

BMJ Open A person-based approach to planning and developing “EmOcean”: A transdiagnostic digital intervention for stress and emotion management

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ABSTRACT

Objectives This paper constitutes an intervention development paper, illustrating the application of the person-based approach to planning and developing a digital transdiagnostic intervention to support Portuguese adults in managing their stress and emotions, thereby enhancing their mental health.

Design A multi-method intervention development study following the person-based approach (Phase I: collating and analysing evidence; Phase II: creating the intervention plan). Evidence from three quantitative studies, examining emotional schemas, psychological flexibility, and mental health in the context of stress, a qualitative study, exploring stress-coping experiences, and a scoping review of digital interventions designed for stress, were combined with experts' consultation to facilitate the creation of the guiding principles and the logic model. This guided the development of prototype intervention.

Setting Community-based recruitment across Portugal, collected online and at hospitals, senior universities and patient organisations.

Participants Quantitative studies used a convenience sample (Study 1, n=666; Study 2, n=583; Study 3, n=276). 29 adults purposively sampled from the Study 3' highest and lowest stress quartiles took part in semi-structured interviews. In the scoping review, 5867 articles were identified, and 131 studies of digital psychological interventions for stress were included. Six experts in stress, cognitive behavioural therapy, acceptance and commitment therapy, emotional schema therapy, digital interventions, intervention development and public health reviewed the draft intervention plan.

Results Stress responses, more than stressor type, were the strongest predictor of both positive and negative mental health, with emotional schemas (negative evaluation of emotions, difficulties in reappraisal) and psychological flexibility (behavioural awareness, valued action, openness to experience) acting as mediators. Qualitative interviews highlighted maladaptive thoughts as the main barrier and emotional management as the main facilitator to coping, alongside preferences for intervention content and delivery. The scoping review found common components in existing digital interventions for stress, but none integrated the emotional schemas model. Together with expert consultation, these findings led to the development of EmOcean prototype, a guided self-help

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This methodological approach is rigorous, flexible and transparent, by explicitly mapping evidence and theory to identify gaps to strengthen the intervention.
- ⇒ Using the person-based approach provides a systematic way to integrate user feedback directly regarding what should be included and how it should be delivered.
- ⇒ The development of EmOcean is comprehensively described, enabling other researchers to easily understand how this methodology can be applied to various intervention contexts, which may differ in terms of the elements included.
- ⇒ While purposive sampling captured diverse stress levels within the qualitative study, the sample was predominantly female, meaning male perspectives remain less well understood.
- ⇒ The scoping review allowed for the prompt integration of existing scientific literature into the intervention design, though its non-systematic nature means some relevant studies may have been missing.

digital intervention comprising eight integrated and five optional modules, tailored to users' needs, characteristics and preferences, which are completed sequentially on a weekly basis. Modules include psychoeducation and exercises on topics such as stress, emotions, cognitive reframing, mindfulness, acceptance, values, activities, problem-solving, time management, physical exercise, sleep, social support, assertiveness and emotional management.

Conclusions Combining empirical, theoretical and person-based evidence supported the development of EmOcean, an intervention hypothesised to support stress and emotion management and enhance mental health. Its acceptability, feasibility and efficacy will be evaluated in future studies.

BACKGROUND

According to the Global Emotions Report,¹ which surveyed adults from 142 countries, 4 in 10 (40%) reported high levels of stress. How individuals manage stress and emotions

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has important consequences for health and adaptive functioning.²⁻⁴ Beyond the broader social, economic and technological transformations happening, occupational, academic and personal demands, further exacerbated by the COVID-19 pandemic, have become prominent contributors to stress. The COVID-19 pandemic comprised various types of stressors, affecting individuals' lives at multiple levels, underscoring the adverse impact of stress on mental health, manifesting in psychopathological symptoms as well as overall well-being^{5 6} and the need for people to learn how to cope effectively with it. Given stress's increasing prevalence and the significant impact it has on psychological and physical health, it has driven the demand for accessible, personalised and evidence-based interventions.

There are various effective psychological interventions to cope with stress. However, most are based on only one model or theory (eg, second-wave cognitive behavioural therapy (CBT) or mindfulness-based approaches), which may limit their applicability to different individuals and contexts. Furthermore, most face-to-face interventions face barriers of geographical access, cost, stigma and availability of qualified mental health professionals. Recognising the impossibility of providing quality mental health services to everyone who needs it worldwide,⁷ digital interventions emerge as a promising alternative to support the population's mental health during and after the pandemic,⁸ with growing evidence demonstrating their effectiveness in protecting and promoting mental health.⁹⁻¹² However, many still lack robust conceptual integration, testing the psychological processes the developers theorise as relevant to change and responsiveness to users' needs, preferences and characteristics.

Stress and emotions are prevalent in everyday life, although people's responses vary across contexts and individuals. Given the complexity and variability of stress responses and emotions, there is growing recognition of the importance of transdiagnostic, integrative and person-based approaches. Some individuals are more vulnerable to the adverse impact of stress and demonstrate negative outcomes.^{13 14} Among the different factors, psychological processes involving attention,¹⁵ affect, memory, reasoning, thoughts and behaviours¹⁵⁻¹⁷ have been shown to contribute to psychological distress across a wide range of psychological disorders¹⁸ and are referred to as transdiagnostic processes.

A transdiagnostic approach identifies and targets the common processes underlying psychological distress and multiple forms of suffering.^{17 19 20} Furthermore, there has been an emerging emphasis in clinical psychology on developing transdiagnostic models and interventions that apply to various disorders.¹⁷ The major advantage of these models and interventions is their applicability to a range of mental health issues, from preventive to inter-ventive. Among the models and interventions developed, third-wave CBT highlights and targets diverse psychological processes that can be considered transdiagnostic. Two specific models and interventions that have been related

not only to a wide range of mental health issues but also to conceptualising the relationship between stress and mental health are the emotional schemas model and the psychological flexibility model.

Maladaptive emotional schemas and psychological inflexibility have been related to, for example, depression, anxiety, lower levels of well-being and post-traumatic stress symptoms,²¹⁻²⁶ which suggests transdiagnostic applicability.²⁷ Effectively, following a more meta-experiential approach, thoughts and feelings about emotions (emotional schemas) appear to play a significant role in conceptualising the association between stress and mental health.²⁸ According to a more experiential approach, the willingness to embrace thoughts and emotions while living in accordance with personal values (psychological flexibility) may be relevant in this relationship.^{23 29} Thus, both models share an experiential orientation, making them theoretically compatible at a functional level.

Although the two models differ primarily in the level of intervention, this difference does not constitute a contradiction. Rather, it means the models address complementary levels of the same problem. The models are not merged into a single theoretical framework but are applied to complementary aspects of stress, emotions and mental health relationship, consistent with an integrative approach^{30 31} combining elements from two or more treatments into one intervention.

Thus, these potentially modifiable transdiagnostic psychological processes may help mitigate the mental health impact of stress, as they fundamentally influence the onset and maintenance of mental health issues. Consequently, integrating the emotional schemas model³² and the psychological flexibility model³³ may help elucidate shared processes across various CBT models and promote more effective and flexible responses at cognitive, emotional and behavioural levels in stressful contexts. By working simultaneously on emotional schemas and psychological flexibility, we anticipate that an integrative intervention can assist in both the prevention and intervention of stress-related problems, ultimately buffering the adverse effects of stress, reducing mental health risk factors and enhancing protective factors through several pathways.

Finally, there has been a growing recognition of the need to design mental health interventions that are not only theoretically sound and evidence-based but also deeply responsive to the target user's unique needs and preferences in their specific context, including content and features that were demonstrated to be relevant to the people who will use them. The person-based approach^{34 35} provides a structured and systematic framework for achieving this goal. This approach aims to enhance user engagement, acceptability, and adherence, support personalisation, consider the user's context, and ultimately contribute to the development of a relevant, engaging, and effective intervention.

According to the person-based approach, when planning and developing interventions, the focus should be

on an in-depth understanding of the target user and their psychosocial context.³⁶ This approach, which can be used in conjunction with evidence-based approach methods and theory,³⁵ includes two phases: Phase I—Collecting and analysing existing and new primary evidence; Phase II—Creating the intervention plan. The present study exemplifies the planning and developing stages of the person-based approach process, illustrating the application of these two phases.

Research aims

To our knowledge, few initiatives have been developed to address the range of mental health symptoms that can result from stress, integrating emotional schemas and psychological flexibility to protect and promote mental health, and combining evidence-based, theory-based and person-based approaches in the development process. Thus, the present paper aims to: (1) describe the planning and development of a transdiagnostic digital intervention to support an adult population in managing their stress and emotions, protecting and promoting their mental health; and (2) illustrate how the person-based approach can be systematically applied to this process. No feasibility, acceptability or effectiveness data are reported here. The proposed intervention aims to integrate transdiagnostic processes derived from various CBT models and include the target user in the development process,

intended to support the relevance and acceptability for them. By combining multiple psychological theories that target psychological processes related to several mental health issues²⁷ with person-based principles, we aim to develop a more comprehensive, flexible and effective intervention.

METHODS

Study design

The present study employs multi-methods. Results from three quantitative studies, a qualitative study and a scoping review were combined with expert consultation to inform the development of the guiding principles and the logic model. This guided the development of the intervention (see figure 1). The development process and its reporting follow the guidance for reporting intervention development studies in health research (GUIDED).³⁷

Participants

The studies were conducted with a convenience sample from Portugal, consisting of individuals aged 16 years or older. Regarding quantitative studies, 666 individuals participated in Study 1. Participants were mostly female (65.8%), aged 16–93 years, married/in a civil union or single, and the majority worked full-time or were retired. In Study 2, 666 participants were initially recruited.

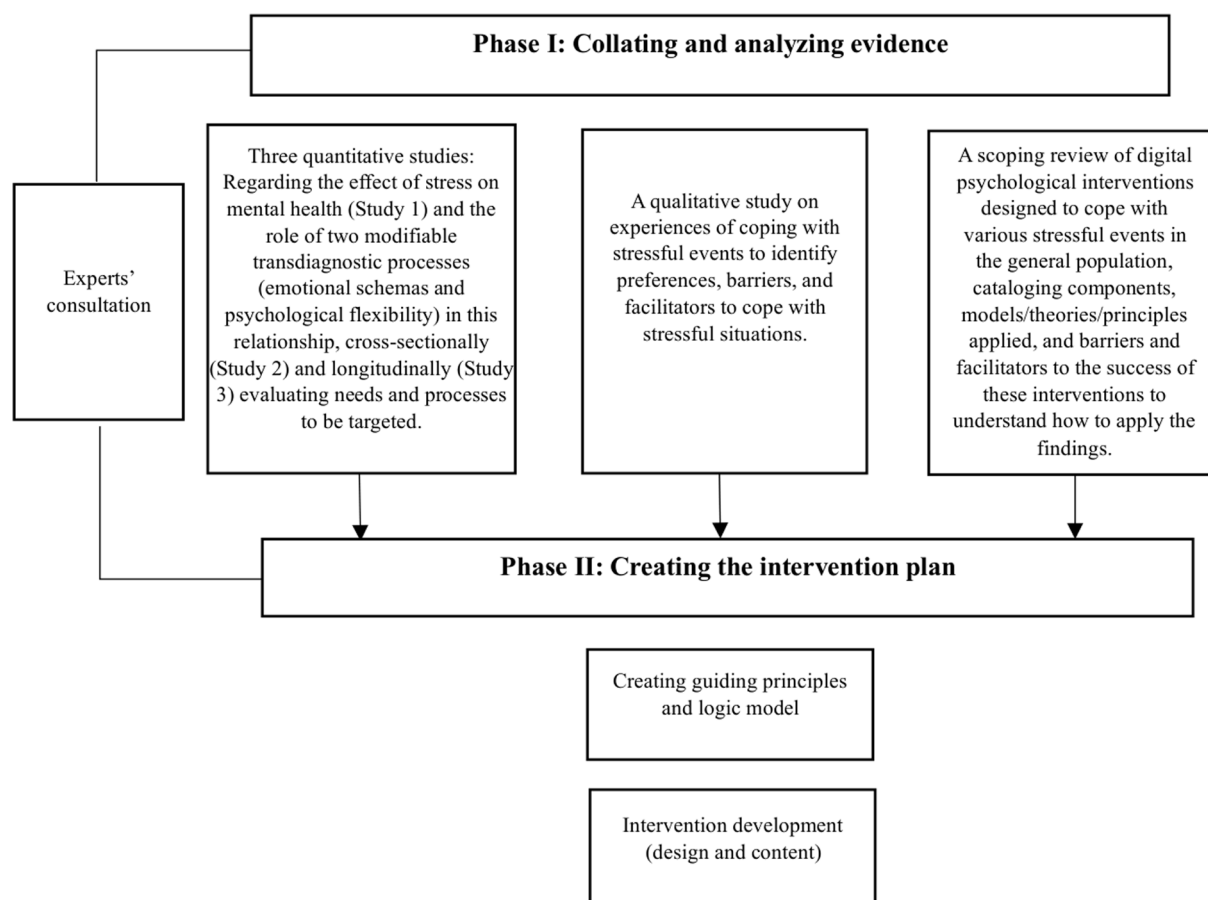


Figure 1 Flowchart outlining each phase of work.



Table 1 Sample characterisation

Sample demographic characteristics	Statistics (n (%))
Age (min.-max.; mean (SD))	21–85; 50.4 (17.07)
Female	21 (72.4%)
Marital status	
Single	9 (31%)
Married	15 (51.7%)
Divorced	2 (6.9%)
Widowed	3 (10.3%)
Level of education	
4 years or less	1 (3.4%)
9 years	1 (3.4%)
12 years	6 (20.7%)
Bachelor's degree	15 (51.7%)
Master's degree	6 (20.7%)
Professional status	
Full-time employee	15 (51.7%)
Part-time worker	1 (3.4%)
Unemployed	5 (17.2%)
Student	1 (3.4%)
Retired	7 (24.1%)
Mental health disorders diagnosed	5 (17.2%)

However, 83 participants were excluded from the analysis due to incomplete questionnaires of interest, resulting in a final sample of 583 participants. This sample ranged in age from 16 to 93 years, was mostly female (64.3%), married/in a civil union or single, and was mostly composed of full-time employees or retired individuals. For Study 3, the initial Time 1 sample included 666 individuals, from which 583 completed all questionnaires of interest. At Time 2, 303 participants completed the survey, but 27 were excluded due to missing data in the questionnaires of interest, resulting in a final longitudinal sample of 276 individuals. This final sample ranged in age from 16 to 86 years, was mostly female (69.9%), married or in a civil union, and consisted of full-time employees. The demographics of the full sample can be consulted in Sebastião *et al*³⁸ and Sebastião & Neto.^{39 40}

From Study 3, RS contacted 73 individuals via email or phone to participate in the qualitative study. Interviewed participants were purposively sampled based on their stress response levels and categorised into high and low groups using quartiles to select participants for the study. This sampling strategy aimed to gather feedback and identify the barriers, facilitators and preferences of potential users with varying levels of stress. High-stress participants were selected from the fourth quartile (stress scores ≥ 64), and low-stress participants from the first quartile (stress scores ≤ 42). 29 participants took part in a single semi-structured interview (see table 1 for sample characteristics).

For the scoping review, studies of digital psychological interventions designed to cope with stress were considered, provided they identified the source of stress and were intended for individuals in the general population across all settings through digital technologies. Literature published in English, Portuguese and Spanish was considered for inclusion. This scoping review considered peer-reviewed, published papers using any study design, including qualitative, quantitative or mixed-methods studies. Studies that did not include at least one psychological intervention component, a description of the intervention's components or the models, theories or principles used to conceptualise and integrate them, were excluded. Studies regarding programmes or interventions that were not delivered through digital technologies or those addressing specific mental health disorders (eg, depression) were also excluded. Studies that did not identify the source of stress were excluded, as were studies that did not include stress as a primary aim of the programme or intervention.

Procedure and materials

All studies involving human beings were conducted following the Declaration of Helsinki and approved by the Ethics Committees of ISPA—Instituto Universitário (protocol code D-049-2-22, date of approval: January 2022; protocol code D-065-5-23, date of approval: May 2023), of Centro Hospitalar de Lisboa Norte (protocol code 51/22, date of approval: May 2022), and of Centro Hospitalar de Lisboa Central (protocol code 1239/22, date of approval: May 2022). Informed consent was obtained from all participants.

Quantitative studies

A full description can be found in ^{38–40}. However, the most relevant methodological information is described below.

Data collection and recruitment

Data collection occurred online and at hospitals, senior universities and patient organisations. The online survey was administered via Qualtrics and disseminated via social networks. Data collection employed these two approaches to include individuals who might not otherwise have access to the questionnaire, thereby ensuring a diverse sample across stress levels and sociodemographic backgrounds. Data for Study 1 and Study 2 were collected cross-sectionally between January 2022 and July 2022. For Study 3, data were collected longitudinally at two time points: January to July 2022 (Time 1) and July 2022 to March 2023 (Time 2), with Time 2 occurring approximately 6 months after Time 1.

Measures

In Study 1, measures regarding the number of COVID-19 stressors, the stressor types, and the stress responses (Impact of Event Scale-Revised, IES-R),⁴¹ and positive (Mental Health Continuum-Short Form, MHC-SF⁴²) and negative mental health (Brief Symptom Inventory 18, BSI-18)⁴³ were collected. Regarding Study 2, individuals

completed measures of stress responses (IES-R),⁴¹ emotional schemas (Leahy Emotional Schemas Scale, LESS),²² psychological flexibility (Comprehensive Assessment of Acceptance and Commitment Therapy processes, CompACT),⁴⁴ positive (MHC-SF⁴²) and negative mental health (BSI-18).⁴³ In Study 3, the same measures as in Study 2 were completed.

Data analysis

Data were analysed using descriptive statistics, t-tests, and Pearson's correlations in all studies. In Study 1, several hierarchical multiple regression analyses were conducted. In Studies 2 and 3, mediation analyses were performed. In Study 2, the mediation analyses were conducted with structural equation models (SEM). Relevant sociodemographic variables (sex, age, previous physical and mental health issues) were controlled in the structural model. The proposed model showed a good fit to the data ($\chi^2(5916) = 9674.43$, $p < 0.001$, comparative fit index = 0.919, Tucker-Lewis index = 0.922, root mean square error of approximation = 0.034, $p = 1.000$, standardized root mean square residual = 0.063). In Study 3, the mediation analyses were conducted in Jeffreys's Amazing Statistics Program using the lavaan R package⁴⁵ with maximum likelihood estimation. The significance of indirect effects was determined using the bias-corrected percentile method bootstrapping with 10 000 resamples,⁴⁶ where a 95% CI not containing zero indicated statistical mediation. In Study 3, positive and negative mental health were both treated as outcome variables at T2, and baseline (T1) levels of positive and negative mental health were controlled along with relevant sociodemographic variables (sex, age and previous mental health issues).

Qualitative study

The Consolidated Criteria for Reporting Qualitative Research (COREQ) was used to guide the qualitative study (see online supplemental table S1). RS carried out interviews at the researcher's university ($n = 6$) or online ($n = 23$) between June and July 2023. No one else was present besides the participant and the researcher. Participants were informed that the researcher's aim was to design a programme to help people manage stress as effectively as possible. Participants' contributions would be in identifying what was essential to include in this programme towards the improvement and prevention of mental health challenges. Each interview lasted approximately 1 hour. Interviews were piloted with two people of different age groups. A semi-structured interview script was developed around four main topics: What are stressful experiences; strategies they use to cope with stress; barriers and facilitators to coping with stressful situations; and suggestions for activities/tasks that they believe would help them cope with stress. The sample size was guided by the concept of information power proposed by Malterud *et al.*⁴⁷ Information power suggests that the more relevant information a sample holds for addressing the study aim, the fewer participants are required. The

present study addressed a relatively focused research question concerning stress experiences, coping strategies, and preferences for digital intervention content. Participants were purposively selected from the highest and lowest quartiles of stress scores to ensure inclusion of information-rich cases with contrasting stress profiles. In addition, data were collected through semi-structured interviews lasting approximately 1 hour, yielding rich, detailed accounts. Although the study was exploratory and not guided by a specific theoretical framework, the combination of a focused aim, strategic sampling and high-quality interview data indicated that a sample of 29 participants provided sufficient information power to address the study objectives.

All interviews were recorded and transcribed. Through reflexive thematic analysis,⁴⁸ barriers, facilitators and preferences were identified. Reflexivity was maintained by using field notes to examine how the interviewer's clinical background as a PhD student and a psychologist influenced participant disclosure and data interpretation. Additionally, differences in coping with stress between participants with low-stress and high-stress responses, as well as between less-challenging and more-challenging experiences, were explored. The analysis was predominantly inductive yet included elements of a deductive approach. The six stages of thematic analysis⁴⁸ were followed using MAXQDA 24. To ensure interpretive rigour, the generated codes and initial findings were presented to and discussed with the research team. Interpretive decisions, theme definitions and coding discrepancies were managed through these iterative meetings.

Scoping review

The review was conducted in accordance with the Joanna Briggs Institute methodology for scoping reviews⁴⁹ and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR) was used to guide the scoping review⁵⁰ (see online supplemental table S2). The scoping review protocol was registered on the Open Science Framework (OSF) prior to its start (registration: osf.io/v2hjk). The APA PsycINFO, MEDLINE, Scopus and Web of Science databases were searched for published articles, with the most recent search conducted on 27 March 2023. This search combined the following terms: 'DE stress OR TI stress or AB stress' AND 'DE Digital Interventions' OR DE Online Therapy OR TI 'online intervention' OR AB 'online intervention' OR TI 'internet-based intervention' OR AB 'internet-based intervention' OR DE Mobile Applications OR 'DE Mobile Health'. There were no date limits used in the screening criteria. All identified records were collated and uploaded to Zotero, and duplicates were removed. The authors of relevant papers were contacted to request full-text access when needed.

Article screening was performed using Rayyan software through a multi-stage, independent-reviewer

process. First, RS and CC screened and assessed the titles and abstracts of all retrieved records against the inclusion criteria. Next, RS and PR independently assessed the full text of the selected studies to determine final eligibility. Any disagreements that arose between reviewers at each stage of the screening process were resolved through discussion, or a third reviewer from the research team was enlisted to resolve the issue. The results of the search and the study inclusion process are presented in a PRISMA-ScR flow diagram⁵⁰ presented in online supplemental figure S1.

Data extraction from papers that met the inclusion criteria was performed by PR and ES using Microsoft Excel to include specific details about the stressor, intervention/programme characteristics, and potential barriers and facilitators reported as affecting the success of the intervention/programme. Thematic analysis⁴⁸ was used to organise the components presented in the interventions using MAXQDA 24.

Data integration

Data from the quantitative, qualitative studies and scoping review were first analysed separately. Quantitative and qualitative studies enabled the personalisation of the intervention according to user needs, barriers, facilitators and preferences. The scoping review enabled us to understand how to apply these findings, identifying the models, theories, principles and components that other interventions have already used, and anticipating potential barriers and facilitators to the success of the intervention.

Through an interactive process between quantitative, qualitative studies and the scoping review, the first draft of the guiding principles and logic model was proposed. In line with the person-based approach,^{34 35} the guiding principles specify: (a) the key intervention design objectives (what the intervention design must achieve to meet the specific needs or overcome specific barriers to the target user); (b) the key intervention features that will achieve those objectives (key features can include techniques, delivery characteristics, implementation setting, communication methods, navigation methods). The logic model synthesises the findings into a testable model that describes how the various intervention components are hypothesised to impact mediators and ultimately influence outcomes.

Experts' consultation was used to ensure the applicability and appropriateness of the intervention plan draft. This first draft was presented to six experts (psychologists and researchers) in stress, CBT, acceptance and commitment therapy (ACT), emotional schema therapy (EST), digital interventions, intervention development and public health, and revised accordingly to incorporate their feedback. Guiding principles and logic model were used to outline the intervention structure, content and design the wireframes.

RESULTS

Needs and processes to be targeted: quantitative findings

Regarding Study 1's results, the strongest predictor of mental health, both positive ($\beta = -.17$, $t = -4.14$, $p < 0.001$) and negative ($\beta = 0.50$, $t = 13.85$, $p < 0.001$), was stress responses. Concerning the role of emotional schemas and psychological flexibility in these relationships, Study 2 highlighted that both were significant mediators. Namely, negative evaluation of emotions and difficulties in reappraisal (emotional schemas dimensions) were significant mediators in the relationship between stress responses and positive (negative evaluation of emotions: $\beta = -0.14$, $p < 0.001$; difficulties in reappraisal: $\beta = -0.05$, $p = 0.009$) and negative mental health (negative evaluation of emotions: $\beta = 0.18$, $p < 0.001$; difficulties in reappraisal: $\beta = 0.02$, $p = 0.021$). Regarding psychological flexibility, only behavioural awareness was a significant mediator in the relationship between stress responses and negative mental health ($\beta = 0.06$, $p < 0.001$). Additionally, valued action was a significant mediator of the relationship between stress responses and positive mental health ($\beta = -0.03$, $p = 0.002$). For positive mental health, a total mediation ($\beta = -0.01$, $p = 0.855$) was observed, and for negative mental health, a partial mediation ($\beta = 0.31$, $p < 0.001$) was observed. The total standardised effect of stress responses on positive mental health was -0.22 ($p < 0.001$), and on negative mental health was 0.57 ($p < 0.001$).

The results of Study 3 suggested that negative evaluation of emotions was a significant mediator of the longitudinal relationship between stress responses and negative mental health ($\beta = 0.03$; 95% CI 0.005 to 0.081). Valued action ($\beta = -0.03$; 95% CI -0.061 to -0.004) and openness to experience ($\beta = -0.04$; 95% CI -0.076 to -0.008) mediated the longitudinal relationship between stress responses and positive mental health. No direct effects of stress responses on positive mental health ($\beta = -0.03$; 95% CI -0.115 to 0.068) or negative mental health ($\beta = 0.03$; 95% CI -0.052 to 0.108) were observed. The findings of these studies supported the need to develop an intervention to cope with stress responses, targeting emotional schemas and psychological flexibility to promote and protect mental health, focusing on different dimensions over time (detailed results can be consulted in).^{38–40}

Barriers, facilitators and preferences: qualitative findings

Six main themes captured participants' perceived facilitators and barriers to coping with stress (representative quotes are provided in online supplemental table S3): (1) Acceptance, values and awareness: When describing how they coped with stress, participants highlighted the acceptance of internal and external events, the connection between their behaviours and their values, and the awareness of the present moment as facilitating strategies. When considering the potential differences between situations perceived as more or less challenging by participants, the link between behaviours and values was

only referred to in more challenging situations among participants experiencing lower stress levels. The awareness of the present moment was used only in less challenging situations by one participant with a higher stress level. However, some participants reported difficulties in accepting internal and external events and becoming aware of the present moment, and they employed experiential avoidance as a means of coping with stress. These strategies seemed difficult to cope with stress. In less challenging situations, the only barrier among these strategies was difficulty with acceptance; (2) Support: Participants reported that being able to rely on others, particularly on an informal (social) level but also on a formal (professional) level, made it easier for them to manage stress. Furthermore, some participants identified the absence of both social and professional support as a barrier. When facing more challenging situations, the absence of both types of support was identified as a barrier. Conversely, for less challenging situations, participants experiencing higher stress levels reported only a lack of social support; (3) Thoughts: Participants attempted to modify the content of their thoughts as a means of managing their stress. On the other hand, the emergence of potentially maladaptive thoughts appeared to hinder participants' ability to manage stressful situations. This was the most cited barrier (n=27, 96%). These thoughts encompass self-related thoughts, thoughts about others, situations, emotions, and rumination. Rumination was predominantly reported by participants experiencing higher levels of stress, in both types of situations; (4) Skills: This involves the participant's ability to apply a set of skills (eg, problem-solving, assertiveness) to enable them to manage stress more effectively. Time management and organisation were perceived as facilitators in both kinds of situations, but only among participants experiencing higher levels of stress; (5) Behavioural activities: Participants disclosed a variety of leisure or pleasurable activities that they found helpful in managing their stress, such as reading and walking; (6) Emotional management: Participants reported various strategies to regulate their emotions. These included avoidance, distraction, compassionate and empowering verbalisations, and breathing techniques. This was the most cited facilitator (n=27, 96%). In more challenging situations, distraction was employed only by participants with higher stress levels. In less challenging situations, breathing was used only by participants with higher stress levels.

Additionally, two further themes emerged concerning participants' preferences for designing an intervention to effectively cope with stress (Preferences for intervention components and Preferences for delivery). Regarding preferences for intervention components, participants identified the following seven sub-themes as interesting and relevant for inclusion. Support: Participants mentioned that both social support (ie, sharing experiences and stress management strategies with peers, asking for help from the support network) and professional support (eg, psychological support, psychiatric

support or therapeutic groups) are important features to include in the intervention; Thoughts challenge: Participants shared that they would like to see a way to reformulate thoughts and find alternative perspectives included; Validation, acceptance and awareness: Participants suggested the inclusion of materials focusing on validation and acceptance of emotional experience; Psychoeducation about stress, other emotions and mental health: Participants proposed the inclusion of information about stress, other emotions and mental health; Skills promotion: Participants mentioned their interest in learning about a set of skills that facilitate stress management (eg, problem-solving, time management); Emotional management tools: Participants proposed integrating a set of strategies that allow emotional regulation (eg, distraction, listening to music, breathing techniques); Activities: Participants expressed a desire for the inclusion of a set of activities that allow for more effective stress management. Support was the most suggested component (n=26, 89.7%), followed by psychoeducation (n=18, 62.1%), emotional management (n=18, 62.1%) and activities (n=18, 62.1%). Regarding preferences for delivery, participants identified the following four sub-themes: Personalised list of pleasurable activities; Presentation of materials in various and appealing formats (audio, video, images); Use of practical examples, testimonials or simulated stressful situations; and Differentiation of material presentation based on user characteristics and context.

This study suggested that acceptance, values and awareness, as well as support and thoughts, should be the focus of the present intervention. They are not only facilitators; their absence was also considered a barrier. In addition, it highlighted the importance of personalising and adapting the presented materials to the user, considering the context characteristics (more or less challenging situations), user characteristics (stress levels, known strategies) and preferences (for content and delivery).

Applying findings: insights from the scoping review

Of the 5867 articles identified for the review, 131 were included. 12 themes of components included in psychological interventions were identified from the scoped literature (see table 2 for descriptions of the themes; representative quotes are provided in online supplemental table S4). The most frequently reported components were Information & psychoeducation (80.9%), followed by Relaxation (74%), Identification & awareness (64.9%), and Behaviour change (55%). The most frequently reported models, theories or principles that were used to conceptualise and integrate into the interventions were the CBT approach (n=39, 29.8%), followed by mindfulness approaches (n=29, 22.1%), a mix between CBT and mindfulness approaches (n=11, 8.4%) and ACT (n=9, 6.9%). Regarding barriers and facilitators to the success of these interventions, 50 articles reported and reflected individual factors, distribution options, practical issues, support, design, materials and other factors (see table 3 for detailed information).

Table 2 Components' themes description and quotes

Theme (frequency of use in the literature)	Description of theme
Information & psychoeducation (106)	Transmission of information or psychoeducation on stressors, stress, and habitual reactions, the rationale behind techniques, psychological models/theories, and available resources.
Identification & awareness (situations, reactions, challenges, present moment, thoughts and emotions) (85)	Becoming aware of and identifying situations, reactions, challenges, the present moment, thoughts, and emotions. It only seeks to identify and become aware, without necessarily acting on it.
Meaning & values (36)	Taking values into account, giving meaning to one's own experiences, and pursuing goals.
Social connection (24)	Activation of a network that assists in case of a problem or challenge, or simply by sharing challenging experiences.
Relaxation (97)	Various techniques aimed at fostering feelings of calm, tranquillity, and balance.
Skills development (48)	Aspects related to acquiring behavioural skills, ranging from communication to time management.
Empowering and compassionate verbalisation (52)	Techniques aimed at fostering a greater sense of self-efficacy, self-compassion and empowerment.
Behaviour change (72)	Varying from self-monitoring of behaviours to adopting healthier habits, engaging in physical exercise, and behavioural activation.
Acceptance & defusion (39)	Techniques aimed at altering the relationship with thoughts and emotions, particularly in the context of third-wave CBT techniques.
Thoughts change (48)	Seeking to change the content of thoughts, varying from identifying negative automatic thoughts to reformulating them and experimenting alternative thoughts.
Emotional management (32)	Techniques that enable managing emotional discomfort, including validation, taking time-outs, implementing intentions, and managing disturbing emotions.
Intervention monitoring & review (51)	Monitoring symptoms, reviewing lessons learnt and preventing relapse.
CBT, cognitive behavioural therapy.	

The overall findings of this scoping review supported the development of an intervention to cope with stress from various sources, aimed at protecting and promoting mental health, based on CBT principles and integrating multiple approaches. The findings of our review also confirm that, to date, there is no available evidence on

the integration of the EST for this purpose. The barriers and facilitators reported in the studies included in the scoping review were considered to help prevent difficulties in the present intervention.

Guiding principles and logic model

The guiding principles and logic model presented below synthesise the evidence gathered across the three quantitative studies, the qualitative study and the scoping review, refined through expert consultation. Table 4 presents the intervention design objectives and the corresponding features through which each objective is achieved. Figure 2 presents the logic model, demonstrating how we anticipate the intervention will work. Online supplemental table S5 comprehensively maps out the elements of the intervention, mapping each key finding to its design implication and corresponding component.

Intervention development: design and content

The draft prototype intervention, named EmOcean, is a guided self-help digital intervention composed of eight integrated and five optional modules. It is designed to support Portuguese adults in managing stress and emotions, thereby enhancing their mental health. The goal was to develop an intervention that can reach a diverse population with varied experiences. The core content was CBT-based, including second- and third-wave CBT principles, such as those from EST and ACT. Books, publicly available intervention protocols and exercises were obtained for stress management interventions, emotion regulation and more generic CBT-based interventions^{32 51–59} and reviewed in the light of our guiding principles and logic model to identify key skills and strategies to include.

Before beginning the intervention, users receive a 10-min call from a coach (who has a bachelor's degree in psychology, but do not necessarily have clinical training) who provides information about the intervention, clarifies doubts, sets usage expectations and explains how to contact a coach if needed. All coaches complete a 1 day training workshop delivered by RS. It covered the intervention's theoretical principles (CBT in general, emotional schemas and psychological flexibility models), the module content, and the safety protocol for high-risk situations. Fidelity to the coaching protocol is monitored through case discussion meetings. Furthermore, users are provided with team contacts to facilitate direct communication in the event of technical difficulties. By default, users receive pre-scheduled check-ins (via email, message or call) after the completion of integrated modules 2, 4, 6 and 8 to address any technical, theoretical or motivational issues, each lasting approximately 15 min, totalling an estimated 55 min of coach contact across the intervention. Users may refuse this support if they prefer a fully self-guided experience.

If active suicidal ideation or other safety concerns arise during these check-ins, coaches follow a protocol to assess risk and develop a safety plan in consultation with a team

Table 3 Facilitators and barriers identified concerning the success of the interventions

Facilitators	Barriers
Individual factors	
Perseverance (1) Recognising benefits from the programme (2)	Difficulties with concentration (3) No current need for support (3) Remembering to do the programme (2) Lack of motivation (2) Lack of time (15) Inability to practise skills learnt in real life (1)
Distribution	
Being online (3) Being app-based (1) Including some face-to-face sessions (1)	Being web-based (3) Not having the programme on their phone (1) Being app-based (1) Being online (6) Online workbook (1)
Practical issues	
Freedom of choosing what to do within the intervention (4) Intervention easily accessible (3) Adequate space (1) Place flexibility (6) Time flexibility (6) Suitable time (6)	Time-consuming intervention (7) Need for adequate space (5) Some parts are too long in content (4) Being during the work shift (1)
Support	
Guidance/support/ feedback within the intervention (7) Social connection within the intervention (5)	Lack of guidance/support within the intervention (8) Lack of awareness of what was offered (1) Lack of social connection within the intervention (8)
Design	
Simple, clear, peaceful and professional presentation (4) Variety of text, graphics, videos (3)	Design issues (eg, colour, text, font size) (9) Lack of a flexible interface/difficulties in navigation (5)
Materials	
Having a structure (3) Peer videos (2) Relevant content (13) Diversified content (3) Shorter content (3) Future planning (1)	Need for more videos, examples of real-life problems, examples of exercises, testimonials and graphics (6) Exercises not being user-friendly (1) Some content perceived as not relevant (8) Lack of summaries (1) Quality of recordings (1) Lack of diversified content (1) Lack of tracking of online activities (2) Lack of tailoring (8)
Others	
Receiving reminders (1)	Technical issues (12) Periodic reminders (1) Lack of reminders (1) Language used (4) Small groups (1) Groups with a lack of common characteristics (1)
Note. The numbers presented in parentheses represent the frequency in the reviewed studies.	

psychologist. In addition to risk identification during scheduled check-ins, users have permanent access to an 'external resources' option within the platform that displays emergency and support lines, ensuring support is not contingent on the check-in schedule. When risk is identified, coaches follow an escalation pathway, with referral to emergency services when needed.

Additionally, users may opt to receive reminders and notifications (see [figure 3a](#)). Those who accept receive engagement prompts and notifications congratulating them on their progress. User data collected through the EmOcean platform is handled in accordance with the General Data Protection Regulation (GDPR). Access to user data is restricted to coaches and authorised research

Table 4 Guiding principles

Intervention design objective	Intervention feature
1. To support an adult population in managing their stress and emotions, enhancing their mental health.	▶ An integrative digital intervention based on various techniques from different CBT models. This intervention should emphasise how individuals experience and respond to stress, bringing emotional processes to the forefront, and focusing on targeting core processes. ▶ The intervention should be developed in modules, presenting the most suitable solution to each user. ▶ The strategies to deal with stress and emotions included in this intervention should be based primarily on common principles found in existing empirically supported psychological interventions, such as general CBT principles, ACT principles and EST principles.*
2. To personalise the intervention to each user based on their characteristics, needs, barriers, facilitators and preferences.	▶ Personalisation of the intervention's contents and the platform itself (eg, self-representation, name). ▶ After the initial contact, participants are asked to build their avatar by completing sociodemographic data in a gamified manner. ▶ The intervention should use neutral language tailored to different education levels, and audio guides will be available in both female and male voices. ▶ During the intervention, users are asked to complete various questionnaires to guide them in responding to their needs. ▶ Users need to receive feedback on their answers, highlighting both their strengths and areas of difficulty in dealing with stress and emotions. ▶ Users receive a suggested plan tailored to their responses, featuring integrated and optional modules.
3. To maximise engagement in the intervention.	▶ Before the intervention begins, a coach holds a brief call with each user to explain the intervention, answer questions, set usage expectations and provide contact information for reaching the coaches. ▶ Information about the modules, their objectives, tasks and deadlines should be clearly explained to the user. ▶ Users have the option to choose when during the day they prefer to log in or receive prompts. ▶ There should be continuity (eg, always presenting the same avatar along the journey). ▶ It needs to be developed for use on smartphones. ▶ The intervention should be designed to be user-friendly, incorporating graphics, images, brief videos (no longer than 2 min) and minimal text. ▶ The videos feature both the image and voice of the intervention's creators. ▶ The contents include real-life problems and practical exercises. ▶ Materials may be supplemented with synchronous support (eg, weekly 10 min calls) and asynchronous support (eg, email or SMS), but only if the user opts in. ▶ The users should be praised and rewarded every time they complete tasks or modules. ▶ Reminders need to be focused on engagement with the intervention and will be forwarded to users at specific time frames.

*Though we have attempted to propose a combination of different CBT models, based on common postulates between them, we need to acknowledge that we did not attempt to reconcile any differences at the basic theoretical level.
CBT, cognitive behavioural therapy.

team members. Before entering the platform, participants must review and complete an informed consent process. This document explicitly outlines: the nature and purpose of the intervention; the tasks required of the user; the voluntary nature of involvement; expected benefits and limitations; anticipated risks and potential discomfort; procedures in the event of a crisis; data collection and confidentiality; and data subject rights under privacy regulations.

EmOcean was created based on a navigation metaphor that draws on the exploration of a map for emotional management, guiding the user experience throughout the intervention. Users are invited to explore the 'Ocean

of Stress and Emotions', visiting various islands (integrated modules) and islets (optional modules), where they encounter tools to achieve increasingly stable, safe and successful navigation (see [figure 3b](#)). Each module includes a theoretical explanation of the topic, accompanied by exercises, presented through a combination of written content, brief videos, interactive tasks and practice assignments (see [figure 3c](#)). The user journey is personalised based on individual characteristics, needs and preferences. Modules are intended to be completed weekly in the order presented. When a specific need is identified, users are redirected to the islets. Users are assigned to optional modules based on specific screening responses

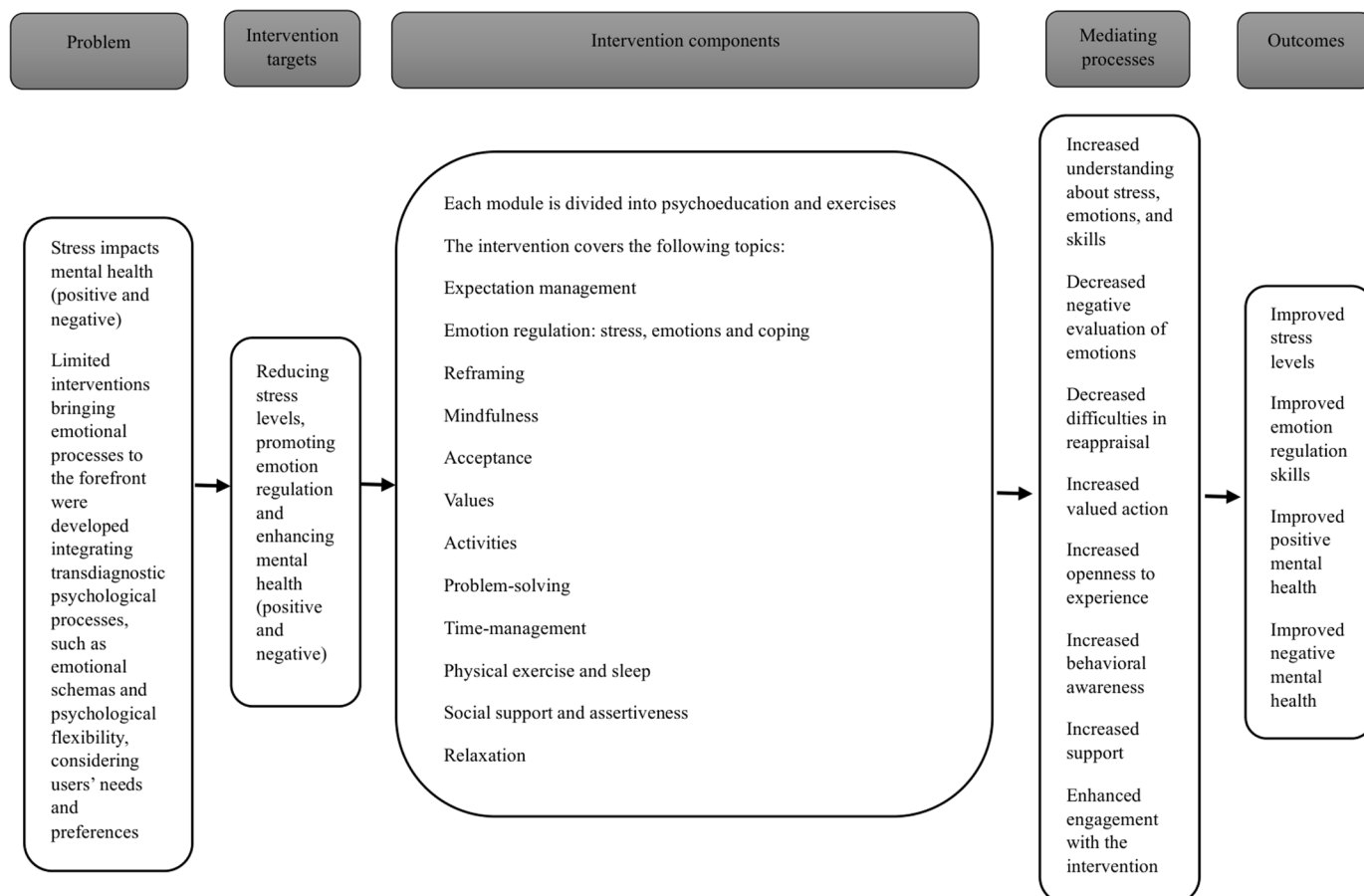


Figure 2 Logic model.

via an automated, rule-based algorithmic tailoring mechanism that requires no real-time clinician guidance. For example, in the Welcome aboard! module, stress levels are evaluated throughout the following question: On a scale of 0 to 10, with 0 being no stress and 10 being the worst

stress possible, what number best describes your level of stress right now? If the stress level is 6 or higher, the user is redirected to the Calmness islet (table 5 details the content and expected target processes of each module). On completing all integrated modules, users gain access

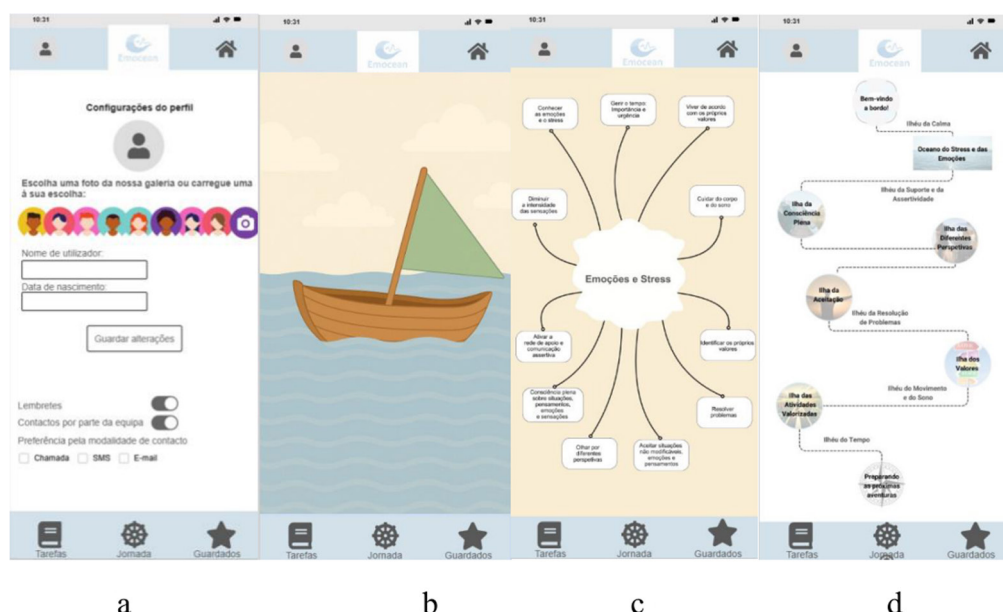


Figure 3 Wireframes of the EmOcean. (a) User profile preferences; (b) Landing screen; (c) Sample content; (d) User journey.

Table 5 Module's contents and target processes

Module and content	Target processes
1. Welcome aboard!: (a) Intervention rationale; (b) Meeting the team; (c) Presentation of external resources; (d) Homework tasks: Stress levels evaluation; Beliefs about emotions assessment.	(a) Expectation management; (b) Engagement with the intervention; (c) Awareness regarding stress levels and beliefs about emotions.
2. Stress and emotions ocean: (a) Psychoeducation and exercises about stress, emotions, reactions, common causes, functions and coping strategies; (b) Homework tasks: Emotions diary; Social support and assertiveness evaluation.	(a) Expectation management; (b) Stress, emotions and coping understanding; (c) Negative evaluation of emotion; (d) Awareness regarding the experience of different emotions, usual coping strategies used, and social support and assertiveness needs.
3. Awareness island: (a) Psychoeducation and exercises about mindfulness and its benefits to stress and emotions; (b) Homework tasks: Practising one mindfulness exercise once a day (eg, Clouds in the sky).	(a) Expectation management; (b) Mindfulness understanding; (c) Awareness without judgement regarding the present and self—emotions, thoughts and body; (d) Behavioural awareness; (e) Negative evaluation of emotion.
4. Different perspectives island: (a) Psychoeducation and exercises about thoughts, the relationship between thoughts and emotions, the ABC model and alternative perspectives; (b) Homework tasks: ABC exercise and alternative perspectives exercise; Practising one mindfulness exercise once a day.	(a) Expectation management; (b) Emotions, thoughts, events and their relationship understanding; (c) Awareness regarding one's own emotions, thoughts, events and interactions between; (d) Negative evaluation of emotion; (e) Difficulties in reappraisal.
5. Acceptance island: (a) Psychoeducation and exercises about acceptance of emotions, thoughts, situations and their benefits to stress and emotions; (b) Homework tasks: Practising one acceptance exercise a day (eg, Emotions as background music); Practising one mindfulness exercise once a day.	(a) Expectation management; (b) Acceptance and defusion understanding; (c) Openness to experience (emotions, thoughts, situations); (d) Negative evaluation of emotion; (e) Difficulties in reappraisal; (f) Awareness about the nature of some situations: modifiable vs non-modifiable.
6. Values island: (a) Psychoeducation and exercises about values, willingness to behave and emotions; (b) Homework tasks: Continuing the values identification exercise; Physical exercise and sleep needs evaluation; Practising one acceptance exercise a day; Practising one mindfulness exercise once a day.	(a) Expectation management; (b) Values understanding, and its relationship with willingness to behave and emotions; (c) Awareness of own values; (d) Awareness of physical exercise and sleep issues; (e) Valued action; (f) Negative evaluation of emotion.
7. Valued activities island: (a) Psychoeducation and exercises about values, behaviours and thoughts; (b) Homework tasks: Applying the weekly planner activities; Time management needs evaluation; Practising one acceptance exercise a day; Practising one mindfulness exercise once a day.	(a) Expectation management; (b) Understanding the relationship between thoughts, behaviours and values; (c) Valued action; (d) Negative evaluation of emotion; (e) Awareness regarding time management skills.
8. Preparing for the next adventures: (a) Summarising the journey; (b) Preparing the future application of learnt content and skills.	(a) Remembering contents and skills; (b) Preparation on how to apply the strategies and techniques learnt in the intervention in real life.
A. Calmness islet: Psychoeducation and exercises about the relationship between emotions and bodily sensations and calming techniques (eg, Diaphragmatic breathing).	(a) Expectation management; (b) Understanding bodily sensation management; (c) Self-management of emotional distress.
B. Support and assertiveness islet: Psychoeducation and exercises about social support, assertiveness and their relationship with stress.	(a) Expectation management; (b) Understanding the importance of social support and assertiveness on stress; (c) Social support and assertiveness skills.
C. Solving problems islet: Psychoeducation and exercises about problem-solving and its relationship with stress.	(a) Expectation management; (b) Understanding the importance of problem-solving to cope with stress; (c) Problem-solving skills.
D. Movement and sleep islet: Psychoeducation and exercises about physical activity, sleep and their relationship with stress.	(a) Expectation management; (b) Understanding the importance of physical activity and sleep on stress; (c) Physical activity and sleep hygiene inclusion in daily lives.
E. Time islet: Psychoeducation and exercises regarding time management and its relationship with stress.	(a) Expectation management; (b) Understanding the importance of time management to cope with stress; (c) Time management skills.
Note. Numbered modules are integrated. The lettered modules are suggested according to the user's needs evaluation.	

to all optional modules. Although users can exit a module at any point and resume later, it is recommended that they complete each module without extended interruptions and long breaks between modules.

Modules and their corresponding content are unlocked only after the previous module is completed. The entire intervention is expected to take between 8 and 13 weeks, depending on the number of optional modules completed. The rationale for the integrated nature of these modules is that the techniques they present may address multiple target processes simultaneously (for example, working with values can help change a negative emotional evaluation while promoting valued actions). In contrast, the optional modules are presented based on the user's needs and preferences, with a focus on specific skills such as time management. To optimise user engagement and intervention feasibility, the platform was designed with a highly flexible architecture. The overall intervention consists of eight core modules, along with optional tailored modules. The approximate completion time per module is intentionally variable, ranging between 10 and 30 min, depending on the complexity of the psychological strategies introduced and the depth of the user's engagement with the experiential exercises. Consequently, it is expected to be a low burden as users are encouraged to progress at their own pace, minimising digital fatigue and fitting into daily routines.

Within the integrated modules, weekly tasks are assigned. Tasks to be completed between modules are stored in a separate section, labelled 'Tasks', for easy access and use. Users can track their progress in a distinct section called 'Journey', where a map visually represents their advancement. Each island and islet is illuminated on completion of the module (see [figure 3d](#)). Additionally, users can save their favourite exercises in a dedicated section, named 'Saves'.

DISCUSSION

Integrating different transdiagnostic processes in a digital intervention, based on user feedback, may protect against the potential negative effects of stress through several pathways. Namely, by reaching a diverse population with varied experiences and being responsive to the target user characteristics, needs and preferences. Thus, the present study describes the process of planning and developing a digital intervention to support an adult population in managing their stress and emotions, enhancing their mental health, following evidence-based, theory-based and person-based approaches.³⁵ These different approaches provide insight into how the intervention should be designed to support participant acceptability and engagement, which will be assessed in future feasibility and acceptability studies.

Employing multiple methods allowed us to draw on the complementary strengths of each, contributing different types of insight to the planning and development process. The methods offer complementary evidence that, taken

together, informed the intervention design. Quantitative studies have highlighted the role of stress responses in mental health and the role of emotional schemas and psychological flexibility in this relationship. This informed the intervention, ensuring it was based on the latest scientific research on the topic and thereby reinforcing the need to target these processes. The qualitative study enables us to explore the facilitators and barriers to coping with stress in various situations. It emphasises the importance of personalising the intervention to align with users' characteristics and preferences, particularly regarding content and delivery methods. Reviewing existing interventions on the topic provides an identification of the components that could be included in the present intervention, the identification of models, theories, or principles that have been used to conceptualise and integrate into these interventions, and finally, an understanding of what has been successful and what has not been successful in past interventions. This element supports the development of an intervention based on the principles of CBT, but also identifies a gap in available resources, as none of the existing interventions integrate the principles of the EST, and few integrate the principles of ACT for this purpose. The barriers and facilitators reported in the studies integrated in the scoping review were considered to avoid difficulties when planning the present intervention. The guiding principles and logic model were created, integrating the results from these three components with expert consultation. The guiding principles summarise the design objectives and key features to address, helping to maintain focus on decision-making. The logic model provides a visual representation of intervention elements and potential mechanisms of action. Based on the understanding gained from the elements mentioned above, we developed the EmOcean intervention prototype.

Strengths and limitations

This methodological approach is rigorous, flexible and transparent. On the one hand, being grounded in evidence and theory, mapping findings and identifying gaps strengthen the intervention. On the other hand, being based on the person allows us to understand people's views on what is important to be included and how. For example, the qualitative study emphasised the importance of incorporating content about emotions and emotion regulation into the intervention, rather than focusing solely on stress management. In addition, it avoids the need to repeatedly start from scratch, since the guiding principles and the logic model can be easily revised. Ultimately, it enables other researchers to easily understand how this methodology can be applied across various intervention contexts, which may differ in the elements included.

However, the present study is not without limitations, and our results should be interpreted with these in mind. The data to the quantitative studies were collected between January 2022 and March 2023, a period influenced by

the COVID-19 pandemic, and the qualitative sample was purposively recruited from these studies. However, our findings suggested that stress responses, rather than the specific type of stressor, emerged as the strongest predictor of both positive and negative mental health.³⁸ This supports the transdiagnostic rationale underlying EmOcean. The intervention targets stress responses through emotional schemas and psychological flexibility, rather than targeting specific stressors. In this regard, it is expected to support transferability of the intervention's core mechanisms across different stressors and beyond the pandemic period. The sample of the qualitative study was primarily composed of women. Although purposive sampling enabled us to access the feedback and diverse needs of potential target users with varying stress levels, it would be helpful to explore the views of more men, as they may report different barriers, facilitators and needs. To address this, future acceptability and feasibility studies will place a particular emphasis on including men in the sample to ensure more balanced and representative user feedback. The scoping review facilitated the timely incorporation of scientific evidence into the intervention plan. However, it was not systematic, so some relevant literature may have been missed.

Regarding the intervention, a further limitation concerns the coaching model's resource intensity. Although the level of support is modest (a single onboarding call and up to four brief check-ins), it requires a trained, supervised coaching workforce and the involvement of a team psychologist for risk situations, which may constrain scalability in low-resource settings or large-scale implementation. Future feasibility and efficacy research should examine whether equivalent levels of engagement and safety can be sustained with only asynchronous contact. Furthermore, the proposed sequencing of the modules reflects a theoretically informed hypothesis rather than an empirically established ordering. This proposed sequence remains to be empirically tested, and future evaluations of the intervention will examine whether the selected order optimally supports engagement and outcomes. Additionally, the specific language, examples, text, audio and video materials, the measures used (validated in Portuguese samples) and available contacts reflect the sociocultural context in which the intervention was developed. However, the theoretical core of the intervention (CBT, emotional schemas and psychological flexibility models based) draws on psychological processes proposed to operate across cultures and is not inherently tied to the Portuguese context or to the pandemic. Even so, broader implementation would likely require linguistic and cultural adaptation of materials and examples, alongside validated measures for the target population. Qualitative studies would also be essential to confirm whether the needs and preferences identified here hold across different sociocultural settings.

CONCLUSIONS

This paper outlines the steps that can be followed using an evidence-based, theory-based and person-based approaches to plan and develop a prototype digital intervention to help an adult population cope with stress and emotions. The planning and development process based on the target user is intended to support the engagement, acceptability and effectiveness of the intervention. These outcomes will be evaluated in later stages of this research project. This integrated, comprehensive and iterative approach has facilitated the development of an intervention based on theory and evidence, but grounded in a deep understanding of user views, context and experiences, informed by expert consultation. In future work, we intend to continue applying this approach, conducting acceptability and feasibility studies, evaluating all intervention components and optimising them from the user's perspective. This will then inform a future randomised controlled trial to evaluate the effectiveness of the intervention and examine whether the intervention works as hypothesised in the logic model.

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Contributors All authors designed the study. RS and DN led the intervention planning, with input from the other coauthors. More specifically, RS and DN were responsible for the quantitative studies. Regarding the qualitative study, RS was responsible for the recruitment, carrying out the interviews and analysing the data. All authors contributed to ensure interpretive rigor. All authors contributed to the scoping review. RS and CMC screened and assessed the titles and abstracts. RS and PRR independently assessed the full text of the selected studies to determine final eligibility. Data extraction from papers that met the inclusion criteria was performed by PRR and ES. DN was the third reviewer when disagreements arose. All authors critically reviewed the manuscript, contributing important intellectual content and approved the final manuscript. RS the guarantor.

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