres, pode facilitar a emergência de sintomas vasomotores (SVM) e é influenciada por representações, estilos de vida, contexto sociocultural (entre outros) e, por isto, idiossincrática para cada mulher.

Assim, revelou-se pertinente o estudo das representações de menopausa através do: 1) desenvolvimento de um instrumento orientado pelo Modelo do Senso-Comum da Auto-Regulação (MSC-AR); 2) e da avaliação do casal na meia-idade. Além do estudo de preditores de gravidade percebida de sintomas de menopausa (SM) e da aplicação de uma intervenção com o objetivo de modificar e, assim, diminuir a gravidade percebida destes sintomas.

Foram realizados quatro estudos (3 transversais e descritivo-observacionais e 1 longitudinal e quase-experimental) com mulheres portuguesas com idades compreendidas entre os 45 e 65 anos. O estado, as representações e os SM constituíram variáveis comuns aos vários estudos.

Desenvolveu-se o MenoSentations-Questionnaire, um instrumento culturalmente validado, para mensurar representações de menopausa em 309 mulheres portuguesas. Foi baseado nas 5 componentes cognitivas do MSC-AR (identidade, consequências, controlo, duração e causa) e demonstrou qualidades psicométricas satisfatórias. Revelando-se útil tanto para avaliação de crenças de menopausa (des)ajustadas bem como para o delineamento de intervenções cognitivo-comportamentais (ICC) com o objetivo de melhorar a experiência de menopausa (Capítulo 2).

Sabendo que a síndrome geniturinária da menopausa (SGM) e os SVM (afrontamentos e suores noturnos) são os SM mais prevalentes e problemáticos no quotidiano das mulheres de meia-idade, e que as representações de menopausa podem determinar a gestão da SGM e, por isto, impactar no funcionamento sexual da mulher e do casal, procedeu-se à avaliação do casal de meia-idade. Explorou-se se as representações de menopausa de 28 casais Portugueses influenciavam o seu funcionamento sexual, concluindo-se que apenas as representações negativas dos homens prejudicavam o seu próprio funcionamento sexual (Capítulo 3).

Posteriormente, desenvolveu-se um modelo estrutural para compreender os preditores da gravidade percebida de SM em 505 mulheres portuguesas (com especial enfâse em comportamentos/aspetos potencialmente modificáveis de dieta e estilo de vida). Concluiu-se que mulheres com obesidade, menopausa iatrogénica, problema psicológico, utilizadoras de medicina complementar alternativa e utilizadoras frequentes de bebidas com cafeína experimentam maior gravidade de SM (Capítulo 4). Estes resultados revelaram-se pertinentes para informar a intervenção que se seguiu, no curso deste doutoramento, para a atenuação de SM.

Assim, com o intuito de atenuar a experiência problemática de SVM em mulheres portuguesas, adaptou-se a MENOS2 (ICC em grupo, eficaz na redução de SVM em mulheres inglesas) à língua e cultura portuguesa (MENOS-PT), tendo também em conta os resultados obtidos no Capítulo 2 e 4. Aplicou-se e testou-se a eficácia da MENOS-PT em 8 mulheres portuguesas, avaliando-as em 4 tempos: T0–antes da MENOS-PT; T1–após a implementação da MENOS-PT; T2–3 meses depois; T3–6 meses depois. Os resultados deste estudo piloto apontam para a diminuição da experiência problemática de SVM e da frequência de afrontamentos ao longo do tempo (T0-T3); já a frequência de suores noturnos diminuiu apenas entre T0-T2. As participantes relataram melhorias na perceção e gravidade percebida de SM, diminuição da perceção de consequências negativas (T0-T3) e maior

perceção de controlo, consciência e causa da menopausa (T0-T2). As mulheres demonstraram melhorias na qualidade de vida apenas no T1, não se verificando melhorias nas consequências positivas percebidas da menopausa, nem na qualidade de sono em nenhum dos momentos de avaliação.
Este conjunto de estudos pretendeu contribuir para melhor compreender a menopausa numa perspetiva bio-psicossocio-cultural, nomeadamente na mensuração de representações de menopausa, do seu impacto no funcionamento sexual, nos determinantes que potenciam a gravidade de SM, bem como na disponibilização de uma ICC capaz de melhorar experiências problemáticas de menopausa.

Palavras-chave: representações de menopausa; sintomas de menopausa; sintomas vasomotores; função sexual do casal; intervenção cognitivo-comportamental

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ABSTRACT

The experience of menopause, despite being a natural physiological phenomenon and transversal to all women, can facilitate the emergence of vasomotor symptoms (VMS) and is influenced by representations, lifestyles, sociocultural context (among others) and, therefore, idiosyncratic for each woman.

As such, the study of menopause representations proved to be relevant through: 1) development of an instrument guided by the Common-Sense Model of Self-Regulation (CSM-SR); 2) assessment of couples at middle-age, as well as the study of predictors of menopause symptoms' (MS) perceived severity and the application of an intervention intended to modify these predictors and, thus, decrease their perceived severity.

Four studies were carried out (3 transversal and descriptive-observational and 1 longitudinal and quasi-experimental) with Portuguese women aged between 45 and 65 years. The status, the representations and MS were variables common in all studies.

The MenoSentations-Questionnaire, a culturally validated instrument, was developed to measure representations of menopause in 309 Portuguese women. It was based on the 5 cognitive components of the CSM-SR (identity, consequences, control, duration and cause), demonstrating adequate psychometric qualities. It proved to be useful both for the assessment of (mis)adjusted menopausal beliefs as well as for delineating cognitive-behavioural interventions (CBI) aiming to improve the menopause experience (Chapter 2).

Knowing that genitourinary syndrome of menopause (GSM) and VMS (hot flushes and night sweats) are the most prevalent and problematic MS in middle-aged women's daily life, and that the representations of menopause can determine the GSM's management and, therefore, impact on women's and the couple sexual functioning, the middle-aged couples were evaluated. We explored whether 28 Portuguese couples' representations of menopause influenced their sexual functioning, concluding that only men's negative representations impaired in their own sexual functioning (Chapter 3).

Subsequently, a structural model was developed to understand the predictors of MS' perceived severity in 505 Portuguese women (with special emphasis on potentially modifiable behaviours/aspects of diet and lifestyle). It was concluded that women with obesity, iatrogenic menopause, psychological problem, alternative complementary medicine's users and frequent users of caffeinated beverages experience greater MS' severity (Chapter 4). These results proved to be relevant to guide the intervention that followed, in the course of this doctoral thesis, for MS' attenuation.

Thus, in order to alleviate the problematic VMS' experience in Portuguese women, MENOS2 (group CBI, effective in VMS's reduction in English women) was adapted to the Portuguese language and culture (MENOS-PT), taking also in consideration the results obtained in Chapter 2 and 4. The MENOS-PT was applied and their effectiveness was tested in 8 Portuguese women, evaluating them in 4 times: T0–before MENOS-PT; T1–after the implementation of MENOS-PT; T2–3 months later; T3–6 months later. The results of this pilot study revealed the decrease of problematic VMS' experience and frequency of hot flushes over time (T0-T3); the frequency of night sweats decreased only between T0-T2. Participants reported improvements in perception and perceived severity of MS, decreased perception of negative consequences (T0-T3) and greater perception of menopause's control, awareness, and cause (T0-T2). Women showed improvements in quality of life only at T1, with no improvements in the perceived positive consequences of menopause, nor in the quality of sleep at any evaluation moment.

This set of studies aimed to contribute to a better understanding of menopause based on a bio-psycho-socio-cultural perspective, namely in the measurement of menopause's

representations, its impact on sexual functioning, the determinants of exacerbation of MS' severity, as well as on the CBI availability that demonstrated improvements in problematic menopause experiences.

Keywords: menopause representations; menopause symptoms; vasomotor symptoms; modifiable predictors; couple's sexual function; cognitive-behavioural intervention.

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Chapter 1

Introduction

Introduction

1. General Overview

The menopause, or the permanent cessation of menstruation, is a universal stage of women's life and normally occurs between 46-52 years (with an overall mean of 49 years) - usually earlier in women from Africa, Latin America, Asia and the Middle East countries and later in European, Australian and American women (Schoenaker et al., 2014).

In 2020, 657 million women worldwide were aged between 45–59 years (United Nations World, 2019) (this is the age range in which natural menopause transition usually takes place). In 2030 is estimated that 1.2 billion women worldwide will be menopausal or postmenopausal, with 47 million new women per year (Hill, 1996). In Portugal, women aged 65 years old can expect to live more, on average, 21 years (Instituto Nacional de Estatística, 2021) which means Portuguese women will spend at least one-third of their lives in postmenopause.

Also, the increasing prevalence of women who had an early menopause (aged 40-45 years old) is notorious worldwide: in the past it was experienced by 1–2% of women, whereas in a recent study early menopause was reported by around 5-10% of women in high-income countries (Mishra et al., 2019). This arises concerns since early menopause has associated health implications, menopause symptoms (MS), and increased risk of comorbidities (Xu et al., 2020).

All these facts reveal that while there is an increase in women's life expectancy, there are also more women living longer in postmenopause.

The idiosyncratic early and natural menopause experience might be influenced by hormonal, psychological, sociocultural, ethnic, geographical, economic, and individual factors (Ayers et al., 2010; Monteleone et al., 2018). This results in heterogeneity regarding the type of MS' report, as well as their severity: if for 20% of women this experience is absent of menopausal distress (Gracia et al., 2018), the majority reported a significant impact in many fields of their daily-routine, namely, personal, sexual, health, leisure, social and work and, consequently, on their global quality of life (QoL) (Monteleone et al., 2018; Yoshany et al., 2021).

In addition, menopause can also have an economic impact since MS can cause, for example, an increased use of health services (Avis et al., 2009; Sharman et al., 2020) and a decreased productivity at work (Geukes et al., 2012; Griffiths et al., 2013). So the major

challenge is to improve the menopause experience and, consequently, QoL and wellbeing of these women (Hacking & Mander, 2022).

As such, the impact of these consequences of menopause-associated hormonal deficiency influences the healthy longevity of women (Davis et al., 2015; Monteleone et al., 2018). Besides, also personal and social changes (e.g., empty nest experience, having the need to provide care for elderly parents, professional demands in midlife) often coincide with this phase of women's midlife (Hunter & Smith, 2015).

In this framework, it is pertinent to: explore menopausal representations of women based on culturally adapted measures; provide evidenced-based regarding menopause, MS, their predictors (such as diet and lifestyle habits) and treatments; and facilitate appropriate strategies to control MS according to women's needs and preferences (including hormonal and non-hormonal treatment options) (British Menopause Society, n.d.).

Following the recommendations of the North American Menopause Society (2015), cognitive-behavioural therapy (CBT) interventions MENOS1 and MENOS2 are two non-hormonal treatments that have been found efficacious for MS attenuation (namely, vasomotor symptoms - VMS). In Portugal there is still a lack of culturally adapted CBT interventions whose effectiveness has been tested (Pimenta & Costa, 2021).

Hence, this doctoral thesis main objective is to contribute to the assessment of menopause representations (and their impact on sexual function) and evaluation of modifiable predictors of symptoms' severity, as well as expand the knowledge of MS management.

This doctoral thesis is divided into six chapters. Chapter 1 contemplates an introduction that addresses: general overview, the brief biological conceptualization of menopause; bio-psycho-socio-cultural approach of menopause and MS; description of MS (namely, VMS and sexual changes); and strategies for MS' attenuation (i.e., hormone replacement therapy-HRT, CBT, and other types of complementary alternative medicine-CAM). This Chapter ends with the presentation of the specific objectives of this thesis.

Chapter 2 describes the development and validation of a culturally adapted measure to assess representations of menopause in middle-aged Portuguese women (MenoSentations-Questionnaire). The questionnaire will be used to explore both men and women representations of menopause, along this study (Chapter 3).

Based on the evidence that, on one hand, women's sexual function might be impacted by their representation of menopause (e.g., believing that menopause entails

vaginal dryness and decrease in libido; or greater sexual freedom) and, on the other hand, sexual function in the couple is interdependent, a couple's study followed the previous ones. Hence, Chapter 3 investigates how the representations of menopause, held by man and woman (couples) influence their own sexual function as well as the sexual function of their partner.

The Chapter 4 explores several predictors of MS' severity which have not gathered unanimity in the literature, namely strategies for MS' management and lifestyle (including the consumption of specific food/beverages). The results will guide a group CBT intervention for MS' attenuation (integrated in the Chapter 5 of this study).

Chapter 5 regards the adaptation of MENOS2, a group CBT short intervention, to Portuguese culture and language (MENOS-PT) and applied to a small sample of Portuguese menopausal women with problematic VMS, in order to test their efficacy in a pilot study (conducted in live video online format). This intervention was structured informed by the results obtained of previous studies (namely, the ones presented in Chapters 2 and 4).

Chapter 6 presents the general discussion of the main findings and limitations, as well as recommendations for future research.

2. Menopause: a brief biological conceptualization

Menopause can occur naturally or be induced/ iatrogenic. Natural menopause (NM) is due to the loss of ovarian follicular activity, and consequent low serum estrogen levels, retrospectively identified after 12 months of amenorrhea, without any other cause identified (Sociedade Portuguesa de Ginecologia [SPG], 2021; World Health Organization [WHO], 1996). The iatrogenic menopause (IM) is earlier, consequence of removal of both ovaries (with or without hysterectomy) or due to iatrogenic ablation of ovarian function (e.g., consequence of chemotherapy) (SPG, 2021; WHO, 1996).

According to the Executive summary of the Stages of Reproductive Aging Workshop + 10 ([STRAW], Harlow et al., 2012), for healthy women, menopausal symptoms (MS) usually start a few months/ years previously to the menstruation cessation. The late reproductive stage defines the moment when fecundability starts to decrease and women's experience changes in their menstrual cycles (STRAW, Harlow et al., 2012). Perimenopause is divided in: a) early menopausal transition – when increase the changes in menstrual cycle, defined as a persistent difference of 7 days or more in the length of consecutive cycles; b) late menopausal transition – characterized by the occurrence of

amenorrhea during 60 days or more (STRAW, Harlow et al., 2012). After this occurs the menopause: the last menstrual period. Postmenopause is composed of: a) early postmenopause - corresponds to the end of perimenopause and lasts, approximately, 5-8 years and is associated with higher prevalence of menopause symptomatology (e.g., VMS) (SPG, 2021; STRAW, Harlow et al., 2012); b) late postmenopause – extends until the end of women's life (STRAW, Harlow et al., 2012). The climacteric comprises pre-, peri- and postmenopause (SPG, 2021).

3. From Bio to a Bio-psycho-socio-cultural approach of menopause and menopausal symptoms (MS)

Despite the biological aspects of menopause, this experience is very influenced by individual, psychological, social and cultural aspects (such as symptom appraisal, coping strategies, past experiences, lifestyle and sociocultural attributions of menopause) (Hunter & Rendall, 2007). Menopause is a bio-psycho-socio-cultural process, which is variable for each woman, within and between cultures (Hunter & Rendall, 2007).

Most women perceived menopause as a natural phase of their life, which has associated negative and positive implications (Araya et al., 2017; Pimenta et al., 2011; Tomás et al., 2018), but still 20% of women considered climacteric phase as a disease (MacPherson, 1981; Nusrat et al., 2008).

Cultural aspects also play a significant role on menopausal meanings (Chou & Schneider, 2012; Hunter & O'Dea, 2001; Hunter & Rendall, 2007; Monteleone et al., 2018). For European women, menopause was more frequently described as loss of fertility and the onset of bothersome symptoms than for American (US) and Japanese women (Nappi et al., 2021). Also, wide variability of MS experience is observed between studies: for Melby et al. (2011) VMS are feeling hot or sweaty, but a Study of Women's Health Across the Nation (SWAN) (Sowers et al., 2000) already included "cold sweats" and a Four Major Ethnic Groups (FMEG) study added "feeling hot or cold" (Im et al., 2006). This variability also is verified within culture, in Japan there is a wide variation in the incidence of report of hot flushes (Anderson et al., 2004; Ikeda et al., 2005) due to the absence of a consensual definition for hot flushes (Nappi et al., 2021).

The Common-Sense Model of Self-Regulation (CSM-SR) contemplates the biological processes, intrinsic to the menopause, and also allows understanding its psycho-socio-cultural aspects has been used to better understand the menopausal transition. Thus,

when women recognize a symptom, they act as a common-sense scientist and assess this symptom based on their past experiences, relatives/friends' experience, sociocultural and economic contexts (Leventhal et al., 1984; Leventhal et al., 2003; Leventhal et al., 2016).

According to the CSM-SR, when symptoms are perceived they trigger the automatic representations based on two pathways – emotional (e.g., worry/ fear) (Severtson et al., 2008) and cognitive (constructed on Identity, Control/Cure, Timeline, Cause, and Consequences) (Hunter & Mann, 2010; Leventhal et al., 2003). The Identity component corresponds to the beliefs that woman has regarding a menopause, as well as associated symptoms. Control/cure relates to the woman's perception of the condition, i.e., whether the menopause is considered to be controllable or curable through their own actions (e.g., lifestyles modification) and/or medical treatments. The Timeline concerns the perception of the duration of the condition which can be acute, chronic or cyclic/episodic. Cause refers to the individual's perception of the factors responsible for the condition, which can be biological (e.g., aging), emotional (e.g., feelings of anxiety), environmental (e.g., pollution), genetic (e.g., genetic disease), and/or behavioural (e.g., smoking habits). The Consequences refer to the perceived severity and impact of the menopause on woman's life (e.g., physical, psychological, social, occupational, and financial fields) (e.g., Benyamini, 2011; Broadbent et al., 2018; Leventhal et al., 2003).

The behaviour might be either adaptive (e.g., seeking medical assistance to manage MS) or dysfunctional (e.g., emotional eating). Since all of these steps of this model will influence women's perceived symptoms severity, as well as how their interpretation and management (Hall et al., 2007), several studies have explored menopause representations framed by CSM-SR (Chou & Schneider, 2012; Hunter & O'Dea, 2001; Pimenta et al., 2019).

Attributing symptoms to a specific condition (i.e., CMS-SR Identity) may result in mislabelling symptoms to a condition, for example, in some cases women may attribute certain symptoms to menopause and these symptoms may be related to other symptoms causes that also occur in midlife, such as stress-related to job demands and caregiving roles (Hunter & Chilcot, 2021). In addition, negative representations prior to the onset of menopause can result in a distressing menopausal experience (Ayers et al., 2010). On the other hand, menopause beliefs and attitudes tend to be more neutral or positive the older a woman is and when in postmenopause (Brown et al., 2018; Smith et al., 2011). This model emphasizes how misrepresentations of menopause can harm their own menopausal

experience, being needed interventions which are capable of modifying dysfunctional representations (Albergaria & Porto, 2021).

Besides the variability of cultural reporting of the same symptoms, it is important to consider that menopausal transition might be associated with symptoms of different nature (such as physical, psychological, sexual, among others).

4. Menopausal symptoms (MS)

Menopausal transition is associated to a host of emotional and physical changes that may or may not be related to menstrual and hormonal alterations (Hunter & Smith, 2015). The short-term MS are vasomotor symptoms (VMS - hot flushes and night sweats), sleep and emotional problems, then genitourinary menopause syndrome (GMS - such as vaginal dryness, dyspareunia, vulvaritching, and recurrent urinary tract infections), and skin changes. As long-term problems cardiovascular disease, neurocognitive problems, and osteoporosis (SPG, 2021).

The most common MS are VMS and GMS. These two MS will be further detailed in their own sections, as they are the subject of this thesis (specifically, VMS and changes in sexual function).

Besides these, women also frequently report memory and concentration difficulties, headaches, mood changes (i.e., depressive mood, irritability, and anxiety) (mood changes are triply more frequent during peri/ postmenopause than premenopause, Gracia et al., 2018; and 40% of women report depression symptoms due to menopause) (Timur & Sahin, 2010), osteoarticular aches/difficulties, sleep related-problems (the prevalence of sleep disorders is variable: 16-42% in premenopause women; 39-47% in perimenopause women; and 35-60% in postmenopause women) (Kravitz & Joffe, 2011), reduced muscle mass and dry skin (Hunter & Smith, 2015; SPG, 2021). The menopause can also increase the risk of developing other health conditions such a cardiovascular disease (Monteleone et al., 2018).

A global cross-sectional survey of women from Europe, US and Japan (Nappi et al., 2021) highlighted that the most commonly MS reported were feeling tired or worn out, osteoarticular aching, sleep difficulties and VMS. In another transcultural study, VMS are reported lower in Middle Eastern than Western countries, and European and Latin American women had mainly central nervous system symptoms (namely, mood variations, sleep problems and irritability) (Sharman et al., 2020).

A Portuguese study revealed that the three more often and severe MS were joint, lower back and muscles aches as well as feelings of lack of energy (Pimenta et al., 2012).

4.1.Vasomotor Symptoms (VMS)

VMS include two types of symptoms: hot flushes and night sweats (Nappi et al., 2021). These are the most prevalent and bothersome menopausal symptoms (MS), characterized by short, sudden feelings of heat, typically in the face, neck and chest, which can make the skin reddish and sweaty (SPG, 2021). In women with natural menopause (NM) their prevalence in early menopause transition is around 40%, with the peak in the first 2 years following to the last menstruation (60-80%) (Gracia et al., 2018), so they are more prevalent in perimenopause and in postmenopause (Pinkerton, 2020; Stuenkel, 2018).

In Western cultures about 70-80% of women are affected by VMS (Andrikoula & Prevelic, 2009; Freeman & Sherif, 2007; SPG, 2021). Around 25–30% of menopause women describe problematic VMS (i.e., with a significant negative impact on their daily-routine) (Hunter & Chilcot, 2021). Its frequency and duration are variable: 10% of women experience VMS for more than 12 years or decades (Avis et al., 2015; Avis et al., 2018; Stuenkel, 2018) and approximately one-third of women aged 65–79 years still have VMS (Zeleke et al., 2016). It is not the frequency of women experience VMS that is associated with quality of life (QoL) and help-seeking behaviours, but rather with how problematic VMS are perceived by women (Ayers & Hunter, 2013; Hunter et al., 2019). Despite of the significant disruptive and impairment that VMS caused on their lives (specifically on mood, laboral productivity, concentration, social embarrassment in relationships/ social activities and physical health) (English et al., 2021), women tend not to seek treatment for VMS, only 20–25% of menopausal women search for medical to help of manage these symptoms (Ayers & Hunter, 2013; Utian, 2005). Untreated VMS are connected with significantly greater frequency of outpatient visits as well as direct and indirect economic costs (Sarrel et al., 2015).

The prevalence of night sweats is lower than hot flushes, but night sweats could cause more impairment due to their association with sleep cycle (Hunter & Smith, 2015): a quarter of menopausal women described the experience of night sweats and referred higher motor restlessness in bed, less effective sleep and feeling tired in the next morning in comparison with women without these nocturnal symptoms (Kravitz et al., 2015) and it may interfere with psychological well-being (Friedman et al., 2005).

Women with a history of breast cancer commonly have more exacerbated VMS (Guo et al., 2019). The intensified severity of VMS in these women is justified by the oncological treatments they underwent, such as chemotherapy and by endocrine therapies (Howell et al., 2005). In addition, women who have or have had breast cancer generally are recommended to discontinue hormone replacement therapy (HRT) – which is an effective treatment to manage MS - since it may increase the risk of cancer recurrence (Hunter & Smith, 2015). These women may benefit from developing and testing the effectiveness of non-pharmacological interventions.

The aetiology of VMS may be a thermoregulatory mechanism's dysfunction, alteration of neurotransmitters' function (e.g., serotonin), and/or mechanisms associated with stress (e.g., Freedman & Krell, 1999; Leventhal et al., 2007; Shanafelt et al., 2002).

Hunter and Mann (2010), based on the Common-Sense Model of Self-Regulation (CSM-SR) (Leventhal et al., 1984), symptom perception (Cioffi, 1991; Pennebaker, 1982) and cognitive-behavioural models (Hunter, 2003), proposed a cognitive model to understand the VMS, entailing four domains:

1) Information input: the process by which estrogen withdrawal leads to the VMS occurs through central thermoregulation mechanisms. The mechanisms that maintain body temperature within the normal range of heat loss are activated and peripheral vasodilation and sweating occurs. Core body temperature is regulated between 2 temperature limits (i.e., thermoneutral zone). Women with MS may have a lowered upper threshold, resulting in a narrower thermoneutral zone, so small variations in temperature trigger peripheral thermoregulatory events such as sweating. Also, VMS triggers (e.g., stress and hot beverages) impact on thermoneutral zone, resulting in it narrower (Hunter & Mann, 2010);

2) Detection and attribution: if a hot sensation is detected it would be associated to a VMS' cognitive representation (Hunter & Mann, 2010);

3) Cognitive appraisal: this entails a symptom assessment, i.e., how severe or problematic the VMS is for women, for example, embarrassing (Carpenter, 2001; Hunter & Liao, 1995);

4) Behaviour: women's actions to self-manage VMS can be with stress and it may exacerbate the physiological response or can apply relaxation techniques as a behavioural strategy to minimize the physiological response (Hunter & Mann, 2010).

Hunter and Mann (2010) have explored more closely the cognitive, emotional and behavioural components of women when they faced problematic VMS (Rendall et al.,

2008) and concluded about the existence of typical cognitions, emotions and behaviours regarding these symptoms, for example:

1. Cognitions: automatic thoughts and beliefs encompassed negative impressions/ thoughts about women who suffer hot flushes in social contexts (e.g., thoughts such as they are unattractive); thoughts that hot flushes are unmanageable and overwhelming and unhelpful beliefs regarding night sweats and sleep (e.g., they will never get back to sleep; they will feel awful tomorrow);
2. Emotions: embarrassment, worrying, anxiety, and frustration;
3. Behaviours: attempts to cool down, refrain from activities and situations, distressing isolation, problems in communicating with other persons.

Building on this work, and mapping the cognitive and emotional patterns associated with VMS exacerbation, this team developed several cognitive-behavioural interventions (CBT) to manage this type of symptoms (e.g., MENOS1, MENOS2, MENOS@Work, and MENOS4) (e.g., Ayers et al., 2012; Mann et al., 2012; Hardy et al., 2018) which will be later presented.

Although the VMS are the most common menopause-related symptoms, sexual symptoms have also been associated with this stage of women's life.

4.2. Changes in sexual function

Female sexual function is a multidimensional phenomenon that could be affected by many biopsychological factors (Khosravi et al., 2022) and it has also been conceptualized according to the Common-Sense Model of Self-Regulation (CSM-SR). Menopausal women's representation about sexual function can determine their investment and symptoms' self-management behaviours: for certain women menopause can promote the sense of sexual freedom (Pimenta et al., 2019) and result in a maintenance/improvement of sexual function; for others menopause means a sexual retirement and hence a decrease or loss of this part of the human functioning (Clayton et al., 2018).

A significant number of women are sexually active during climacteric phase (Dąbrowska-Galas et al., 2019), although the prevalence of female sexual dysfunction is 25-63%, increasing through the menopausal transition (68-86.5%) (Heidari et al., 2019) and the peak is in postmenopause (26-85.2%) (Masliza et al., 2014; Nazarpour et al., 2018).

The typical symptoms that caused sexual impairment during menopausal process, also designated for genitourinary syndrome of menopause (GSM), are hypoactive sexual

desire, orgasmic dysfunction and dyspareunia (Simon et al., 2018; von Hippel et al., 2019). The GSM is a chronic and progressive condition that worsens over the time without treatment (contrary to vasomotor symptoms (VMS), that usually improve across the time) (Scavello et al., 2019) and, consequently, women that experience this symptomatology have less self-confidence and engage less in intimacy and coitus (Lo & Kok, 2013; Shifren, 2018; Vieira-Baptista et al., 2017).

The aetiology of sexual dysfunction throughout midlife remains unclear: if one study concluded that sexual activity decreases as consequence of problematic MS, such as VMS, sleep problems, and vaginal pain/dryness (Nappi & Nijland, 2008); other justified it with the fact of women not have a partner (Lonnèe-Hoffmann et al., 2014).

Factors such as age (i.e., being older), hormonal alterations (Dąbrowska-Galas, et al., 2019; Simon et al., 2018; Ptaszkowski et al., 2015), sex and aging negative attitudes (Avis et al., 2005; Dennerstein et al., 2005), unemployment (Zhou et al., 2019) menopausal status (namely, being in postmenopause) (Khani et al., 2021), menopausal symptoms (MS) experience (i.e., high symptoms' severity) (Dąbrowska-Galas et al., 2019; Pérez-López et al., 2012), presence of metabolic and cardiovascular comorbidities (Scavello et al., 2019), lower partner's relationship quality (Thomas et al., 2015) and lower partner's sexual function (Chedraui et al., 2014) influenced negatively menopausal women's sexual function.

It is worrying to note that a high proportion of menopausal women with sexual problems do not seek treatment (Nappi et al., 2016). These barriers may be justified by health providers lack of time for longer appointments or knowledge, personal discomfort and stereotypes about sexual demands regarding mid-aged and older women (Caruso et al., 2016).

There is still little research about male partners of middle-aged women to assess their understanding of menopause and MS (e.g., Parish et al., 2019; Simon et al., 2014) and even fewer studies focused on the mutual influences on sexual difficulties that may occur in the middle-aged couple (e.g., Štulhofer et al., 2021). For example, it is known that the presence of erectile dysfunction in the partner and, consequently, lower coital frequency may worsen MS (Chedraui et al., 2014). Therefore, further studies and the design of specific interventions entailing mid-aged couples are pertinent (e.g., Jannini & Nappi, 2018) (instead of just women).

5. Menopausal symptoms (MS) predictors

There are multiple precipitating and maintenance factors that prompt the occurrence of MS while others might have a protective effect.

Approximately 50% of hot flushes can be precipitated by some events, such as taking hot drinks, switching or increasing ambient temperature, rushing, stress and/or consumption of hot/spicy foods (Hunter & Liao, 1995).

Additionally, some sociodemographic and health status characteristics might be negatively associated with the menopause experience, namely low education level, poor general health (Noll et al., 2022), bilateral oophorectomy, diminished sexual frequency or sexual abstinence (Angelou et al., 2020), low household income, poor social support, past stressful life events (e.g., sexual abuse) (Avis et al., 2015; Gibson et al., 2019; Prairie et al., 2015) and higher parity (Chedraui et al., 2014) were found to be linked with worsened MS. Moreover, women in postmenopausal status also reported higher symptom severity (Chedraui et al., 2014; Khani et al., 2021; Pimenta et al., 2012; Zhou et al., 2019).

Ethnicity also affects how women experience menopausal transition, for example, European and Latin American women have higher prevalence of VMS than other ethnic groups (Palacios et al., 2010). In addition, European women experience more moderate/severe VMS (40%) in comparison with American (34%) and Japanese women (16%), although American women experienced each episode with a longer duration (34 minutes per episode) than European and Japanese women (both of reported 23 minutes per episode) (Nappi et al., 2021). Still in this survey, all participants, independent of their ethnicity, considered that the highly bothersome MS was weight gain (in a scale ranging from 0 – *not bothersome* to 6 – *extremely bothersome*) in US (the average level of bothersome was 4.8), in Europe (4.57), and in Japan was moderately bothersome (3.86) (Nappi et al., 2021).

Environmental aspects, such as climatic factors (i.e., higher temperatures) and altitude (i.e., lower altitude), are also associated with higher severity of MS (Hunter et al., 2013).

The literature identified some determinants of diet and lifestyle for worsen prevalence and severity of MS: higher body mass index (Hunter & Smith, 2015) or obesity (Noll et al., 2022; Thurston et al., 2008; Thurston et al., 2009); smoking (e.g., Farrell et al., 2017; Pimenta et al., 2011); alcohol consumption (e.g., Zhang et al., 2020); lack of exercise (Angelou et al., 2020); and consumption of solid fats/snacks and ultra-processed foods

(Noll et al., 2022). Regarding coffee consumption, a Portuguese study concluded that women who drank more coffee had less severe VMS than the ones who drank less coffee (Pimenta et al., 2011).

A protective effect on MS' (perceived) severity is the consumption of food rich in phytoestrogens (e.g., plants compounds with estrogen-like properties such as soy) (Carbonel et al., 2018) and in fibre (Gold et al., 2006). Also, a high intake of vegetables and fruits, one characteristic of the Mediterranean diet, might be useful in the VMS management (Barrea et al., 2021; Safabakhsh et al., 2020). Other study has corroborated this, specifically, a higher ingestion of vegetables predicted lesser intensity of VMS, depressive mood, sleep related-problems, and better quality of life (QoL) (Noll et al., 2022).

Regarding food, the literature has shown heterogeneity in the results since studies evaluate either the consumption of supplements (which may vary according to the extraction, manufacture, composition, dosage and absorption), or the consumption of certain nutrients, or even the consumption of specific foods (i.e., presence/absence of this consumption or frequency of consumption) (SPG, 2021). As such, it is difficult to conclude about the impact of certain foods on the exacerbation or not of MS or, specifically, of VMS.

The MS are a multidimensional phenomenon that may require interventions with health professionals to address changes in lifestyle, use of medications, and individual perceptions and expectations, in order to foster better health and QoL during perimenopause and postmenopause. Therefore, it is important to explore the efficacy of pharmacological and non-pharmacological options to attenuate MS (namely, VMS and negative changes on sexual function).

6. Treatment options for menopausal symptoms' (MS) attenuation

6.1.Hormonal treatments - Hormone replacement therapy (HRT)

Currently around 12 million of women in Western countries use HRT for menopausal issues, designated as primary treatment for MS (Collaborative Group on Epidemiological Studies of Ovarian Cancer, 2015). Women who take HRT are usually the ones who present more severe/intense/bothersome MS (Pimenta et al., 2011), namely moderate/severe vasomotor symptoms (VMS), genitourinary syndrome of menopause (GSM) (Stuenkel, 2015), and sexual dysfunction (Chedraui et al., 2009). This treatment is prescribed by health professionals, based on an individualised risk/benefit assessment, which may differ for each woman and over time (Vigneswaran & Hamoda, 2022).

Moreover, it is recommended that changes in lifestyle habits are implemented simultaneously with this medical approach to symptom management, such as diet, physical exercise, tobacco cessation and alcohol consumption reduction (SPG, 2021).

Some women may be unwilling or not recommended to use this therapy based on their concerns regarding these treatments' side effects and health consequences (Johnson, et al., 2019). Hence, it is pertinent to explore safe and effective non-pharmacological treatments for the management of MS, designated complementary alternative medicine (CAM) (where it is included cognitive behavioural therapy - CBT (e.g., Mann, et al., 2012; Hunter & Smith, 2014) and over-the-counter medications like herbal remedies – e.g., black cohosh, ginseng and St. John's wort) (Nappi et al., 2021). According to European Menopause and Andropause Society (2015) nowadays non-hormonal treatments for MS management are a realistic option.

6.2.Non-hormonal options for the management of menopausal symptoms (MS)

Pharmacologic options

There are non-hormonal but pharmacologic alternatives for the MS treatment, particularly for breast cancer women, such as antidepressants (e.g., Serotonin and norepinephrine reuptake inhibitor and Serotonin reuptake inhibitor) and anti-epileptic (e.g., gabapentina) that reduces the severity/frequency of VMS. Clonidine and oxybutinin can also be considered (SPG, 2021).

Non-pharmacologic options

Cognitive-Behavioural Therapy (CBT)

CBT interventions for MS (namely VMS and another MS such as sexual function, low mood, and sleep problems) will be described on table 1. These interventions are for women in menopause transition, breast cancer women with treatment-induced symptoms, and women with problematic VMS in work sphere, delivered by health professionals (either individually or in group), in the format of self-help (with the deliver of treatment book and other materials), and in online format (Hunter & Chilcot, 2021). The target of non-hormonal MS' treatments are usually only focussed on VMS (as presented on table 1). Additional strategies may be needed regarding of other troublesome MS (Roberts & Hickey, 2016), as related to GSM.

Table 1. *CBT interventions for MS (namely VMS and another MS such as vaginal dryness, low mood, and sleep problems).*

Intervention	Inclusion criteria and Design	Groups	Description of CBT intervention	Assessments Variables	Results
MENOS1 (Mann et al., 2012)	2-arm Randomised control trial (RCT) for breast cancer women with experience of 10 troublesome (or more) VMS per week.	Group CBT intervention (n=47) **vs.** usual care for breast cancer women (n=49).	Group CBT with 6-sessions, each of 90-minutes: -Menopause and VMS physiology and cognitive-behavioural model; -Individual goals identification; - Identification and modifying VMS triggers; -CBT strategies for stress management (e.g., paced breathing); -Cognitive-behavioural reactions to menopause, aging and VMS; - Information about night sweats and sleep habits; - Night sweats and sleep CBT strategies management; -Topics about vaginal dryness, body image, sexuality, breast cancer, osteoporosis and mood disturbance; - Maintenance plans.	The assessments were done at baseline, 9-, and 26-weeks post-randomization. VMS frequency and problem rating, mood, and health related quality of life.	Group CBT compared to usual care, reduce problematic VMS at 9-weeks post-randomization, and maintained 26-weeks after (p<0.0001). Additional improvements in mood, sleep, and quality of life were obtained on Group CBT.
MENOS 2 (Ayers et al., 2012)	3-arm RCT, including women with natural menopause and who experience at least 10 weekly	CBT intervention group (n=48) **vs.** self-help CBT (n=47)	Group CBT with 4-sessions, each of 2-hours, that addressed the same topics of MENOS1 with the exception of breast cancer-related contents.	The assessments were based at baseline, 9-, and 26-weeks. VMS frequency and problem rating, emotional/ physical	Group CBT and a self-help CBT demonstrated a significant reduction on problem rating of VMS at 9-weeks (p<0.001 for both groups), and at 26-weeks (p<0.001, p<0.005, respectively). Group CBT significantly reduced night

Intervention	Inclusion criteria and Design	Groups	Description of CBT intervention	Assessments Variables	Results
MENOS 2 (Ayers et al., 2012) (continuation)	problematic VMS.	**vs.** no treatment control (n=45)		function, mood, and quality of life.	sweats frequency at 6-weeks and 26-weeks (p=0.019; p=0.004, respectively) compared to no treatment control participants. Participants in self-help CBT significantly reduced night sweats frequency at 26-weeks (p=0.014) compared to the control group. Additional improvements in mood, quality of life, emotional and physical functioning for group CBT.
EVA (Duijts et al., 2012)	3-arm RCT of women with breast cancer and problematic VMS.	Group CBT + physical exercise (PE) (n=106) **vs.** only CBT (n=109) **vs.** only PE (n=104) **vs.** usual care for breast cancer women and VMS (n=103).	The CBT intervention was composed of 6-weekly sessions, each one with 90-minutes duration, in accordance with MENOS1 (Mann et al., 2012), mainly focused on VMS, but also on vaginal dryness, body image, sexuality, and mood problems. The PE program during 12-weeks, 2.5-3 hours per week, individually tailored, home-based and including a self-directed exercise program (with a physiotherapist's supervision).	Assessments were completed at baseline, 12-weeks, and 6-months later post-randomization. VMS frequency and problem rating, endocrine symptoms, sexual functioning, urinary symptoms, body image, psychological distress, and quality of life.	Improvements over time for endocrine symptoms (p=0.001), and problematic VMS (p=0.001). Intervention groups exhibited a significantly decrease in endocrine symptoms compared with the control group at 12-weeks (all p=0.001). Significant decrease in VMS problem ratings in the CBT and CBT/PE groups, but not in the PE group, regarding the control group at 12-weeks (p=0.001 in both groups) and 6-months (p=0.001 in both groups). Only CBT/PE group scored significantly better on sexual activity at 6-months (p=0.002). All 3 intervention groups had a significantly reduction their urinary symptoms (12-weeks), but only the CBT group exhibited sustained improvements in these symptoms at 6-months follow-up (p=0.007). Similarly, all 3 intervention groups showed a significantly improvement in physical functioning compared with the control group (12-weeks). But only

Intervention	Inclusion criteria and Design	Groups	Description of CBT intervention	Assessments Variables	Results
EVA (Duijts et al., 2012) (continuation)					PE group sustained physical functioning improvements for 6-months (p=0.002).
CBT for MS following breast cancer treatment (Chilcot et al., 2014)	2-arm RCT for women with breast cancer and experience of MS.	Group CBT (n=47) **vs.** care as usual (n=49).	Based on MENOS1 study (Mann et al., 2012).	The assessments were done at baseline, 9-, and 26-weeks post-randomization. VMS frequency, problem rating and possible moderators and mediators, such as sociodemographic, medical, and psychological aspects.	This CBT intervention significantly reduced the VMS at 9-weeks regardless of age, body mass index (BMI), time since breast cancer diagnosis, status of menopause at diagnosis, or oncological type treatment. The improvement was significantly greater in women not receiving chemotherapy, those with greater levels of psychological distress at baseline as well as for non-white women. Hot flushes' beliefs about control/coping were the main mediators of problem rating improvements after CBT intervention. Hot flushes' beliefs in a social situations, depressive mood, and sleep difficulties were also recognised as mediators.
Telephone-based CBT for insomnia (CBT-I) (McCurry et al., 2016) MsFLASH	2-arm RCT, including peri/ postmenopausal women with moderate insomnia symptoms and at least 2 daily hot flushes.	CBT-I (n=53) **vs.** menopause education control (MEC) (n=53)	CBT-I or MEC telephone sessions were performed during 8-weeks. Participants filled in electronic sleep diaries in all 8-weeks and also received group-specific written educational resources. The CBT-I sessions included psychoeducation regarding sleep restriction, stimulus control, sleep hygiene education, cognitive	Evaluated at baseline, 8-, and 24- weeks post-randomization. VMS frequency, problem rating and interference, insomnias, and quality of sleep.	From baseline to 8-weeks, the severity of insomnias significantly decreased in both groups (p<0.001), these significant differences were sustained at 24-weeks. The sleep quality (higher scores indicate worse sleep quality) on follow-up decreased in both groups, but more in CBT-I, with a significant difference between groups (p<0.001). These differences between groups were sustained at 24-weeks. Women in the CBT-I group were significantly more likely to have good sleep quality at 8-, and 24-weeks

Intervention	Inclusion criteria and Design	Groups	Description of CBT intervention	Assessments Variables	Results
Telephone-based CBT for insomnia (CBT-I) (McCurry et al., 2016) MsFLASH (continuation)			restructuring, and behavioural homework. MEC sessions offered menopause, and women's health information.		(p<0.001; p=0.006, respectively). There were no significant differences between both groups on hot flushes' ratings, frequency, severity, or bother at either 8- or 24-weeks. The interference of hot flushes significantly decreased at 8- and 24-weeks for those in the CBT-I group compared with those in the MEC group (p=0.03; p=0.003, respectively).
MENOS @Work (Hardy et al., 2018)	2-arm RCT designed for women with 10 or more troublesome VMS a week, at work.	Self-help cognitive behaviour therapy (SH-CBT) booklet (n=60) **vs.** waitlist control (n=64).	The SH-CBT booklet was adapted from the self-help booklet used in the MENOS2 with additional sections covering work-related stress and how to discuss menopause at work (information, exercises, and homework) to be completed over a 4-week period.	Assessments at baseline, 6- and 20-weeks post-randomization. VMS frequency and problem rating, VMS beliefs/behaviours, and work-related outcomes.	SH-CBT significantly reduced VMS problem rating at 6-weeks and at 20-weeks (p<0.001; p< 0.01). There was a significant effect on VMS frequency at 6-, and 20-weeks assessment (p<0.01; p<0.05, respectively). SH-CBT also significantly improved work, and social adjustment; sleep, menopause beliefs, VMS beliefs/behaviours at 6- and 20-weeks; improved wellbeing, somatic symptoms and reduced laboral impairment due to menopause-related presenteeism at 20-weeks, compared with control group. No differences were found between groups in other work-related outcomes.
EVA online iCBT (Atema et al., 2019)	3-arm RCT for breast cancer survivors with treatment-induced MS.	Therapist-guided iCBT (with support of therapist) (n=85) **vs.** self-managed iCBT group (without	Participants in the 2 intervention groups had access to the same 6-week iCBT program (focus on VMS, but other topics such as stress management and sleep problems).	Questionnaires were administered at baseline, at 10-, and 24- weeks post-randomization. Were measured the impact and frequency of VMS, MS, sleep	Compared with the control group, the guided and self-managed iCBT groups reported a significant decrease in the perceived impact of VMS (p=0.001) and improvements in sleep quality (p=0.001). The guided group also reported significant improvements in overall MS (p=0.003), and

Intervention	Inclusion criteria and Design	Groups	Description of CBT intervention	Assessments Variables	Results
EVA online iCBT (Atema et al., 2019) (continuation)		therapist) (n=85) **vs.** waiting list control group (n=84).	Information was provided through texts and video clips offered by experts and breast cancer survivors' women with similar MS. Participants in the guided group received a weekly written feedback throughout the 6-week period, provided by experts with access to the online entries of the women.	quality, sexual functioning, psychological distress, and health-related quality of life.	night sweats frequency (p=0.001). At 24-weeks, the the results sustained significant in guided group on VMS' perceived impact, and sleep quality; self-managed group on overall levels of MS. Longer-term changes for both intervention groups were found for hot flushes frequency.
CBT-Meno (Green et al., 2019)	Single-blind RCT for women who were seeking treatment for MS.	12-week CBT-Meno condition (n=36) **vs.** 12-week waitlist condition (n=35).	The CBT-Meno treatment was offered in 12-weekly 2-hour sessions, is a published manualized treatment (Green et al., 2012) designed to target a range of MS (i.e., VMS, depressive symptoms, sleep difficulties, anxiety, and sexual concerns).	Blind assessments were conducted at baseline, 12-weeks post-baseline, and 3-months post-treatment. VMS problem rating and interference, depressive and anxiety symptoms, sleep quality, and sexual concerns/ function.	There were significantly greater improvements in CBT-Meno compared with waitlist in VMS interference (p<0.001), and bothersomeness (p=0.04), depressive symptoms (p=0.001), sleep difficulties (p=0.001), and sexual concerns (p=0.03). Gains were maintained at 3-months post-treatment.
MENOS4 (Fenlon et al., 2020)	2-arm RCT with women with breast cancer who experience troublesome hot flushes, delivered by nurses, specialized in breast cancer.	Group CBT guided by breast cancer nurses (n=63) **vs.** usual care (n=67).	CBT group was composed of 6-weekly sessions (each one with 90-minutes). The topics of each session were based on MENOS1 (Mann et al., 2012).	Questionnaires were administered at baseline, at 9- and 26- weeks post-randomization. VMS problem rating and frequency, sleep, depression, and anxiety.	At 26-weeks mean VMS dropped by 3 in CBT and by 0.8 in usual care (p=0.039). Improvements were also found for total VMS (p=0.010), sleep (p=0.005), and depression (p=0.003).

Intervention	Inclusion criteria and Design	Groups	Description of CBT intervention	Assessments Variables	Results
Group CBT to VMS for women diagnosed with mood disorders (Conklin et al., 2020)	Single-arm study for peri/ postmenopause women with major depression/ bipolar disorder, and problematic VMS.	Group CBT (n=59).	The CBT was delivered in 6-sessions, weekly 90-minute groups in an outpatient setting. Based on MENOS2 assumptions (Ayers et al., 2012). The session 6 was adapted for the study population (i.e., psychoeducation about menopause and major depressive disorder or bipolar disorder or anxiety disorder).	Questionnaires were administered at baseline and 6-weeks post Group CBT. VMS problem rating and frequency, hot flushes interference, quality of life, psychological symptoms, and beliefs/ cognitive appraisals of menopause.	The improvements on VMS problem rating was clinically relevant for 39% of women. Changes in quality of life and hot flushes interference significantly improved at 6-weeks (p=0.001; p<0.001, respectively). The same was verified on hot flush frequency, depression, anxiety, perceived stress (p<0.001), and anhedonia (p=0.001). The control component of menopausal representations significantly improved (p<0.001).

Notes. BMI - body mass index; CBT - cognitive behaviour therapy; CBT-I - cognitive behaviour therapy for insomnia; MEC - menopause education control; MS – menopausal symptoms; PE - physical exercise; RCT - Randomised control trial (RCT); SH-CBT - Self-help cognitive behaviour therapy; VMS – vasomotor symptoms.

MENOS2

Adapting MENOS2 (Ayers et al., 2012) and testing its effectiveness in Portuguese women is one of the main objectives of this thesis. Therefore, a detailed description of this intervention is considered important.

MENOS2, randomised control trial (RCT) of group CBT, was delineated for women who are experiencing a "natural" menopause and 10 or more problematic VMS (Ayers et al., 2012). The authors defined as inclusion criteria, women: with experience of 10 or more troublesome VMS and this intense experience is the main reason for seeking help; fluent in English (spoken and written); without any major physical/ psychological problem; with availability to join the group CBT (Hunter & Smith, 2015).

To assess women's eligibility, an in-person or telephonic assessment was carried out, covering: medical, socio-demographic and lifestyle information; questions about menopause, duration, treatments and experience of MS; and questionnaires measures of hot flushes, mood, and health-related quality of life (QoL). Women were also provided the rationale of CBT intervention, brief description of the group intervention, including: ground

rules; importance of completing homework, diaries, assessments (baseline, 3- and 6-months follow-ups) and sessions (Ayers et al., 2012; Hunter & Smith, 2015).

MENOS2 is composed of 4 weekly sessions, 2 hours, that include: VMS - modifying thoughts and behaviours/ identifying and modifying triggers; improving sleep quality; stress management and lifestyles changes; problem-solving; relaxation and paced breathing. During the group sessions were used several exercises and materials, such as: PowerPoint slides; handouts about topics covered in sessions; weekly diaries; brainstorms about: cognitions, behaviours, menopausal beliefs, precipitants, stress-reduction goals, sleep goals, and relaxation/ breathing exercises and role-plays (Ayers et al., 2012; Hunter & Smith, 2015).

Although CBT is also considered a type of Complementary Alternative Medicine (CAM), it was considered pertinent detail CBT interventions for MS (which we had access) and frame other unconventional solutions (like phytoestrogens, biologically based therapies, mind-body interventions and acupuncture).

Other Complementary Alternative Medicine (CAM)

The increase of prevalence of women users of CAM therapies is shown by the Study of Women's Health Across the Nation (approximately 49% in 2002 and 80% in 2008) (Bair et al., 2008). Around 51% of women use CAM for MS management and more than 60% of these considered CAM to be a natural, effective and safe option for MS' attenuation (Posadzki et al., 2013) with no or mild side effects (Biglia et al., 2019). Another study indicated that 33% of women reported that MS had slightly improved with CAM (Nappi et al., 2021). However, the majority of these women search for options to relieve MS in online contexts and do not involve their health care providers in the decision making (Posadzki et al., 2013). This can potentiate adverse events *per se* and/or in combination with other medications (Johnson et al., 2019).

An overview about phytoestrogens and soy isoflavones, conducted by Chen and Chen (2021), have shown their efficacy in reducing the frequency of VMS and improving bone mineral density, however another study concluded that phytoestrogens and soy isoflavones had inconsistent outcomes (Guo et al., 2019).

Some biologically-based therapies, such as pollen extract, improve VMS (SPG, 2021) and a systematic literature revealed, based on 35 clinical studies and 1 meta-analysis, that isopropanolic black cohosh extract *Cimicifuga racemosa* was significantly superior for

treating neurovegetative and psychological MS compared with placebo (Castelo Branco et al., 2021). On the other hand, St. Kitts wort and ginseng are not recommended as a treatment for VMS (SPG, 2021) due to the concerns about their safety and increased risk associated with liver toxicity (Naser et al., 2011).

Regarding yoga, a systematic review and meta-analysis of 13 RCTs on 1306 women confirmed their efficacy on reduction of MS (including hot flushes), psychological and urogenital symptoms, without adverse consequences, when compared with no treatment (Cramer et al., 2018). Moreover, physical exercise can improve sleep quality, mood problems and VMS (SPG, 2021).

Hypnosis had evidenced clinically improvements in reduction of hot flushes (Johnson et al., 2019) and it is supported by meta-analysis that defended that hypnosis improves quality of life (QoL) and MS experience (i.e., frequency/severity of hot flushes) (Chiu et al., 2015).

The acupuncture on MS is effective in reducing hot flushes frequency/severity in peri and postmenopause women, besides the improvements in health-related QoL (Befus et al., 2018). The supramentionated results were analysed on a meta-analysis about the effects of acupuncture on MS (that included 3 systematic reviews and 4 RCTs). However, Consenso Nacional sobre Menopausa (SPG, 2021) did not confirm that acupuncture decreases VMS.

Since temperature is a trigger of VMS, in order to reduce it, cooling strategies have been proposed (i.e., wearing layered clothes, cotton clothing and standing away from sources of warming). But the effectiveness of these cooling strategies in VMS' attenuation is not unanimous (Carpenter et al., 2015). Despite the recent study, which explored European, American, and Japanese women who adopted lifestyle changes regarding menopause (i.e., including cooling strategies, relaxation, and increasing the level of physical exercise), reported that over half of participants experience improvements in VMS.

The non-hormonal therapies, such as lifestyle changes (e.g., physical exercise), lubricants, and moisturizers are the first line treatment in SGM (Angelou et al., 2020). Also, the introduction of pelvic floor muscle exercises significantly diminishes SGM in postmenopausal women (Koothirezhi & Ranganathan, 2021).

In sum, the menopause experience, as well as the impact of MS on women's lives, highlights the need to explore effective and culturally validated psychological solutions adjusted to middle-aged Portuguese women.

This thesis has the following specific aims: 1) contribute to the development of standard and high-quality measure that assesses women’s and their partners menopause representations, as well as their impact on the couple’s sexual function; 2) assess predictors of menopausal symptoms’ severity (MS) and 3) explore the effectiveness of a cognitive-behavioural intervention to attenuate VMS’ severity (pilot study).

7. References

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Chapter 2

Contribute to the development of standard and high-quality measure to assess menopause representations – Menopause Representations Questionnaire (MenoSentations-Q)

This chapter is based on the paper: Albergaria, R., Leal, I., Hunter, M., & Pimenta, F. (2021). Menopause Representations Questionnaire: development and validation with Portuguese women. *Climacteric, 24(*3), 275-281. Doi: 10.1080/13697137.2021.1873937.

1. Abstract

Objective: This study aimed to develop and validate a Portuguese version of the Menopause Representations Questionnaire (MenoSentations-Q), a self-report measure to assess cognitive appraisal of menopause, based on cognitive components of the Common-Sense Model of Self-Regulation and the results from a previous Portuguese qualitative study. *Methods:* A total of 309 Portuguese women, aged 45–65 years, completed the questionnaire. Factorial, convergent, discriminant, and criterion validity, as well as reliability and psychometric sensitivity, were studied. *Results:* MenoSentations-Q has demonstrated acceptable factorial, convergent, and discriminant validity, as well as good values of sensitivity and reliability for the four factors (i.e. identity; positive consequences; negative consequences; and control, awareness, and cause). Criterion validity was only obtained for two factors. *Conclusions:* MenoSentations-Q, a brief measure of menopausal representations, in this sample of Portuguese women provides information to inform interventions that might include challenging unhelpful menopausal representations. This instrument could be used in both clinical and community settings.

Keywords: Menopause Representations Questionnaire (MenoSentations-Q); menopausal representations; Portuguese women; validation and development

2. Introduction

Menopause is a universal phase in female reproductive aging. Nevertheless, wide variations are reported about menopausal perceptions and symptoms across different cultures (Hunter & Rendall, 2007).

Natural menopause (NM) is defined by the permanent cessation of menstruation due to the loss of ovarian follicular activity, retrospectively identified after 12 months of amenorrhea (Sociedade Portuguesa de Ginecologia, 2021). Iatrogenic, or surgical, menopause (IM) is the consequence of removal of the ovaries or iatrogenic ablation of ovarian function (e.g., consequence of chemotherapy) (Sociedade Portuguesa de Ginecologia, 2021). Dravta et al. (2009) have demonstrated that IM prevalence is high (22–47%) among European countries.

Menopause representations (i.e., attributions, appraisals, and beliefs) have been examined using the Common-Sense Model of Self-Regulation Model (CSM-SR) (Brown et al., 2018; Chou & Schneider, 2012, 2014; Hunter & O'Dea, 2001; Pimenta et al., 2020). The CSM-SR suggests that the cognitive representation has five components (Leventhal et al., 1984, 1998, 2003): identity (i.e. attribution of symptoms to the menopause), timeline (i.e. duration of symptomatology – acute, chronic, or cyclic), cause (i.e., beliefs about the causes of menopause/symptoms), control (i.e. ability to self-manage menopausal symptoms – preventable, curable or controllable), and consequences (i.e. severity and impact of the menopausal process on women's lives) (Chou & Schneider, 2012; Hunter & O'Dea, 2001; Pimenta et al., 2020). Based on their cognitive and emotional representations, women use a variety of strategies to cope with menopause and its symptoms, and then evaluate their effectiveness; this appraisal stage can provide information that assists women to self-regulate their symptom experience (Chou & Schneider, 2012; Leventhal et al., 1998). Representations influence the experience of menopause and how impactful and manageable its symptoms are (Hunter & O'Dea, 2001; Brown et al., 2018). Negative attitudes regarding menopause, from both women and social networks, affect women's symptom experience, and a positive menopause experience seems to influence women's attitudes (Ayers et al., 2010).

According to Fagulha et al. (2011), Portuguese women still lack information about menopause, experiencing unanticipated changes that are difficult to manage. Hunter and O'Dea (2001) were the first to measure cognitive menopausal representations, through devising and testing the Menopause Representations Questionnaire in a UK sample of

women. Using a similar qualitative and quantitative methodology, this study explores menopause representations in Portuguese women, and describes the development of a culturally adapted Menopause Representations Questionnaire measure (i.e. MenoSentations-Q), based on the cognitive components of the CSM-SR and categories that emerged from a Portuguese qualitative study (Pimenta et al., 2020), to assess their menopausal cognitive appraisal.

3. Method

Participants

This cross-sectional study used an intentional non-probabilistic sample of 309 Portuguese women aged between 45 and 65 years. Participants completed the questionnaire in both an online format (n=175) and a paper-and-pencil format (n=134). Characterization of these women is presented in Table 2.

Table 2. *Participants' characterization regarding socio-demographic and menopause characteristics.*

	Paper Format (n=134)		**Online Format (n=175)**		**Total Sample (n=309)**	
	Mean age=53.57; *SD* of age=5.86		*Mean* age=53.23; *SD* of age=5.43		*Mean* age=53.38; *SD* of age=5.61	
	n	%	*n*	%	*n*	%
Menopausal status						
Premenopausal	44	32.8	35	20	79	25.57
Perimenopausal	16	11.9	29	16.6	45	14.56
Postmenopausal	74	55.2	111	63.4	185	59.87
Type of menopause						
Natural	49	36.57	91	52	140	45.31
Iatrogenic	23	17.16	19	10.86	42	13.59
Romantic relationship						
Yes	82	61.1	127	72.6	209	67.6
No	48	35.8	47	26.9	95	30.7
Education level						
Primary	18	13.4	3	1.7	21	6.8

Middle	33	24.6	24	13.7	57	18.5
	Paper Format (n=134)		**Online Format (n=175)**		**Total Sample (n=309)**	
Education level (continuation)	*n*	*%*	*n*	%	*n*	*%*
High	48	35.8	54	30.9	102	33
University degree	34	25.4	92	52.6	126	40.8

Notes. SD, Standard Deviation

Materials

The 10-Item Cervantes Scale

The 10-Item Cervantes Scale (CS-10) was originally developed by Pérez-López et al. (2013). It was adapted and validated with a sample of Portuguese women (Pimenta et al., 2019). This measurement assesses the degree of perceived severity of menopausal symptoms (i.e. vasomotor symptoms; heart beating quickly/out of control; sleep problems; muscle and/or joint aches; lack of energy; perception of being useless; anxiety/nervousness; urinary incontinence; vaginal discomfort/dryness; skin-related changes). Each item is scored according to a 6-point Likert scale, ranging from 0 (*no symptom*) to 5 (*very severe*). Its psychometric properties were adequate both in the original and Portuguese CS-10 versions (Pérez-López et al., 2013; Pimenta et al., 2019) (Appendix A).

Sociodemographic and menopausal questionnaire

Participants also completed a self-reported socio-demographic and menopause-related questionnaire in order to characterize age, menopausal status (i.e. premenopause, perimenopause, and postmenopause, according to the Stages of Reproductive Aging Workshop Criteria) (Harlow et al., 2012), type of menopause, relationship status, and education level (Appendix A).

Procedure

Participants were recruited through both Facebook and website groups about menopause and aging, using an online questionnaire (online format). A paper-and-pencil version of the questionnaire was also distributed in community settings (e.g., organizations,

schools).

All women were first presented with information about the study (i.e. aims, inclusion criteria, voluntary participation, and researcher contact). The online format questionnaire would only become available if women agreed to participate and signed an informed consent form. Participants who completed the questionnaire in paper-and-pencil format received an open envelope with the consent form and the questionnaire. After completing the questionnaire, they were asked to return it in a sealed envelope to a research team member. Only questionnaires with a signed consent form were considered.

This research procedure was approved by the Ethical Committee of ISPA – Instituto Universitário (D/012/01/2019) and followed the standards of the Ordem dos Psicólogos Portugueses (2011) and the American Psychological Association (2003).

Menopause Representations Questionnaire (MenoSentations-Q)

Item generation

The items were developed based on different sources: literature about menopause representations; categories that emerged from semi-structured interviews in a previous study (also guided by the CSM-SR) conducted with premenopausal, perimenopausal, and postmenopausal Portuguese women (Pimenta et al., 2020); and cognitive components of the CSM-SR (e.g., Leventhal et al., 1984, 1998).

The items of the MenoSentations-Q were created in Portuguese language by two health psychologists and revised by two senior researchers with expertise in menopause. The initial version had 53 items, theoretically distributed through five factors: identity (17 items), cause (3 items), control (7 items), timeline (4 items), and consequences (22 items). The items were presented to the participants in Portuguese (the English version presented in this article was not tested and was subjected to translation by two researchers fluent in English). MenoSentations-Q is intended for use in Portuguese; it is recommended that an English version is used only after adequate procedures of independent translation and back-translation (see Appendix B for Portuguese questionnaire items).

Item format

Participants indicated their degree of agreement with each item based on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Women were asked to choose their degree of agreement regarding each statement.

Statistical and psychometric analysis

Firstly, Student's t-test was used to explore whether there were significant differences between women who completed the questionnaire in the online format and those who filled in the paper format. In the absence of difference, the sample would be considered homogeneous and treated as a single sample (independent of collection method: online and paper).

To explore the structure of the instrument, exploratory factor analysis (EFA) was performed with the Statistical Package for Social Sciences (IBM, SPSS, version 23.0; IBM, Armonk, NY, USA) using the principal components method and varimax rotation. The suitability of the data was analyzed based on the Kaiser–Meyer–Olkin test (KMO adequate when greater than 0.7 and $p < 0.05$) (Marôco, 2011). Regarding the factorial loadings, items were retained if they presented communalities above 0.3 with loadings equal to or greater than 0.5 in a particular factor and lower than 0.5 in the remaining factors. This analysis was made in 50% of the sample, selected randomly ($n = 160$). The reliability was measured through Cronbach's α (an adequate value should be higher than 0.7), and the sensitivity was explored through the minimum and maximum of each item, and the item's skewness and kurtosis (acceptable values should be $|sk| < 3$ and $|ku| < 7$) (Marôco, 2011).

Confirmatory factor analysis was performed afterward. To ascertain the goodness of fit, several indices were considered: the X^2 statistic to degrees of freedom ratio (value below 2 indicating good model fit), the comparative fit index and Tucker–Lewis index (value higher than 0.9 considered good), and the root mean square error of approximation (value less than 0.5 indicating good fit) (Marôco, 2014). AMOS software (version 18; SPSS Inc., Chicago, IL, USA) was used. The convergent validity of the measurement was analyzed through the average variance extracted (AVE) (values higher than 0.5 considered adequate) (Marôco, 2014). The discriminant validity was explored by comparing the squared correlation of inter-factors with the AVE of each individual factor (confirmed when the association between factors is lower than the individual AVE) (Marôco, 2014).

To evaluate the criterion validity, Pearson correlation was used to test whether there

were significant and strong correlations between menopausal representations (factors of MenoSentations-Q, namely identity and consequences) that are likely to be associated with symptom reporting, according to the literature (e.g., Chou & Schneider, 2014) and menopausal symptom severity (CS-10). It was expected that the higher the score for both identity and negative consequences (MenoSentations-Q), the higher the menopausal symptom severity (CS-10); on the contrary, the higher the score for positive consequences (MenoSentations-Q), the lower the menopausal symptom severity (CS-10).

Additionally, Student's t-test was also used to explore differences with regard to each factor of MenoSentations-Q between postmenopausal women who had NM and those who had IM. The sample of participants with IM numbered 42 and the median of their score for menopausal symptoms (as measured by the CS-10) was calculated. Afterward, from the total sample with NM, 42 women were randomly selected in order to present a similar menopausal symptom severity profile (assessed by the CS-10) to their counterparts with IM: 21 women above the median of CS-10 total score, and 21 women equal to or below the median. Finally, the two groups (NM and IM) were compared regarding the dimensions of MenoSentations-Q. To compare whether women with different menopausal status differed in their menopause representations (as assessed by the four factors MenoSentations-Q), one-way analysis of variance (followed by a Tukey post-hoc test) was used.

4. Results

Online versus paper format

No differences were found regarding the factors of MenoSentations-Q between women who completed the questionnaire in online format and those who did in paper-and-pencil format (identity, $t(307)=0.233$; $p=0.816$; positive consequences, $t(307)=–0.284$; $p=0.776$; negative consequences, $t(307)=1.34$; $p=0.181$; and control, awareness, and cause, $t(307)=1.494$; $p=0.136$).

Exploratory factor analysis of MenoSentations-Q

EFA was first conducted with extraction of the five factors of the CSM-SR. Since one factor only presented two items (control and timeline), the EFA was repeated with the extraction of four factors. In this analysis, 29 items were excluded since they presented lower factorial weights and values of kurtosis and skewness higher than recommended. The

sampling adequacy was confirmed by the Kaiser–Meyer–Olkin test (KMO=0.874; $p \leq 0.001$) and the total variance explained by these four factors was 58.01%.

All factors of MenoSentations-Q demonstrated adequate values of reliability (see Table 3). Also, the retained items of MenoSentations-Q presented values ranging from the minimum (equal to 1) to maximum (equal to 5) possible value. The final structure of MenoSentations-Q included 22 items, organized into four factors: identity (nine items), positive consequences (four items), negative consequences (four items), and control, awareness and cause (five items) (Table 3).

Table 3. *MenoSentations-Q's factors, items, and psychometric properties.*

Factor	Items	Mean (Standard Deviation)	Skewness; Kurtosis	Factor loadings
	Menopause is ...			
Identity α = 0.910	1. Having hot flushes (sudden heat) and/or night sweats.	3.13 (1.232)	0.139; 0.276	0.680
	2. Having changes in appearance (e.g., skin, hair, nails).	3.20 (1.156)	0.139; 0.276	0.772
	3. A trigger of new diseases.	2.96 (1.166)	0.139; 0.276	0.799
	4. Increasing weight.	3.28 (1.183)	0.139; 0.276	0.774
	5. To have pain in bones, muscles and joints.	3.32 (1.131)	0.139; 0.276	0.813
	6. To have poor sleep quality.	3.10 (1.217)	0.139; 0.276	0.743
	7. To have sexual changes (e.g., vaginal dryness, lower sexual desire).	3.33 (1.156)	0.139; 0.276	0.650
	8. Feeling more tired.	3.34 (1.137)	0.139; 0.276	0.711
	9. Feeling mood swings (e.g., more anxious, irritable and depressed).	3.19 (1.221)	0.139; 0.276	0.635
	Menopause consequences are ...			
Positive Consequences α = 0.703	10. To have more freedom to plan activities without worries.	3.41 (1.11)	0.139; 0.276	0.656
	11. Feeling physically better.	2.7 (.969)	0.139; 0.276	0.735
	12. Feeling psychologically better.	2.67 (.921)	0.139; 0.276	0.754
	13. To have more sexual freedom.	3.3 (1.075)	0.139; 0.276	0.731

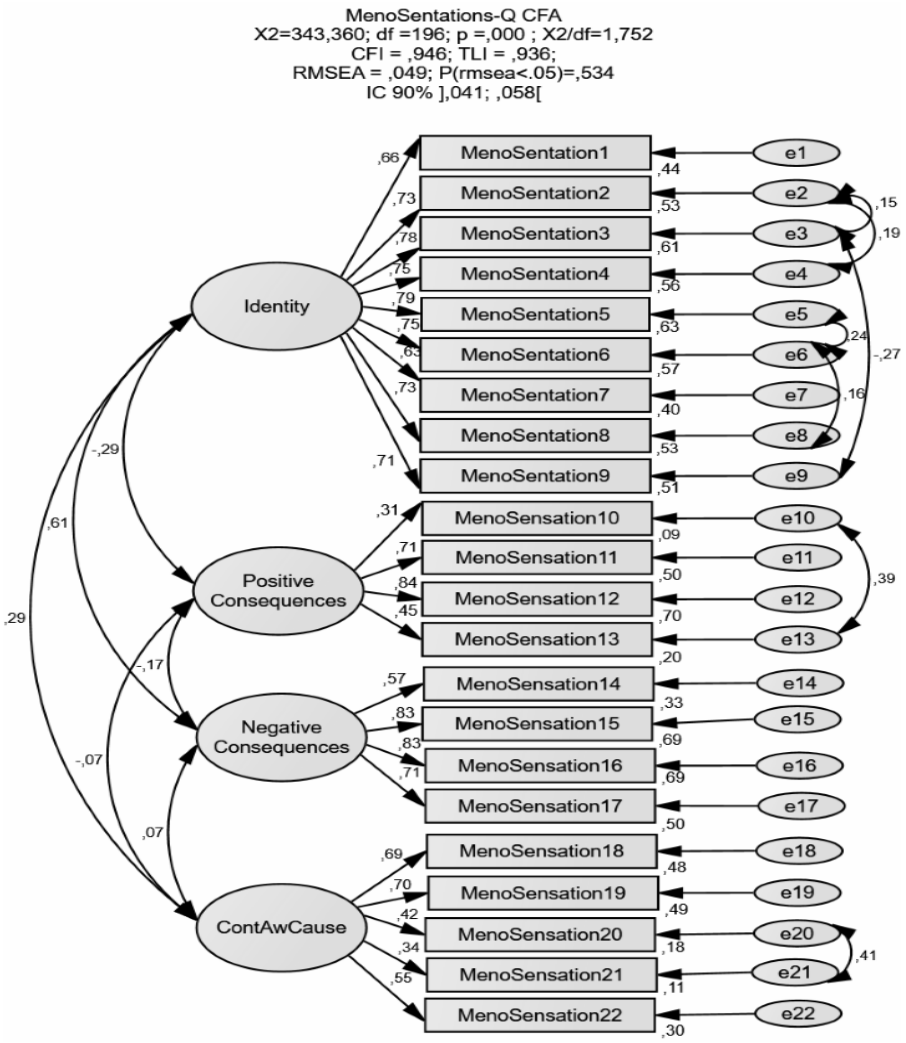
Factor	Items	Mean (Standard Deviation)	Skewness; Kurtosis	Factor loadings
Negative Consequences α = 0.820	14. To get easily sick.	2.82 (1.052)	0.139; 0.276	0.631
	15. To interfere with my work-related life.	2.5 (1.087)	0.139; 0.276	0.808
	16. To have a poorer quality of life.	2.52 (1.041)	0.139; 0.276	0.802
	17. To interfere with my family life.	2.24 (1.098)	0.139; 0.276	0.754
Control, Awareness and Cause α = 0.706	18. Menopause is a natural phase of women life.	4.39 (0.831)	0.139; 0.276	0.673
	19. Menopause is the end of reproductive phase.	4.22 (1.042)	0.139; 0.276	0.610
	20. If I can't manage my menopausal symptoms, I know I can look for medical support.	4.06 (0.851)	0.139; 0.276	0.738
	21. The lifestyle (e.g., diet, physical activity) may influence my menopausal symptoms.	3.79 (0.978)	0.139; 0.276	0.686
	22. Menopause is caused by hormonal changes.	4.35 (0.787)	0.139; 0.276	0.640

Notes. α - alpha Cronbach.

Confirmatory factor analysis of MenoSentations-Q

The measurement model (Figure 1) presented a good fit (X^2 statistic to degrees of freedom ratio=1.752; comparative fit index=0.946; Tucker–Lewis index=0.936; root mean square error of approximation=0.049; 90% confidence interval 0.041, 0.058; p=0.534).

All factorial weights were above 0.55, except item 10 (r^2=0.31), item 13 (r^2=0.45), item 20 (r^2=0.42), and item 21 (r^2=0.34). Likewise, the majority of squared multiple correlations were above 0.25, with the exception of item 10 (r^2=0.094), item 20 (r^2=0.179), and item 21 (r^2=0.113).



Notes. χ^2/df - chi-square statistic to degrees of freedom ratio; CFI - comparative fit index; ContAwCause - control, awareness, and cause; IC 90%, 90% confidence interval; RMSEA - root mean square error of approximation; TLI - Tucker–Lewis index.

Figure 1. Confirmatory factor analysis (CFA) of MenoSentations-Q.

In relation to AVE, the factors of identity (AVE=0.54), positive consequences (AVE=0.53), and negative consequences (AVE=0.56) presented adequate values. However, control, awareness and cause demonstrated an AVE below 0.5 (AVE=0.45).

Additionally, all possible relationships between factors confirmed discriminant validity (Table 4).

The criterion validity (asserted through the association between MenoSentations-Q and overall score of the CS-10) was verified for identity (r=0.305; p=0.001) and negative consequences (r=0.322; p=0.001) through a significant although weak correlation. Positive consequences (r=–0.102; p=0.073) did not show an association with the CS-10.

No differences were evident between postmenopausal women with NM versus IM

regarding the factors of MenoSentations-Q (identity, $t(82)= –0.518$; $p=0.606$; positive consequences, $t(82)=0.916$; $p=0.362$; negative consequences, $t(82)= –0.639$; $p=0.525$; and control, awareness, and cause, $t(82)= –0.1.744$; $p=0.085$). Regarding menopausal stages, there were no significant differences between participants with different menopausal status (namely, premenopause vs. perimenopause vs. postmenopause) regarding the factors of MenoSentations-Q (identity, $F(2,306)=1.059$; $p=0.348$; positive consequences, $F(2,306)=1.4$; $p=0.248$; negative consequences, $F(2,306)=0.446$; $p=0.64$; and control, awareness, and cause, $F(2,306)=2.993$; $p=0.052$).

Table 4. *Discriminant validity.*

Association between factors	Squared correlations
Identity <-> Control, Awareness and Cause	0.082
Identity <-> Positive Consequences	0.085
Negative Consequences <-> Identity	0.373
Control, Awareness and Cause <-> Positive Consequences	0.004
Control, Awareness and Cause <-> Negative Consequences	0.005
Positive Consequences <-> Negative Consequences	0.03

5. Discussion

MenoSentations-Q suggests that the CSM-SR is suitable to explain and assess menopausal representations, as supported by previous studies (Chou & Schneider, 2012, 2014; Hunter & O'Dea, 2001; Pimenta et al., 2020). The cognitive components of the CSM-SR (i.e. identity, cause, control, and consequences) are reflected in MenoSentations-Q. The only exception is timeline, which items did not meet the necessary psychometric criteria to be included in the last version of MenoSentations-Q. This has also happened in a previous study (Pimenta et al., 2020), which demonstrated that timeline (i.e. how long will menopause last) appeared less relevant for women (Hunter & O'Dea, 2001; Pimenta et al., 2020).

The component consequences appeared in this study (emerging from the EFA) in a comprehensive presentation, distinguishing positive from negative consequences, in different factors. This emphasized that women perceived positive and negative consequences associated with menopause (Hunter & O'Dea, 2001; Pimenta et al., 2020), but in a distinct way; this emphasizes that benefits toward menopause are perceived. With

regard to negative consequences, the item ‘To get easily sick’ is interesting because menopause has been associated with physical (Blumel et al., 2012; Xi et al., 2017) and emotional (Dennerstein & Soares, 2008) symptoms. Equally, another item related to menopause being disruptive to professional life (‘To interfere with my work-related life’); this is relevant as women represent a large part of labor forces in European countries and many of them will be working during their menopausal years (Griffiths et al., 2012). Several studies found that some women consider that menopause has negative effects at work (Geukes et al., 2012; Griffiths et al., 2013) and have explored strategies/policies to promote their occupational health (Griffiths et al., 2012; Hardy et al., 2018, Hardy et al 2019).

The components cause and control (also informed by the CSM-SR) in this study were aggregated into a single factor (i.e., control, awareness, and cause). This probably occurred because control and cause (as formulated in this instrument: ‘Menopause is caused by hormonal changes’ and ‘If I could not manage my menopausal symptoms, I know I can look for medical support’) were closely correlated. Perhaps knowledge of hormonal causes was more present amongst women who were aware of medical treatment options. This factor also included awareness of the menopause as a life stage and the influence of lifestyle on menopause management. Having awareness of the impact of lifestyle on menopausal symptoms is important since there are modifiable risk factors that may attenuate their severity (e.g., sedentary lifestyle has been associated with severe menopausal symptoms and obesity) (Blumel et al., 2016). Delivering health education, specifically regarding exercise and diet, to mid-aged women can promote knowledge and positive attitudes toward menopause and aging, and improve menopausal symptoms (Xi et al., 2017).

This study has several limitations. The sampling procedure (intentional non-probabilistic) does not allow generalization of our results to the Portuguese population. Also, this sample presents a high level of education (41% had a university degree) and the sub-sample who had IM was small (n=42). Thus, it would be important to explore the structure of MenoSentations-Q in future studies with larger samples of women (including participants with lower education level and with a larger subsample with IM).

This study enabled the development and validation of a brief measure of menopause representations, suitable for mid-aged Portuguese women. MenoSentations-Q has generally demonstrated factorial, convergent, discriminant, and criterion validity, as well as good values of sensitivity and reliability. MenoSentations-Q could be a useful tool in both community and clinical settings, providing information that may inform interventions.

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Chapter 3

Does mine impact yours? A dyadic study about the impact of menopause representations on couple's sexual function

1. Abstract

Introduction: The impact of menopause upon women may include hot flushes, night sweats and sleep problems but also genitourinary symptoms. However, sexual functioning in mid-aged couples is an interdependent experience, hence consideration of both middle-aged women and their partners/spouses. This study aimed at exploring the influence of menopausal cognitive representations in female/male sexual functioning of mid-aged Portuguese heterosexual couples, using actor-partner interdependence model (APIM). *Methods:* This was a cross-sectional study of 28 heterosexual couples; women were between 45 and 65 years old (M=53.00; SD=6.03). Measures included the Menopause Representations Questionnaire (MenoSentations-Q), Female Sexual Function Index-6 (FSFI-6), International Index of Erectile Function (IIEF-14), and a sociodemographic questionnaire. *Results:* Men's perceived negative consequences of menopause negatively influence their own sexual function and women's perception of menopausal symptoms marginally, but positively influence their own sexual function. *Discussion:* This study aimed to address a gap in the literature related to the study of mid-aged couples. However, the results emphasized that, in addition to menopausal representations, other couple's variables (e.g., communication about menopause and sexuality, andropause/menopause symptoms) should be studied to better understand and intervene on sexual function in middle-aged couples.

Keywords: mid-aged couple; menopausal representations; sexual function; actor-partner interdependence model (APIM).

2. Introduction

The experience of menopause is influenced by women's cognitive representations (personal experience and attribution of symptoms– e.g., presence/ severity of symptoms, beliefs as well as their interpersonal relationships) (Ayers et al., 2010). Resulting from menstrual cessation, women might perceive this as a phase of sexual freedom to plan activities without menstrual symptoms, or risk of pregnancy (Albergaria et al., 2021) and/or as a dysfunctional stage based on menopause-related negative consequences, such as low sexual interest and poor quality of life (Albergaria et al., 2021; Levine et al., 2018; Khalesi et al., 2020).

During this process women might experience menopausal symptoms (namely, genitourinary symptoms) which can impair their sexual function. Although these genitourinary symptoms may be present in around 60% of postmenopausal women, only 7% of them end to seek help for treatment (Nappi et al., 2016).

Assessing and treating sexual function difficulties or concerns in a couple requires a comprehension about both partners' responses to the problem (Gregory, 2021). Couplepause is a couple-oriented framework proposed by Jannini and Nappi (2018), which addresses the sexual health demands of the couple. This approach promotes a shared and supported adaptation to each partner's age-related physical and sexual changes.

The authors emphasise the importance of considering both menopause and andropause (or late onset hypogonadism - LOH) as significant and interdependent experiences, hence being crucial to assess not only middle-aged women/men but also their partners/spouses (Jannini & Nappi, 2018; Khalesi et al., 2020) to understand and intervene in couple-related difficulties (e.g., sexual function) impacted by meno/andropause.

There are a few studies with middle-aged and older couples that have explored the couple by dyadic data (i.e., considering both members of the couple). Two examples of these dyadic studies: a study among older couples of European Countries in regards of relationship intimacy, sexual distress, and help-seeking for sexual difficulties (Stulhofer et al., 2019) and other about middle-aged couples which evaluated the effects of health status, marital satisfaction and self-efficacy on retirement preparation (Jung & Shin, 2018).

In this sense the most appropriate approach to explore this mutual influence on couples is an actor-partner interdependence model (APIM), which enables conceptualization of how partners influence one another, while also modelling the statistical interdependence that often exists between their relationship (Kenny et al., 2006).

Therefore, this study aimed at exploring the influence of menopausal cognitive representations in female and male sexual function of 28 middle-aged Portuguese heterosexual couples, using APIM. Additionally, potential differences among dyads regarding menopause representation will be explored.

3. Method

Participants

This cross-sectional study recruited 28 heterosexual couples; female participants were aged between 45 and 65 years old (*M*=53.00; *SD*=6.03) and male partners aged from 39 to 65 (*M*=53.50; *SD*=7.00). The mean relationship duration was 24 years (range 2-38 years; *M*=23.89 years; *SD*=10.50). Overall, 26 participants had a university degree (14 women and 12 men) and 15 had finished high school (11 men and 4 women).

Materials

Data was collected using Menopause Representations Questionnaire (MenoSentations-Q), Female Sexual Function Index-6 (FSFI-6), International Index of Erectile Function (IIEF-14) and a sociodemographic questionnaire (see Appendix C).

Menopause Representations Questionnaire (MenoSentations-Q)

MenoSentations-Q is a self-report questionnaire to measure cognitive appraisal of menopause. This instrument has 22 items, distributed in 4 factors: identity (ID; composed of several symptoms, e.g., "*Menopause is having hot flushes (sudden heat) and/or night sweat*"); positive consequences (POS; entailing several positive consequences associated with menopause, e.g., "*Menopause consequences are to have more freedom to plan activities without worries*"); negative consequences (NEG; contemplated negative consequences about menopause, e.g., "M*enopause consequences are to get easily sick")*; and control, awareness, and cause (CAC; regarding menopausal knowledge towards cause, awareness and strategies to cope with menopausal symptoms, e.g., *"If I cannot manage my menopausal symptoms, I know I can look for medical support"*). The scale of response is a 5-point Likert scale, which varies from 1 (*strongly disagree*) to 5 *(strongly agree)*. The higher the score, the higher the agreement with the presence of symptoms, of positive/negative consequences, and of awareness/cause/control associated with

menopause. MenoSentations-Q has adequate psychometric properties in a sample of menopausal women (Albergaria et al., 2021).

Female Sexual Function Index-6 (FSFI-6)

The FSFI-6 (Isidori et al., 2010) is a short scale that assesses female sexual function (specifically, desire, satisfaction, arousal, pain, orgasm and lubrification). The items related to desire and satisfaction are responded on a 5-point Likert scale, ranging between 1 to 5, according to the specific construct that aim evaluated (i.e., item 1 measure sexual desire and range from 1 (*low or none at all*) to 5 (*very high*); item 5 assess satisfaction and vary from 1 (*very dissatisfied*) to 5 (*very satisfied*). Other items respond based on a 6-point Likert scale, varying from 0 to 5, also according to the construct that aim evaluated (e.g., item 6 tested pain and range between 0 (*did not attempt intercourse*) to 5 (*almost never or never*). The total score of FSFI-6 may be range from 2 to 30 points, lower scores indicated worse sexual functioning. Both the original FSFI-6 (Isidori et al., 2010) and their Portuguese versions have good psychometric properties in samples of Portuguese women (Pechorro et al., 2016; Pimenta et al., 2017).

International Index of Erectile Function (IIEF-14)

The original IIEF has 15 items (Rosen et al., 1997) and is a brief, self-administered questionnaire that evaluated: erectile function (6 items), orgasmic function (2 items), sexual desire (2 items), intercourse satisfaction (3 items) and overall satisfaction (2 items). The Portuguese version of IIEF is composed by 14 items, assessing male sexual function in the last four weeks (Quinta & Nobre, 2012). This questionnaire calculated specific indexes for each dimension, or a sexual function total index - higher scores indicated higher levels of sexual functioning. The Portuguese version of the IIEF has adequate psychometric properties (Quinta & Nobre, 2012).

Sociodemographic questionnaire

The sociodemographic questionnaire contained questions about age, educational levels and the duration of the couple's relationship.

Procedure

Couples were recruited by email, using snowball convenience sampling. The content of this email included study objectives, participants' inclusion criteria (couples: women aged 45 to 65 years and their partner - male/female) and questionnaire link. This email was sent to all researcher contacts (i.e., colleagues, relatives, friends and health professionals) encouraging their participation and/or dissemination.

The individuals who accessed the link were firstly presented with informed consent that provided study objectives, inclusion criteria and researchers' contacts. Afterwards, participants completed a sociodemographic questionnaire about their biological gender, as well as their type of relationship (e.g., homosexual or heterosexual). According to their previous responses, an instruction of an alphanumeric code was provided to ensure the correct correspondence between the members of each couple (e.g., if the individual indicated that he was male and had a heterosexual relationship, the instruction was: *Assuming that partner's name is Maria Isabel Rodrigo Casemiro Alexandre and her year of birth is 1958, the alphanumeric code that must be entered is MIRCA58 - that is, the initials of partner names and the last two digits of her birth year. Based on this example, please apply it to your case. Insert the initials of your partner's names as well as the last two digits of her year of birth).* It was reinforced that couple members should enter the same alphanumeric code for what was considered in this study.

The last question of the questionnaire asked that, if the person considered it appropriate, provide their partner's email address for sending this questionnaire. Only questionnaires with the same alphanumeric code were considered as a couple in this study.

The standards of the American Psychological Association regarding the ethical treatment of participants were taken into account (American Psychological Association, 2003; Ordem dos Psicólogos Portugueses, 2011).

Data analysis

Paired-sample T-Student tests were used to evaluate differences between women and men in relation to each dimension of the MenoSentations-Q (i.e. ID; POS; NEG; and CAC). In order to perform a dyadic analysis several steps were considered. Firstly, the original database composed for 56 individuals (28 women and 28 men) was restructured into a dyadic database, constituted for 28 couples. The variable “Couple” was used to identify the dyads. Additionally, according to the literature (Kenny & Ledermann, 2010),

there are two types of dyads: indistinguishable dyads - is not possible distinguish dyad members by any variable (e.g., homosexual couples); distinguishable dyads - is possible distinguish dyad members through a variable (e.g., biological sex in heterosexual couples). In the present study dyads were considered distinguishable based on their biological sex (i.e., men/women) and according to the three criteria of Distinguishing Variable (i.e., their means are unequal to zero; variances are unequal to zero; and differences between the correlations of variables - to correlations differ variances must be set equal for the two members). Even if the correlations are different, the effects of cross variables (e.g., actor and partner effects in the APIM) may not be different. Several models were estimated and adjusted to determine which one was most suitable. To compare models were considered the values of chi-square test (only informational due to the reduced size of sample), chi-square difference test, root mean squared error of approximation (RMSEA - less than 0.08, the model is considered well adjusted) and the sampling-error-adjusted Bayesian information criterion (SABIC – which is an index of "inadequacy of fit" with lower values indicating a better fit).

To test the non-independence of dyads, the structural equation model was used by the Lavaan program through the website https://davidakenny.shinyapps.io/Dingy/ (Kenny, 2015).

The database was converted at https://apimsem.ugent.be/shiny/apim_sem/ (Stas et al., 2018) and the assumptions were verified in order to allow the analysis of the effects (it was necessary to identify the study's dependent variable - sexual function - and the independent variable - menopausal cognitive representations - factors of MenoSentations-Q). Since there are 4 factors of MenoSentations-Q (i.e., ID; POS; NEG; and CAC) four models were built in order to calculate the impact of the representations of menopause on female/male sexual function (both Actor and the Partner Effects).

This application arises from the APIM by Kenny, Kashy, and Cook (2006) which seeks to understand how the members of a dyad influence each other, that is, the influence that a given variable has on the individual and on the other element of the dyad, with two aspects to be evaluated: 1) Actor Effect, which concerns the intrapersonal effect of a variable, i.e., the impact it has on the individual; 2) Partner Effect, which concerns the interpersonal effect, that is, the impact that a variable has on the partner (Kenny et al., 2006). The Actor Effect is the effect that its own menopausal representations has on its own sexual function. The Partner Effect is the effect that its own menopausal representations

has on his/her partner's sexual function. The analyses used structural equation modelling with maximum likelihood estimation using the Lavaan.

4. Results

Regarding ID, NEG and CAC (MenoSentations-Q factors) there were no significant differences between women and men [$t(27)=1.22$;$p=0.272$; $M_{women}=27.89$;$SD_{women}=6.28$;$M_{men}=26.3$;$SD_{men}=7.77$;$t(27)=-1.23$;$p=0.229$;$M_{women}=7.93$;$SD_{women}=3.24$;$M_{men}=9$;$SD_{men}=3.56$);($t(27)=1.229$;$p=0.23$;$M_{women}=21.04$;$SD_{women}=2.7$;$M_{men}=20.19$;$SD_{men}=4.25$]. Only MenoSentations-Q POSfactor showed a significant difference between women and men ($t(27)=2.947$; $p=0.007$; $M_{women}=10.37$;$SD_{women}=3.41$; $M_{men}=8.48$; $SD_{men}=3.4$): women perceived more positive consequences associated with menopause, then their male partners.

The distinguishability test showed that it is reasonable to conclude that dyad members are fully distinguishable ($X^2=83.647$; $df=25$; $p<0.001$).

Regarding APIM analysis, table 5 presents the fit for five models which provide different types of distinguishability.

Table 5. *Tests of different types of distinguishability*

Model	Equal means	Equal variances	Equal correlations	χ^2	*df*	*p*	RMSEA	SABIC
I	Yes	Yes	Yes	169.768	30	< 0.001	0.408	177.591
II	No	Yes	Yes	111.974	25	< 0.001	0.352	120.9
III	Yes	Yes	No	91.273	10	< 0.001	0.539	103.546
IV	No	Yes	No	50.301	5	< 0.001	0.569	63.69
V	No	No	No		0			14.504

Notes.*df* - degrees of freedom; *p* - level of statistical significance; RMSEA- root mean squared error of approximation; SABIC - sampling-error-adjusted Bayesian information criterion; χ^2 - chi square.

Tests of hypotheses of equal means, variances and correlations are demonstrated on Table 6. Regarding means of each variable (Model I *vs.* Model II) the result is statistically significant - means are unequal. The test that explores correlations (Model I *vs.* Model III) is statistically significant - correlations are unequal. Lastly, the test of variances (Model IV *vs.* Model V) is statistically significant - variances are unequal. Due to all of the models having poor fit (regarding chi-square test and RMSEA) and the SABIC is lowest for the

model of complete distinguishability (table 5), it is reasonable to conclude that dyad members are fully distinguishable.

Table 6. *Tests of hypotheses of different types of distinguishability*

	Test	χ^2	*df*	*p*
Means	I *vs* II	57.807	5	< 0.001
Correlations	I *vs* III	78.508	20	< 0.001
Variances	IV *vs* V	50.301	5	< 0.001

Notes. *df* - degrees of freedom; *p* - level of statistical significance; RMSEA- root mean squared error of approximation; SABIC - sampling-error-adjusted Bayesian information criterion; χ^2 - chi square.

Additionally, it was explored if the scores of women and men were correlated, i.e., non-independent. There were 25 correlations between their scores. There is good evidence that there is non-independence or correlation between the scores of women and men, treating dyad members as distinguishable (table 7). Despite of the three conditions of the model were validated, the values of RMSEA and SABIC demonstrated the model's lack of fit.

Table 7. *Tests of nonindependence across women and men*

	χ^2	*df*	*p*	RMSEA	SABIC	SABIC (Sat)
Distinguishable	83.647	25	< 0.001	0.289	95.527	14.504
Indistinguishable	40.558	15	< 0.001	0.247	45.021	7.81

Notes. *df* - degrees of freedom; *p* - level of statistical significance; RMSEA- root mean squared error of approximation; SABIC - sampling-error-adjusted Bayesian information criterion; χ^2 - chi square.

Table 8 presented all APIM results. Regarding Identity the actor effect for women was 0.418 (p=0.078, 95% CI [-.05, 0.88]) and was marginally significant (i.e., more experience of symptoms is predictor of better sexual function). The actor effect for men was -0.132 (p=0.207, 95% CI [-0.34, 0.07]) and was not statistically significant. Both partner effects from men to women (p=0.682, 95% CI [-0.12, 0.18]) and from women to men (p=0.187, 95% CI [-0.21, 1.05]) were not statistically significant (figure 2).

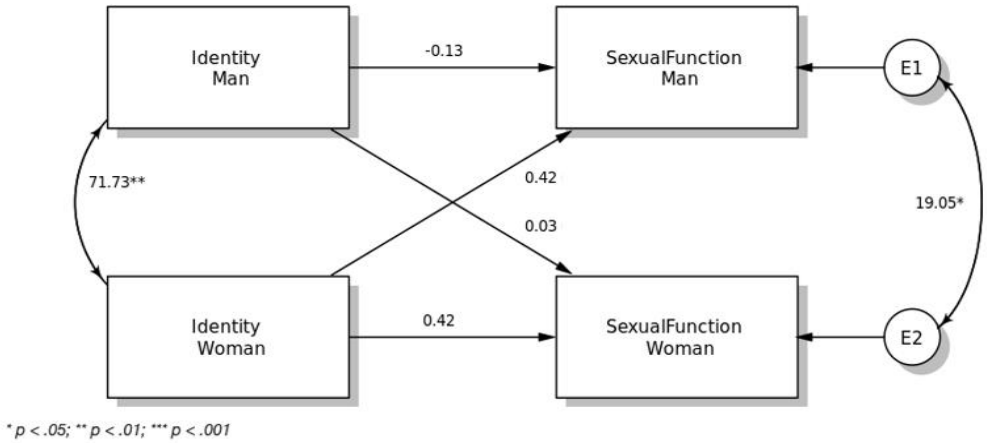


Figure 2. APIM Model of identity of menopause on sexual function.

The menopausal positive consequences demonstrated that the actor effects for the women was -0.203 (p=0.146, 95% CI [-0.48, 0.07]) and for the men was 0.029 (p=0.524, 95% CI [-0.06, 0.12]). Both of them were not statistically significant. Also, the partner effects from men to women (p=0.147, 95% CI [-0.02, 0.16]) and women to men (p=0.719, 95% CI [-0.23, 0.33]) were not statistically significant (figure 3).

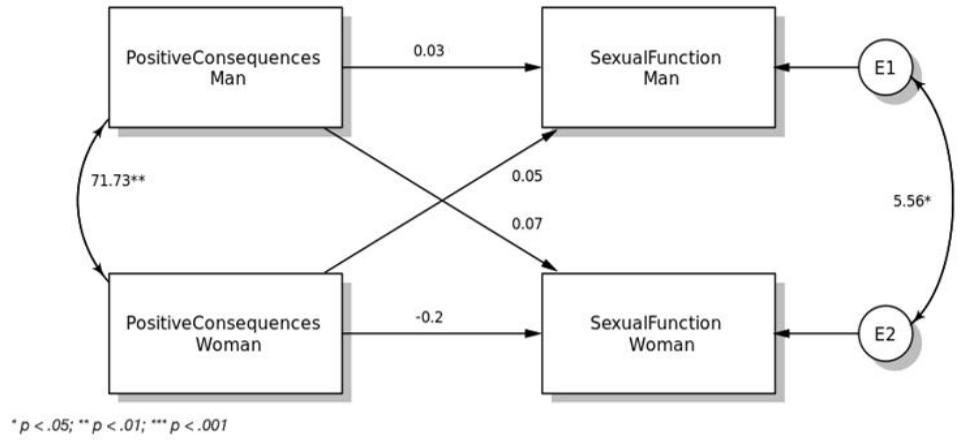


Figure 3. APIM Model of positive consequences of menopause on sexual function.

Concerning the negative consequences, the actor effect for women was 0.017 (p=0.899, 95% CI [-0.25, 0.29]) and was not statistically significant. The actor effect for men was -0.094 (p=0.032, 95% CI [-0.18, -0.01]) and was statistically significant (i.e., men who had more perceived menopausal negative consequences indicated worse sexual function). The partner effects from men to women (p=0.570, 95% CI [-0.06, 0.11]) and from women to men (p=0.884, 95% CI [-0.24, 0.28]) were not statistically significant (figure 4).

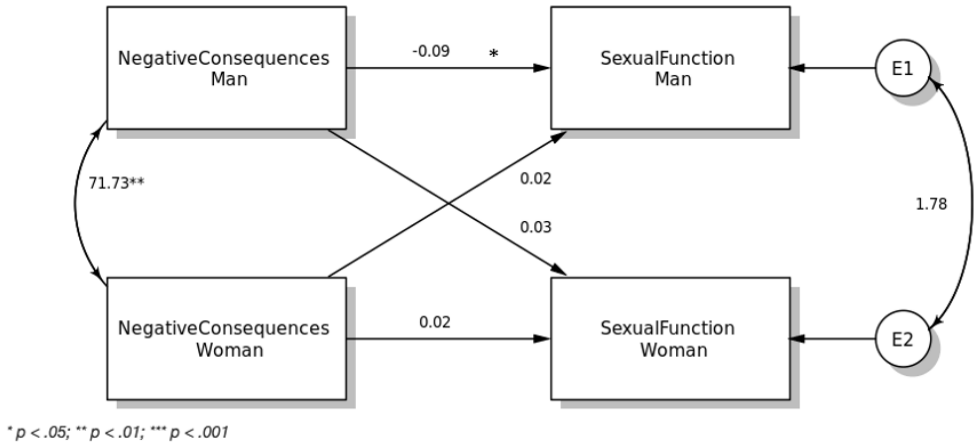
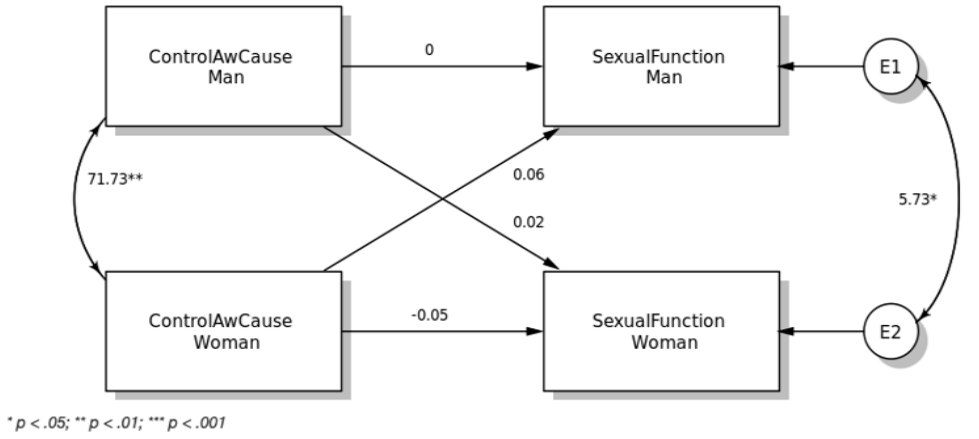


Figure 4. APIM Model of negative consequences of menopause on sexual function.

In respect of the factor of control, awareness, and cause both of the actor effects (i.e., women and men) were not statistically significant (women=-0.045; *p*=0.693, 95% CI [-0.27, 0.18]; men=0.002; *p*=0.977, 95% CI [-0.11, 0.12]). Additionally, the partner effect from men to women (*p*=0.543, 95% CI [-0.05, 0.1]) and from women to men (*p*=0.728, 95% CI [-0.29, 0.42]) were not statistically significant (figure 5).



Notes. ControlAwCause - Control, Awareness and Cause.

Figure 5. APIM Model of control, awareness and cause of menopause on sexual function.

Table 8. *APIM Models of menopausal representations in sexual function*

	Men				Women			
	R^2	β	p	r	R^2	β	p	r
Identity	0.066				0.218			
Actor		-0.132	0.207	-0.232		0.418	**0.078**	0.316
Partner		0.424	0.187	0.242		0.032	0.682	0.077
PosCon	0.053				0.082			
Actor		0.029	0.524	0.119		-0.203	0.146	-0.265
Partner		0.051	0.719	0.068		0.066	0.147	0.264
NegCon	0.215				0.028			
Actor		-0.094	**0.032**	–0.375		0.017	0.899	0.024
Partner		0.02	0.884	0.028		0.025	0.57	0.107
CAC	0.008				0.011			
Actor		0.002	0.977	0.005		-0.045	0.693	-0.074
Partner		0.063	0.728	0.066		0.023	0.543	0.114

Notes. R^2 = Coefficient of determination; β = standardized coefficient; *p = level of statistical significance; r = effect size;* PosCon - Positive Consequences; NegCon - Negative Consequences; CAC - Control, Awareness and Cause.

5. Discussion

Since menopause can bring a change to both members of the couple, this study aimed at exploring the impact of menopausal representations (both from men and women) on both members of the couple's sexual function. Perceived menopause identity (i.e., related symptoms) and negative consequences of menopause presented an impact on either partner's or own sexual function.

Men's perceived negative consequences of menopause was a predictor of their own sexual function, i.e., the more negative consequences were perceived the worse sexual

function men reported. Additionally, women's menopausal identity (marginally) predicted female sexual function: women perceiving more symptoms reported better sexual function.

Men who perceived more negative experiences associated with their partner's menopause reported poorer sexual function. It is congruent with literature since one of the main demands described by men of menopausal women is the difficulty to cope with menopausal perceived difficulties (e.g., changes in sexuality) and it has a significant role in determining the men's sexual function (Ghazanfarpour et al., 2018; Rodolpho et al., 2016) and in their marital relationship (Rodolpho et al., 2016).

Also, men's knowledge about menopause might be inadequate, since it is obtained from their friends/relatives and/or through online resources, instead of health professionals (Fasero et al., 2020). This may not challenge men's misconceptions about negative consequences of the menopause, and, subsequently, experience a less sexual function. In this sense, multidisciplinary interventions directed to the couple, focusing on menopausal changes (and others topics about men aging, e.g., andropause) have the potential to improve couple's communication, confidence and awareness towards this field, namely for men (about menopause as a natural and physiological phase, menopause symptoms, short/long-term consequences and strategies to enhance menopause symptoms management and well-being). This could be a collaborative way of managing menopause/andropause-related changes and specifically a more positive attitude with respect to menopause (Vale et al., 2017). A Spanish study demonstrated that men with a higher level of education have significantly more knowledge about menopause comparing to men with lower schooling (Fasero et al., 2020).

Our study demonstrated a marginal influence regarding women's perception of menopausal symptoms and a better (own) sexual function. This result does not support the findings of other studies, since women's poor sexual functioning has been strongly related to: poor physical health of her partner or herself; partner's sexual problems; and menopause-related symptoms (namely vaginal dryness and dyspareunia) (Harder et al., 2019).

Despite this, women's positive attitude towards sex and aging (e.g., beliefs that sex is important for well-being/ age is not an obstacle for sex), and relationship happiness were significant predictors of higher frequency of sexual activity and intercourse (Avis et al., 2009; Træen et al., 2019). Ayers, Forshaw, and Hunter (2010) sustain that women adopt different adjustments or measures in order to cope with these challenges. So protective variables that might influence a better sexual function, despite of women identifying more menopausal symptoms were: postmenopausal status, higher level of education, positive

menopausal attitudes, partner's attitudes, perception of support by partner, an adaptative communication with partner, the quality of support from medical systems (Ayers et al., 2010), as well as having an intimate partner and physical health to continue a sexual life with satisfaction. The majority of the sample has a long-term relationship (which might be an indicative of a good relationship) and were highly educated. Additionally, 20-25% of women search for medical help for menopausal symptoms relief (Ayers & Hunter, 2013; Utian, 2004) and also improving their knowledge about options for the treatment such as through lubricants and hormone replacement therapy. Given this, the particular result in this study (i.e., women's perception of menopausal symptoms and a better (own) sexual function) might be explained by the fact that women who represent menopause with more symptoms, might mobilise themselves to search for information/medical help and, consequently, have a better sexual function.

The main limitations of this study were the small size of the sample (i.e., 28 middle-aged couples who had sexual contact during the past four weeks). Thus, this investigation did not include couples who avoid sexual activity together. Also, the sampling procedure used (snow-ball) and the pandemic context (this sample was recruited during the lockdown of the pandemic caused by Covid-19) might also have an impact on the data since the pandemic brought several challenges to families, such as the (re)adjustment of daily routines and family dynamics (Goldberg et al., 2021). Lastly, the measures used to evaluate sexual function did not assessed alternative forms of expressing sexuality such as intimate touching or mutual masturbation, only evaluating penetrative sex (Ayalon et al., 2019).

This study aimed to address a gap in the literature related to the study of mid-aged couples. However, due to the model's lack of fit, other couple's variables - besides of the menopausal representations - should be studied to better understand and intervene on sexual function in middle-aged couples (e.g., communication about menopause and sexuality, andropause/menopause symptoms).

In short, the only significant result was in relation to the sexual function of men themselves - men who consider their partner's menopause to be more negative tend to have worse sexual function. Another relevant result but marginally significative was women that perceived more symptoms associated to menopause tend to have a better sexual function.

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Chapter 4

Dietary, lifestyle and menopausal factors associated with menopausal symptom severity

This chapter is based on the paper: Albergaria, R., Pimenta, F., Albergaria, M. T., & Bicudo, M.J., & Leal, I. (submitted). Are dietary and lifestyle factors associated with menopausal symptom severity? – A short report.

1. Abstract

Objective: Women have various options to manage menopausal symptoms (MS) for example, hormone replacement therapy-HRT, complementary/alternative medicine-CAM, and making changes to lifestyle habits. It is therefore pertinent to explore the influence of diet, lifestyle, menopausal status, type of menopause and MS' treatment options on women's perceived severity of menopausal-related symptoms. *Method:* A total of 505 Portuguese women, aged 45-65 years (M=53.07; SD=5.41), completed the Cervantes 10-item scale (CS-10), sociodemographic, diet, lifestyle, and menopausal questionnaires (namely, menopausal status, type of menopause, and MS' treatment options). Structural equation modelling was applied. *Results:* The structural model has acceptable fit. Significant predictors of perceived severity of MS were body mass index, induced menopause, CAM, recent psychological problems and intake of caffeine beverages. *Conclusions:* These results provide information for some modifiable MS' determinants that could inform interventions for women with moderate/ severe MS.

Keywords: menopausal symptoms severity; diet; lifestyle; health; diet; menopausal status; treatment options.

2. Introduction

Across the menopause transition and postmenopause women commonly report vasomotor symptoms (VMS), sleep changes, genitourinary syndrome, skin changes, osteoporosis, cardiovascular and neuro-cognitive symptoms (Sociedade Portuguesa de Ginecologia, 2021). While hormone replacement therapy (HRT) can relieve menopausal symptoms (MS), less is known about the impact of diet and other lifestyle factors (e.g., complementary/alternative medicine - CAM) on the severity of MS (Sociedade Portuguesa de Ginecologia, 2021).

This study aimed to explore the influence of diet, body mass index (BMI), physical and psychological health, menopausal status (pre-/peri-/post-menopause according to the Stages of Reproductive Aging Workshop Criteria–STRAW) (Harlow et al., 2012), types of menopause (i.e., natural or induced menopause) and MS' treatment options (i.e., CAM and HRT) on MS' perceived severity, in a sample of middle-aged Portuguese women.

3. Method

Participants

Cross-sectional study with 505 Portuguese women aged 45-65 years old (M=53.07; SD=5.41), recruited by an intentional non-probabilistic sample, who completed questionnaire in: online format-OF (n=281) recruitment occurred through websites/Facebook groups about menopause/aging; paper-and-pencil format-PF (n=224) recruited in community settings (e.g., cancer-related associations). Table 9 presented participants characteristics.

Table 9. *Participants characteristics.*

		Total Sample (n=505)	
		n	%
Education level			
	Primary	29	5.7
	Middle	125	24.8
	High	162	32.1
	University degree	178	35.2

	Total Sample (n=505)	
Menopausal status		
Premenopausal	139	27.6
Perimenopausal	96	19.1
Postmenopausal	268	53.3
Menopausal type		
Natural	201	75
Induced	57	21.3
BMI		
< 25 kg/m^2	207	41.2
> 25 kg/m^2	296	58.8
Treatment options for MS		
Complementary/alternative medicine-CAM	28	5.5
Hormone Replacement Therapy-HRT	20	4
Tobacco consumption		
None	386	77.2
< 5 cigarettes per day	22	4.4
6-20 per day	81	16.2
> 20 per day	11	2.2
Soy food		
None	311	61.8
1-2 per week	107	21.4
3- > 5 per week	39	7.8
1-2 per day	42	8.4
Spicy food		
None	355	71.3
1-2 per week	75	15.2
3- > 5 per week	21	4.3

		Total Sample (n=505)	
	1-2 per day	43	8.7
High-fat food			
	None	268	53.1
	1-2 per week	101	20
	3- › 5per week	51	10.1
	1-2 per day	85	16.8
Hot beverages			
	None	25	5
	1-2 per week	242	48.1
	3- › 5 per week	235	46.7
	1-2 per day	1	0.2
Caffeine beverages			
	None	72	18.9
	Occasionally	105	27.6
	1-2 per day	123	32.3
	3- › 5 per day	81	21.3
Coffee			
	None	79	17.1
	Occasionally	86	18.6
	1-2 per week	199	43
	3- › 5 per week	99	21.4
Alcohol			
	None	146	29.2
	1 or less per month	222	44
	1-2 per week	105	21
	1- › 1 per day	27	5.4
Sleep Quality (1“poor” to10“excellent”)			

	Total Sample (n=505)	
("poor"=1)-3	125	24.7
4-5	101	20
6-7	104	20.6
8-(10="Excellent")	174	34.5
Physical exercise		
None	227	45
1-2 per week	129	25.5
3-4 per week	95	18.8
> 5 per week	54	10.7
Physical health problem		
Yes	104	20.8
Psychological health problem		
Yes	83	16.5

Notes. BMI- body mass index; MS-menopausal symptoms

Procedure

ISPA's Ethical Committee approval (D/012/01/2019) was obtained (2019). Potential participants were informed about the aims, inclusion criteria, voluntary participation and investigator contact details. All standards of Ordem dos Psicólogos Portugueses (2011) and the American Psychological Association (2003) were followed.

Measures

Sociodemographic, Diet, Lifestyle and Menopausal Questionnaire

Women completed a socio-demographic (e.g., age); diet (assessed by the frequency of consumption of soy/spicy/high-fat food, hot/coffee/alcohol/caffeine beverages); lifestyle (tobacco consumption frequency; sleep quality; frequency of physical exercise), health (BMI-based on self-reported height and weight; recent physical disease; recent psychological problem) and menopause-related questionnaire (natural/induced menopause; CAM/HRT to attenuate MS; menopausal status, i.e., pre-/peri-/post-menopause) (Appendix A).

10-Items Cervantes Scale (CS-10)

The CS-10 (Pimenta et al., 2019; Pérez-López et al., 2013) assesses the perceived severity of a variety of symptoms: VMS; heart beating fast/out of control; sleep difficulties; muscles and/or joints aches; lack of energy; perception of being useless; anxiety/nervousness; involuntary urinary leakage; vaginal discomfort/dryness; skin-related alterations. A 6-point Likert scale (0-*no symptom* to 5-*very severe)* was used to score each item. Psychometric properties were adequate (Pimenta et al., 2019; Pérez-López et al., 2013). In this study Cronbach's α was equal to 0.89 (an adequate value should be higher than 0.7) (Appendix A).

Statistical and psychometric analysis

T-Student tests were used to examine whether there were significant differences between women who completed the questionnaire in OF *versus* PF regarding CS-10 score.

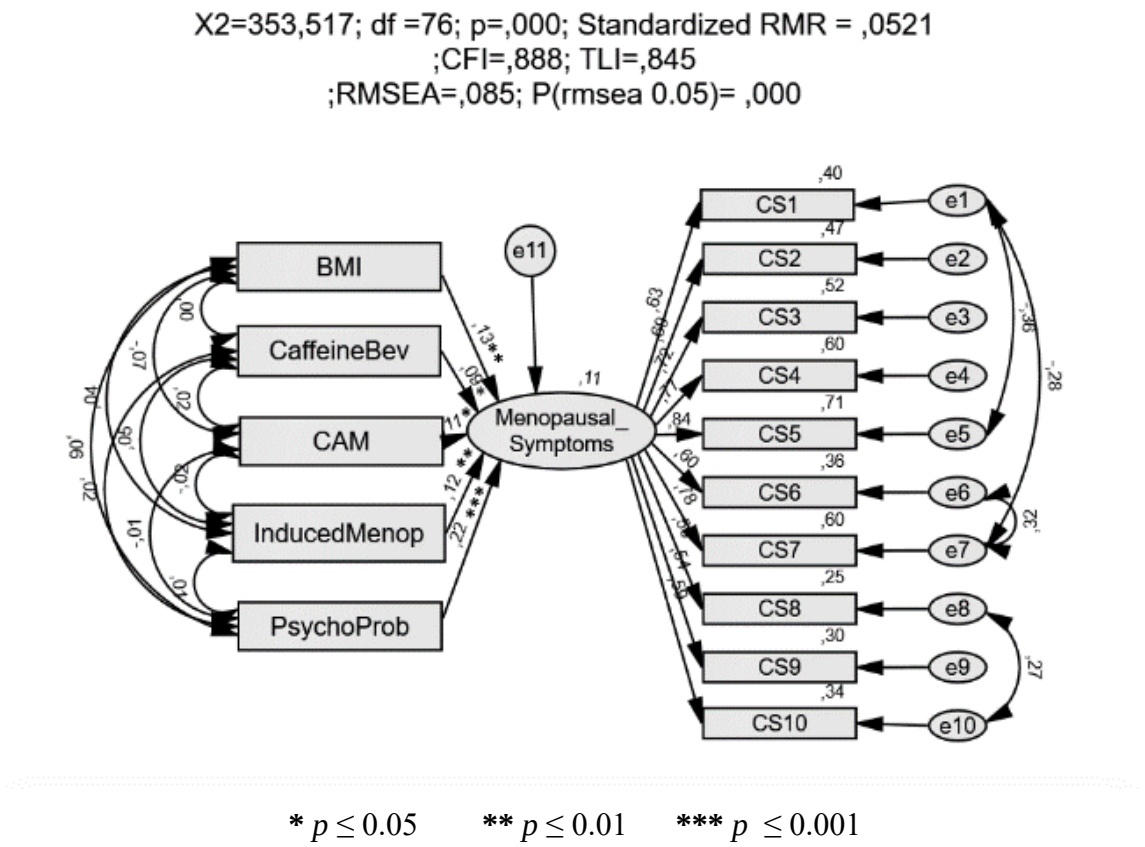
The Structured Equation Model's quality fit was evaluated by: Standardized Root Mean Square Residual-SRMSR, Comparative Fit Index and Tucker Lewis index-CFI/TLI and Root Mean Square Error of Approximation-RMSEA.

The multivariate analysis was performed with all independent variables (i.e., menopause type and status; BMI; CAM/HRT use; tobacco use; soy/spicy/high-fat food consumption; coffee/alcohol/hot/caffeine beverages intake; sleep quality; physical/psychological problem; physical exercise). Only significant predictors of MS severity were presented in the final model (figure 6).

4. Results

No differences were found between women who completed the questionnaire in either format, i.e., OF and PF ($t(503)=-1.1$; $p=0.272$).

The structural model had an acceptable fit (figure 6). MS severity significant predictors were: BMI (i.e., participants with higher BMI had more severe MS), induced menopause (i.e., participants with induced menopause presented higher severity of MS), CAM (i.e., women that managed their MS with CAM showed higher severity of MS), psychological problems (i.e., women with a psychological problem presented higher MS severity) and caffeine beverages (i.e., women who consumed more caffeine beverages had higher severity of MS). These variables explained 11% of MS severity's variance.



$$* \; p \leq 0.05 \qquad ** \; p \leq 0.01 \qquad *** \; p \leq 0.001$$

Notes. BMI – body mass index; CaffeineBev – caffeine beverages; CAM – complementary alternative medicine; CFI - Comparative Fit Index; CS1-10 – items of Cervantes Scale; *df* - degrees of freedom; InducedMenop – induced menopause; *RMSEA*= root mean squared error of approximation*;* SRMSR - Standardized Root Mean Square Residual; PsychoProb – psychological problem; TLI - Tucker Lewis index; χ^2 - chi square.

Figure 6. Predictors of MS' severity.

5. Discussion

According to the results, this sample is mainly in postmenopausal status, had a higher level of education, is overweight and is sedentary. Additionally, MS severity significant predictors were BMI, induced menopause, CAM, psychological problem and caffeine beverages.

Higher BMI has previously been found to be associated with more problematic MS; and there is evidence that during midlife joint/muscular discomfort, somato-vegetative and urogenital symptoms increased with overweight/obesity (Singhania et al., 2020).

CAM interventions (e.g., herbal products) are frequently used to manage MS, but the literature is not unanimous regarding their efficacy and safety; specifically, some of them could potentiate health problems (Sociedade Portuguesa de Ginecologia, 2021). This

may be due to the fact that women with more severe symptoms use CAM (mean of CS-10 total score = 17.74; SD = 11.66 compared to women with no CAM mean of CS-10 total score = 12.77; SD = 10.1) and/ or CAM were not effective.

Previous mood problems (i.e., anxiety and depression) can negatively impact women's perceived severity of MS (Lui-Filho et al., 2018).

Women with induced menopause (consequence of disease, surgery, radiotherapy or chemotherapy) reported more severe symptoms which may be due to abrupt decrease of estrogen (Sociedade Portuguesa de Ginecologia, 2021).

The promotion of literacy about the impact of healthy behaviours (including caffeine intake and weight-related) might be important to help women manage their MS severity and consequent quality of life during middle-age.

This study has some limitations: it is a cross-sectional study; the sample recruitment procedure did not allow the generalization of results; the majority of sample was of postmenopausal status.

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Chapter 5

MENOS-PT - Adaptation and effectiveness of a cognitive-behavioural intervention for vasomotor symptoms: A pilot study

1. Abstract

Objective: Vasomotor symptoms (VMS) are reported as problematic by an estimated 25–30% of menopausal women. Some women are not recommended, or prefer not to use menopause hormone replacement therapy (HRT) to attenuate menopausal symptoms. MENOS2 Group CBT is a group cognitive-behavioural therapy with demonstrated efficacy on VMS attenuation. Due to the lack of culturally adapted interventions for Portuguese women with VMS, this study aimed to adapt, apply and test in a pilot the efficacy of MENOS2 Group CBT to Portuguese women (MENOS-PT). *Method:* Eight Portuguese women with 10 or more problematic VMS per week, aged 44-62 years took part in a single group exploratory study of MENOS-PT. VMS problem rating and frequency, as well as perceived severity, insomnia and night sweats' interference, quality of life and menopausal representations were evaluated at baseline (T0), immediately after MENOS-PT (T1), and 3 and 6 months following MENOS-PT (T2 and T3). *Results:* MENOS-PT demonstrated a significant reduction on VMS problem rating over time, also the frequency of hot flushes decreased after 6 months. Night sweats frequency significantly decreased only at 3 months. A significant attenuation on perceived severity of menopausal symptoms was obtained between T0-T3, as well as lesser menopausal symptoms identification and negative consequences (T0-T3). Women also showed higher control and awareness about menopause (T0-T2). Despite the positive results, the participants' quality of life only improved immediately after MENOS-PT. *Conclusions:* Findings suggest that MENOS-PT may be a brief and effective non-pharmacological intervention for Portuguese women with problematic VMS, but further randomised controlled trials are needed.

Keywords: vasomotor symptoms; cognitive behavioural therapy; MENOS-PT; efficacy.

2. Introduction

The most prevalent and bothersome menopausal symptoms are vasomotor symptoms (VMS); these entail quick and abrupt feelings of heat in women's face, neck and chest, which can make their skin red and sweaty – these are recognized as hot flushes (Sociedade Portuguesa de Ginecologia, 2021). Additionally, one-quarter of menopausal women describe having experienced these symptoms during nocturnal period, therefore designated night sweats (Sociedade Portuguesa de Ginecologia, 2021). Consequently, these women will report greater motor restlessness in bed, less effective sleep and feelings of tiredness in the morning (Kravitz et al., 2015).

In Western cultures, approximately 70% of women are affected by VMS (Andrikoula & Prevelic, 2009; Freeman & Sherif, 2007; Sociedade Portuguesa de Ginecologia, 2021) and the prevalence of moderate/severe VMS in Europe is around 40% (Nappi et al., 2021), specifically in perimenopause and postmenopause (Pinkerton, 2020; Stuenkel, 2018). Around 25–30% of women define VMS as problematic due their significant impairment of their daily-routine (Hunter & Chilcot, 2021), specifically on mood, work-related performance, concentration, social embarrassment in relationships/ social activities, and physical health (English et al., 2021).

The aetiology of VMS may be a dysfunction on thermoregulatory mechanisms, alteration of neurotransmitters' function (e.g., serotonin), and/or mechanisms associated with stress (e.g., Freedman & Krell, 1999; Alexander et al., 2007; Shanafelt et al., 2002). Besides these physiological process, also psycho-socio-cultural aspects influence menopausal representations (Hunter & Rendall, 2007) and the experience of menopausal symptoms, and these vary widely in relation to its duration and reaction within and between women, for example, VMS: a) duration: while 10% of women suffer VMS during more than 12 years (Avis et al., 2015; Avis et al., 2018; Stuenkel, 2018), one-third of women aged 65–79 years still have them (Zeleke et al., 2016); b) reaction: some women experience VMS as troublesome but assess themselves capable of managing them, whereas for others this experience is overwhelming and they do not believe they have the resources to face the situation (Brzezinski, 2019).

Some women are not recommended to use hormonal therapy for menopausal symptoms and/or are reluctant about side effects of pharmacological options (Johnson et al., 2019). Therefore, it is crucial to explore non-pharmacological options to manage VMS based on women's preferences and accessibility.

MENOS2 is highlight as nonhormonal therapy for VMS; it is cognitive-behavioural therapy (CBT), designed to challenging and changing unhelpful representations and behaviours towards menopause and VMS' management strategies (Ayers et al., 2012). This intervention was driven from a theoretical model of VMS, which outlines specific components and hypotheses for how these might modify women's VMS experience (Hunter & Mann, 2010). Moreover, the North American Menopause Society (2015) recommends CBT based on the MENOS protocol (Ayers et al., 2012; Hunter & Smith 2015; 2020; Mann et al., 2012) as an effective non-medical treatment for VMS.

Furthermore, the Covid-19 pandemic has impacted negatively middle-aged women resulting in higher levels of perceived stress about their menopausal symptoms and other health-related complaints, due to the impossibility or difficulty in resourcing to health care (Sözer et al., 2022). In this sense, it is pertinent to explore the efficacy of alternative clinical approaches such as m/eHealth (e.g., via telecommunications and digital communication technologies) in order to guarantee health care of mid-aged women, accommodating their needs and improving their health (Puspitasari et al., 2021; Sözer et al., 2022). This type of care provider – m/eHealth – has proven acceptable and efficient in women with breast cancer that specifically noticed significant hot flushes' interference on their daily life (Gooma et al., 2022).

Thus, this study aims at adapting the MENOS2 Group CBT for Portuguese language, adjusting cultural aspects and applying it to women who experience at least 10 problematic VMS per week (MENOS-PT), using a synchronous video online format.

In order to explore the efficacy, the problem rating and frequency of VMS (i.e., hot flushes and night sweats), menopausal symptoms perceived severity, insomnia and night sweats' interference, quality of life and menopausal representations of the participants, they were compared between baseline (T0), immediately after the intervention (T1) and follow-ups, 3 and 6 months later following MENOS-PT (T2 and T3).

3. Method

Participants

This is a longitudinal (assessments were done at T0, T1, T2, and T3) and non-controlled study (i.e., exploratory study without a comparison group).

The sample included 8 mid-aged Portuguese women, aged 44-62 years (*M*=54.5; *SD*=5.9), with a mean body mass index (BMI) equal to 28 kg/m^2 (*M*=27.70; *SD*=4.01) and who did not use any type of menopausal treatment in the month prior to MENOS-PT. Other relevant characteristics of the sample are presented on table 10.

The inclusion criteria for participants of MENOS-PT were: 1) experience of 10 or more problematic VMS per week, in last month; 2) fluency in Portuguese language (spoken and written); 3) aged above 40 years old; 4) with availability to participate in a group CBT; 5) availability to report any change in menopause treatments during the intervention (without any consequences); 6) with sufficient digital literacy and access to the Zoom platform.

Exclusion criteria were women: 1) non-Portuguese fluent; 2) with history of breast cancer; and 3) having any physical or psychological circumstances that may negatively impact their participation in group CBT.

Table 10. *Characteristics of the sample*.

	n = 8
Menopausal status	
Perimenopause	4
Postmenopause	4
Education	
High-school	2
University	6

Material

Participants completed a self-reported socio-demographic, health and menopausal questionnaires, intended characterize the sample concerning age, education level, height, weight (resulting in their BMI), menopausal status (i.e., premenopause, perimenopause and postmenopause, according to the Stages of Reproductive Aging Workshop Criteria STRAW+10) (Harlow et al., 2012) and options to attenuate menopausal symptoms (Appendix D).

Primary Outcomes

Hot Flush Rating Scale (HFRS)

The HFRS (Hunter & Liao, 1995) measures VMS problem rating, hot flushes and night sweats frequency. The VMS problem rating score is guaranteed by the mean of the 3 items (i.e., "*To what extent do you regard your flushes/sweats as a problem?*", "*How distressed do you feel about your hot flushes?*" and "*How much do your hot flushes interfere with your daily routine?*"). The response scale varies in a 10-point Likert scale: higher scores mean more problematic VMS. In follow-ups assessments, a 2-point difference on scores (e.g., between T0 *vs.* T2) is considered clinically significant (Ayers et al., 2012). The HFRS demonstrated adequate psychometric proprieties in previous studies (e.g., Ayers et al., 2012) (Appendix D).

Secondary Outcomes

10-items Cervantes Scale (CS-10)

The CS-10 is a self-reporting instrument that evaluates menopausal symptoms' perceived severity (namely, VMS; heart beating quickly/out of control; sleep problems; osteoarticular symptoms; lack of energy; self-perception of uselessness; anxiety/nervousness; genitourinary symptoms; skin-related changes). The items are scored in a 6-point Likert scale, varying from 0 (*no symptom*) to 5 (*very severe*). Its sound psychometric properties were evidenced in previous studies (Perez-Lopez et al., 2013; Pimenta et al., 2019) (Appendix D).

Utian Quality of Life Scale (UQoLS)

The UQoLS is a questionnaire strongly based on perception of sense of well-being as distinct from menopausal symptoms. Its original version presents 23 items (Utian et al., 2002); the Portuguese version has 22 items (Pimenta et al., 2013), divided into 4 components of quality of life (QoL): occupational, health, emotional, and sexual. The scoring system is done on a 5-point Likert scale, varying between 1 (*not true*) to 5 (*very true*). This questionnaire has proven to have good psychometric properties, including in a Portuguese sample (Pimenta et al., 2013; Utian et al., 2002) (Appendix D).

MenoSentations Questionnaire (MenoSentations-Q)

MenoSentations-Q measures representations about menopause. It is composed of 22 items, aggregated in 4 subscales (identity - "*Menopause is having hot flushes (sudden heat) and/or night sweats*"; positive consequences - "*Menopause consequences are feeling psychologically better*"; negative consequences - "*Menopause consequences are to interfere with my work-related life*"; control, awareness and cause - "*Menopause is a natural phase of women's life*"). Participants specified their degree of agreement with each item, based on a 5-point Likert scale, from 1 (*strongly disagree*) to 5 (*strongly agree*). This instrument has shown suitable psychometric properties (Albergaria et al., 2021) (Appendix D).

Insomnia and night sweats' interference questions (INSiq)

The INSiq was structured by our team, and has a total of 3 questions: one question related to initial insomnia (i.e., difficult to sleep: early insomnia or sleep-onset insomnia); other question about middle insomnia (i.e., difficulty to maintain sleep without initial or late insomnia, also designated as sleep maintenance insomnia), based on definitions of Perlis and Gehrman (2013); and a question about the experience of night sweats during sleep. These questions were scored between 1 (*never*) to 5 (*all days*). Higher scores mean more frequency of insomnia/ night sweats' interference (Appendix D).

MENOS-PT CBT Intervention

The Group CBT had 6 sessions (each one with 1,5 hours - 8 hours in total), once per week, during 6 weeks.

The main objectives of this intervention were providing psychoeducation about VMS-related CBT aspects; triggers of VMS; CBT strategies to manage both stress and VMS (hot flushes and night sweats) and sleep management (e.g., Ayers et al., 2012; Hunter & Smith, 2015; Mann et al., 2012). All sessions were audio recorded with the individual and a priori permission of all participants, in order to guarantee that each topic was covered as planned.

Previously to each session, women received several materials including, audio records of relaxation/paced breathing recording, handouts (and sleep diaries) (Appendix E). During the MENOS-PT sessions were psycho-education was used, a brief PowerPoint presentation was shared with participants and they were encouraged to address topics that

were presented in sessions as homework, and share and discuss their VMS' experience (addressing the topics of homework) in followed sessions (Appendix H).

Session 1: The ground rules for group participants were provided (e.g., confidenciality, mutual respect, share the time of session with all participants, etc.). The VMS' CBT model was presented (including VMS physiological, cognitive, behavioural, and emotional aspects). Information about VMS' triggers identification (e.g., caffeine bevarages) and their modification were provided and explored with participants. The paced breathing was introduced and practised in group (and was promoted group discussion about relaxation experience and encouraged group to practise it on their daily-routine). As homework were proposed practised relaxation exercises as well as participants be aware of VMS' triggers during their daily routine;

Session 2: Revision and shared experience about homework. Information about stress, lifestyle and their impact in VMS were provided (based on CBT model). Also, strategies for stress management (e.g., problem-solving; relaxation/ paced breathing) and well-being improvement (e.g., engaging in regular physical exercise and in pleasant activities) were explored in order to set individual and specific goals about aforementioned aspects for each participant. Relaxation/paced breathing (group practise and discussion about facilitators and barriers). As homework were defined the implementation of stress management goals and identification and modification of VMS' triggers.

Session 3: Revision and shared experience about homework. Facilitate and develop helpful cognitive/behavioural strategies during hot flush either in social situations/relational context, either alone (e.g., recognising VMS' negative or catastrophic patterns of thinking vs. more helpful thoughts about it; wearing layers). Encouragement and practice of paced breathing to use in stressful conditions and at the onset of a VMS (relaxation/paced breathing were applied); As homework was suggested be aware of unhelpful and helpful thougts regarding VMS. In this session was facilitated a sleep diary to monotorizing their sleep on following week.

Session 4: Revision and shared experience about homework and sleep diaries. Exploration of thoughts, beliefs and behaviours about sleep and night sweats. Information and strategies to improve sleep-cycle (e.g., relaxation/paced breathing), and night sweats management (e.g., sleep hygiene; sleep goals). The paced breathing/relaxation were practised in session. As homework was proposed be aware of VMS' thoughts and using alternative responses (i.e., calming) at onset and during VMS and implementation sleep

goals improvement;

Session 5: Discussion of homework. Exploration of sleep mechanisms and facilitation of cognitive/behavioural strategies to cope with night sweats and its consequences on daily life. Relaxation/paced breathing were training in session. As homework were defined all previous homeworks and their practice on women's daily routine;

Session 6: Revision and shared experience about homework and general progresses during the intervention**.** Addressed topics regarding other menopause-related consequences (such as sexuality, memory, osteoporosis, body image, mood changes and genitourinary symptoms). Revision of the VMS' CBT model (including VMS physiological, cognitive, behavioural, and emotional aspects), establishment individual goals and a maintenance plan for the future (relapse prevention).

Procedure

The Ethics Committee of ISPA - Instituto Universitário approved this research. The project complied with the norms of the Ordem dos Psicólogos Portugueses (OPP, 2011) and the American Psychological Association (APA, 2003).

The first step was to translate and adapt all contents of MENOS2 Group CBT for Portuguese and adjust to Portuguese cultural aspects, with permission from the Team who develop the intervention manual and Taylor and Francis Group (Managing Hot Flushes and night sweats using Group CBT a Manual for Health Professionals; Hunter & Smith, 2015; copyrights reserved to Routledge, Taylor and Francis Group) (Appendix E). This procedure was done by two health psychologists, fluent in English, and all reviewed by one physician, also fluent in English. The aforementioned process was also done for the translation of the Hot Flush Rating Scale.

MENOS-PT was programmed to be applied in a face-to-face format and in community and clinics contexts. However, due to the pandemic caused by Covid-19, the several and prolonged confinements in Portugal forced social distance and the implementation of MENOS-PT was only possible through the Zoom platform (by synchronous video online format).

The study dissemination was done both in online contexts (i.e., in multi-thematic groups targeting middle-aged women and menopause) and community contexts (i.e., through flyers) stating clearly: its objectives; participants' inclusion criteria; contacts of the researcher. Women interested in participating on MENOS-PT contacted the researcher (via

email or telephone). Women's eligibility was assessed by telephone interview (covering their clinical antecedents, menopausal symptoms, and treatment use) (Appendix F). If the inclusion criteria were met, the timing and other important topics about the MENOS-PT and sessions/assessments format were also explained.

One week before the MENOS-PT, participants received an email with a link in order to complete the baseline assessment (T0). Accessing the link, women first had to approve the informed consent (which included, again, the study objectives, inclusion criteria, voluntary participation, and investigator's contact) and then completed the questionnaires.

The day before each session, participants received emails with a reminder of the MENOS-PT session's schedule, as well as the link to access it on Zoom. Moreover, participants received emails kindly reminding them to fill in the questionnaires immediately after MENOS-PT (T1), 3 months later (T2) and 6 months later (T3).

Statistical analysis

Data were analysed through SPSS version 25.0 (IBM Corp, Armonk, NY, USA).

Descriptive statistics were performed to summarize the participants characteristics and the study variables**.**

To test the effectiveness of MENOS-PT the sphericity assumption for all variables based on the Muchly's test (and on the Greenhouse-Geisser test for variables which did not fulfil the sphericity assumption, to improve the degrees of freedom in variance's analysis) was tested. Afterwards, a repeated measures ANOVA was used with the following variables: 1) VMS' frequency and problem rating; 2) perceived severity of menopausal symptoms; 3) insomnia and night sweats' interference; 4) quality of life; and 5) four components of menopausal representations (identity; positive consequences; negative consequences; control, awareness and cause). Multiple comparisons between assessments were done by Fisher LSD post-hoc test. Also, partial eta-squared (η^2p) (reference values: small ≤ 0.05; medium $]0.05; 0.25]$; high $]0.25; 0.5]$; very high > 0.05) and the observed power (π), desirable when above 0.8, were calculated (Marôco, 2011).

4. Results

All instruments used in this study presented an acceptable to excellent reliability, assessed through Cronbach's alpha (Cronbach's alpha of all instruments ranges from 0.75 to 0.90).

Table 11 presents a descriptive analysis of the variables assessed throughout the several assessments.

Table 11. *Descriptive analysis of MENOS-PT's variables assessed throughout the several assessments*

Variables	T0 *M(SD)*	T1 *M(SD)*	T2 *M(SD)*	T3 *M(SD)*
VMS' problem rating	6.82(1.51)	5.15(1.05)	4.36(1.03)	3.96(0.99)
Night sweats' frequency	6.87(3.56)	3.13(1.46)	2.75(2.32)	3.37(3.46)
Hot flushes' frequency	14.75(6.6)	8.63(3.07)	7.5(2.62)	6(2.2)
Menopausal perceived severity	23.75(7.76)	16.63(5.4)	14.37(5.68)	14.13(3.72)
Insomnia and night sweats' interference	9.5(2.33)	8.5(1.78)	8.25(2.23)	7.75(3.06)
Quality of life	69.75(17.24)	82.25(10.82)	76.25(19.26)	71.38(15.93)
Menopausal representations (Identity)	31(9.24)	20.38(7.23)	18.25(5.2)	19.25(5.09)
Menopausal representations (Positive consequences)	9.63(3.82)	11.88(2.85)	10.63(3.29)	7.5(3.21)
Menopausal representations (Negative consequences)	13.5(2.73)	6.25(3.01)	6.88(4.05)	7.26(3.58)
Menopausal representations (Control, awareness, and cause)	17.5(5.21)	22.5(3.46)	22.13(3.36)	21.13(2.59)

Notes. *M* – Mean; *SD* – Standard Deviation

All statistical analyses to explore MENOS-PT's efficacy are presented in table 12. A brief report of the results demonstrated a significant decrease on VMS problem rating, from T0 to T3. The frequency of night sweats significantly reduced only from T0-T2. Better

results were evident on hot flushes frequency, which decreased between T0-T3.

Women experienced lower perceived severity of menopausal symptoms from T0-T3. Also, women experienced a better quality of life after the intervention, but only when comparing T0-T1. The insomnia and night sweats' interference did not improve at all.

Regarding menopausal representations, women demonstrated an identification with menopause-based symptoms in a lower degree (identity) (T0-T3), as well as lower menopausal negative consequences (T0-T3). Women's control, awareness and cause (T0-T2) significantly enhanced. But no significant differences were assessed regarding positive consequences.

Table 12. *Variables studied at T0, T1, T2 and T3 based on ANOVA repeated measures*

Variables	**Muchly's Sphericity (W); *p-value***	**F test; p-value;** η^2p; π	**Assessments**	***MD(SE); p-value***
VMS problem rating	W=0.18; *p*=0.081	F=20.676; ***p*<.001**; η^2p=0.748; π=1	T0 vs. T1	1.68(0.28); **0.001**
			T0 vs. T2	2.47(0.34); **0.001**
			T0 vs. T3	2.867(0.57); **0.002**
Night sweats frequency	W=0.384; *p*=0.367	F=5.422; ***p*=0.006**; η^2p=0.436; π=0.883	T0 vs. T1	3.75(1.031); **0.049**
			T0 vs. T2	4.125(0.766); **0.006**
			T0 vs. T3	3.5(1.62); 0.067
Hot flushes frequency	W=0.144; *p*=0.053	F=14.406; ***p*=0.004**; η^2p=0.824; π=0.781	T0 vs. T1	6.13(2.14); **0.024**
			T0 vs. T2	7.25(1.81); **0.005**
			T0 vs. T3	8.75(2.32); **0.007**
Menopausal symptoms severity	W=0.315; *p*=0.257	F=10.637; ***p*<0.001**; η^2p=0.603; π=0.995	T0 vs. T1	7.13(1.56); **0.003**
			T0 vs. T2	9.38(2.49); **0.007**
			T0 vs. T3	9.63(2.65); **0.008**
Insomia and night sweats' interference	W=0.151; *p*=0.058	F=1.347; *p*=0.286; η^2p=0.161; π=0.306	T0 vs. T1	1(0.65); 0.17
			T0 vs. T2	1.38(0.71); 0.092
			T0 vs. T3	1.75(0.6); 0.15
Quality of life	W=0.245; *p*=0.159	F=1.534; *p*=0.235; η^2p=0.18; π=0.345	T0 vs. T1	-12.5(3.78); **0.013**
			T0 vs. T2	-6.5(7.65); 0.424
			T0 vs. T3	-1.63(8.37); 0.852
Menopausal representations (Identity)	W=0.844; *p*=0.965	F=9.565; ***p*<0.001**; η^2p=0.577; π=0.99	T0 vs. T1	10.63(2.95); **0.009**
			T0 vs. T2	12.75(2.91); **0.003**
			T0 vs. T3	11.75(3.03); **0.006**

Menopausal representations (Positive consequences)	W=0.35; *p*=0.312	F=2.127; *p*=0.127; η^2p=0.233; π=0.465	T0 vs. T1 T0 vs. T2 T0 vs. T3	-2.25(1.934); 0.283 -1(2.13); 0.653 2.13(2.1); 0.345
Menopausal representations (Negative consequences)	GG=0.645	F=9.307; ***p*=0.003**; η^2p=0.571; π=0.935	T0 vs. T1 T0 vs. T2 T0 vs. T3	7.25(1.37); **0.001** 6.625(1.92); **0.011** 6.25(1.61); **0.006**
Menopausal representations (Control, awareness, and cause)	W=0.165; *p*=0.07	F=3.993; ***p*=0.021**; η^2p=0.363; π=0.758	T0 vs. T1 T0 vs. T2 T0 vs. T3	-5(1.44); **0.01** -4.63(1.625); **0.025** -3.625(2.11); 0.13

Notes. GG - Greenhouse-Geisser; η^2p - partial eta-squared; π - observed power.

5. Discussion

MENOS-PT is the first Portuguese adaptation of MENOS2 Group CBT, in an online synchronous video format. This brief cognitive-behavioural intervention was developed for the management of problematic VMS (both problem rating and frequency). Given that MENOS-PT also focused in managing/improving other menopausal symptoms, sleep, representations of menopause, this pilot study also controlled other secondary outcomes, such as perceived severity of menopause symptoms, quality of life, insomnia and menopausal representations.

The long-term results (confirmed 6 months after the intervention) were: the decrease of VMS problem rating; decrease of hot flushes frequency; lower perceived severity of menopausal symptoms; lower identification of menopause as a symptom-based condition; and lower menopause representation negative consequences. Night sweats decreased frequency and higher perception of control and awareness about menopause were only maintained for 3 months (at the 6-month follow-up these gains were no longer observed). These findings are in line with those of previous research using CBT interventions for VMS (e.g., Ayers et al., 2012; Green et al., 2019).

Quality of life benefits were only reported immediately after MENOS-PT implementation. These results may have been influenced by the fact that MENOS-PT was implemented during the lockdown caused by Covid-19, but also by the small sample size. Or because MENOS-PT was not developed to improve all the dimensions that Utian Quality of Life Scale assesses (e.g., occupational quality of life). The absence of changes in the sleep and respective night sweats' interference might be due to either participants'

expectations which might have been significantly focused on VMS' management (since this was the main purpose of the MENOS-PT intervention and largely invested over time) or/and lack of quality of the three questions used to assess this experience (given the questions were developed for this study, their validity was not tested and it might have measured just a small portion of what sleep quality is).

One study, that analysed psychosocial impact of Covid-19 in mid-aged women, described that they experienced a severe decline in their quality of life, besides the exacerbation of psychological and urogenital symptoms (Monterrosa-Blanco et al., 2021). In addition, during this uncertainty period, women experienced an increase of perceived stress and emotional distress, resulting in an unhealthy diet and sedentary behaviours (Coppi et al., 2021). Although MENOS-PT did not improve participants' quality of life, it may be responsible for not worsening quality of life - which would be expected according to the literature above.

Our results are in accordance with previous researchers which support that the CBT intervention impacts the menopausal symptom perception and appraisal (Ayers et al., 2012) due to the positive transformation on participants' menopausal representations over the time. After MENOS-PT long-term assessment, participants have demonstrated a higher degree of menopause-related control and knowledge. And lesser perceived severity of menopausal symptoms and agreement with menopausal negative consequences. Other studies have supported that psycho-education about menopausal transition and awareness about symptoms management enables women to better deal with this phase of their lives (Koyuncu et al., 2018; Towey et al., 2006).

Most women in this pilot study had a university degree. Literature demonstrates that women with higher education usually have more knowledge and positive attitudes towards menopause-related representations (namely, control, awareness, and cause/ positive consequences). Due to the women in baseline already presented higher mean scores in control, awareness, and cause (i.e., more concordance regarding menopause's cause, perception of control and awareness) was not expected significative results on this dimension, contrary to what it happened. Still, in this small sample of highly educated women, MENOS-PT significantly improved their menopause's control, awareness, and cause, at 3 months after the intervention. This MENOS-PT result emphasises the idea that providing adequate and reliable educational material about menopause (in the context of a brief group CBT-oriented therapy) helps menopausal women to enhance their self-care and manage effectively their MS, as argued in other studies (Du et al., 2016).

One concern regarding the implementation of MENOS-PT was the dropout rates associated with the format (online). In this context, the recommendations of Lindh-Åstrand et al. (2015) were followed (namely, to explain the participants that a total intervention time is needed to practice the CBT contents, in order to maximize the chance of seeing improvements; to give a clear deadline for the homework; to assure the participants' computer/internet knowledge; to assert their motivation asking specific questions). No dropout was identified at any time, including all four assessments, which might demonstrate participants satisfaction and motivation to adhere to the MENOS-PT. Also, the fact that MENOS-PT was implemented with synchronous video sessions (with the presence of an experienced clinical psychologist), thus enabling the benefits associated with a therapeutic alliance, and with a group format, including women who shared a common problem (experience of problematic VMS), might have prompt beneficial experience associated with this format (e.g., universality, cohesiveness, altruism); both aspects, associated with the content of MENOS-PT, might also explain the positive outcomes of this intervention. Additionally, the advantages inherent to online CBT intervention were observed in the literature (e.g., Atema et al., 2019). Future studies should also consider studying the determinants associated with the change in this type of interventions.

Our findings suggest that MENOS-PT may be a brief and effective psychological intervention for VMS attenuation, during the menopausal transition, particularly for women who are not recommended or unwilling to adopt hormonal treatments, since participants have improved VMS problem rating and hot flushes, menopausal symptoms in general, at 3 and 6 months after the program. Additional benefits were reported in menopausal representations over time.

Study's mains limitations were the reduced size of the sample, the lack of a control group, the assessments and interventions being performed/oriented by the same person (although the assessments were made online, without the researcher's presence), absence of verification of content delivery (namely, degree of compliance with the original protocol) by another researcher and absence of validity confirmation (namely, construct validity - prior to this study) of insomnia/ night sweats' interference and the Hot Flush Rating Scale (HFRS) with a middle-aged Portuguese sample (although the necessary steps for a robust translation and retro-translation of HFRS were followed, was confirmed their reliability, and the instrument has shown good psychometric properties in other European samples). Further studies should test the effectiveness of MENOS-PT, using a 2-arm

randomised controlled trial in order to compare women allocated to the experimental group, and comparing with those in usual care.

This CBT intervention was implemented during Covid-19 pandemic (with all the psychosocial implications that may be associated) so its replication at a time without major social disruptions may be beneficial.

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Chapter 6

Global discussion

Global discussion

This doctoral thesis intends to contribute to the assessment of women's menopause representations (in addition to its impact on their sexual function), as well as of their partners. In addition, it aims at evaluating the predictors (including modifiable and diet-related behaviours) of menopausal symptoms' (MS) severity, and also expand the knowledge of a cognitive-behavioural intervention (CBT) efficacy for the management of vasomotor symptoms (VMS).

Thus, a theory-driven instrument (based on Common-Sense Model of Self-Regulation-CSM-SR) was developed and validated in order to assess women's menopause representations (MenoSentations-Questionnaire). Afterwards, the impact of couples' menopause representations (women and their partners) in their sexual function was also explored. Additionally, a structural model was built in order to explore risk and protective predictors of MS contributing to inform the CBT which was implemented at the end of this project (in a pilot format), to address both problematic VMS attenuation (primary outcome) and menopause representation (one of the secondary outcomes). Overall, this project intended to broaden spheres yet unexplored including theory-driven assessment, couple conceptualization and psychological intervention in the field of menopause.

1. Menopause Representations: from Construct to Couple

Women's representations influence menopause experience and how impactful and controllable its symptoms are (Brown et al., 2018; Hunter & O'Dea, 2001). Menopause representations' assessment allow a crucial knowledge about how women will face this phase life, providing evidence-based knowledge to improve women's menopause experience and symptoms management. In this sense, it was developed the MenoSentations-Questionnaire, a standard, high-quality and culturally adapted measure to assess Portuguese women's menopause-related representations.

The MenoSentations-Questionnaire was developed based on the five cognitive components of the CSM-SR (identity, cause, consequences, timeline and control) (e.g., Leventhal et al., 1984; Leventhal et al., 2003; Leventhal et al., 2016). And, given the impact of the cultural aspects on menopause representations (e.g., Hunter & Rendall, 2007; Monteleone et al., 2018; Nappi et al., 2021), this instrument also considered several

categories that emerged from a qualitative study conducted peri- and postmenopause Portuguese women (Pimenta et al., 2020) (as described on Chapter 2).

The final structure of this measure is brief, since it is composed only of 22 items, distributed across four factors (i.e., identity; positive consequences; negative consequences; control, awareness and cause), and explained 58% of variance for the items regarding menopause representations. MenoSentations-Questionnaire presented good psychometrics proprieties and, for this reason, could be used either on community or clinical settings, contributing to identify unhelpful menopause beliefs and inform individual/ group psychological interventions.

This menopause representations measurement reflected the cognitive components of the CSM-SR (the exception is timeline). Timeline is not present in the final version of MenoSentations-Questionnaire, since it did not demonstrate adequate values on factorial analysis. This could result from unpredictability and considerable variation in the duration of menopausal experience and its symptoms (e.g., Avis et al., 2015, 2018; Hunter & O'dea, 2001; Stuenkel, 2018; Sydora et al., 2021; Zeleke et al., 2016). When women were inquired about the duration of MS and its impact, only 3% considered that MS would last longer than 10 years, and most women expected MS to last less than 5 years (Rouhbakhsh et al., 2018). However, longitudinal studies revealed that MS may last much longer (Currie & Moger, 2019) around 7-12 years (e.g., Avis et al., 2015; Berecki-Gisolf et al., 2009).

Concerning negative consequences, the main impact reported by women are on their general quality of life, family, work and health. General quality of life, work and health has been targeted in some CBT interventions (e.g., MENOS1, MENOS2 and MENOS@Work) (Ayers et al., 2012; Hardy et al., 2018; Mann et al., 2012). But in relation to family, although around 23% of women described feelings of isolation from their family due to menopause (Rouhbakhsh et al., 2018) and 60-80% of women mentioned MS experience as having a negative impact on the couple relation (Sydora, et al., 2021), there are no available interventions to improve the impact of menopause on this field of women's and their partner's life (to our knowledge). The aforementioned highlights the importance of developing studies with couples, especially focusing on climacteric women, a neglected field of behavioural science. A comprehensive understanding of the couple's menopause representations is necessary, as well as the impact of menopause representations in the couple's various spheres.

In this line, a systematic review (Zhang et al., 2020) concluded that partner's perceptions and attitudes may influence women's MS and, in contrast, women's attitudes

toward menopause may be affected by perceptions and attitudes of their partners. Since women's sexual function might be impacted by their representation of menopause and, on the other hand, some literature demonstrated that sexual function in the couple is interdependent (e.g., Jian et al., 2013, Klein et al., 2015) this study also aimed to reduce the gap in the literature regarding the mutual influences of menopausal cognitive representations in female/male sexual functioning of couples, using actor-partner interdependence model (APIM) for this purpose (as described on Chapter 3).

The results of our study did not confirm mutual influence between couples. The only significant result was regarding the male counterparts. The perception that men tend to have about menopause-related negative consequences affect their own (men) sexual function. The literature concluded that the majority of men (who had a relationship with women with MS experience) reported, similar to the present study, that menopause-related negatives consequences impacted negatively on women's menopausal experience (i.e., higher frequency and severity) and on their relationship's quality (Bielawska-Batorowicz & Jarecka, 2017; Parish et al., 2019).

The negative consequences of menopause endorsed items related with poor quality of life, and menopause as a trigger for others diseases. Men could perceive their partners as more physically and psychologically vulnerable, and thus feel their sexuality and intimacy affected; consequently, tend to experience a decrease in their own sexual function (Salazar-Molina et al., 2015). On the other hand, middle-age men may also experience hormonal changes related to their own (reproductive) aging, also designated by Late Onset Hypogonadism (or andropause), that results in decrease of levels of testosterone in men's bodies, which can impair morning erection's frequency, erectile function, sexual desire, incapacity to participate in some activities (such as, running), lack of energy, depression, and tiredness (European Male Ageing Study, 2010). Previous studies have shown that there is a lack of knowledge about the male aging process, not only in the literature, but for women (Pimenta et al., 2022) and men themselves (Yan, 2010). However, men's sexual function may be affected by other factors (such as, stress, relationship factors, expectations about aging).

Given this, besides more research needed to expand the knowledge of how the couple's sexual function is interdependently influenced, couple-oriented appointments in health settings (in order to intervene with, for example, natural aging consequences, such as menopause and late onset hypogonadism), may be useful and impactful for couple's relationship quality and health. These couple-oriented appointments are already frequent

in, for example, oncological hospitals, in order to minorize the treatments' side effects that may affect the couple (for example, improving their sexual functioning and protecting sexual health from the changes imposed by disease and treatments).

These conclusions highlight the need for more studies with mid-aged couples, including measures relating to both partners in order to better explain this mutual influence model (such as, an inventory of andropause symptoms, its representations, and relationship variables such as intimacy, communication style, and quality of the relationship).

2. Menopausal Symptoms: Predicting and Changing

An accurate knowledge about menopausal symptoms' (MS) predictors is crucial for women to better cope with MS. Thus, exploring risk (negative) and protective (positive) predictors of MS perceived severity can inform not only women inserted in community and clinical settings, but also CBT interventions, in order to promote change and improve the impact of this experience on women's lives (e.g., through healthy lifestyles adoption) (Hunter & Liao, 1995; Idris & Amr, 2021).

The predictors of perceived severity of MS were explored: having a iatrogenic menopause, having a self-reported psychological problem, displaying a higher body mass index (BMI), using complementary alternative medicine (CAM) to manage MS, and having a more frequent intake of caffeine beverages (as demonstrated on Chapter 4) were associated with more severe MS. These variables only explained 11% of MS' severity variance. Dietary behaviours such as consumption of soy, spicy food, alcohol and hot beverages were expected to have an influence. Therefore, other variables should be accounted in future studies such as life conditions or others health-related problems (physical and/or psychological) that are not configured in this study.

Women can influence their own perceived severity of MS since BMI and consumption of caffeine beverages are modifiable. As such, women can actively reduce consumption of caffeine beverages and management their weight adopting, for example, a Mediterranean diet considered a safe and healthy approach to manage MS related obesity and to prevent other health complications (Pugliese et al., 2020). Promotion of healthy habits, such as aforementioned Mediterranean diet and regular exercise, as daily walking, might be important to address in messages (delivered by physicians, nurses, and other health professionals) directed to menopausal women (namely those close to peri-menopause in order to make possible an effective prevention of weight gain).

Weight gain interventions directed to menopause women/ mid-aged women are still scarce (Jull et al., 2014) and its efficacy is sporadic since menopause physiological status, metabolic comorbidities, MS experience and psychological distress regularly determine women's unsuccessful weight-loss (Chopra et al., 2019). Multidisciplinary interventions that including: nutritionists who can ensure a balanced, low-calorie diet, supplementation if needed (e.g., due to vitamin D deficit), alternatives to caffeine beverages, and other strategies tailored to women's nutritional needs and preferences; psychomotricians to increase women's physical activity (e.g., combination of aerobic and balance exercises) based on their particularities; and psychologists who address strategies to adherence/maintained lifestyle changes (namely, weight reduction/control and alternatives to caffeine beverages) may also be important. These might enhance women's MS experience, as well as perception of control about MS and, consequently, a more positive attitude about menopause.

Additionally, regarding CAM the results demonstrated that these products might not have the expected efficacy, and thus the following hypotheses could explain this result: women who perceived higher severity of MS tend to be CAM users.

Another important finding was the presence of a recent psychological problem predicting a higher MS severity. Psychological problems, symptoms or disorders could be associated to other factors including stressful life events, negative attitudes towards menopause, lower relationship quality with partner, and iatrogenic menopause (Angoulea et al., 2020; Vivian-Taylor & Hickey, 2014). Screening for psychological distress or mental health symptoms in middle-age, by a health professional could prevent an aggravated clinical situation and, consequently, improve MS' experience.

Additionally, iatrogenic menopause also predicted a higher perceived severity of MS, but physical illness (which is often associated with iatrogenic menopause) did not. This is probably due to the heterogeneous women's responses towards physical illness. For this, physical illness did not predict MS' severity but iatrogenic did. Since the literature proven that this type of menopause, which abruptly occurs, is frequently associated to higher severity of MS.

Therefore, MS' experience is influenced, besides the hormonal factors, by health and lifestyle – some of them modifiable factors, highlighting the bio-psychosocial-cultural perspective of menopause. Therefore, and in accordance with Liao and Hunter (1998), the modification of lifestyle behaviours and negative beliefs will lead to an enhancement of the MS experience.

For this purpose, the group CBT MENOS2 was adapted to Portuguese language and cultural aspects, and based on modifiable predictors of MS was structured the MENOS-PT, to deliver to a small sample of Portuguese women, intending to improve their VMS' problematic experience. Also, the assessment of women's menopause beliefs was tested through MenoSentations-Questionnaire.

This Group CBT is the first Portuguese psychological or adjuvant intervention, in a group and in online synchronous video format, which intended to provide useful knowledge and strategies to cope with menopause, VMS, and other MS, such as vaginal dryness (e.g., including to perform adaptive changes in lifestyle, to promote a good sleep hygiene and strategies to improve sexual quality of life). MENOS-PT, a pilot study, with a short duration (6 sessions) and cost-effective, demonstrated that positive changes were achieved and maintained over time, namely, the decrease in VMS' problem rating, decrease in the frequency of hot flushes, decrease in the perceived severity of MS, lower identification of menopause as a symptom-based condition, and lower menopause representation negative consequences (as described on Chapter 5). But further studies are needed since the reduced sample and the exploratory design (with no control group) need to be confirm in controlled studies with randomisation of sample and bigger samples. Yet, it is important to emphasise that in most analysed parameters the statistical power was high and the majority of the effect size regarding the symptoms and representations improvement was from moderate to high. Also, literature documents evidence of the effectiveness of this brief Group CBT intervention in reducing VMS in non-Portuguese samples (e.g., Hunter & Chilcot, 2021; Hunter et al., 2019).

The format in which MENOS-PT was applied highlights advantages and disadvantages. On one hand, women may have felt a greater sense of security, as they were in a familiar context (e.g., home), without spending time and money to be able to attend the Group CBT sessions. This format also enabled a group experience, in a trusting environment, prompting the share of significant and personal experiences related with menopause. On the other hand, during Covid confinement, studies indicate that women reported being overwhelmed because most were teleworking, experiencing difficulty in fulfilling other social and family roles. In addition, the online format does not allow a closer interaction between participants (e.g., before and/or after MENOS-PT sessions). However, some studies have documented that it is possible to have a functional therapeutic relation and develop/deliver therapeutic goals and respective strategies in an online therapeutic setting (Peter et al., 2019).

Hence, in order to meet women's needs, as well as implement health promotion initiatives, it is recommended to amplify the approach to menopause in Portugal's health care systems. It seems crucial to promote women's awareness, education and empowerment (either in primary health care for premenopause women and in menopause appointments for peri- and postmenopause women). This will give them information, adjusted expectations and representations as well as improve their sense of control. Inviting the partners of menopausal women menopause conversation, whenever they find useful and the partners find it valuable, might promote a more adaptative couple experience of menopause.

At primary health care settings, it could be useful and cost-effective to invest in delivering psychoeducation about menopause and its associated symptoms, as well as actions women can take to effectively manage the experience. These could be done through leaflets, audio and visual contents exhibiting in waiting rooms of these settings. These types of interventions would provide reliable and accurate information and could simultaneously develop a more positive and adjusted women's/men's attitudes towards menopause. Also, group sessions in community settings (for example, International Menopause Day - October 18th) which has the purpose of raising awareness to menopause and options available for improving health and wellbeing at this stage of life) may be important to increase public knowledge about menopause and challenging associated misconceptions. Multidisciplinary intervention for menopause in these settings (both clinical and community) may be mainly targeted for premenopausal women – early as 35 years – since general beliefs about menopause tend to be more negative for younger women than for menopausal women (Smith et al., 2011), due to the increasing prevalence of women who have early menopause and having in mind an early prevention of weight gain and early change of unhelpful behaviours (such as caffeine intake).

At menopause clinics for peri- and postmenopause women with problematic MS, it may be helpful a change from a purely biological approach - involving only medical doctors - to a multidisciplinary approach, to include psychologists, nutritionists, nurses, physical therapists, and psychomotricians. This would allow to enhance MS' experience according menopause women's personal needs and preferences, through nutritional and supplementation support, pelvic and physical exercises prescription and efficient strategies to increase adherence/maintained their lifestyle changes over time. Also, MENOS-PT could be a cost-effective resource to implement in these settings, after further studies which prove its efficacy with a controlled design and larger samples.

3.Limitations and Future Research

This doctoral thesis has several limitations. In all the empirical studies presented here, participants were recruited using convenience samples: most of the women were in postmenopause and highly educated. As postmenopause women and with higher education levels, they tend to have more positive menopause representation and better management of MS. The aforementioned aspects in addition to the reduced size of the samples, limited the generalization of the results. Additionally, both the participants that integrated the studies of couples and those of MENOS-PT were recruited during the Covid-19 pandemic Covid-19 and, for this reason, the recruitment as well as the obtained results may have been impacted. Future studies should replicate the delivery of this intervention using more heterogeneous samples with more participants and in a more stable period when social confinement is not mandatory.

Furthermore, in the study about the impact of menopause representations on couples' sexual function, future studies should explore information about couples' relationship quality, covering not only penetrative sex but other forms of sexuality (such as intimate touching or reciprocated masturbation), and explore the impact of menopause representations in couples with absence of sexual activity. Additionally, a couple-orientated study to explore andropause and menopause and its more prevalent symptoms (namely, representations and perceived helpful strategies to enhance their own experience as well as their partner's experience of menopause/andropause). This study could inform a CBT couple-orientated in future.

Regarding the group CBT MENOS-PT, due the pandemic context (and consequently the lockdowns in Portugal), only women who had computers and with basic computer skills (i.e., knowledge about computer, internet and Zoom platform) were eligible to participate in this group intervention. As such, women who met these criteria are more differentiated, which may be a bias in the obtained results. Further 3-arm randomised controlled trial aiming to compare VMS and menopause representations outcomes of an internet-based MENOS-PT Group CBT, a face-to-face MENOS-PT Group CBT, and a waiting list control group for women with troublesome VMS could be interesting. Also, a sleep's multidisciplinary intervention (with an accurate and objective measure such as polysomnography) for women who seeking professional help to night sweats' sleep may expand night sweats' knowledge impact on sleep.

The majority of lifestyles and health variables (e.g., frequency of caffeine beverages/ weight and height that resulted in BMI) were obtained through women's self-report. Moreover, MENOS-PT explored triggers of VMS (some of them were regarding the aforementioned lifestyle variables) in future studies could be pertinent to add objective measures to test these variables and understand if the reduction of consumption of these VMS' triggers influence their reduction on problem rating and frequency.

In sum, this doctoral thesis granted a useful contribution to the understanding of menopause experience in several samples of Portuguese women. These occurred either by the development of a theory-driven menopause representations instrument (MenoSentations-Questionnaire), and assessment of the impact of menopause representations on middle-aged couple's sexual function. This thesis also contributed to the broadening knowledge about negative determinants of MS' perceived severity, such as individual characteristics, health status, and lifestyle. Finally, it adapted and made available an efficacious CBT short and manualized intervention to help women to better manage their MS and representations; the pilot run with MENOS-PT presented optimistic preliminary results for Portuguese women with problematic menopause experiences, demonstrating a useful intervention for women who are not prescribed for HRT and/ or are unwilling to use it.

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