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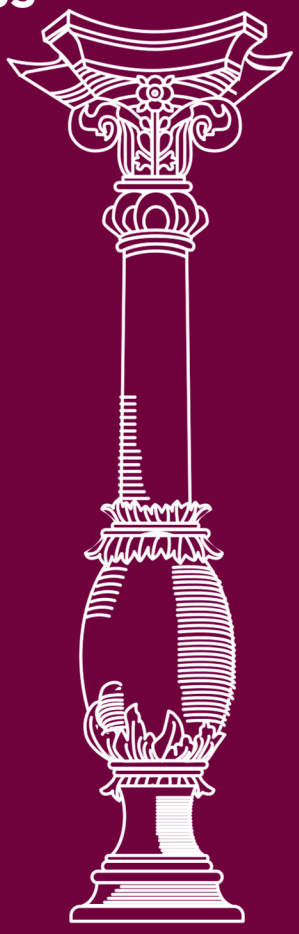
Factors Associated with Outcomes of an Internet-delivered Stress Recovery Intervention for Health Care Workers



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DOCTORAL DISSERTATION
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Social Sciences
Psychology **S 006**

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The dissertation was prepared between 2021 and 2025 at Vilnius University.

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VILNIAUS UNIVERSITETAS

Augustė Nomeikaitė

Internetinės atsigavimo nuo streso intervencijos sveikatos priežiūros darbuotojams pokyčių veiksnių analizė

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ABBREVIATIONS

CBT – Cognitive Behavioral Therapy
FOREST – “For Recovery from Stress” program
FOREST+ – the updated “For Recovery from Stress” program
GAD-7 – the Generalized Anxiety Disorder Scale-7
HCWs – Health care workers
ICBT – Internet-delivered Cognitive Behavioral Therapy
PHQ-4 – the Patient Health Questionnaire-4
PHQ-9 – the Patient Health Questionnaire-9
PSS-4 – the Perceived Stress Scale-4
REQ – the Recovery Experiences Questionnaire
RCT – Randomized Controlled Trial
WHO – World Health Organization
WHO-5 – the World Health Organization Well-being Index-5

CONTENTS

PREFACE

The aim of this doctoral project was to examine factors that contribute to sustained outcomes following an internet-delivered cognitive behavioral therapy (ICBT) intervention for recovery from stress among health care workers. The doctoral research was conducted with the team at the Center for Psychotraumatology of the Institute of Psychology, Faculty of Philosophy, Vilnius University, Lithuania, with international collaborators from Sweden, Australia, Germany, and Switzerland. I am deeply grateful to all those who contributed to and supported this work (see Acknowledgments).

It is essential to note the key experiences that shaped this dissertation. I joined the research team at the Center for Psychotraumatology during my clinical psychology master's studies at Vilnius University and got involved in the development and validation of the ICBT program. I later continued this research as part of my doctoral project, handling the program update process and delving deeper into factors associated with its efficacy.

During my doctoral studies, I had the privilege of examining the mental health and well-being of health care workers through collaborative research with medical professionals and direct observations of their work environments. These firsthand experiences provided a deeper and more empathetic understanding of the challenges faced by this essential workforce. Furthermore, during my doctoral studies, I had the opportunity to visit several leading international research centers specializing in internet-delivered interventions, including institutions in Sweden, Australia, Switzerland, Canada, Germany, and Ireland. These visits broadened my perspective and enhanced my knowledge of the key factors that make such interventions scalable, accessible, and effective.

The dissertation is based on four empirical studies published in peer-reviewed journals. It begins with an overview of ICBT and its relevance for health care workers burdened by stress, both in the Lithuanian and global context, followed by a review of factors influencing outcomes in ICBT and existing knowledge gaps. The subsequent dissertation chapters briefly present the methodology and results of the four studies. The final sections discuss these findings in the context of broader research and offer recommendations for future studies to improve access to evidence-based psychological care.

Through this research, we aim to contribute to the growing field of internet-delivered mental health interventions and support efforts to integrate ICBT into the health care system to ensure that psychological support reaches those who need it most.

LIST OF PUBLISHED PAPERS

This doctoral dissertation is based on the four studies published in the following articles*:

I. Truskauskaite, I., Dumarkaite, A., **Nomeikaite, A.**, Andersson, G., & Kazlauskas, E. (2024). Longitudinal Interplay Between Subjective Stress, Anxiety, Depression, and Well-being in Internet-Based Stress Recovery Intervention for Nurses. *Behavioural and Cognitive Psychotherapy*,1-10. doi:10.1017/S1352465824000456

II. **Nomeikaite, A.**, Andersson, G., Dear, B. F., Dumarkaite, A., Gelezelyte, O., Truskauskaite, I. & Kazlauskas, E. (2023). The Role of Therapist Support on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Healthcare Workers: A Randomized Control Trial. *Cognitive Behaviour Therapy*, *52*(5), 488–507. doi:10.1080/16506073.2023.2214699

III. **Nomeikaite, A.**, Gelezelyte, O., Böttche, M., Andersson, G., & Kazlauskas, E. (2025). Role of Tailored Timing and Frequency Prompts on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Health Care Workers: Randomized Controlled Trial. *JMIR Mental Health, 12:*e62782. doi: 10.2196/62782

IV. **Nomeikaite, A.,** Gelezelyte, O., Berger, T., Andersson, G. & Kazlauskas, E. (2023). Exploring Reasons for Usage Discontinuation in an Internet-Delivered Stress Recovery Intervention: A Qualitative Study. *Internet Interventions*, 34, 100686. doi:10.1016/j.invent.2023.100686

1 INTRODUCTION

1.1 Bridging the Gap in Mental Health Care

Mental disorders are a growing global concern, with every second person at risk of developing a mental health condition before the age of seventy-five (McGrath et al., 2023). While advancements in medicine and public health have led to a decline in many physical illnesses since 1990, the burden of mental disorders has remained unchanged (Ferrari et al., 2022). Recent global events, including Russia's war on Ukraine, the COVID-19 pandemic, the climate crisis, rising unemployment, and increasing living costs, have further exacerbated already poor levels of mental health worldwide (WHO, 2022a).

Mental health is a fundamental human right, and everyone is entitled to it, including the right to mental health care that is available, accessible, acceptable, and of good quality (WHO, 2023). Unfortunately, despite the availability of evidence-based psychological treatments such as Cognitive Behavioral Therapy (CBT; Hofmann et al., 2012), access to care remains limited in many parts of the world (Haakenstad, Yearwood, et al., 2022), often due to low perceived need, stigma, preference to self-manage, perceived inefficacy, high cost, lack of specialists, lack of time, and limited access to services (Andersson & Titov, 2014; Fullen et al., 2020; Mojtabai et al., 2011). In the European region, one in three people with mental health conditions do not receive the treatment they need (WHO, 2025).

Lithuania is no exception to these challenges. While Lithuania has over a hundred mental health centers offering services for individuals with mandatory health insurance, these facilities are primarily concentrated in urban areas, making access difficult for those in rural regions (Ministry of Health of the Republic of Lithuania, 2022). Deeply ingrained beliefs, such as the idea that one must solve problems independently, avoid burdening others, and that expressing emotion is a sign of weakness, further prevent people from seeking support before reaching a crisis point (Dadašev et al., 2016).

As a result, a significant proportion of the population is suffering from untreated mental conditions, the consequences of which can be profound both on the individual and societal levels. In 2019, mental disorders accounted for 16% of all years lived with disability and were associated with an economic burden equal to about 5 trillion USD globally (Arias et al., 2022). Disorders such as depression and anxiety are also strongly associated with increased suicide risk (Ferrari et al., 2014), and Lithuania has long ranked among the countries with the highest suicide rates (Health Information Center of the Institute of Hygiene, 2025). All this shows the profound effect untreated

mental health conditions can have on health and economic losses, emphasizing the urgent need for systemic improvements.

With 93% of the population in high-income countries now online (International Telecommunication Union, 2024), digital mental health tools, such as internet-delivered interventions, smartphone apps, wearables, chatbots, and virtual reality, are emerging as promising solutions to expand access to care. The COVID-19 pandemic served as a turning point (or a "black swan") for digital health, as restrictions on face-to-face interactions led to the widespread adoption of digital mental health services globally (Wind et al., 2020), including in Lithuania (Ministry of Health of the Republic of Lithuania, 2022). In the United States, this shift resulted in an overall increase in psychological counseling (Olfson et al., 2024), demonstrating the potential of digital tools to bridge gaps in care. In the context of ongoing crises such as Russia's war on Ukraine, the ability to deliver remote mental health care has become not only beneficial but essential (Goloktionova & Mukerjee, 2021).

Among the various therapeutic approaches delivered online, internet-delivered cognitive behavioral therapy (ICBT) stands out as the most widely used and empirically supported (Andersson, Titov, et al., 2019), though other modalities, such as psychodynamic therapy, are also being explored (Lindegaard et al., 2020). ICBT emerged in the late 1990s with its conceptual foundation rooted in bibliotherapy (Andersson et al., 2008). Over the years, research has demonstrated moderate to large treatment effects for various psychiatric and somatic conditions through self-help CBT approaches, primarily self-help books (Watkins & Clum, 2008). As self-help CBT, ICBT retains all core components of evidence-based psychological treatment (Andersson, 2014).

ICBT is typically delivered through a secure, structured online platform with treatment material (modules) often complemented by interactive elements, such as homework assignments, progress tracking, therapists' feedback, and prompts (Vlaescu et al., 2016), which are considered more effective than unstructured psychoeducational content (Ebert et al., 2018). When combined with guided support, ICBT may even produce effects equivalent to face-to-face therapy (Carlbring et al., 2018; Hedman-Lagerlöf et al., 2023), while requiring less therapist time (Hedman et al., 2012), making it a cost-effective alternative (Buntrock, 2024; Donker et al., 2015; Kählke et al., 2022; Rohrbach et al., 2023).

ICBT can be accessed through a website or mobile app on a computer, tablet, or smartphone (Andersson, Titov, et al., 2019), allowing individuals to engage with therapy at a time and place convenient to them. In addition, it offers greater privacy by eliminating the need for in-person clinic visits

(Andersson, 2016; Donker et al., 2015), which may reduce the stigma felt when seeking mental health care (Chen et al., 2024). ICBT can be offered either as a stand-alone intervention or blended with face-to-face therapy (Erbe et al., 2017), making it a flexible and scalable solution. It can also serve as a complementary or alternative intervention at the initial step of a stepped-care model (Green & Iverson, 2009), overcoming barriers such as long waiting times and limited resources, thereby bridging the treatment gap.

Several countries have integrated ICBT into their national health care systems, demonstrating its potential for large-scale implementation. Germany, a pioneer in the integration of Digital Health Applications (DiGAs), offers more than 50 approved and prescribable tools, with psychological conditions being the most addressed (Goeldner & Gehder, 2024). Several other countries, including Sweden, Denmark, Norway, Canada, and Australia, have successfully integrated ICBT into routine care on a large scale (Titov et al., 2018). In recent years, research on the efficacy of such interventions has also been carried out in Lithuania, with promising results for stress and trauma-related conditions (Biliunaite, Kazlauskas, et al., 2021; Dumarkaite et al., 2022, 2023; Eimontas, Rimsaite, et al., 2018). Yet its implementation remains confined to research settings.

Integrating ICBT into routine care poses challenges (Titov et al., 2019), and not all attempts are successful (Gilbody et al., 2015). For these reasons, researchers have increasingly called for studies focused on the active ingredients of psychological treatments that drive their effects (Holmes et al., 2018; Holmes & Craske, 2014). In general, it has been suggested that for any CBT intervention to bring about positive mental health outcomes, adapting the intervention to target a specific psychological problem is fundamental (Barlow, 2004). However, as most studies in the field of internet interventions have been conducted on anxiety and depression (Carlbring et al., 2018), less is known about their application to other conditions. Accordingly, more research is needed to explore the factors and circumstances influencing treatment-related change in ICBT targeting other mental health problems.

1.2 Occupational Stress

Selye (1950) once wrote – "*Stress in health and disease is medically, sociologically, and philosophically the most meaningful subject for humanity that I can think of*" (as cited in Szabo et al. (2012), p. 472). Stress, defined as the physiological demand on the body to adapt or cope (Chrousos, 2009; Selye, 1936), can spur us into action when facing everyday stressors.

However, prolonged exposure to stress without sufficient recovery can lead to a range of adverse health outcomes (McEwen, 2008).

While widespread stress is not necessarily a phenomenon unique to the XXI century (Jackson, 2014), it has emerged as a significant public health challenge in modern occupational settings (WHO & ILO, 2022). Chronic work-related stress has been linked to various physical health conditions, such as cardiovascular diseases (Kivimäki & Kawachi, 2015), and a range of mental problems, including depression, anxiety, and poorer well-being (Rugulies et al., 2023). Approximately 60% of the world's population is in the workforce (ILO, 2025), and in 2019, 15% of working-age adults globally were affected by mental health disorders (WHO & ILO, 2022). In addition, stress at the workplace has been associated with impaired job performance and productivity, as well as absenteeism, which all lead to substantial costs for society (Hassard et al., 2018). Depression and anxiety alone account for 12 billion lost working days annually (WHO & ILO, 2022), and around half of the societal cost of mental health conditions is driven by indirect costs such as reduced productivity (WHO & ILO, 2022).

Both globally and in Lithuania, health care systems face difficulties meeting health needs and providing quality care to working-age adults (Haakenstad, Yearwood, et al., 2022). In response to these ongoing challenges, the WHO (2022b) issued mental health guidelines for the workplace, where, alongside organizational and structural changes to protect and promote health at work, the guidelines also include a call for implementation of evidence-based psychosocial support interventions. These include mindfulness-based and cognitive behavioral therapy-based interventions, which have been shown to enhance workers' stress management skills (Heber et al., 2017) and subjective well-being (Sakuraya et al., 2020). However, examining the usefulness of such interventions for specific professions that face unique stressors and job demands is crucial.

1.2.1 Stress and Mental Health of Health Care Workers

Health care workers (HCWs) face an elevated risk of mental disorders due to the emotional, physical, and cognitive demands inherent in their profession, with poorer mental health compared to population norms (e.g., De Cieri et al., 2019). These challenges extend beyond HCWs themselves, affecting patients, health care institutions, and society. Burnout and psychological distress among physicians are linked to increased medical errors, lower-quality care, longer patient recovery times, and decreased patient satisfaction with treatment (West et al., 2018). In addition, poor working conditions and chronic

stress can lead HCWs to consider quitting their jobs and leaving the medical field altogether (Norkiene et al., 2021), further straining already overburdened health care systems (Haakenstad, Irvine, et al., 2022).

In 2022, during the COVID-19 pandemic, a survey in Lithuania found that among 1081 HCWs, 21.4% experienced severe stress, 23% exhibited symptoms of severe depression, and 27.4% reported severe anxiety. What is more, 66.8% considered changing their careers due to work-related stressors, including poor working conditions, direct contact with patients, limited career prospects, workplace harassment, and exhaustion (Kavaliauskas, Nomeikaite, et al., 2024). A subsequent study involving 685 HCWs from the same sample found that 30.4% were at high lifetime suicide ideation and risk for suicidal behavior, 11.4% had previously engaged in suicide planning, and 2.5% had attempted suicide. Poor mental health, absence of a long-term relationship, and work-related stressors were identified as key risk factors for suicidal ideation (Kavaliauskas, Kazlauskas, et al., 2024).

Despite the high prevalence of mental health problems, health care workers rarely seek professional psychological support. Several barriers contribute to this reluctance, including time constraints, stigma, career concerns, and limited access to mental health services (Adams et al., 2010; Gold et al., 2016). Globally, the perceived mental health stigma is related to reduced help-seeking behavior in HCWs (Adams et al., 2010; Wallace, 2012). In Lithuania, Doblytė (2021) hypothesized that the stigma surrounding mental health may be rooted in post-Soviet regulations, which historically restricted medical professionals from practicing if they had a diagnosed mental disorder. It was only in 2020 that legislation was amended to remove mental health conditions, with only a few exceptions, as grounds for suspending a medical license. However, the deep-seated stigma still discourages some from seeking mental help (Doblytė, 2021).

Reluctance to seek help may lead many HCWs to resort to maladaptive coping mechanisms with potentially devastating consequences, such as increased risk of substance abuse, depression, suicidal ideation, accidents, and poor self-care (West et al., 2018), highlighting the need for acceptable and accessible psychological support interventions for HCWs to promote recovery from occupational stress.

1.3 Recovery from Stress

Recovery from occupational stress during leisure time is an essential factor determining employee well-being and has even been described as an explanatory mechanism in the relation between acute stress reactions and

chronic health impairment (Geurts & Sonnentag, 2006). The ways in which people recover from stress may vary from person to person, but the psychological experiences that lead to it are likely to be universal. Stress recovery, as proposed by Geurts & Sonnentag (2006), refers to a process by which psychophysiological systems that were activated during work return to and stabilize at the pre-stress level, e.g., a level that appears in a situation in which an individual faces no special demands. Theory suggested that recovery as a process and recovery as an outcome should be differentiated: recovery as a process is the activity (e.g., break) and experience (e.g., mentally detaching from work) that leads to a change in the indicators of strain, while recovery as outcome refers to the psychological or physiological state a person reaches after a period of recovery (Sonnentag & Geurts, 2009).

The effective recovery from stress process is underlined by four experiences, as described by Sonnentag & Fritz (2007): (1) psychological detachment from work – not only being away from the work situation, but also being able to disengage oneself mentally from work, (2) relaxation – reducing prolonged activation in order to restore an organism's pre-stressor state by taking time to unwind and release tension from mind and body during leisure time, (3) mastery – experiencing competence and proficiency in off-job activities, and (4) control – being able to choose which activity to pursue during leisure time, as well as when and how to pursue this activity. Through the recovery experience process, individuals can restore their internal resources in the face of work-related stressors, which in turn should contribute to overall psychological well-being.

Empirical research confirms that stress recovery experiences, such as psychological detachment from work, are crucial for maintaining the health and productivity of employees exposed to high levels of stress (Sonnentag et al., 2014). Interventions focusing on stress recovery, therefore, have the potential to support workers in effectively managing occupational stress and, as a result, improving mental health and overall well-being.

1.4 ICBT for Stress

Cognitive Behavioral Therapy (CBT) has strong empirical support for its effects on stress (Hofmann et al., 2012), and studies have found that CBT-based programs yield better outcomes than other types of intervention for stress management in occupational settings (Richardson & Rothstein, 2008). Modern CBT refers to a large group of interventions that integrates cognitive, behavioral, and emotion-focused techniques to bring about positive changes in specific mental health conditions (Hofmann et al., 2013) by altering

dysfunctional cognitions and maladaptive behaviors (Hofmann et al., 2012). CBT programs for stress typically incorporate techniques such as deep breathing, guided imagery, progressive muscle relaxation, mindfulness, and cognitive restructuring (Toussaint et al., 2021; Vernmark et al., 2024).

Comparable mental health outcomes are observed when CBT is delivered online (Andersson et al., 2018). “For Recovery from Stress” (FOREST) is a structured, guided, six-week internet-delivered intervention explicitly designed to support the mental health of nurses amid the COVID-19 pandemic. It was developed in Lithuania by the team at the Center for Psychotraumatology, Vilnius University (Jovarauskaite et al., 2021). FOREST is based on CBT and includes techniques, such as mindfulness, cognitive restructuring, deep breathing, and relaxation, to promote the stress recovery process as described by Sonnentag & Fritz (2007).

A recent randomized controlled trial demonstrated FOREST efficacy in enhancing the stress recovery, reducing perceived stress, anxiety, and depression symptoms, and improving overall psychological well-being among nurses, with changes in stress, depression symptoms, and well-being sustained at three-month follow-up (Dumarkaite et al., 2023). These results highlight the potential of ICBT to provide timely and efficacious mental health support to health care professionals burdened by occupational stress.

1.5 Factors Underlying Outcomes in ICBT

While internet-delivered CBT interventions offer significant opportunities to enhance access to evidence-based mental health care, they also carry ongoing challenges. A large Swedish individual patient data meta-analysis found that while more than half (65.6%) of ICBT clients respond to treatment and achieve recovery, only a third (35.0%) reach full remission (Andersson, Carlbring, et al., 2019). Adding to this, one-fifth of ICBT clients (26.8%) can be classified as non-responders (Rozental et al., 2019), and a small percentage (5.8%) can experience deterioration (Rozental et al., 2017). Diminished treatment effects can be associated with high attrition rates (Eysenbach, 2005; Haller et al., 2023), with approximately half of ICBT clients not completing the full course of treatment (Cross et al., 2022; Waller & Gilbody, 2009). While these challenges are not necessarily greater than in face-to-face treatment (Andersson, Titov, et al., 2019; Gullickson et al., 2019; Rozental et al., 2014), it is crucial to examine the factors that influence both adherence to ICBT and its therapeutic outcomes. However, much of the research over recent decades has prioritized the development of new digital tools rather than testing and updating existing ones, leaving a critical gap in our knowledge

about how to optimize internet-delivered interventions and enhance utilization across diverse populations.

A range of technological, environmental, and individual factors may be needed to comprehensively explain user engagement and treatment response in ICBT (Ryan et al., 2018). Identifying factors that consistently influence treatment outcomes – the processes or events that are responsible for the change, the reasons why the change occurred, or how the change came about – can provide valuable insights into which treatments work best, for whom, and under what conditions (Kazdin, 2007, 2009). These analyses can guide the personalization of interventions by identifying individuals most likely to benefit and can also inform adaptations or the development of alternative treatments for those who do not respond well (Kraemer et al., 2002). Ultimately, this should help improve the match between patient needs, preferences, and therapeutic approaches, leading to the best possible outcomes.

1.5.1 Sustainability of Intervention Effects

As short-term symptom reduction does not translate to lasting recovery, investigating long-term outcomes is essential for understanding the factors contributing to sustainable mental health improvements. Cognitive Behavioral Therapy has shown long-term treatment effects for various mental conditions (Hofmann et al., 2012), with outcomes possibly more favorable than those of medication (Cuijpers et al., 2013). As internet-delivered CBT becomes increasingly accessible and widely implemented, it is crucial to investigate whether these long-term benefits extend to digital formats.

A review of the literature suggests that therapist-supported ICBT can lead to sustained outcomes of up to five years across a range of conditions, including panic disorder, social anxiety disorder, generalized anxiety disorder, depression, mixed anxiety and depression, obsessive-compulsive disorder, pathological gambling, stress, and chronic fatigue (Andersson et al., 2018). These results of outcome sustainability are promising and in line with what has been observed in face-to-face therapy. Further research is, however, needed, and follow-up data should be collected across more conditions and target groups for which long-term effects are less well-known.

1.5.2 Interplay Between Outcomes

Robust evidence identifies stress as a key risk factor for both mental and physical health conditions (Chrousos, 2009). Importantly, subjective perceptions of stress are stronger predictors of adverse outcomes than mere

exposure to stressors (Shields et al., 2023). High stress perceptions can lead to a range of mental health conditions (O'Connor et al., 2025), including depression (Kessler, 2013), anxiety, and poorer well-being (Rugulies et al., 2023). Given that symptoms of mental health conditions, such as depression and anxiety, often show interrelated patterns over time (Jacobcon & Newman, 2017), when developing internet-delivered cognitive behavioral therapy for stress management, it is essential to evaluate not only its effects on stress itself but also on related mental health outcomes and how they interplay over time.

Research has demonstrated that ICBT has the potential to reduce not only elevated perceived stress but also improve secondary outcomes such as anxiety and depression (Svärdman et al., 2022). In general, interventions often target more than one outcome and typically include multifaceted components (Skivington et al., 2021), yet most randomized controlled trials give limited attention to the multiplicity or correlation between outcomes (Stringer et al., 2024). Understanding how changes in one symptom domain influence others over time can provide deeper insight into therapeutic processes and help optimize ICBT for individuals with complex or overlapping mental health needs.

1.5.3 Guided Support

With the rapid growth of digital technologies, the psychologist's role is shifting from delivering therapy entirely to facilitating structured self-help materials. Internet-delivered CBT typically involves a therapist who guides clients through the program, provides feedback on assignments, offers general support, and answers questions (Andersson, 2014). This support is often more technical and practical rather than psychotherapeutic in nature (Titov, Andrews, Davies, et al., 2010) and, as it involves less therapist time, the ICBT format is possibly more cost-effective than face-to-face therapy (Donker et al., 2015; Hedman et al., 2012; Kählke et al., 2022). Another scalable solution in ICBT is guidance delivered by non-clinicians, such as supervised master's students in clinical psychology (Friesen et al., 2014), with studies finding such support in ICBT to be as effective as clinician guidance (Leung et al., 2022).

While research suggests that core therapeutic factors, such as the therapeutic alliance, remain just as vital in internet-delivered interventions as in face-to-face therapy (Berger, 2017; Kaiser et al., 2021; Pihlaja et al., 2018), the role of support might be somewhat different. A theoretical model focusing specifically on the role of human support in internet interventions, by Mohr and colleagues (2011), argues that the function of human support is to increase adherence through accountability to a therapist who is seen as trustworthy,

benevolent, and having expertise. This effect of accountability may be moderated by client motivation, meaning that the more the client is motivated, the less support they may need.

In line with the "Supportive Accountability" model, several systematic reviews and meta-analyses have found that guided interventions have the potential to be more effective than unguided ones and reduce dropout (Baumeister et al., 2014). However, unguided treatments are more scalable and affordable (Karyotaki et al., 2017). Additionally, it has been suggested that the support beyond some point may not facilitate further gains (Titov, 2011), and even unguided interventions can be effective as a low-threshold option for individuals who might not seek treatment otherwise (Karyotaki et al., 2017). Moreover, the need for the therapeutic support may vary depending on the specific mental health condition being addressed (Andersson et al., 2014).

While some studies highlight the clear benefits of structural clinician guidance (Kleiboer et al., 2015), others suggest that access to support when asked for (optional support/support on demand) with automated reminders is enough for some problems targeted (Berger et al., 2011; Bisby et al., 2022; Eimontas, Gegieckaite, et al., 2018; Johansson & Andersson, 2012; Rheker et al., 2015). A study by Dear and colleagues (2021) demonstrated the cost-effectiveness of an optional support format in an internet-delivered intervention for pain management, as compared to regular clinician feedback, making it a promising format to increase the scalability of ICBT. However, more research is needed to test the role of guidance in ICBT targeting different mental health conditions.

1.5.4 Program Use and Prompting

The dose-response effect describes "the relationship between the dose (e.g., length, frequency) of treatment and the subsequent probability of improvement" (Robinson et al., 2020). It has been suggested that the optimal dose of guided self-help interventions is four to six sessions (Robinson et al., 2020). Unfortunately, high dropout rates pose a serious challenge, with as much as half of the clients leaving the ICBT intervention before completion (Cross et al., 2022; Waller & Gilbody, 2009). Across a range of diagnoses, lower adherence (i.e., "the degree to which the user followed the program as it was designed" (Donkin et al., 2011, p. 2) is significantly associated with diminished treatment effects in adults (Haller et al., 2023). Identifying factors underlying dropout is crucial for guiding improvements in the delivery of

effective interventions (Swift & Greenberg, 2012), as well as for informing on how to accurately estimate treatment effects (Karin et al., 2018).

In a recent attempt to review existing theories in ICBT, a scoping review by Ryan et al. (2018) identified the following theoretical perspectives of adherence to internet-delivered interventions: Internet Intervention Model (Ritterband et al., 2009), Persuasive Systems Design (Oinas-Kukkonen & Harjumaa, 2009), the 'PERMA' framework (Ludden et al., 2015), the Support Accountability Model (Mohr et al., 2011), the Model of User Engagement (Short et al., 2015), the Technology Acceptance Model (Davis, 1986), the Unified Theory of Acceptance and Use of IT (Venkatesh et al., 2003) and the Conceptual Model of User Engagement (O'Brien & Toms, 2008). These theoretical perspectives differ in their focus, as some give more attention to individual and environmental factors, while others focus on the design of a program to promote adherence and change, and a third focus on business and computing. However, theoretical frameworks explaining user engagement continue to evolve, reflecting the growing complexity of this area of research.

A recent attempt was made to combine the main theoretical perspectives on internet interventions with insights from motivational psychology to better understand engagement in the context of digital mental health. Cross & Alvarez-Jimenez (2024) introduced a Digital Cumulative Complexity Model (DiCuCoM; Figure 1), which is based on Fogg Behavior Model (Fogg, 2009), Persuasive System Design (Oinas-Kukkonen & Harjumaa, 2009), Self-Determination Theory (Deci & Ryan, 2000b, 2000a), and Supportive Accountability (Mohr et al., 2011). The DiCuCoM is a person-centered model that highlights the balance between a patient's workload (treatment demands and daily life burdens) and their capacity (impacted by illness and limited personal resources). Rather than workload or capacity alone, the model suggests that an imbalance between the two is the main cause of poor engagement and outcomes.

While not explicitly designed for internet-delivered interventions, Self-determination theory is sometimes applied in ICBT research as a helpful framework for interpreting results on user motivation (e.g., Wilhelmsen et al., 2013). Based on Self-determination theory, humans naturally have intrinsic motivation but may need support to maintain and enhance it (Deci & Ryan, 2000b, 2000a). Three basic psychological needs should be satisfied to enhance intrinsic motivation: relatedness, competence, and autonomy. Relatedness includes a sense of recognition, belonging with peers, family, or community, and a need to feel connected to and valued by significant others. Competence involves socio-contextual success with optimal challenges, feedback, and freedom from demeaning evaluation. However, competence will only enhance

motivation if accompanied by a sense of autonomy – the feeling one has choice and is willingly endorsing one's behavior. Thus, based on this approach, when therapy feels supportive but is still autonomous, credible, and personally meaningful, patients might be more likely to internalize the reasons for treatment and stay engaged.

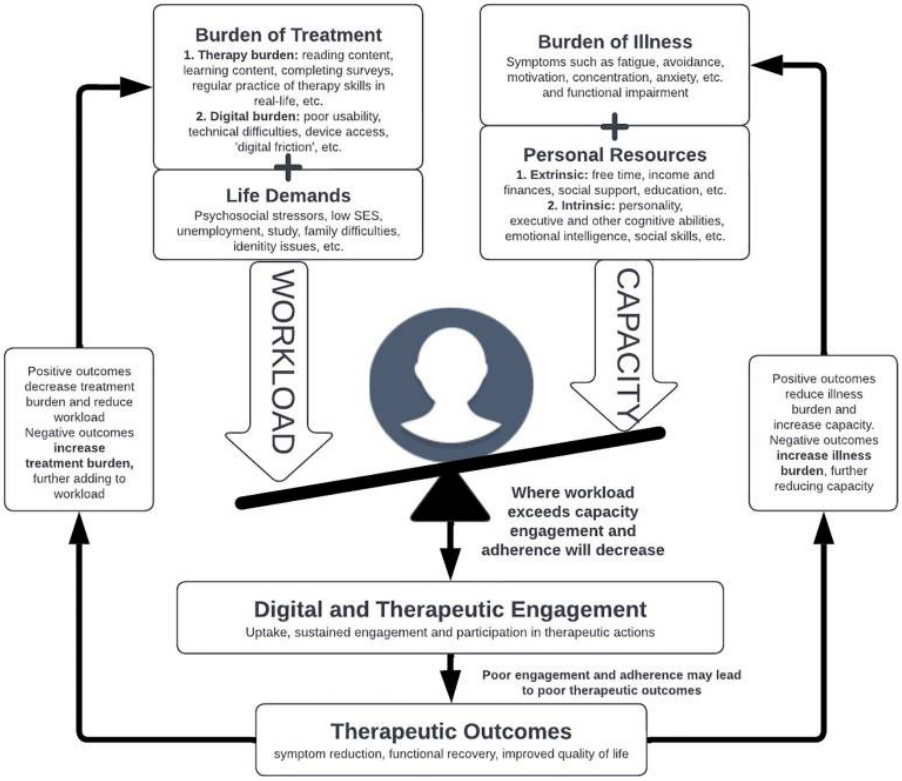

Figure 1. The Digital Cumulative Complexity Model (DiCuCoM).
Note. Figure is taken from "The digital cumulative complexity model: a framework for improving engagement in digital mental health interventions" by Cross & Alvarez-Jimenez (2024). CC BY.

The "Fogg Behavior Model" (FBM) offers a systematic approach to understanding how people interact with technology and engage digitally (Fogg, 2009). It emphasizes behavior change through persuasive design, proposing that behavior occurs as a product of motivation, ability, and a trigger. Therefore, for a desired behavior to take place, an individual must be motivated, capable of performing the behavior, and prompted at the right moment. As an expansion of the FBM model, the "Persuasive Systems Design" model outline design strategies in technology that encourage behavior change and foster engagement, including various software qualities,

such as availability and being open, unobtrusive, incremental, useful, and ease of use; which can be used directly or indirectly to motivate and persuade users to reach their personal goals (Oinas-Kukkonen & Harjumaa, 2009).

Prompting strategies have become a focal point in efforts to improve user adherence to digital interventions (Kelders et al., 2012), yet their effectiveness remains mixed and poorly understood. A meta-analysis by Webb et al. (2010) has found the efficacy of internet interventions for health behavior change to be enhanced by the use of additional methods of communicating with participants, particularly the use of short message service (SMS) or text messaging. However, research findings remain inconsistent, with studies reporting no significant clinical benefits from incorporating supplementary prompts in digital treatments (Gandy et al., 2016) or finding that more frequent use of text messaging may even be associated with smaller benefits (Walters et al., 2024).

It is possible that when prompts are perceived as irrelevant or take too much time, they may become intrusive rather than supportive, potentially undermining the user experience (Lehto & Oinas-Kukkonen, 2011). One strategy could be to tailor their frequency and timing of prompts (e.g., Morrison et al., 2017). Another approach to mitigate negative emotional responses to reminders involves encouraging users to set personal goals, for example, specifying the amount of time they plan to dedicate to the intervention (Meschtscherjakov et al., 2023). Nevertheless, there is limited evidence on how such tailoring would affect engagement or treatment response.

1.5.5 User Experience

While the effects of internet-delivered CBT are widely researched, there is a growing recognition of the need to understand users' perceptions and experiences to optimize such interventions. Yardley and colleagues (2015) introduced a person-based approach when developing internet interventions, with two key elements: (1) a deep understanding of the psychosocial context of users and their views of the behavioral elements of the intervention which can be achieved with qualitative research, and used to anticipate and interpret intervention usage and outcomes, as well as modify the intervention to make it more persuasive, feasible, and relevant to users, and (2) identify guiding principles that can help inspire and inform the intervention development by highlighting the distinctive ways that the intervention will address key context-specific behavioral issues. Therefore, exploring user experiences

through qualitative research can provide important insight into how to design internet-delivered interventions to achieve optimal outcomes.

A systematic review by Patel and colleagues (2020) synthesized findings from 24 qualitative and mixed-methods studies. It identified three central themes in users' experiences with internet interventions: initial motivations and expectations, the importance of personalization, and the value of personal support. The meta-synthesis suggests that participants' initial beliefs about internet intervention can affect their engagement, while personal support is valued as a major component of the success of such interventions, as it enables individual personalization of care.

While previous qualitative research has been conducted on the experiences of ICBT completers (e.g., Biliunaite, Dumarkaite, et al., 2021; Rozental et al., 2020), less is known about the experiences of treatment dropouts. This is unfortunate, as to ensure optimal outcomes, it is important to explore why users discontinue ICBT and what barriers prevent them from fully engaging with it (Waller & Gilbody, 2009). A qualitative study by Johansson and colleagues (2015) on individuals who discontinued an ICBT for generalized anxiety disorder found that non-adherence results from an interaction between personal and treatment-related factors. Their proposed theoretical model emphasizes how a mismatch between participants' daily routines, expectations, and cognitive resources, as well as the intervention's workload, content complexity, or delivery format, can lead to disengagement. More research is needed to assess whether these results translate into users' experiences in interventions targeting other mental health problems.

1.6 Knowledge Gaps

Internet-delivered CBT offers a viable alternative to traditional stress management therapies, particularly for populations such as health care workers, who face significant barriers to accessing psychotherapy. ICBT has emerged as a promising solution to help nurses recover from stress and improve their mental health and well-being (Dumarkaite et al., 2023), with lasting outcomes for up to three months. However, there is a need to expand such interventions to a broader range of health professionals. Additionally, to ensure the long-term well-being and functioning of health care workers, who are continually exposed to high levels of occupational stress, it is crucial to examine whether the positive effects of an ICBT persist over more extended periods and to identify the factors that contribute to sustained mental health improvements.

As individuals under stress can experience a range of mental health difficulties (O'Connor et al., 2025), there is a need to explore the relationships between mental health outcomes over time. A study examining the associations between perceived stress, psychological well-being and common difficulties, such as anxiety, depression, could help identify which symptoms should be targeted by ICBT to achieve the best overall effect.

Moreover, while guided ICBT for stress management has been associated with better treatment outcomes than unguided intervention (Heber et al., 2017), it remains unclear if optional guided support from clinicians and trained clinical psychology students provided based on individual needs is sufficient for lasting mental health outcomes in health care workers, many of whom face severe levels of stress, anxiety, and depression (Kavaliauskas, Nomeikaite, et al., 2024). Also, given that guided support can motivate adherence (Mohr et al., 2011), it is unclear what impact a reduction in the level of support would have on programe usage.

Furthermore, as a significant challenge in ICBT is high dropout rates, identifying the reasons for early program discontinuation and exploring strategies to enhance engagement is essential. Guided support and prompts, such as SMS reminders, are often used in ICBT (Kelders et al., 2012). However, they may not be suitable for all individuals equally. Tailoring prompts to individual client needs and goals could be a viable solution. To our knowledge, there is no research on the role of tailored prompting on adherence and outcomes in ICBT for health care workers, a population for whom flexibility and accessibility of therapy are essential due to the demanding nature of their work.

Finally, improving ICBT interventions requires actively involving clients by seeking and incorporating their feedback. There are, as far as we know, no qualitative studies that examine the experience of health care workers who discontinued the use of an ICBT for stress recovery. By examining the barriers and facilitators faced by users who dropout from treatment, researchers and clinicians can gain valuable insights that can inform the design of interventions, engagement strategies, and retention efforts.

* * *

Overall, ICBT provides a promising setting for investigating factors underlying adherence and outcomes, as a structure and delivery of the intervention allows researchers to isolate and examine the active ingredients driving treatment-related change. Randomized controlled trials (RCTs), considered the gold standard for evaluating therapeutic efficacy and

effectiveness (Hariton & Locascio, 2018), can provide rich insights into these factors. Moreover, by complementing quantitative research with qualitative analysis of user experiences, we can gain a deeper understanding of other factors that are important in shaping engagement and outcomes. Finally, by studying health care workers, a population that often faces difficulty accessing psychological support, we can gain valuable insights into how to refine and optimize mental health treatments, ultimately improving accessibility, usability, and effectiveness across diverse mental health settings.

1.7 Aims

The primary aim of this dissertation was to explore the factors that contribute to mental health outcomes of health care workers following an internet-delivered CBT intervention for stress recovery. To achieve this, in addition to the evaluation of long-term intervention effects, the interplay between mental health outcomes, the role of guided support, treatment plan with tailored prompting, and user experiences of the intervention was explored. The dissertation adopted a mixed-methods approach, comprising two randomized controlled trials, a qualitative study, and secondary data analysis of an intervention study.

To address the existing knowledge gaps, five research questions were derived:

1. Are mental health outcomes following an internet-delivered stress recovery intervention for health care workers sustained three and six months following the intervention? [Studies II and III]
2. Are there longitudinal links between different mental health outcomes (perceived stress, anxiety, depression, psychological well-being) in an ICBT for stress recovery? [Study I]
3. Is an optional psychologist's support sufficient to drive significant mental health improvements and sustain program use in ICBT for stress recovery among health care workers, compared to regular guided support? [Study II]
4. Can tailored timing and frequency prompts, aligned with pre-intervention goals, enhance ICBT program use and mental health outcomes in ICBT for stress recovery among health care workers? [Study III]
5. Based on user experience, what factors contribute to the early discontinuation of the ICBT stress recovery intervention for health care workers? [Study IV]

2 METHODS

The doctoral research, carried out at the Center for Psychotraumatology, evaluated the factors underlying sustained outcomes in mental health following an internet-delivered cognitive behavioral therapy intervention, "For Recovery from Stress" – FOREST (Dumarkaite et al., 2023), or its updated version FOREST+ (Nomeikaite, Andersson, et al., 2023). FOREST intervention was developed during the implementation of the EU-funded project "Development of an innovative stress analysis and management platform (STAMP)" (No.: 01.2.2-LMT-K-718-03-0072), led by Prof. Evaldas Kazlauskas.

A mixed methods approach was applied in the dissertation, including four empirical studies published in four peer-reviewed scientific articles: (1) a secondary data analysis (Study I) of a randomized controlled trial (Dumarkaite et al., 2023), (2) a randomized controlled trial examining the role of therapist support (Study II), (3) a randomized controlled trial analyzing the role of tailored prompting (Study III), and (4) a qualitative study (Study IV). In the doctoral studies, the author played a key role in the conceptualization, administration, investigation, data curation, methodology, data analysis, and writing of the manuscripts. Throughout the research process, she also served as one of the program's psychologists and as a supervising psychologist.

2.1 Studies Design

Study I. A secondary data analysis was conducted based on an RCT examining the efficacy of the FOREST program (Dumarkaite et al., 2023). This analysis aimed to investigate further the mental health factors underlying the sustained intervention outcomes. The initial study applied an RCT design with two study arms: an intervention group, which received access to the program after the randomization, and a waiting list control group, which received access to the intervention 18 weeks after the baseline measurement. Data were collected at five time points: T1 (baseline), T2 (6 weeks post-baseline), T3 (3 months post-T2), T4 (6 weeks post-T3; only for the control group), and T5 (3 months post-T4; only for the control group). The data was collected between April and October 2021. For this secondary data analysis, data from the intervention group were combined with data from the waiting list control group, merging T2 with T4, and T3 with T5. The T4 and T5 measurements of the waiting list control group were not used in the efficacy study and were, therefore, analyzed for the first time in this secondary data

study. Informed consent was obtained for both groups at the baseline measurement.

Study II-III. Two randomized controlled trials (RCTs) were conducted as part of the doctoral project. These RCTs were explicitly designed to evaluate the efficacy of altered FOREST+ interventions against the standard intervention. The approach was designed to identify the factors relevant to sustained change in mental health, including the therapist's role and treatment plan with prompting. Both RCTs featured two study arms: a standard intervention group and an altered intervention group. Participants were randomly assigned to the groups (1:1 ratio) by an independent researcher. Participants received access to the program immediately after the randomization. Data were collected at three measurements: pre-intervention, post-intervention, and follow-up. The follow-up period varied between studies, with 3 months for Study II and 6 months for Study III. In Study II, data were collected between March and September 2022, and in Study III between September 2022 and May 2023. Informed consent was obtained from participants in both trials at the pre-intervention measurement. The results of the trials were reported in accordance with the CONSORT 2010 Statement for reporting parallel group randomized trials (Schulz et al., 2010).

Study IV. The qualitative study was carried out alongside the randomized controlled trial, which analyzed the role of tailored prompting (Study III). Participants provided informed consent to take part in both the trial and the qualitative study during the pre-intervention assessment. To address the research question, only the participants who had started using the program but discontinued it by the fourth week were invited to take part in semi-structured interviews. The semi-structured interview protocol was developed by the authors of this study, based on the existing literature and Knox & Burkard's (2009) qualitative interview principles. Trained researchers conducted the telephone interviews in December 2023. The audio of interviews was recorded and later coded and analyzed by two researchers, using a thematic approach, as described by Braun & Clarke (2006). The study was reported following the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines for qualitative research.

2.2 Participants and Recruitment

A total of 548 people registered for the program. After the eligibility assessment, the total sample consisted of 495 help-seeking health care workers

who received access to the program. Data from 111 HCWs were analyzed in Study I, 196 in Study II, and 87 in Study III. Out of those in study III, 12 were included in the qualitative study (Study IV). The secondary data study (Study I) explicitly included only nurses and assistant nurses, while the other three studies (Studies II, III, and IV) enrolled a wider range of health care workers.

Participants were recruited through various health care institutions, national media, social networks, and social network groups for health care workers. All those interested could register to take part in the study through the program's website www.forestmedikams.lt. Individuals were included depending on whether they met pre-defined inclusion criteria: (1) currently working as a health care worker, (2) aged 18 and over, (3) comprehend Lithuanian, and (4) have access to a device with internet access. Participants were excluded from the intervention if they: (1) were experiencing an acute psychiatric crisis, (2) were at high risk of suicide, (3) were experiencing ongoing interpersonal violence, and (4) were addicted to alcohol or drugs (only applicable for Study I).

2.3 Ethical Considerations

The research was conducted in accordance with national and international ethical standards. The research was approved by the Vilnius University Psychology Research Ethics Committee (Reference No. 2021-03-22/61). Informed consent was obtained from participants to take part in the study and have the results published. Personal contacts (phone number, email address) were collected during the baseline measurement and used only to contact participants for the purposes of the study. Collected data were subsequently anonymized by providing participants with individual identifying numbers for data analysis. All the data was collected using the same platform where the program was hosted – Iterapi, which is hosted on designated servers in Linköping University, Sweden, and ensures high-level stability and security (Vlaescu et al., 2016).

Important measures were taken to avoid adverse events during the intervention. A crisis management plan was prepared for dealing with crises (e.g., high suicide risk), which stated that participants should be referred to acute mental health care institutions by phone when necessary or at their own request. Participants who registered but were not included in the intervention due to not meeting the inclusion criteria or other reasons (n = 29) were also informed about other available mental health care options.

2.4 Intervention

"For Recovery from Stress" (FOREST) is an internet-delivered cognitive behavioral therapy intervention grounded in the principles of mindfulness and with a focus on stress recovery (Jovarauskaite et al., 2021). The program was developed at the Center for Psychotraumatology, Institute of Psychology, Vilnius University, in collaboration with the Department of Behavioral Sciences and Learning, Linköping University. FOREST+ is a revised version of the original FOREST program, updated in accordance with Dumarkaite et al. (2023) to accommodate a broader population of health care workers. Given that control-related outcomes in the original program returned to baseline after three months, the revised version integrates control-related content throughout all modules rather than concentrating it at the end, addressing the issue of high dropout rates. Additional text, assignment, and video refinements were made based on participant feedback to enhance clarity and engagement.

Figure 2 shows the interface of the program, hosted on a website platform – Iterapi (Vlaescu et al., 2016). The platform screen is responsive to the device used and can be accessed on different devices, such as computers, smartphones, and tablets.

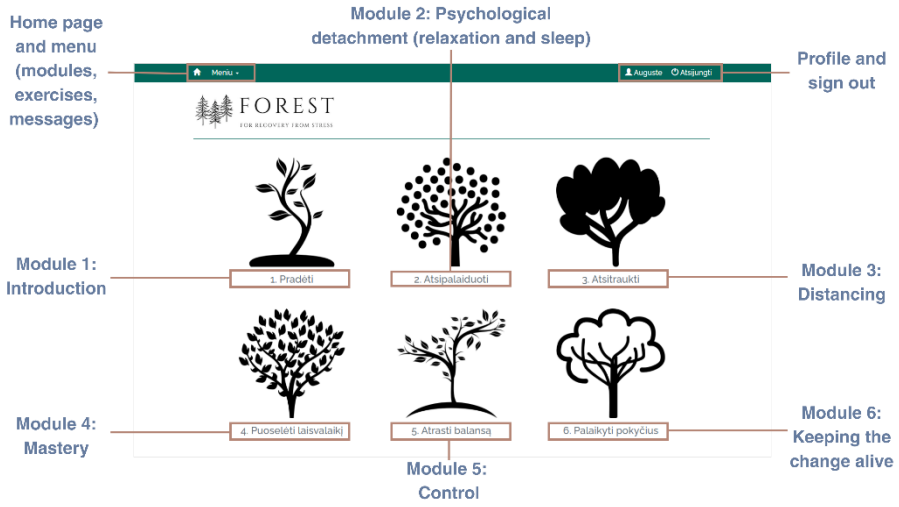

Figure 2. FOREST programs interface (Iterapi platform).

The six-week FOREST intervention consists of six modules made available on a weekly basis: (1) Introduction, (2) Psychological detachment (relaxation and sleep), (3) Distancing, (4) Mastery, (5) Control, (6) Keeping the change alive. Each module includes psychoeducational texts, video and audio recordings, and worksheets with interactive exercises. The content of

each module is described in detail in the papers published. The standard intervention format includes regular written feedback from the trained program psychologists or master's students in clinical psychology, given in an asynchronous manner after each module completion. Program psychologists had regular supervisions led by experienced psychologists.

2.5 Measures

The studies assessed participants' self-reported experiences of stress recovery, perceived stress, depression, anxiety, and psychological well-being at three time points: pre-intervention, post-intervention, and follow-up. Figure 3 indicates the questionnaires used in the four studies.

	Study I	Study II	Study III	Study IV
Demographic questionnaire	✓	✓	✓	✓
Recovery Experiences Questionnaire (REQ)	✗	✓	✓	✗
Perceived Stress Scale (PSS-4)	✓	✗	✓	✗
Perceived Stress Scale (PSS-10)	✗	✓	✗	✗
Patient Health Questionnaire-4 (PHQ-4)	✓	✗	✓	✗
Patient Health Questionnaire-9 (PHQ-9)	✗	✓	✗	✗
Generalized Anxiety Disorder Scale-7 (GAD-7)	✗	✓	✗	✗
World Health Organization Well-being Index (WHO-5)	✓	✓	✓	✗
User satisfaction and program usability	✗	✓	✓	✗

Figure 3. Self-report measures used in the studies.

The Recovery Experiences Questionnaire (REQ; Sonnentag & Fritz, 2007) was used to assess the primary outcome – the recovery from work-related stress. REQ is a 16-item questionnaire with four subscales (4 items each): (1) psychological detachment, (2) relaxation, (3) mastery, and (4) control. The REQ was validated in a Lithuanian health care personnel sample (Kazlauskas et al., 2023).

In addition, questionnaires were provided to measure secondary outcomes. Perceived stress levels were measured using the Perceived Stress Scale-10 (PSS-10; Roberti et al., 2006) or its short version, the Perceived Stress Scale-4 (PSS-4; Cohen et al., 1983). The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) and the Generalized Anxiety Disorder Scale-7 (GAD-7;

Spitzer et al., 2006), or the short version – the Patient Health Questionnaire-4 (PHQ-4; Kroenke et al., 2009), were used to assess depression and anxiety symptoms. The World Health Organization Well-being Index-5 (WHO-5; Topp et al., 2015) was used to evaluate psychological well-being. The pre-intervention assessment also included the demographics questionnaire, while the post-test intervention assessment in Study II and Study III included user satisfaction and program usability questions.

In the qualitative study, a semi-structured interview protocol was designed by the authors of the study to explore participants' experiences with the FOREST+ program. The interview questions were drawn from the literature on the experiences of ICBT users and divided into four categories: (1) overall experience, (2) program-related and usage factors, (3) personal characteristics and life circumstances, and (4) recommendations and other observations. The protocol included 10 mandatory questions and 20 optional prompts or clarifying questions to guide the interview. Additionally, interviewers were allowed to ask additional questions if they saw it necessary.

2.6 Data Analyses

In the quantitative studies (Studies I, II, and III), the data was analyzed using IBM SPSS and Mplus 8.2-8.8 (Muthén & Muthén, 1998-2017). A latent change modeling approach (Duncan et al., 2013) was used to assess longitudinal changes. In Study II and Study III, a series of latent change models (LCM) were conducted to evaluate changes in outcome variables over time, comparing the two RCT groups (standard intervention vs. altered intervention). In Study I, a cross-lagged panel analysis was performed (Selig & Little, 2012), in addition to a series of latent change models, to examine the interplay between mental health indicators over time. Between-group and within-group effect sizes were calculated following the guidelines for calculating the appropriate effect size in LCM (Feingold, 2009). Values of 0.20 were interpreted as a small effect, 0.50 as a medium effect, and 0.80 as a large effect.

In the qualitative study (Study IV), semi-structured interviews were transcribed and coded by two independent researchers using ATLAS.ti. Thematic analysis, as described by Braun & Clarke (2006), was used to analyze the qualitative data. Codes were reviewed to identify meaningful themes, which were then discussed until a consensus on the themes was reached among coders.

3 RESULTS

Sustainability of intervention effects [Study II and III]. Studies II and III evaluated the effects of the ICBT stress recovery intervention on the mental health of health care workers by comparing post-intervention and follow-up measurements with pre-intervention baselines. To test this, a series of latent change models was conducted in standard intervention group samples.

Both trials demonstrated significant positive effects of the standard intervention on most mental health indicators at the post-intervention measurement. In Study II, users of the standard intervention showed a significant increase ($p < .01$) in all four recovery from stress (REQ) domains: psychological detachment (Cohen's $d = 0.72$), relaxation ($d = 0.52$), mastery ($d = 0.44$), and control ($d = 0.31$). In addition, results of the Study III indicated an increase in the overall stress recovery score (REQ; $d = 0.31$), though it did not reach statistical significance ($p = .06$).

Moreover, in Study II, significant improvements ($p < .001$) were seen post-intervention in psychological well-being (WHO-5; $d = 0.54$), perceived stress (PSS-10; $d = -0.73$), depression (PHQ-9; $d = -0.57$) and anxiety symptoms (GAD-7; $d = -0.55$). In Study III, significant improvements were also seen in psychological well-being (WHO-5; $d = 0.46$, $p = .02$), but not in perceived stress (PSS-4; $d = -0.26$, $p = .15$), depression (PHQ-4; $d = -0.23$, $p = .21$), or anxiety symptoms (PHQ-4; $d = -0.33$, $p = .06$).

Study II and Study III demonstrated that improvements in mental health were sustained for three and six months after the intervention, respectively. In Study II, significant improvements ($p < .01$) were maintained across all four REQ domains: psychological detachment ($d = 0.65$), relaxation ($d = 0.40$), mastery ($d = 0.45$), and control ($d = 0.36$) at three months follow-up. Results of the Study III also indicated a significant ($p < .001$) increase in the overall stress recovery score ($d = 0.85$) six months following the intervention as compared to baseline.

In Study II, significant ($p < .001$) improvements in psychological well-being ($d = 0.58$), perceived stress ($d = -0.70$), depression ($d = -0.57$), and anxiety ($d = -0.49$) were seen three months following the intervention. Results of Study III indicated that the improvements in psychological well-being ($d = 0.45$), perceived stress ($d = -0.70$), depression ($d = -0.38$), and anxiety ($d = -0.64$) were also sustained at six months follow-up ($p < .05$).

Interplay between outcomes [Study I]. The secondary data analysis study (Study I) assessed how different mental health indicators (perceived stress, anxiety, symptoms of depression, and psychological well-being)

interact over time in ICBT for stress recovery among nurses. To test this, data were analyzed using cross-lagged panel analysis. The results showed that levels of anxiety after the intervention positively predicted levels of perceived stress ($\beta = 0.38$, $p < .01$) and depression ($\beta = 0.55$, $p < .001$) at 3 months follow-up. Moreover, levels of psychological well-being after the intervention negatively predicted levels of perceived stress ($\beta = -0.30$, $p < .01$) at 3 months follow-up. No cross-lagged effects were observed from baseline to post-intervention.

Guided support [Study II]. Study II examined the outcomes of a standard intervention, featuring regular weekly written feedback from a psychologist or a trained master's student in clinical psychology, compared to an altered program where support was optional. In the regular (usually weekly) support group ($n = 100$), to which the psychologist provided written feedback on the completed tasks, the psychologists sent 340 messages and received 50 messages from the participants. All nine psychologists or master's students in clinical psychology who participated in the intervention reported spending 5829 minutes (per message: $M = 17.14$, $SD = 79.46$; range: 3-60 min) providing feedback to participants. Meanwhile, in the optional support group ($n = 96$), 12 messages were received from participants, and 11 were sent by psychologists. In this group, two psychologists spent a total of 190 minutes (per message: $M = 17.27$, $SD = 4.67$; range: 10-25 min) writing responses to participants.

A series of latent change analyses was conducted to test for differences between RCT groups. The results showed that, like users of the standard program, users of the optional support program experienced a significant ($p < .01$) increase post-intervention in psychological detachment (Cohen's $d = 0.31$), relaxation ($d = 0.21$), mastery ($d = 0.30$), but not in control ($d = 0.13$, $p = .205$). In addition, the analyses indicated small but significant between-group differences in changes of psychological detachment ($\beta_{pre\text{-}post} = 0.21$, $p = .004$) and relaxation ($\beta_{pre\text{-}post} = 0.16$, $p = .047$), with higher mean changes in the group with regular support. However, no differences between the two RCT groups were found at three months follow-up, as a significant improvement ($p < .01$) was observed in psychological detachment (Cohen's $d = 0.42$), relaxation ($d = 0.36$), mastery ($d = 0.45$), and control ($d = 0.27$) in the optional support group.

Participants in the program with optional support also showed significant improvements in psychological well-being (post-intervention: $d = 0.35$; follow-up: $d = 0.67$), perceived stress ($d_{POST} = -0.61$; $d_{FU} = -0.75$), depression ($d_{POST} = -0.56$; $d_{FU} = -0.61$), and anxiety symptoms ($d_{POST} = -0.51$;

$d_{FU} = -0.64$), both post-intervention ($p < .01$) and during follow-up ($p < .001$). No between-group differences in changes over time were found.

An analysis was also carried out to determine how users receiving different levels of support used and evaluated the program. No significant differences were found between RCT groups in terms of modules opened ($t(164) = -1.26$, $p = .209$), and self-reported time spent while using the program ($\chi 2(1) = 1.72$, $p = .423$). However, a significant difference ($p = .003$) was found in the number of logins, with regular support group users accessing the program more frequently. Overall, 76.7% of participants found the program useful, 85.3% liked it, and 91.4% found it easy to use. There were no differences between the RCT groups in the evaluation of the usefulness of the intervention ($\chi^2(2) = 0.62$, $p = .734$), likeability ($\chi^2(2) = 1.53$, $p = .466$), and ease of use ($\chi^2(2) = 1.38$, $p = .501$).

Program use and prompting [Study III]. Study III tested whether tailored timing and frequency prompts, aligned with the pre-intervention treatment plan, would enhance program usage and efficacy. A series of latent change analyses was performed to assess these outcomes and test for differences between RCT groups (standard intervention vs. intervention supplemented by tailored prompts).

The results showed that although the majority (98%; $n = 39/40$) of users responded positively to the tailored prompts received, they did not improve the use of the program in terms of indicators such as the number of logins ($t(85) = -0.91$; $p = .36$), modules opened ($t(83,57) = -1.47$; $p = .15$), modules completed ($t(85) = -0.71$; $p = .48$), tasks completed ($t(85) = -1.05$; $p = .30$), or subjective time spent using the program ($\chi^2(2) = 1.13$; $p = .57$).

In the tailored prompts group, a significant improvement ($p < .05$) was seen in an overall stress recovery score post-intervention ($d = 0.34$) and six months follow-up ($d = 0.38$) as compared to baseline. When comparing the tailored prompts group with the standard intervention group, there was no significant difference in the level of stress recovery post-intervention ($\beta = 0.01$, $p = .93$). However, when comparing changes six months following the intervention, there was a significant difference between the groups ($\beta = -0.24$, $p = .03$), indicating that the group receiving the standard intervention had a greater increase in stress recovery at 6 months compared to the group receiving the tailored prompts.

Participants in the program supplemented by tailored prompts showed significant improvements in all outcomes at six months follow-up: psychological well-being ($d = 0.40$), perceived stress ($d = -0.47$), depression

($d = -0.11$), and anxiety symptoms ($d = -0.57$). No between-group differences in changes at post-intervention and follow-up assessment were found.

User experience [Study IV]. The qualitative study (Study IV) investigated subjective barriers and facilitators faced by health care workers who had discontinued the six-week ICBT program by week 4. For this purpose, a thematic analysis was carried out, exploring themes in semi-structured interviews.

The results showed that health care workers who discontinued the use of the program had more than one reason for doing so (range: 2-14; $M = 8.05$, $SD = 3.68$). The most common reasons for dropping out were lack of time, busy pace of life, fatigue, travel, or various factors related to the program, such as technical difficulties in accessing the program, previous participation, or simply the inappropriate nature of the program itself (prioritizing face-to-face therapy).

The analysis of the identified barriers and facilitators faced by the users revealed the importance of both personal and program-related factors. Personal aspects included psychological reactions to the program (positive or negative emotions experienced and unmet expectations), personal characteristics (intrinsic motives, being open-minded, prior knowledge, difficulties in disclosing oneself, self-neglect), and life circumstances (extrinsic motives, time and private space to use the program, lack of energy, improved well-being, life stressors/crises). Program-related aspects included the level of support received (therapeutic alliance, lack of support, number of reminders, technical support), the content of the program (complexity, relevance, and engaging properties of content, format suitability, professionalism), and technical aspects (convenience of access, technical issues).

4 DISCUSSION

The main aim of this doctoral project was to analyze what makes internet-delivered cognitive behavioral therapy (ICBT) for stress recovery work among health care workers (HCWs), i.e., what factors can be attributed to positive mental health outcomes sustained over time. To answer this, four studies were conducted, and five research questions were addressed, focusing on exploring the sustainability of intervention effects, the interplay between mental health outcomes, the role of guided support, treatment plan with tailored prompting, and user experience. The mixed method approach to these questions included two RCT trials, a qualitative study, and secondary data analysis of previous RCT. Further, the findings of these studies are discussed within the broader context of literature.

4.1 Sustainability of Intervention Effects

The internet-delivered CBT intervention "For Recovery from Stress" (FOREST) has demonstrated efficacy across multiple studies. An initial RCT with 168 nurses showed moderate to large post-intervention effects across four stress recovery domains compared to a waitlist control (Dumarkaite et al., 2023). Two subsequent doctoral studies with 283 HCWs replicated these results, yielding small to moderate within-group improvements in stress recovery (Nomeikaite, Andersson, et al., 2023; Nomeikaite et al., 2025). Across all three trials, FOREST also led to small to moderate reductions in perceived stress, depression, and anxiety, and increases in psychological well-being, aligning with findings from a meta-analysis on ICBT for adults with elevated stress (Svärdman et al., 2022). Additionally, 67–74% of FOREST users reported improved psychological well-being, and 37–46% noted physical health gains, consistent with the theoretical framework by Sonnentag and Fritz (2007), suggesting that an effective stress recovery process restores internal resources strained by work-related stressors, supporting improvements in both mental and physical health.

Three-month follow-up from the initial FOREST trial (Dumarkaite et al., 2023) showed sustained improvements in stress recovery, perceived stress and well-being, but not in perceived control, anxiety or depression, suggesting the need to strengthen the control domain, which plays a critical role in the stress recovery process (Sonnentag & Fritz, 2007). A subsequent RCT from the current doctoral project (Study II; Nomeikaite, Andersson, et al., 2023) demonstrated that the updated version of the intervention led to lasting improvements across all outcomes, including perceived control. The sustained

improvements in anxiety and depression may be partly explained by strengthened control, as experience of low control can result in negative self-evaluations and decreased self-worth, which can be associated with anxiety and depression in occupational settings (Rosenfield, 2009).

Finally, a second RCT of the FOREST intervention (Study III; Nomeikaite et al., 2025) confirmed that improvements in stress recovery and secondary outcomes were sustained six months after the intervention. Effects for stress recovery at follow-up were even larger than in previous trials, suggesting that participants may have continued practicing stress management skills beyond the six-week intervention period, reinforcing and even enhancing their gains over time, which is in line with previous research, as a recent meta-analysis showed that ICBTs for elevated stress and stress-related disorders in adults can lead to sustained effects or a slight increase in the positive effect of reduced perceived stress over time (Svärdman et al., 2022).

4.2 Interplay Between Outcomes

During this doctoral project, a secondary data analysis was conducted (Study I; Truskauskaite et al., 2024) to explore how perceived stress, anxiety and depression symptoms, and psychological well-being are interrelated over time. We found that higher levels of psychological well-being after the ICBT stress recovery intervention were associated with lower perceived stress at the three-month follow-up. This result is consistent with the recovery from stress theory (Sonnentag & Fritz, 2007), which suggests that positive emotional states, a key component of psychological well-being (Bech, 2004), can act as an internal resource that boosts self-esteem and self-confidence (Philippe et al., 2018). This, in turn, may support individuals in handling daily challenges and act as a buffer against stress (Cohen & Williamson, 1988).

Additionally, findings from the doctoral study (Study I) showed that higher post-intervention anxiety levels were associated with higher perceived stress and depression at the three-month follow-up. Prior research has indicated that a key factor in improving mental health through mindfulness-based stress reduction interventions is decreased repetitive negative thinking (Gu et al., 2015). It is well established that reducing repetitive negative thinking is often accompanied by lower anxiety levels (Monteregge et al., 2020). Therefore, when developing ICBT stress management interventions, it might be important to target anxiety through such potential therapeutic mechanisms.

The baseline level of anxiety and well-being could be used as indicators for offering additional resources to individuals with higher levels of anxiety or lower levels of well-being, as a way to personalize ICBT

(Hadjistavropoulos, Peynenburg, et al., 2024). However, it should be considered that interventions with fewer treatment components may be more efficacious in occupational settings (Richardson & Rothstein, 2008). As such, it is essential to identify those who could benefit from extra components, while avoiding overburdening those who do not need them.

Overall, results support the need to move towards a more person-based and transdiagnostic approach to mental health treatment, wherein treatments target shared processes in disorders like anxiety, depression, and post-traumatic stress disorder, instead of treating each disorder separately (Harvey et al., 2004). The ICBT provides an excellent platform for putting this approach into practice. A recent longitudinal observational study in Canada tested a transdiagnostic ICBT for public safety personnel, with additional resources prescribed based on individual needs, which showed good treatment satisfaction, course completion, and symptom reduction (Hadjistavropoulos, McCall, et al., 2024).

4.3 Guided Support

As part of this doctoral project, a randomized controlled trial (Study II; Nomeikaite, Andersson, et al., 2023) was conducted to examine the role of guided support in ICBT for health care workers. The findings indicated that regular guided support, typically in the form of weekly written feedback given in an asynchronous manner, did not result in better long-term outcomes compared to the optional support format, nor did it substantially affect program usage. Although participants in the regular support group logged in more frequently, there were no significant group differences in other usage measures, such as modules opened, tasks completed, or self-reported time spent while using the program. The higher login count in the regular support group was likely due to the need to log in to access feedback messages following assignment completion.

These results are consistent with previous research suggesting that optional therapist support, particularly when paired with automated reminders, is sufficient for maintaining engagement and achieving positive mental health outcomes in ICBT (Berger et al., 2011; Bisby et al., 2022; Eimontas, Gegieckaite, et al., 2018; Johansson & Andersson, 2012; Rheker et al., 2015). In the current doctoral study, participants in the intervention received periodic contact from researchers and program administrators, which may have contributed to a perceived sense of support even without regular therapist involvement.

When considering the role of therapists in internet-delivered interventions, both the client's alliance with the therapist and with the program itself should be taken into account (Berger, 2017). As Frank and Frank in the book "Persuasion and Healing" (1991) put it, "*the success of all techniques depends on the patient's sense of alliance with an actual or symbolic healer*" (p. xv). It is possible that in ICBT with optional support, individuals may still perceive a sense of care from a symbolic therapist represented by the program, mainly as the intervention includes videos with professionals. Ultimately, investigating how the therapeutic alliance functions differently in digital versus face-to-face settings may provide valuable insights into the mechanisms through which it promotes therapeutic change (Berger, 2025).

Importantly, the optional support format required significantly fewer resources than regular guided support. Over the six-week intervention, therapists in the optional support group spent an average of two minutes per participant, nearly seven times less than those in the regular support group. These findings highlight the potential for resource optimization and improved cost-effectiveness in ICBT. However, despite growing interest in mental health economics and cost-effectiveness of interventions (e.g., Dear et al., 2021), further research is needed to address existing gaps to improve the availability, accessibility, and scalability of such interventions (Knapp & Wong, 2020).

An important observation was that several participants in the optional support group overlooked the option to contact their therapist, which contributed to early discontinuation of the program, which indicates an area for improvements in program design. Previous research indicates that early therapist contact may foster positive therapeutic outcomes (Haas et al., 2002; Krieger et al., 2023). One possible solution is for therapists or trained supporters to send a brief introductory message at the start of the program, informing participants about the availability of support. Such an initial message could notify clients about the possibility of the therapist's support and encourage them to adhere to the treatment.

In the doctoral project studies, the guided support was delivered either by clinical psychologists or trained and supervised master's students in clinical psychology. Overall, participants were satisfied with the support they received, suggesting that guidance provided by non-clinicians can also be effective (Leung et al., 2022). Such a guided support method can be a good learning opportunity for students (Friesen et al., 2014) and may help address resource limitations, such as the shortage of available counselors (Watkins et al., 2012).

In summary, optional guided support offers a promising and scalable approach to ICBT, significantly reducing therapist workload without compromising efficacy. That said, as suggested by Mohr and colleagues (2011), in the "Supportive accountability" model, individuals with lower intrinsic motivation may benefit from more structured guidance. Unfortunately, there are hardly any studies to support this claim.

4.4 Program Use and Prompting

Findings from the first FOREST intervention trial (Dumarkaite et al., 2023), along with the following RCT conducted as part of this doctoral project (Study II), found that only half of the participants engaged with the full content of the intervention and accessed all six program modules, with one-fifth finishing all assignments, which is consistent with previous research (Cross et al., 2022; Waller & Gilbody, 2009). In light of these findings, an RCT was conducted to analyze the effects of tailored SMS prompts, customized in terms of timing and frequency and aligned with individual pre-intervention usage goals (Nomeikaite et al., 2025).

Results showed no significant effect of tailored prompts on program usage metrics such as logins, modules accessed, modules completed, or self-reported time spent. However, other studies have reported benefits of SMS reminders on different indicators, like faster login times (Nordby et al., 2022), which our study did not measure. Moreover, although the majority of users appreciated receiving tailored SMS prompts, prompts did not improve mental health outcomes, including perceived stress, anxiety, symptoms of depression, and psychological well-being. These findings are inconsistent with previous research showing associations between dialogue support, such as reminders, and positive effects on adherence and outcomes (Kelders et al., 2012).

An unexpected finding was that those receiving prompts showed smaller improvements in the stress recovery process at six-month follow-up. We hypothesize that reminders to take time to unwind may have undermined participants' sense of control and mastery, essential for effective stress recovery (Sonnentag & Fritz, 2007). These findings are consistent with existing literature suggesting that external motivation, particularly when perceived as pressure to complete tasks, can be counterproductive and may hinder treatment outcomes (Alfonsson et al., 2016). As a self-help treatment, ICBT depends heavily on users' self-determination, which external prompts may inadvertently weaken by reducing feelings of autonomy and competence (Deci & Ryan, 2000b, 2000a). In addition, prompts can undermine the sense of self-agency, whereby individuals attribute their progress more to the

external forces, such as researchers or automated prompts, rather than their own initiative, which in turn limits the ability to initiate and direct actions toward the achievement of goals (Zimmerman, 2006).

While our study did not find any positive effects of tailored prompting by SMS, alternative forms of persuasive system design (Oinas-Kukkonen & Harjumaa, 2009) may yield better adherence and treatment outcomes. For example, scheduled telephone support has been shown to improve adherence and symptom reduction in patients at risk of discontinuing ICBT for depression (Pihlaja et al., 2020). Another possible solution would be using a person-based approach (Yardley et al., 2015) to make prompts even more persuasive, feasible, and relevant to users. Moreover, there is a growing trend wherein gamification principles are proposed as a means to enhance ICBT engagement (Brown et al., 2016), though there remains a lack of empirical evidence on how they can be effectively integrated into internet-delivered interventions.

4.5 User Experience

Across the initial FOREST efficacy trial and two subsequent RCTs conducted as part of this doctoral project (Dumarkaite et al., 2023; Nomeikaite, Andersson, et al., 2023; Nomeikaite et al., 2025), eight out of ten users found the intervention useful and satisfactory, and nine out of ten found it easy to use and would recommend it to others. Showing good acceptability of ICBT for stress recovery among health care workers.

As an extension of these results, a qualitative study was conducted (Study IV; Nomeikaite, Gelezelyte, et al., 2023), focusing on individuals who discontinued the ICBT program for stress management prematurely (by module four out of six). In line with previous research (Johansson et al., 2015), we observed that both personal, e.g., expectations, motivation, time, energy, and program-related factors, e.g., support, relevance, convenience, content engagement, acted as facilitators and barriers to participation in ICBT. Moreover, like in previous research (Waller & Gilbody, 2009), the reasons for usage discontinuation were more often personal than program-related.

The qualitative analysis highlighted that some participants dropped out after finding the program did not align with their expectations, particularly when hoping to receive face-to-face contact. Previous studies have also identified expectations as significant predictors of program use (Dear, 2025; Kazlauskas et al., 2020). Similar patterns are observed in traditional psychotherapy, where clients often discontinue treatment when it does not meet their needs (Kullgard et al., 2022). Matching treatment delivery to

individual preferences, whether online or in-person, has been shown to improve the likelihood of treatment adherence by up to 12% (Gonzalez Salas Duhne et al., 2022). Therefore, it is essential to offer various approaches to delivering mental health services and allow clients to choose treatment modalities in line with their preferences and needs.

Attitudes towards the intervention provided can also shape engagement. The qualitative analysis highlighted that perceiving the program as relevant, convenient, professional, and trustworthy acted as a facilitator when engaging in ICBT. However, finding the ICBT irrelevant or unhelpful acted as a barrier. Perceived skepticism towards internet-delivered interventions can be a major challenge when implementing ICBT (Folker et al., 2018). If users do not see the credibility of an internet intervention based on relaxation (i.e., that it could help them relieve stress), it could motivate dropout (Alfonsson et al., 2016). Educational videos prior to internet-delivered interventions could be an effective way to change perceptions regarding ICBT and increase treatment expectations (Soucy et al., 2016).

Some participants in the qualitative study reported experiencing anxiety, self-blame, guilt, or heightened stress as a result of the ICBT program. Similarly, Banerjee et al. (2017), in a qualitative study on an internet-delivered mindfulness intervention for health care workers, identified the emergence of negative thoughts and increased self-criticism as major obstacles to engagement. Enhancing participant involvement in the treatment process may help mitigate such negative experiences. Qualitative findings suggest that individuals who take responsibility for their treatment and attribute their progress to their own efforts tend to benefit more (Bendelin et al., 2011). One promising strategy to promote a sense of control is through a person-based approach (Yardley et al., 2015), wherein participants are allowed to choose the intervention modules they find most relevant, set their own pace, and determine the level of therapist support they require. This approach has been shown to boost perceived control and reduce anxiety more effectively than traditional ICBT programs (Nissling et al., 2021).

The qualitative analyses also highlighted how motivation, whether intrinsic or extrinsic, can play a key role for health care workers engaging in ICBT. Similarly, a study conducted in Canada has found that motivation for public safety personnel to access ICBT included a desire to overcome mental health problems, perceived convenience of ICBT, and the desire to manage symptoms autonomously (McCall et al., 2021). Intrinsic motivation can possibly be shaped by motivational interviews before the ICBT program, and studies have shown that it may encourage participants to use the program for more days (Soucy et al., 2021; Titov, Andrews, Schwencke, et al., 2010).

Another solution to increase intrinsic motivation, suggested by one of the study's participants, was the inclusion of a social forum. Self-determination Theory (Deci & Ryan, 2000b, 2000a) suggests that relatedness and a sense of belonging with peers can be essential for intrinsic motivation. Studies have shown the importance of social relationships in engaging with and adhering to the internet intervention, as well as leading to better outcomes (Cross et al., 2022; Vöhringer et al., 2020). However, a study in Canada tested the impact of online discussion forums in ICBT for public safety personnel and found low engagement with such peer support forums (McCall & Hadjistavropoulos, 2024). One possible explanation is that public safety personnel may be reluctant to expose themselves, making social forums less suitable.

We also found that high workload, lack of time, and associated fatigue were seen as barriers to ICBT engagement. Multiple psychosocial challenges can limit a person's ability to engage in treatment, increasing the overall treatment burden and negatively impacting uptake, completion, and symptom improvement (Cross et al., 2022). Mental health symptoms may also hinder access to necessary care by reducing motivation, impairing daily functioning, and compromising adherence to recommended treatment plans (De Hert et al., 2011). Authors of the DiCuCoM model suggest that strategies for enhancing engagement should include assessing individual capacity, minimizing treatment burden, and leveraging technology to anticipate and address disengagement (Cross & Alvarez-Jimenez, 2024). 'Effort-Optimized Interventions' have been proposed to minimize the effort needed to engage in therapeutic activities, including approaches like graded tasks and dynamically tailored assignments (Baumel & Muench, 2021).

Finally, while offering stress management interventions is a good start, it is not enough to ensure the mental health of health care workers, and systemic organizational changes are warranted (WHO, 2022b). As Demerouti (2025), in a paper on resources for well-being, put it: "*Instead of placing all responsibility for the successful technology implementation on employees […] to turn technology into a resource, organizations, authorities, and policymakers need to take responsibility for job design that satisfies basic human needs*" (p. 7).

4.6 Future Directions

Given limited resources and restricted access to mental health care, it is increasingly important to offer a range of psychosocial support options that meet diverse client needs while considering accessibility, scalability, and affordability (Kazdin & Rabbitt, 2013). Internet-delivered cognitive

behavioral therapy is increasingly recognized as a useful and evidence-based tool and is now recommended by several national health services, such as in the United Kingdom (NHS, 2022). However, the acceptance and use of ICBT interventions remain relatively low (Jardine et al., 2024; Lincke et al., 2022). In the face of these challenges, rather than continually developing new interventions, the emphasis should be on optimizing and refining existing tools and grounding them in clinical theory (Clark, 2004). To achieve this, further analysis of the active components of therapy is warranted, considering both treatment-specific mechanisms and common factors shared across most psychotherapies (Cuijpers et al., 2019; Mulder et al., 2017), such as treatment credibility and user expectations (Dear, 2025). Also, as most studies have been conducted in Western, Educated, Industrialized, Rich, and Democratic (WEIRD) populations (Henrich et al., 2010), further research in more diverse cultural and socioeconomic contexts is needed to ensure global applicability.

Given that symptoms often overlap across disorders, an important area for future research is the transdiagnostic approach, which targets shared underlying processes in treating mental health disorders (Harvey et al., 2004). Moreover, a promising development in internet interventions is the person-based approach (Yardley et al., 2015), wherein individuals are recognized as having unique needs and preferences, highlighting the need to tailor interventions to different types of people who might use them rather than adopting a one-size-fits-all approach. The rapid growth of artificial intelligence (AI) further expands the possibilities for personalization in digital mental health care (Olawade et al., 2024). Together, transdiagnostic and tailored approaches offer significant potential to improve both treatment efficacy and user engagement, while deepening our understanding of mechanisms of change (Păsărelu et al., 2017), an advancement that benefits not only ICBT but psychotherapy as a whole.

Another area requiring further research concerns engagement and adherence in ICBT. Although widely applied, prompting still requires stronger empirical support. Strategies to enhance engagement should aim to balance workload with individual capacity (Cross & Alvarez-Jimenez, 2024). Furthermore, as digital tools continue to evolve, the promotion of autonomy (Deci & Ryan, 2000b, 2000a), should remain a key priority, ensuring that technological innovations support rather than undermine it.

Although some studies highlight the clear importance of adherence (Haller et al., 2023), recent evidence suggests that substantial improvements can occur after only a few sessions for many users (Bisby et al., 2022) and that even a single ultra-brief ICBT lesson may yield significant benefits (Bisby et al., 2024). However, the factors that determine how much treatment is enough for

whom remain unclear. Moreover, comparisons across studies are difficult, as there is inconsistent terminology and an absence of operational definitions (Smoktunowicz et al., 2020). Dropout, for example, in the intervention research field may also be known as non-adherence (e.g., Johansson et al., 2015; Van Ballegooijen et al., 2014), attrition (e.g., Linnet et al., 2023), non-usage (e.g., Eimontas, Gegieckaite, et al., 2018), among other terms. Future research should therefore aim to standardize these definitions to improve the clarity and comparability of findings.

Finnaly, there is a visible need for new mental health care solutions in Lithuania. Learning from research and the experiences of other countries is essential for successfully implementing internet interventions in routine care. Experiences from successful clinics in five countries (Titov et al., 2018) demonstrate that incorporating internet interventions into routine care allows services to be offered at low or no cost, tailored to local contexts, and accessible to large numbers of clients. However, issues such as perceived skepticism towards ICBT, recruitment of clients, training of therapists, and the long-term sustainability of ICBT services (Titov et al., 2018), as well as ethical safeguards (Torous & Roberts, 2017) should be addressed. Advancing the implementation of innovative solutions will be critical to bridging the gap in mental health care provision.

4.7 Limitations

Several limitations of the doctoral studies should be considered when interpreting the findings. Participation in the ICBT stress recovery program may have been shaped by the structured nature of the randomized controlled trial (Kelders et al., 2012), highlighting the need to examine real-world effectiveness. Data collection was also limited to self-report questionnaires at three time points. Given the dynamic nature of mental health and well-being, studies with more frequent assessments, such as ecological momentary assessment (Shiffman et al., 2008) might be more informative. Moreover, as a six-month follow-up, used in one of the doctoral studies, is a relatively short, future research should try extending it to explore longer-term outcomes. For instance, an RCT on an eleven-week ICBT program for work-related stress found significant mental health improvements that lasted up to three years (Ruwaard et al., 2007).

Furthermore, although the tested intervention included various worksheets and psychoeducational content (texts, videos, and audio recordings), only guided support and tailored prompts were analyzed due to resource constraints. Future research should identify which elements (e.g., mindfulness

practices or targeted modules) or a set of elements drive outcomes, with factorial trials offering a promising approach (Andersson, 2023).

Measurement reliability posed another challenge. The PSS-4 used in Studies I and III showed low reliability, possibly limiting sensitivity to stress changes. The more comprehensive tools in Study II (PSS-10, PHQ-9, GAD-7) may have better captured nuanced mental health changes, complicating cross-study comparisons and highlighting the need for consistent, robust assessments in future research.

Sample characteristics also limit generalizability. Participants were primarily self-referred female health care workers, raising concerns about volunteer bias and applicability to other professions or men. While women account for the majority of the Lithuanian health care workforce (Official Statistics Portal, 2022), the gender imbalance in the intervention was still notable. Research suggests men are less likely to seek help (Harris et al., 2016) or respond to ICBT (Rozental et al., 2019). Addressing barriers such as stigma, privacy concerns, and cultural norms is essential to increasing male participation. Digital tools may also play a role in improving mental health literacy and help-seeking among men (Chen et al., 2024; Kutcher et al., 2016; Morgan et al., 2018). Future studies should evaluate the efficacy of the ICBT stress recovery program for other target groups. One such study is already underway to assess its feasibility for adolescents (Zelviene et al., 2023).

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Despite the limitations, the results from the doctoral studies provide new insights into the field of digital mental health care. To our knowledge, the current doctoral project was the first to use a mixed-method approach to analyze a set of factors that contribute to outcomes in ICBT for stress recovery among health care workers. The reliability of the study results is enhanced by the randomized controlled trial design used, which allows for the assessment of predictions and helps to discover not only "what works" but alo "why things work" (Deaton & Cartwright, 2018). Moreover, integrating qualitative analysis alongside quantitative research provided a deeper understanding of additional factors that shape user experiences in internet-delivered interventions.

CONCLUSIONS

1. The results demonstrate that internet-delivered cognitive behavioral therapy intervention for recovery from stress is efficacious in enhancing the stress recovery process among health care workers, as well as improving psychological well-being, and reducing perceived stress, symptoms of depression, and anxiety, with effects persisting up to six months following the program.
2. Post-intervention levels of anxiety are linked to reduced long-term levels of perceived stress and depression, while higher psychological well-being post-intervention is associated with lower levels of stress at three-month follow-up. These results highlight the importance of reducing anxiety and enhancing psychological well-being in order to improve the efficacy of an internet-delivered stress recovery intervention for health care workers.
3. Internet-delivered stress recovery intervention with optional guided support is sufficient in enhancing stress recovery and psychological well-being, and reducing perceived stress, depression, and anxiety at three-month follow-up, without significantly affecting program use, in comparison to regular guided support. Importantly, the optional support, wherein instead of weekly written feedback from psychologists, clients can get support on demand, requires less psychologists' time, making it a more resource-efficient solution.
4. Tailoring the frequency and timing of prompts in an internet-delivered stress recovery intervention does not improve usage indicators, perceived stress, anxiety, depression, and psychological well-being, and may even hinder the stress recovery process. Therefore, while most users appreciate tailored prompts delivered through short messaging services, they may not be the most effective way to encourage engagement among health care workers.
5. Based on findings from the qualitative study, user engagement with internet-delivered interventions is shaped by a range of personal and program-related factors. Personal factors, such as life circumstances, personal characteristics, and psychological responses to the program, overlap with program-related factors, including technical aspects, program content, and the level of received guided support. These factors can either facilitate or hinder the user experience. Therefore, fostering engagement in internet intervention requires a holistic approach that considers both individual needs and program design.

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Study I

Longitudinal Interplay Between Subjective Stress, Anxiety, Depression, and Well-being in Internet-Based Stress Recovery Intervention for Nurses

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MAIN

Longitudinal interplay between subjective stress, anxiety, depression, and well-being in internet-based stress recovery intervention for nurses

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Abstract

Background: Cognitive behavioural therapy (CBT) interventions are effective in reducing subjective stress. Nevertheless, the longitudinal links between mental health indicators are rarely studied in intervention research. Therefore, it is unknown how the intervention effects are sustained.

Aim: The current study investigated mechanisms explaining sustained intervention effects in a sample of medical nurses who receive a CBT-based internet-delivered stress recovery program.

Method: A single-group longitudinal study design with three measurement points, pre-test, post-test, and 3-month follow-up, was used in the current study. The sample consisted of nurses and assistant nurses from Lithuania ($n = 111$, age: M (SD) = 41.69 years (10.85)) who had participated in a 6-week CBT internet intervention targeting stress recovery. Data were collected as the randomised control trial, the treatment samples were combined, and the data were analysed using cross-lagged panel analysis with four variables representing the psychological well-being and symptoms of stress, anxiety, and depression.

Results: The results revealed that decreased anxiety and increased psychological well-being at post-test predicted reduced stress levels at the 3-month follow-up. In addition, decreased anxiety at post-test predicted decreased depression at follow-up.

Conclusions: Decreased anxiety and increased well-being could explain the sustainability of reduced stress following a CBT-based internet intervention for nurses. The implications of this for research and practice are discussed.

Keywords: anxiety; cross-lagged effect modelling; depression; internet-based CBT; stress

Introduction

Prolonged elevated stress often has devastating negative long-term effects on physical and mental health (Cohen, 2000; Haight *et al.*, 2023; O'Connor *et al.*, 2021). Moreover, stress imposes a substantial financial burden on society, mainly due to loss of productivity and increased demand for healthcare services (Hassard *et al.*, 2018). For some occupations, such as healthcare professionals, acute stress seems to be an inherent part of daily work (Mingote Adán *et al.*, 2004). Substantial evidence shows that stress-management interventions can effectively reduce subjective stress, with multi-modal, relaxation-based, and cognitive interventions showing the most beneficial effects in reducing stress symptoms (Estevez Cores *et al.*, 2021).

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The increasing demand for psychological services (e.g. American Psychological Association, 2021) and the rapid development of secure information technologies have encouraged the growth of internet-delivered psychological interventions (Andersson, 2018). In the face of the burden brought on the world by the COVID-19 pandemic, the world has faced the reality that, at times, internet interventions might be the only available option when addressing mental health issues when face-to-face contact is not recommended (Wind *et al.*, 2020). In general, internet-delivered interventions are seen as a more cost-effective alternative to face-to-face therapy (Andersson *et al.*, 2014). Being also more accessible, internet interventions are seen as particularly valuable when addressing the lack of trained therapists, especially in rural or remote locations (Lattie *et al.*, 2022).

Numerous randomised controlled trials (RCTs) have demonstrated the efficacy of internet-delivered interventions on various mental health outcomes, such as anxiety and mood disorders (Andersson *et al.*, 2019). A meta-analysis of 13 RCTs published between 2010 and 2021 confirmed the efficacy of internet interventions targeting elevated stress as a primary outcome and also documented secondary effects on measures of anxiety and depression (Svärdman *et al.*, 2022). Moreover, in nine out of 10 studies with follow-up measures, the effects of internet interventions on stress sustained ($n = 4$) or even slightly increased ($n = 5$) over time (Svärdman *et al.*, 2022). Nevertheless, most existing studies have focused on the effectiveness of interventions without examining how the effects are sustained or how different mental health symptoms interact. Moreover, it has been suggested that alongside a reduction of symptoms, an increase in well-being should be confirmed to establish intervention effects (Cloninger, 2006). However, the interplay between the increase in psychological well-being and the reduction of symptoms is rarely addressed in intervention research, including research on the effects of CBT-based internet interventions.

To address these gaps in previous research, the current study aimed to investigate longitudinal links between symptoms of stress, anxiety, and depression, as well as psychological well-being, in a help-seeking sample of medical nurses who participated in the internet-delivered CBT-based intervention FOREST, targeting stress reduction (Jovarauskaite *et al.*, 2021; the description of the intervention FOREST is provided in the Method section). In the current study, we defined stress as the subjective feeling of lack of control and confidence to handle difficulties in important areas of life (Cohen and Williamson, 1988). Anxiety was defined as a feeling of nervousness and inability to control worrying; and depression as a lack of interest or pleasure when doing things and feeling down or hopeless (Kroenke *et al.*, 2009). Psychological well-being was defined as the subjective experience of positive emotional states, vitality, and sense of purpose (Bech, 2004).

As was found in the previously conducted RCT, FOREST had immediate and follow-up effects, decreasing stress and depression and increasing well-being (Dumarkaite *et al.*, 2023). Symptoms of depression and anxiety tend to be interlinked over time (Jacobson and Newman, 2017). Therefore, we expected that anxiety and depression would predict each other over time. There is abundant literature linking exposure to stressful life events and mental health. Some longitudinal research shows that stressful events precede mental health deterioration (e.g. Schneider *et al.*, 2021), and some report bi-directionality of associations between exposure to stress and mental health (e.g. Schönfeld *et al.*, 2019). However, there has been less research on longitudinal links between subjective stress and mental health. Some evidence shows that subjective stress is an even stronger predictor of overall health than exposure to stressful events (Shields *et al.*, 2023). Also, the evidence from prospective longitudinal research showed that higher levels of subjective stress were a risk factor for future mental health problems in healthcare workers (Van Steenkiste, 2022). Keeping this in mind and also considering that the current study was conducted in the context of stress recovery intervention, we expected that lower levels of subjective stress would predict a decrease in depression and anxiety symptoms and an increase in well-being over time. Nevertheless, most studies that inform intervention research are conducted in non-intervention settings. Addressing longitudinal links between stress, anxiety, depression, and well-being in the help-seeking sample that reported intervention-induced changes in mental health indicators

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would allow a better understanding of what further outcomes we might expect after fostering mental health.

Method

Participants

The participants of the internet-delivered stress recovery program FOREST (Dumarkaite *et al.*, 2023; Jovarauskaite *et al.*, 2021) were included in the current study. Participants were nurses and assistant nurses from both study arms of the RCT: an intervention group (IG) and a delayed treatment group (DTG), which received the intervention after a 3-month follow-up assessment. The inclusion criteria were as follows: (1) being a licensed nurse actively working within the national healthcare system; (2) providing written informed consent electronically; (3) completing a baseline assessment prior to randomization; (4) sufficient proficiency in Lithuanian to understand the intervention content and instructions; (5) possessing a computer, tablet, smartphone, or similar device with internet access. Exclusion criteria were as follows: (1) experiencing an acute psychiatric crisis; (2) a high risk of suicide; (3) alcohol or drug addiction; (4) current experience of interpersonal violence. Overall, 208 applicants registered for participation, and 184 met the inclusion and did not meet the exclusion criteria (93 were assigned to the IG and 91 to the DTG). Of these, 73 participants were excluded from the analysis because (1) they were from the DTG group and had not completed pre-test measurement questionnaires ($n = 29$); (2) they had never logged in to the program ($n = 23$); (3) they had not completed the post-test and/or follow-up assessment ($n = 21$). The final sample of the current study consisted of 111 participants (65 from the IG and 46 from the DTG). The study flowchart is presented in Fig. S1 in the Supplementary material. Demographic characteristics of the current study sample ($n = 111$) collected at enrolment are presented in Table 1.

We found no differences between participants of the current study ($n = 111$) and excluded participants ($n = 73$) at the enrolment in terms of demographic characteristics, including gender ($\chi^2(1) = 0.89$, $p = .35$), age ($t_{182} = 1.21$, $p = .23$), job position ($\chi^2(1) = 0.00$, $p = .98$), education ($\chi^2(2) = 0.98$, $p = .62$), working status ($\chi^2(2) = 1.99$, $p = .37$), work experience ($\chi^2(3) = 3.86$, $p = .28$), subjective income ($\chi^2(2) = 0.13$, $p = .94$), partnership status ($\chi^2(1) = 0.22$, $p = .64$), seeing a psychologist ($\chi^2(1) = 2.84$, $p = .09$), and usage of psychopharmacological medicine due to mental health difficulties ($\chi^2(1) = 1.08$, $p = .30$). Also, there were no differences between included and excluded participants regarding any outcome measures at the enrolment: perceived stress (M (SD) = 7.86 (2.33) *vs* M (SD) = 7.89 (3.20); $t_{121.58} = 0.06$, $p = .95$), anxiety (M (SD) = 2.88 (1.56) *vs* M (SD) = 2.63 (1.95); $t_{130.36} = -0.93$, $p = .35$), depression (M (SD) = 2.56 (1.49) *vs* M (SD) = 2.56 (1.75); $t_{182} = 0.13$, $p = .99$), and psychological well-being (M (SD) = 9.41 (4.65) *vs* M (SD) = 9.84 (5.22); $t_{182} = 0.59$, $p = .56$).

Procedures

The participants were all from Lithuania and were enrolled via disseminating information through press releases to media, healthcare institutions, and specialised social networks. Detailed enrolment procedures and participant eligibility criteria have been reported previously (Dumarkaite *et al.*, 2023; Jovarauskaite *et al.*, 2021). Informed consent was obtained from all participants before data collection. In the current study, the IG data collected at T1, T2 and T3 and the DTG data collected at T3, T4 and T5 were merged into a single data pool and represented pre-test, post-test, and follow-up, respectively. Thus, the current study presents the secondary analysis of the IG data collected at T1 and T2, as well as IG and DTG data collected at T3, while the data collected at T4 and T5 has not been analysed previously.

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Table 1. Demographic characteristics of the participants at the enrolment ($n = 111$)

Variable	*n* (%)
Gender	
Female	109 (98.2)
Male	2 (1.8)
Age	
M (*SD*)	41.69 (10.85)
Range	23–59
Position	
Assistant nurse	6 (5.4)
Nurse	105 (94.6)
Education	
Secondary or lower	1 (0.9)
Higher or non-university higher	65 (58.6)
Higher university	45 (40.5)
Working status	
Part-time	6 (5.4)
Full-time	45 (40.5)
More than full-time	60 (54.1)
Working experience	
<2 years	14 (12.6)
2–5 years	15 (13.5)
6–10 years	13 (11.7)
>10 years	69 (62.2)
Income	
Lower than average	13 (11.7)
Average	81 (73.0)
Higher than average	17 (15.3)
Partnership (long-term)	
No	27 (24.3)
Yes	84 (75.7)
Visiting a psychologist	
No	101 (91.0)
Yes	10 (9.0)
Taking psychopharmacological medicine	
No	106 (95.5)
Yes	5 (4.5)

Program FOREST

The online cognitive behavior therapy-based stress recovery program used in the study FOREST aimed to enhance the healthcare staff's stress recovery skills. FOREST also included mindfulness principles that have been shown to assist in the modulation of brain–behaviour interaction involved in recovery from stress (Johnson *et al.*, 2014). FOREST consisted of six sessions and lasted six weeks. Each session was unlocked on a weekly basis and covered the following topics: (1) Introduction; (2) Relaxation; (3) Psychological detachment; (4) Mastery; (5) Control; (6) Keeping the change alive. The topics of sessions 2 to 5 represented the four elements of the stress recovery experiences (Sonnentag and Fritz, 2007). FOREST consisted of three main elements that can be found throughout the whole program: psychoeducation (text and video recordings), exercises (written and audio recordings), and communication with a psychologist. The psychologist's role included providing feedback to the participants once they completed exercises and replying to personal messages from program participants. FOREST was developed specifically for healthcare staff experiencing stress by clinical psychologists and researchers at Vilnius University. More details on the program and its entire content can be found in the study protocol (Jovarauskaite *et al.*, 2021) and the FOREST RCT study (Dumarkaite *et al.*, 2023).

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Measures

Stress

The Perceived Stress Scale (PSS-4) (Cohen and Williamson, 1988) was used to evaluate the changes in self-reported perceived stress. The PSS-4 consists of four questions (e.g. 'In the last month, how often have you felt that you were unable to control the important things in your life?'); each question is ranked on a 5-point Likert scale ranging from 0 ('never') to 4 ('very often'). A higher score indicates more pronounced perceived stress. In the current study, Cronbach's alpha for the PSS-4 at pre-test was $\alpha = .65$.

Symptoms of anxiety and depression

The Patient Health Questionnaire (PHQ-4) (Kroenke *et al.*, 2009) was used to evaluate the changes in self-reported anxiety and depression symptoms. The PHQ-4 consists of four items and two subscales: the anxiety subscale (e.g. 'Feeling nervous, anxious or on edge') and depression subscale (e.g. 'Little interest or pleasure in doing things'); each item is ranked on a 4-point Likert scale ranging from 0 ('not at all') to 3 ('nearly every day'). A higher score indicates more pronounced anxiety and depression symptoms. In the current study, Cronbach's alpha for the PHQ-4 anxiety subscale at pre-test was $\alpha = .83$, and for the PHQ-4 depression subscale at pre-test was $\alpha = .75$.

Psychological well-being

The World Health Organization Well-being Index (WHO-5) (Bech, 2004) was used to evaluate the changes in self-reported psychological well-being. The WHO-5 consists of five items (e.g. 'I have felt cheerful and in good spirits'); each item is ranked on a 6-point Likert scale ranging from 0 ('at no time') to 5 ('all of the time'). A higher score indicates more pronounced psychological well-being. In the current study, Cronbach's alpha for the WHO-5 at pre-test was $\alpha = .87$.

Data analyses

The current study aimed to investigate the longitudinal interplay between mental health indicators when participating in the internet-based stress-reduction intervention. As a preliminary analysis, we assessed the change on four indicators: symptoms of stress, anxiety, and depression, as well as the level of psychological well-being using the latent change modelling approach (Duncan *et al.*, 2013). We ran a series of latent change models, indicating the estimated baseline levels and the estimated change in variables from pre- to post-test and from pre-test to follow-up.

To analyse the interplay between mental health indicators over time, we conducted a cross-lagged panel analysis (Selig and Little, 2012), with four variables representing symptoms of stress, anxiety, and depression, as well as the level of psychological well-being measured at three time-points, i.e. pre-test, post-test, and 3-month follow-up. When running the autoregressive cross-lagged model, the cross-lagged effects were estimated by controlling for the stability paths between the pre-test and post-test and between post-test and follow-up, as well as within-time correlations among all variables at all measurement points. All analyses were conducted using the sum scores of the variables with the robust maximum likelihood estimator in Mplus 8.2 (Muthén and Muthén, 1998–2017). The model fit of the cross-lagged model was evaluated using the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), and χ^2 test (Kline, 2011). The CFI/TLI values higher than .90 and RMSEA values below .08 indicate an acceptable fit; CFI/TLI values higher than .95, RMSEA values below .06, and insignificant χ^2 test represent a good fit. The full information maximum likelihood (FIML) algorithm was used for handling missing data in the current study.

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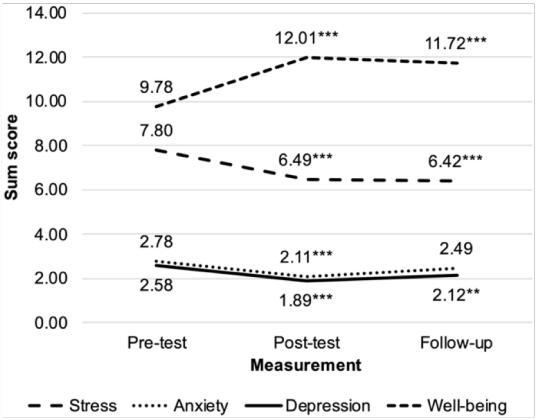

Figure 1. The univariate trajectories of stress, anxiety, depression, and psychological well-being over the study period ($n = 111$). The variables were measured in different scales and are incomparable with one another; stars next to the estimated means represent the difference at post-test or follow-up in comparison with pre-test: $^{**}p < .01$, $^{***}p < .001$.

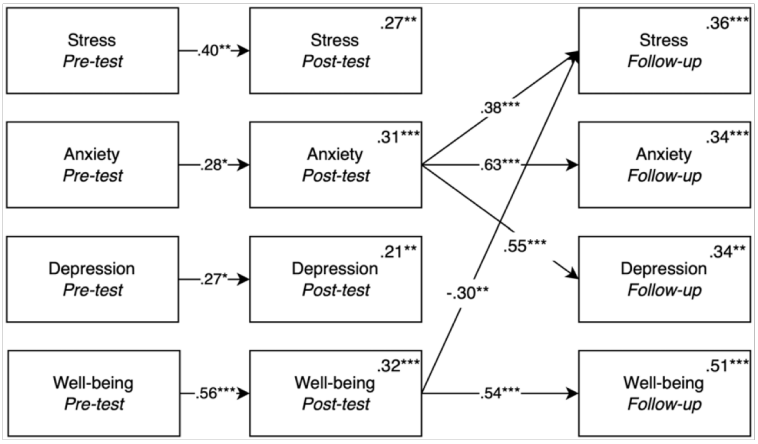

Figure 2. Standardised significant estimates of the cross-lagged panel model ($n = 111$). Numbers on the lines represent standardised beta coefficients; numbers within rectangles represent standardised R^2 coefficients; $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Results

The latent change analysis indicated statistically significant reductions in stress, anxiety, and depression symptoms and a significant increase in well-being from pre- to post-test (see Fig. 1). At follow-up, the decreases in stress and depression symptoms and the increase in well-being were sustained, while anxiety levels returned to pre-intervention levels. The results of the autoregressive cross-lagged panel analysis indicated that the model fitted data well ($\chi^2(16) = 17.43$, $p = .358$, CFI/TLI = .997/.988, RMSEA [90% CI] = .028 [.000, .094]). Significant stability paths and cross-lagged effects are presented in Fig. 2. The within-time correlations are reported in Table 2. As shown in

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Table 2. Within-time cross-lagged panel correlations between study variables

	Variable at the same time point		
	Stress	Anxiety	Depression
T1 Anxiety	.53	—	—
T1 Depression	.58	.72	—
T1 Well-being	−.50	−.56	−.56
T2 Anxiety	.33	—	—
T2 Depression	.49	.56	—
T2 Well-being	−.35	−.33	−.42
T3 Anxiety	.62	—	—
T3 Depression	.59	.61	—
T3 Well-being	−.55	−.67	−.50

All correlations are significant at $p<.001$.

Fig. 2, the levels of anxiety symptoms at the post-test positively predicted the levels of stress and depression symptoms at follow-up. Additionally, the levels of psychological well-being at the post-test negatively predicted stress symptoms at follow-up. No cross-lagged effects were observed from the pre-test to the post-test.

Discussion

The current study aimed to investigate the longitudinal links between symptoms of stress, anxiety, and depression and the psychological well-being of the participants of the CBT-based internet intervention FOREST, targeting stress recovery. Our previous RCT study (Dumarkaite *et al.*, 2023) confirmed that the intervention positively affected nurses' mental health and the effects on stress and depression symptoms, as well as well-being, sustained at a 3-month follow-up. The same within-group effects were confirmed in the current study using the combined sample of intervention participants who received intervention right after enrolment and delayed treatment group data. Overall, the results demonstrate that reduced anxiety and increased well-being predict the sustainability of the effects of reduced stress. Additionally, we found that reduced anxiety appears to contribute to sustaining intervention effects on reduced depression symptoms.

In contrast to our expectations, we did not find that reduced subjective stress was linked with decreased symptoms of poor mental health. In contrast, increased mental health contributed to sustaining lower subjective stress levels achieved through participation in the intervention. Even though there is strong evidence that exposure to stressful events precedes the symptoms of anxiety and depression (Schneider *et al.*, 2021), our results suggest that when addressing elevated subjective stress, we need to target other mental health outcomes, such as anxiety and psychological well-being if we want effects to be sustained. Also, contrary to our expectations, we did not find bi-directional longitudinal links between anxiety and depression symptoms. The results suggest that reduced anxiety plays a role in sustaining intervention effects on depression symptoms but not vice versa.

Previous research has demonstrated that one of the primary mechanisms behind improved mental health following mindfulness-based stress-reduction interventions is decreased repetitive negative thinking (Gu *et al.*, 2015). It is also known that the reduction of repetitive negative thinking is usually paired with reduced anxiety (Monteregge *et al.*, 2020). Although the design of the current study did not allow testing mediation mechanisms of intervention effects, it has been shown that reduced anxiety is one of the predictors of sustained intervention effects. Therefore, in stress reduction intervention research, more attention should be paid to targeting decreased anxiety through reduced repetitive negative thinking or other potential mechanisms.

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The results also highlighted the importance of improved psychological well-being when targeting elevated stress and promoting mental health. There are many mechanisms for tackling well-being (Diener and Biswas-Diener, 2019). Some of them, such as CBT and mindfulness, were also used in the FOREST intervention. The results suggest that increased well-being contributes to sustaining reduced stress. From the perspective of the experiences of recovery from stress model (Sonnentag and Fritz, 2007), positive emotionality, which is an internal part of psychological well-being (Bech, 2004), might be seen as internal resources, providing a sense of self-esteem and self-confidence (Philippe *et al.*, 2018) and thus might assist in coping with everyday challenges and protecting from stress (Cohen and Williamson, 1988). Therefore, future intervention research should consider measuring psychological well-being as a secondary intervention outcome.

In summary, based on the findings of the current study, when applying internet-delivered interventions targeted at sustained stress reduction in clinical research and practice settings, specialists should consider incorporating more anxiety-reduction strategies. Moreover, interventions targeting stress reduction should consider focusing not only on immediate relief but also on longer-term strategies that could potentially increase overall well-being. Also, based on the findings of the current study, researchers and clinicians should consider monitoring anxiety and well-being as early indicators of whether the stress-reduction intervention has the potential to have long-lasting results. Finally, when personalising the interventions targeting stress, the baseline level of anxiety and well-being could be used as indicators when offering different levels of support or booster sessions to individuals with higher levels of anxiety or lower levels of well-being.

The current study's findings should be seen in light of its limitations. The study's main limitation is the combined study sample, resulting in different measurement times for the intervention group (IG) and delayed treatment group (DTG). Even though we did not find any differences between groups at pre-test and post-test and, in most cases, at follow-up, stress levels were higher at follow-up in the DTG, possibly indicating that long-term effects on stress were more sustainable in the IG, compared with DTG. Even though the waiting conditions do not seem to have negative effects on intervention outcomes when participating in stress reduction interventions (Elliott and Brown, 2002), in help-seeking samples (this was also the case in the current study), waiting for the intervention might introduce some dissatisfaction and, in turn, the final intervention effects might be less beneficial (Gunnarsson *et al.*, 2023). Additionally, the study was conducted with a sample of self-referred nurses, indicating the risk of volunteering bias and the results should be generalised to other samples with caution. Moreover, the very short versions of stress, anxiety, and depression measures were used in the study and could limit the comparison of the results with other studies. Finally, the follow-up effects of the study were relatively short-term. Future studies should test the predictors of the sustained intervention effects with longer follow-ups.

Conclusion

The results of the current study provide evidence of the importance of reducing anxiety and promoting psychological well-being when targeting stress in internet interventions, as the post-intervention levels of anxiety and psychological well-being are associated with the sustainability of the intervention effects on reduced stress over time.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1352465824000456

Data availability statement. The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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Author contributions. **Inga Truskauskaite:** Conceptualization-Lead, Data curation-Equal, Formal analysis-Lead, Funding acquisition-Equal, Investigation-Equal, Methodology-Equal, Project administration-Supporting, Visualization-Lead, Writing - original draft-Lead, Writing - review & editing-Lead; **Austeja Dumarkaite:** Conceptualization-Supporting, Data curation-Equal, Investigation-Lead, Methodology-Supporting, Project administration-Equal, Writing - review & editing-Supporting; **Auguste Nomeikaite:** Investigation-Supporting, Project administration-Supporting, Writing - review & editing-Supporting; **Gerhard Andersson:** Funding acquisition-Supporting, Methodology-Supporting, Resources-Equal, Supervision-Supporting, Validation-Supporting, Writing - review & editing-Supporting; **Evaldas Kazlauskas:** Conceptualization-Supporting, Funding acquisition-Lead, Investigation-Equal, Methodology-Equal, Project administration-Equal, Resources-Equal, Supervision-Lead, Validation-Lead, Writing - review & editing-Equal.

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Competing interests. All authors declare no competing interests.

Ethical standards. The study was approved by the Psychology Research Ethics Committee of Vilnius University (reference no. 2021-03-22/61). All participants gave informed consent to participate in the study and for the results to be published. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees and with the Helsinki Declaration of 1975, as revised in 2008. The trial was registered at www.clinicaltrials.gov (NCT04817995: https://clinicaltrials.gov/ct2/show/NCT04817995, 30 March 2021).

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Study II

The Role of Therapist Support on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Healthcare Workers: A Randomized Control Trial

Nomeikaite, A., Andersson, G., Dear, B. F., Dumarkaite, A., Gelezelyte, O., Truskauskaite, I. & Kazlauskas, E. (2023). The Role of Therapist Support on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Healthcare Workers: A Randomized Control Trial. *Cognitive Behaviour Therapy*, *52*(5), 488–507. doi:10.1080/16506073.2023.2214699

The role of therapist support on the efficacy of an internet-delivered stress recovery intervention for healthcare workers: A randomized control trial

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The role of therapist support on the efficacy of an internet-based stress recovery intervention for healthcare workers: A randomized control trial

Internet-delivered CBT interventions effectively improve different aspects of mental health, although the therapist's role remains unclear. The aim of this trial was to evaluate the efficacy of a therapist-supported 6-week internet-delivered intervention in improving stress recovery among healthcare workers compared to a group with optional therapist support. A total of 196 participants were recruited and randomly allocated to regular therapists' support or optional therapists' support groups. The primary outcome measure was the Recovery Experiences Questionnaire (REQ), developed to assess four components of stress recovery: psychological detachment, relaxation, mastery, and control. Secondary outcomes measured perceived stress (PSS-10), anxiety (GAD-7), depression (PHQ-9), and psychological well-being (WHO-5). All four stress recovery skills improved significantly after participating in the intervention at a 3-month follow-up, with small to medium effects (0.27-0.65) in both groups. At follow-up, we also found a significant reduction in perceived stress, depression, and anxiety in both groups, as well as an improvement in psychological well-being. The results indicate that ICBT can be effective in improving stress recovery skills among healthcare workers with optional support from the therapist, provided at the participants' request. This RCT suggests that optional therapist support could meet participants' needs and reduce resources needed in routine care.

Keywords: internet-delivered intervention, cognitive behavior therapy, stress recovery, healthcare workers, RCT

Introduction

There is growing evidence that internet-delivered psychological therapies can efficiently reduce the burden of mental disorders (Andersson, 2018; Andersson et al., 2019; Fu et al., 2020). Research shows that internet-delivered cognitive behavior therapy (ICBT) is one of the most effective online treatments for improving different aspects of mental health (Andersson et al., 2018; Carlbring et al., 2018; Heber et al., 2017). Moreover, it has been reported that ICBT may be as effective as face-to-face therapy for various mental health conditions (Andersson et al., 2014; Carlbring et al., 2018).

In the changing landscape of psychological treatments, which now include digital interventions, the therapist's role is changing considerably from one where the therapist provides the entire therapy to one where structured therapeutic material plays a central role. However, the impact of a therapist on the outcomes of internet-delivered interventions remains to be determined. Some research findings show that the core therapeutic factors, such as the therapeutic alliance, can be as important in internet interventions as in traditional face-to-face psychological therapies (Berger, 2017; Kaiser et al., 2021; Pihlaja et al., 2018). Furthermore, internet-delivered psychosocial programs are often considered to require at least minimal support from a therapist (Baumeister et al., 2014) in order to have positive outcomes on mental health. However, other studies have reported ambiguous findings, suggesting that for certain conditions and when delivered in certain ways, internet-delivered psychological interventions can be similarly effective in reducing symptoms whether delivered with therapist support, with optional therapist support, or even as a standalone online program without any support from a therapist but sometimes with automated reminders (Berger et al., 2011; Bisby et al., 2022; Eimontas et al., 2018; Johansson & Andersson, 2012; Rheker et al., 2015).

Healthcare professionals face highly demanding working conditions resulting in high levels of occupational stress. The COVID-19 pandemic further increased the physical and mental burden on healthcare workers (HCWs). Research shows that during the COVID-19 pandemic HCWs experienced moderate to high emotional strain or extreme stress (Mira et al., 2020), symptoms of anxiety, depression, insomnia, post- traumatic stress, complex post-traumatic stress disorder (Jovarauskaite et al., 2022; Sani et al., 2022), and many considered leaving the medical field altogether (Norkiene et al., 2021). All of this strongly indicates that medical professionals may benefit from professional psychological interventions. However, HCWs rarely seek psychological help, often due to the prevailing stigma associated with seeking help from mental health professionals (Knaak et al., 2017; Mehta et al., 2018; Søvold et al., 2021). Internet- delivered interventions could therefore help to reduce help-seeking barriers in this specific context. Moreover, in some situations, as during the COVID-19 pandemic, internet-delivered interventions may be the only option to address mental health problems (Wind et al., 2020). Several RCTs have already shown that among HCWs, internet-delivered interventions can help develop coping skills (Morrison Wylde et al., 2017), improve resilience

(Angelopoulou & Panagopoulou, 2022), reduce stress levels (Gollwitzer et al., 2018), improve psychological well-being (Smoktunowicz et al., 2021), and increase work engagement (Gollwitzer et al., 2018; Imamura et al., 2019).

A recent randomized control trial supported the efficacy of the FOREST intervention, indicating that it can effectively improve stress recovery skills, reduce stress levels, anxiety, and depression symptoms as well as increase psychological well- being among nurses (Dumarkaite et al., 2023). The "For Recovery from Stress" (FOREST) internet intervention is a brief six-week program developed based on CBT and mindfulness principles to specifically address the mental health needs of nurses amid the COVID-19 pandemic (Jovarauskaite et al., 2021). The FOREST intervention is grounded on the theoretical framework of stress recovery (Sonnentag & Fritz, 2007). Stress recovery is the process by which individual functional systems activated during a stressful experience return to pre-stress levels (Meijman & Mulder, 1998). Sonnentag and Fritz (2007) distinguished four components of stress recovery: (1) psychological detachment – a degree to which a person can detach from work responsibilities or thoughts about work during leisure time; (2) relaxation – the ability to reduce tension and relax the body and mind; (3) mastery – sense of competence and new challenges outside work; and (4) control – being able to decide how to allocate work and leisure time and what activities to engage in.

Research shows that guided ICBT interventions for stress are more effective than unguided interventions (Heber et al., 2017). However, it is unclear whether low-intensity internet-delivered stress recovery intervention would be as effective with optional support from a therapist as compared to therapist support as usual in a non-clinical sample of HCWs. The FOREST+ is an updated version of the 6-week internet-delivered stress recovery program for nurses FOREST (Jovarauskaite et al., 2021). The current trial aimed to evaluate the role of therapist support intensity in an internet-delivered intervention FOREST+ for stress recovery in healthcare workers. A randomized controlled trial was conducted in which one group received regular therapist support while the other group received the same program with optional therapist support.

The primary objective of the trial was to evaluate the efficacy of the therapist-supported internet-delivered stress recovery intervention in improving stress recovery among healthcare workers compared to an optional therapist support group. The secondary objectives were: (1) to evaluate the efficacy of the therapist-supported stress recovery intervention in improving perceived levels of stress, anxiety, depression, and psychological well-being among healthcare workers compared to an optional support group; (2) to assess participants' engagement in the FOREST+ program in a group with regular therapist support and with optional support; (3) to evaluate the usability of the internet-delivered stress recovery program.

Methods

Study design

A two-armed randomized controlled trial was conducted, comparing healthcare workers who used the internet-delivered stress recovery program with regular

therapist support and a group using the same program with optional support from a therapist, provided on request. Participants were randomly assigned to study groups (1:1 ratio) by an independent researcher using a random number generation procedure at www.random.org. Both groups started using the program immediately after randomization on 26 April 2022. To assess the efficacy of the program, three measurements were taken: pre-intervention (March 2022), post-intervention (June 2022), and 3-month follow-up (September 2022). Informed consent was obtained from study participants before the pre-intervention assessment. The self-reported data were collected using the same secure platform where the intervention was hosted – Iterapi (Vlaescu et al., 2016). The present trial was approved by Vilnius University Psychology Research Ethics Committee (Reference No. 2021-03-22/61). The trial is registered on www.clinicaltrials.gov (NCT05272774).

Procedure

Healthcare workers were invited to participate in the study through various social network groups for healthcare professionals, healthcare institutions, and through national media. Those interested in participation could register for the program at www.forestmedikams.lt, by filling out the pre-intervention questionnaire. After completing the online pre-intervention questionnaire, participants were contacted by the study administrators for a brief telephone interview to assess their eligibility for the intervention further. Eligibility criteria for participation in the present trial were: (1) currently working in a healthcare institution; (2) aged 18 or over; (3) comprehend Lithuanian; (4) access to and ability to use a device with internet access. In addition, the exclusion criteria were as follows: (1) high suicide risk; (2) acute psychiatric crisis; (3) currently experiencing interpersonal violence. The full procedure of the trial is presented in the CONSORT flow diagram in Figure 1.

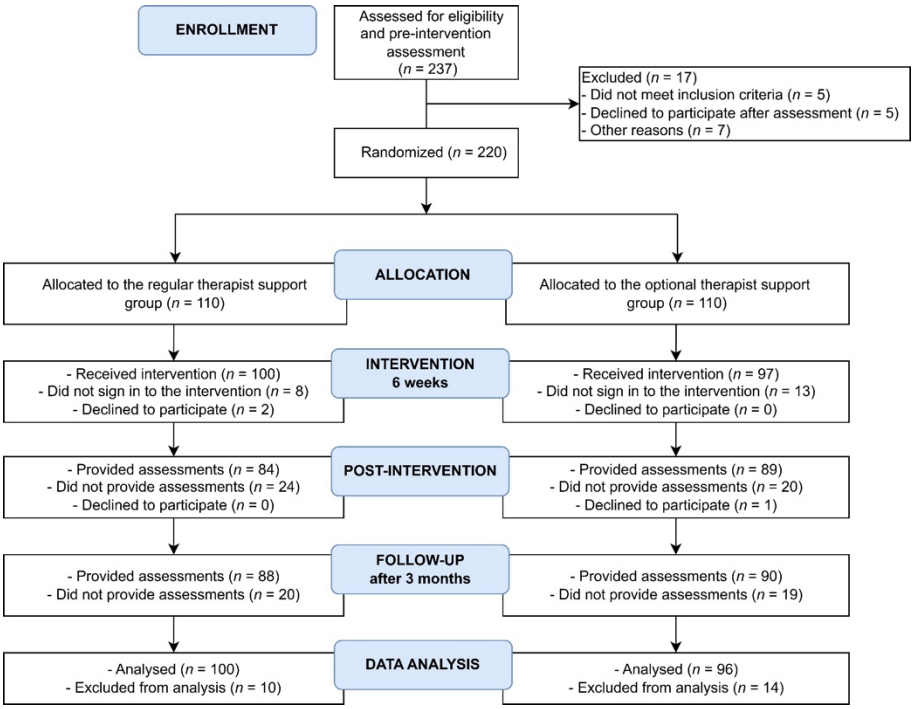

Figure 1. The CONSORT flow diagram for the present trial.

Participants

In total, 237 healthcare workers registered for the 6-week internet-delivered stress recovery intervention. Of these, 220 completed the pre-intervention measurements, met the inclusion criteria, and were invited to participate in the intervention. After randomization 110 participants were assigned to the regular therapist support group (RS) and 110 to the optional therapist support group (OS). Of these, 21 participants did not sign in to the program and were therefor excluded and not included in the data analysis. In the regular support group, two participants, and in the optional support group one participant declined to participate in the study during the course of the intervention. The final sample included in the data analysis comprised 196 participants, 100 in regular support and 96 in optional support groups.

The included healthcare workers ($N = 196$) were aged 22-73 years ($M = 40.96$, $SD = 12.14$), and 94.4% were women. Comparisons of sociodemographic and work-related characteristics for regular support and optional support groups at baseline (pre-intervention assessment) are presented in Table 1. Groups significantly differed only in terms of previous self-help apps used ($\chi^2(1) = 4.32$, $p = .038$), with the regular support group having used more self-help apps ($n = 24/100$), than the optional support group ($n = 12/96$). At baseline, groups did not differ significantly in terms of primary (stress recovery) and secondary (stress, anxiety, depression, and psychological well-being) outcome measures (see Figure 3 and Figure 4).

Table 1. Characteristics of the sample at baseline.

Variable		Regular support group (n = 100)	Optional support group (n = 96)	Significance statistics
Gender				
	Female	95 (95.0%)	90 (93.8%)	$\chi^2(1) = 0.14$, $p = .704$
	Male	5 (5.0%)	6 (6.3%)	
Age				
	M (SD)	39.78 (11.83%)	42.19 (12.39%)	$t(194) = 1.39$, $p = .166$
	Range	22-73		
Education				
	Secondary or lower	3 (3.0%)	3 (3.1%)	$\chi^2(2) = 0.06$, $p = .970$
	Post-secondary or vocational	18 (18.0%)	16 (16.7%)	
	Higher education	79 (79.0%)	77 (80.2%)	
Long-term relationship				
	No	23 (23.0%)	23 (24.0%)	$\chi^2(1) = 0.03$, $p = .874$
	Yes	77 (77.0%)	73 (76.0%)	
Position*				
	Doctor	31 (31.0%)	38 (39.6%)	$\chi^2(1) = 1.85$, $p = .208$
	Resident doctor	11 (11.0%)	13 (13.5%)	$\chi^2(1) = 0.29$, $p = .587$
	Nurse	26 (26.0%)	21 (21.9%)	$\chi^2(1) = 0.46$, $p = .499$
	Other	22 (22.0%)	21 (21.9%)	$\chi^2(1) = 0.00$, $p = .983$
Management position				
	No	81 (81.0%)	78 (81.3%)	$\chi^2(2) = 0.00$, $p = .964$
	Yes	19 (19.0%)	18 (18.8%)	
Work status				
	Part-time	9 (9.0%)	8 (9.3%)	$\chi^2(2) = 0.10$, $p = .953$
	Full-time	39 (39.0%)	36 (37.5%)	
	> Full-time	52 (52.0%)	52 (54.2%)	
Type of services*				
	Outpatient	63 (63.0%)	52 (54.2%)	$\chi^2(1) = 1.58$, $p = .209$
	Inpatient	36 (36.0%)	37 (38.5%)	$\chi^2(1) = 0.14$, $p = .713$
	Rehabilitation	7 (7.0%)	11 (11.5%)	$\chi^2(1) = 1.17$, $p = .280$
	Nursing	6 (6.0%)	7 (7.3%)	$\chi^2(1) = 0.13$, $p = .716$
	Paramedics	13 (13.0%)	7 (7.3%)	$\chi^2(1) = 1.74$, $p = .187$
	Intensive care	4 (4.0%)	11 (11.5%)	$\chi^2(1) = 3.86$, $p = .050$
Work experience				
	< 2 years	23 (23.0%)	19 (19.8%)	$\chi^2(3) = 4.48$, $p = .215$
	2-5 years	16 (16.0%)	7 (7.3%)	
	6-10 years	13 (13.0%)	14 (14.6%)	
	> 10 years	48 (48.0%)	56 (58.3%)	
Provided services to Ukrainian refugees				
	No	63 (63.0%)	69 (71.9%)	$\chi^2(1) = 1.75$, $p = .185$
	Yes	37 (37.0%)	27 (28.1%)	
Provided services to COVID-19 patients				
	No	39 (39.0%)	30 (31.3%)	$\chi^2(1) = 1.29$, $p = .256$
	Yes	61 (61.0%)	66 (68.8%)	
In psychological treatment				
	No	87 (87.0%)	89 (92.7%)	$\chi^2(1) = 1.74$, $p = .187$
	Yes	13 (13.0%)	7 (7.3%)	
Taking medication due to mental health difficulties				
	No	93 (93.0%)	89 (92.7%)	$\chi^2(1) = 0.01$, $p = .937$
	Yes	7 (7.0%)	7 (7.3%)	
Recent use of other self-help apps				
	No	76 (76.0%)	84 (87.5%)	**$\chi^2(1) = 4.32$, $p = .038$**
	Yes	24 (24.0%)	12 (12.5%)	

* Participants could choose more than one answer from the list.

Intervention

FOREST+ program is a 6-week internet-delivered intervention based on the principles of Cognitive Behavioral Therapy (CBT) and mindfulness and comprises six modules (unlocked weekly by a schedule): (1) "Introduction" – introduction to intervention, psychoeducation about stress, burnout, and stress recovery; (2) "Psychological detachment" – psychoeducation about body relaxation, and improving the quality of sleep; (3) "Distancing" – psychoeducation about intrusive thoughts and distancing from work during leisure time (both physically and mentally); (4) "Mastery" – psychoeducation about skillfulness, challenging activities, and physical exercise; (5) "Control" – psychoeducation about feeling in control of one's life, and the importance of self-care; and (6) Keeping the change alive – a brief summary of the program, and psychoeducation of the importance of further practice (see Figure 2). Each module includes psychoeducational texts on all four stress recovery skills, videos, audio recordings, and several exercises (e.g., identifying stressors and symptoms of burnout; evaluating tension before and after body scan relaxation). After the FOREST efficacy study by Dumarkaite et al. (2023), the content of the FOREST+ intervention has been updated to suit a wider sample of healthcare workers and to strengthen the control component of the stress recovery experience, which returned to their baseline level after 3 months follow-up in the original FOREST program.

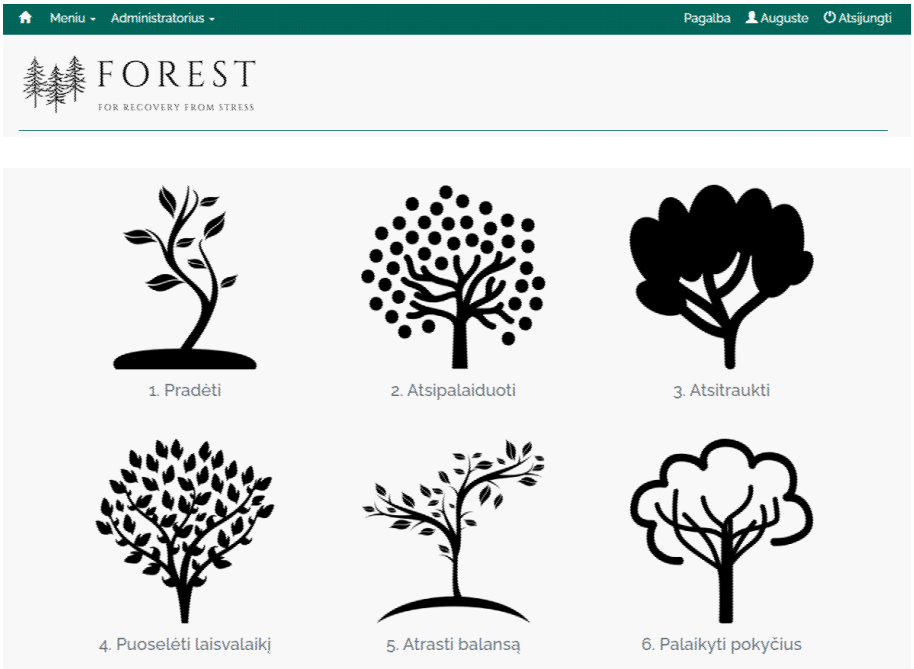

Figure 2. Interface of the FOREST+ intervention.

All participants had access to psychological support online via the program website. In the therapist support group, participants were randomly assigned to one of 9 therapists (4 experienced psychologists and 5 master's students in clinical psychology). In addition to being able to write a message to the therapists, the regular therapist support group received written feedback from a therapist on each of the completed module worksheets. If participants did not complete the tasks, they did not receive feedback from the therapist. Meanwhile, the optional therapist support group did not receive any feedback from the therapists, but could write a message to a psychologist, and one of the two therapists (both experienced psychologists) would respond. All psychologists were trained, had to follow guidelines on how to write responses to participants, had weekly supervision and/or intervision groups and were able to contact more experienced therapists by phone if needed.

All participants received scheduled weekly email reminders sent manually by the study administrators about a newly unlocked module and incentives to complete worksheets. In addition, before, in the middle (at week 4), and after the intervention, the study administrators contacted each participant for a brief telephone interview to address any technical questions about using the program.

Measures

Demographic questionnaire

In a pre-intervention assessment, participants were asked to provide answers to questions about their socio-demographics: age, gender, education, relationship status, current psychological treatment experience, as well as usage of mental health medication and other self-help programs. In addition, they were asked to answer questions on work-related aspects: work and management position, work status, type of services provided, work experience, and service provision to victims of the war in Ukraine and COVID-19 patients.

Recovery from stress

The Recovery Experiences Questionnaire (REQ; (Sonnentag & Fritz, 2007) was used to measure stress recovery. The REQ comprises 16 items assessing four components of stress recovery: (1) psychological detachment ($n = 4$; e.g., "*I don't think about work at all*"), (2) relaxation ($n = 4$; e.g., "*I take time for leisure"*), (3) mastery ($n = 4$; e.g., "*I do things that challenge me*"), and (4) control ($n = 4$; e.g., "*I decide my own schedule*"). Participants were asked to rate how strongly they agree with each statement on a 5-point Likert scale ranging from 1 – "*Totally disagree*" to 5 – "*Totally agree*". The REQ subscales scoring is obtained by calculating the sum of the responses to the four items comprising the subscale. Higher scores of the REQ indicate a more pronounced stress recovery experience component. Previous studies have shown adequate psychometric properties of the REQ (Almén et al., 2018; Sonnentag & Fritz, 2007). The Lithuanian version of REQ was used in previous studies (Dumarkaite et al., 2023). In the present trial, Cronbach's alphas for the REQ subscales at the pre-intervention assessment were good: psychological detachment ($\alpha = .87$), relaxation ($\alpha = .85$), mastery ($\alpha = .84$), control ($\alpha = .85$).

Perceived stress

The Perceived Stress Scale (PSS-10; Cohen et al., 1983) was used to measure stress levels. The PSS-10 comprises 10 items (e.g., "*In the last month, how often have you felt nervous and "stressed"?*"), which are scored on a 5-point Likert scale from 0 – "*Never*" to 4 – "*Very often*". A total score of the PSS-10 is a sum of responses to all items (reverse coded items 4, 5, 7, and 8), with higher scores indicating higher levels of perceived stress. Previous studies have shown good psychometric properties of the PSS- 10 (Roberti et al., 2006). In the present study, Cronbach's alpha for the total PSS-10 scale was good (α = .83).

Depression

The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) was used to measure probable symptoms of depression. Participants were asked to rate how often the mentioned experiences (e.g., "*Little interest or pleasure in doing things*") bothered them in the last 2 weeks. Items were rated on a 4-point Likert scale, from 0 -"*Not at all*" to 3 - "*Nearly every day*". The PHQ-9 score is a sum of responses to all 9 items. Higher scores of the PHQ-9 indicate higher severity of depression symptoms and can range from 0 to 27. Previous studies have shown good psychometric properties of the Lithuanian PHQ-9 version (Pranckeviciene et al., 2022). In the current trial, Cronbach's alpha for the total PHQ-9 scale was good (α = .85).

Anxiety

The Generalized Anxiety Disorder 7-item (GAD-7; (Spitzer et al., 2006) scale was used to measure probable anxiety symptoms. Participants were asked to rate how often the listed experiences (e.g., "*Feeling nervous, anxious, or on edge*") bothered them in the last 2 weeks. All 7 items were rated on a 4-point Likert scale, from 0 - "*Not at all*" to 3 - "*Nearly every da*y". The GAD-7 scores were obtained by summing up responses to each item. Higher scores of the GAD-7 indicate higher severity of anxiety symptoms and can range from 0 to 21. Previous studies have shown good psychometric properties of the Lithuanian GAD-7 version (Pranckeviciene et al., 2022). Cronbach's alpha for the GAD-7 scale was excellent in this study (α = .91).

Psychological well-being

The World Health Organization Well-being Index (WHO-5; Bech, 2004) scale was used to measure psychological well-being. The WHO-5 comprises 5 items (e.g. "*I have felt calm and relaxed*") measuring how often the respondent has felt in a certain way during the last two weeks. Items were scored on a 6-point Likert scale, from 0 – "*At no time*" to 5 – "*All of the time*". The raw WHO-5 score is calculated by summing up the responses of all 5 items and can range from 0 to 25. Percentage scores were used in the current study, which can be attained by multiplying the raw score by 4 (ranging from 0 to 100). Higher WHO-5 scores indicate better psychological well-being. Previous studies have shown good psychometric properties of the WHO-5 (Topp et al., 2015). The Lithuanian version of WHO-5 has been used in previous

studies (Norkiene et al., 2021). Cronbach's alpha for the WHO-5 was good in the present study (α = .87).

Intervention evaluation

At post-intervention assessment, participants were asked to evaluate the FOREST+ program by indicating its usefulness (from 1 – "*Not useful at all*" to 5 – "*Very useful*"), likability (from 1 - "*I did not like it at all*" to 5 - "*I liked it a lot*"), and ease of use (from 1 - "*It was not easy at all*" to 5 – "*It was very easy*"). Furthermore, participants were asked to indicate how their psychological well-being and physical health have changed (from 1 - "*Worsened a lot*" to 5 - "*Improved a lot*") and whether they would recommend the program to other healthcare workers (from 1 - "*Not at all*" to 5 - "*Definitely would recommend*").

Data analysis

Data analysis was carried out using IBM SPSS 28 and Mplus 8.8 (Muthén & Muthén, 1998). Chi-square and Student-t tests, or Mann-Whitney test for non-parametric data, were used to compare the demographic/work-related characteristics and program evaluation of the group with regular therapist support and the group with optional therapist support. To estimate the internet-delivered stress recovery intervention effects on primary outcomes (psychological detachment, relaxation, mastery, and control) and secondary outcomes (perceived stress, anxiety, depression, and psychological well- being) a Latent Change Modeling approach was used (Duncan et al., 2013). To estimate the within-group effects in the regular support and optional support groups, a series of multi-group latent change models were performed, reporting changes in the outcome variables from pre-intervention to post-intervention and from pre-intervention to follow- up in each group separately. To calculate the between-group effects, we ran the series of conditional latent change models in a full sample by regressing the intervention condition (0 = regular therapists support group; 1 = optional therapists support group) on changes in outcome variables and baseline scores. A Maximum Likelihood with Robust standard errors (MLR) estimator was used in latent change analyses. The Full Information Maximum Likelihood (FIML) algorithm was used for handling the missing data. Moreover, between-group and within-group effect sizes were calculated according to the correct effect size calculation recommendations in latent change models (Feingold, 2009). Effect sizes were interpreted according to Cohen's (1988) guidelines, that is, 0.20 = small effect, 0.50 = medium effect, and 0.80 = large effect.

Results

Participant engagement and therapist support

There were no statistically significant differences ($t(164) = -1.26$, $p = .209$) in the number of opened intervention modules between the regular support ($M = 4.64$; $SD = 1.78$) and optional support ($M = 4.31$; $SD = 1.86$) groups. Participants logged in to the FOREST+ program between 1 and 40 times ($M = 7.38$, $SD = 5.95$). Mann-Whitney test showed that participants in the regular support group ($M = 8.58$, $SD = 6.53$) had

logged in statistically significantly more times than the optional support group (M = 6.13, SD = 5.02; p = .003). The number of opened modules during the intervention is presented in Table 2. In terms of self-reported time spent on the program by participants who completed the post-intervention assessment (N = 163), there were no differences between the regular support and optional support groups ($\chi 2(1) = 1.72$, $p = .423$). In total, 42.9% (n = 70) of participants spent less than 15 minutes, 39.3% (n = 64) spent between 30 and 60 minutes, and 17.8% (n = 29) spent more than an hour per week on the internet-delivered stress recovery program.

Table 2. Number of the opened intervention modules (N = 196).

Number of opened modules	Total n (%)	RS n (%)	OS n (%)
No modules	1 (0.5)	0 (0.0)	1 (1.0)
1 module	18 (9.2)	9 (9.0)	9 (9.4)
2 modules	20 (10.2)	8 (17.0)	12 (12.5)
3 modules	23 (11.7)	12 (12.0)	11 (11.5)
4 modules	17 (8.7)	7 (7.0)	10 (10.4)
5 modules	19 (9.7)	9 (9.0)	10 (10.4)
6 modules	98 (50.0)	55 (55.0)	43 (44.8)

RS – regular support group; OS – optional support group.

In the regular support group (n = 100), which received therapist feedback on completed worksheets, 340 messages were sent by the therapists, and 50 were received from the participants. All 9 psychologists involved in the intervention reported spending a total of 5829 minutes (per message: M = 17.14, SD = 79.46; range: 3-60 min.) providing feedback to participants. Meanwhile, in the optional support group (n = 96), 12 messages were received from the participants, and 11 messages were sent by the therapists. In this group, 2 psychologists spent a total of 190 minutes (per message: M = 17.27, SD = 4.67; range: 10-25 min.) on writing answers for the participants. Overall, on average, one therapist spent 547 minutes on responses during the program in both groups (in regular support group (n = 9): M = 647.66, SD = 289.13; in optional support group (n = 2): M = 95, SD = 0).

Intervention outcomes

The results of latent change analyses are presented in Figure 3, Figure 4, and Supplementary Table S1. The effect sizes of the within-group and between-group intervention effects are presented in Table 3. At post-intervention, both groups showed significant improvements in psychological detachment, relaxation, and mastery (p < .05), with small to medium effects. Control improved significantly after the intervention in the regular support group (d = 0.31 (C.I. 95% [0.03; 0.59]), p = .003), but not in the optional therapist support group (d = 0.13 (C.I. 95% [-0.16; 0.41]), p = .205). However, at follow-up, a significant improvement in all four components of stress recovery (p < .01) was observed in both groups compared to pre-intervention levels. The within-group effect sizes from pre-intervention to follow-up indicated medium intervention effects on the increase of psychological detachment and mastery, and small effects on the increase of relaxation and control (See Table 3).

The conditional latent change analyses indicated significant but small between-group effects on the increase of two stress recovery experiences at post-intervention: psychological detachment (β*pre-post* = 0.21, p = .004) and relaxation (β*pre-post* = 0.16, p = .047), with higher mean changes in the group with regular support. However, these between-group effects were not significant at follow-up, nor were the effect on mastery and control.

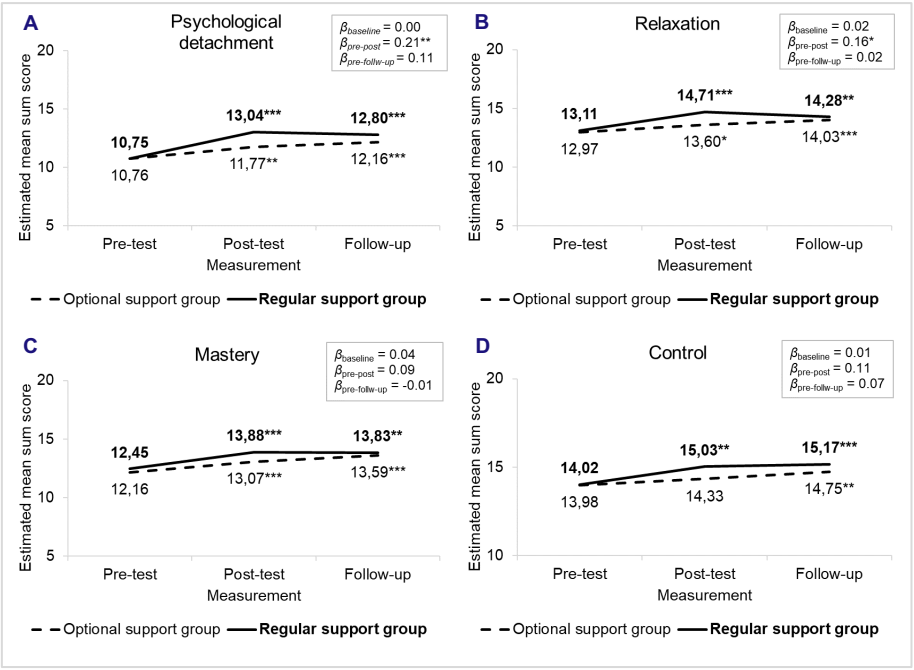

Figure 3. Trajectories of change in four components of stress recovery in the regular support (n = 100) and optional support (n = 96) groups.
β – regression coefficient for between-group analyses.
Mean values are presented for within-group analysis for pre- to post-intervention and from pre-intervention to follow-up. *p < .05, **p < .01; ***p < .001

A significant reduction in stress, depression, and anxiety symptoms and an increase in psychological well-being in both regular support and optional therapist support groups was found post-intervention (p < .01), with medium to large effects. These changes remained significant for both groups at three-month follow-up compared to baseline (p < .001), with the largest effects on the decrease of perceived stress (d_{RS} = -0.70 (C.I. 95% [-0.99; -0.42]); d_{OS} = -0.75 (C.I. 95% [-1.04; -0.45])). No significant between-group effects on change or baseline were found regarding stress, anxiety, depression, and psychological well-being.

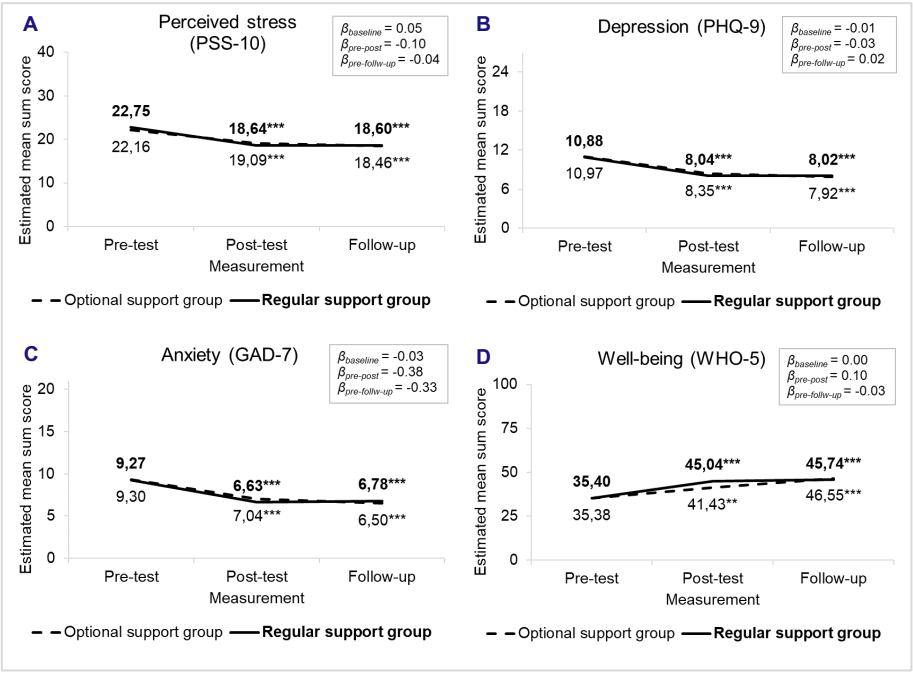

Figure 4. Trajectories of change in psychological distress and psychological well-being outcome measures in the regular support (n = 100) and optional support (n = 96) groups.

β – regression coefficient for between-group analyses.

Mean values are presented for within-group analysis for pre- to post-intervention and from pre-intervention to follow-up. *p < .05, **p < .01; ***p < .001

Table 3. Intervention effect sizes.

		Within-group effect size		Between-group effect size	
		Pre-post	Pre-follow-up	Pre-post	Pre-follow-up
Variable	Group	*d* [95% C.I.]	*d* [95% C.I.]	*d* [95% C.I.]	*d* [95% C.I.]
Psychological detachment	RS	0.72 [0.43; 1.00]	0.65 [0.36; 0.93]	0.37 [0.09; 0.65]	0.19 [-0.09; 0.47]
	OS	0.31 [0.02; 0.59]	0.42 [0.13; 0.70]		
Relaxation	RS	0.52 [0.23; 0.80]	0.40 [0.12; 0.68]	0.32 [0.04; 0.60]	0.04 [-0.24; 0.32]
	OS	0.21 [-0.07; 0.49]	0.36 [0.07; 0.64]		
Mastery	RS	0.44 [0.16; 0.72]	0.45 [0.17; 0.73]	0.15 [-0.13; 0.43]	-0.01 [-0.29; 0.27]
	OS	0.30 [0.01; 0.58]	0.45 [0.16; 0.74]		
Control	RS	0.31 [0.03; 0.59]	0.36 [0.08; 0.64]	0.21 [-0.07; 0.49]	0.12 [-0.16; 0.40]
	OS	0.13 [-0.16; 0.41]	0.27 [-0.01; 0.56]		
Perceived stress	RS	-0.73 [-1.01; -0.44]	-0.70 [-0.99; -0.42]	-0.19 [-0.47; 0.09]	-0.08 [-0.36; 0.20]
	OS	-0.61 [-0.90; -0.32]	-0.75 [-1.04; -0.45]		
Depression	RS	-0.57 [-0.86; -0.29]	-0.57 [-0.85; -0.29]	-0.04 [-0.32; 0.24]	-0.04 [-0.32; 0.24]
	OS	-0.56 [-0.85; -0.28]	-0.61 [-0.90; -0.32]		
Anxiety	RS	-0.55 [-0.83; -0.27]	-0.49 [-0.77; -0.21]	-0.07 [-0.35; 0.21]	0.06 [-0.22; 0.34]
	OS	-0.51 [-0.79; -0.22]	-0.64 [-0.93; -0.35]		
Psychological well-being	RS	0.54 [0.26; 0.82]	0.58 [0.30; 0.68]	0.21 [-0.07; 0.49]	-0.05 [-0.33; 0.23]
	OS	0.35 [0.06; 0.63]	0.67 [0.38; 0.96]		

RS – regular support group; OS – optional support group.

Pre-intervention, post-intervention, and follow-up perceived stress levels in the total sample were significantly negatively correlated with all components of stress recovery (psychological detachment, relaxation, mastery, and control) in all three measurements (r ranges from -0.16 to -0.55; $p < .50$), with the exception of an insignificant correlation of perceived stress at follow-up with pre-intervention psychological detachment ($r = -0.15$, $p = .530$). At pre-intervention, post-intervention, and follow-up, perceived stress significantly positively correlated with symptoms of depression (r ranges from 0.47 to 0.78; $p < .001$) and anxiety (r ranges from 0.49 to 0.78; $p < .001$), and negatively correlated with psychological well-being (r range from - 0.36 to - 0.70; $p < .001$) (see Supplementary Table S2).

Usability

Overall, 76.7% (n =125) of participants found the program to be useful, 85.3% (n = 139) liked it, and 91.4% (n = 149) thought that it was easy to use it. There were no differences between the regular support and optional support groups in the reported intervention usefulness ($\chi^2(2) = 0.62$, $p = .734$), likability ($\chi^2(2) = 1.53$, $p = .466$), and ease of use ($\chi^2(2) = 1.38$, $p = .501$) at post-intervention ($n = 163$). A total of 66.5% (n = 109) of respondents reported that the program had improved their psychological well- being, and 36.8% (n = 60) reported that the program improved their physical health. There were no statistically significant differences between the regular support and optional support groups in terms of self-reported change in psychological well-being ($\chi^2(2) = 1.05$, $p = .593$) and physical health ($\chi^2(2) = 1.33$, $p = .249$) at post-intervention. Finally, 82.8% (n = 135) of participants indicated that they would recommend the FOREST+ program to other healthcare workers.

Discussion

The present trial aimed to evaluate the role of therapist support in FOREST+, a 6-week online stress recovery intervention program for healthcare workers based on principles of CBT and mindfulness. The primary analysis showed that, regardless of therapist support provided on a regular basis or on request, all four stress recovery components (psychological detachment, relaxation, mastery, and control) increased significantly after participating in the intervention. Furthermore, the secondary analysis showed that the stress recovery intervention was also effective in reducing symptoms of perceived stress, depression, and anxiety as well as improving psychological well-being regardless of the intervention group. Moreover, the intensity of the therapist's support did not affect the participants' engagement, as they spent a similar amount of time in the program, regardless of group. Finally, regardless of group, participants had a generally positive attitude towards the FOREST+ program, and eight out of ten participants would recommend it to other healthcare professionals. In combination, these findings support the potential of internet-delivered interventions for supporting stress management skills and the mental health of a broad range of healthcare workers, and suggest that several approaches to providing therapist support may be equally effective.

In both regular and optional therapists' support groups, small to medium effects were found in the present trial in the improvement of all stress recovery skills three months after the program. Similar small to medium effects of the FOREST intervention on stress recovery skills among nurses were found in Dumarkaite et al. (2023) study. Furthermore, a significant but small between-group effect size was found in the current study for the increase in psychological detachment and relaxation skills after using the program, with higher changes in the group with regular support. However, three months after the intervention, differences between groups were not significant. We hypothesize that regular support from the therapist may have led to a slightly more rapid learning of some stress recovery skills, but in the long term, this was not associated with the level of skills acquired. This finding is consistent with theories that suggest that rapid improvement is only consolidated and leads to better treatment outcomes after interactions with therapists (Aderka & Shalom, 2021). However, our study shows that, in the long run, internet-delivered stress recovery intervention can be just as effective with optional therapist support.

The primary outcomes of the trial are in line with other studies, which found that internet-delivered interventions can be effective regardless of the intensity of the support from the therapist. Hadjistavropoulos et al. (2019) study showed that when given an opportunity, the vast majority (78%) of participants would select standard therapist support, with 22% selecting support on request. However, in previous studies, no differences were found in treatment outcomes between groups with regular therapist support and optional support in internet-delivered interventions for the treatment of social phobia (Berger et al., 2011), adjustment disorder (Eimontas et al., 2018), or anxiety (Dahlin et al., 2022) and depression (Andersson et al., 2023; Hadjistavropoulos et al., 2017). Nevertheless, it is important to note that the intensity of therapeutic support required is likely to depend on the mental health problem targeted (Andersson, 2014) and the amount of therapist support used is likely to depend on patient preferences (e.g., Hadjistvaropoulos et al., 2019). In summary, internet-delivered psychological support can be effective with the support of a therapist on request for different mental health aspects. To our knowledge, the present trial is the first to compare the therapist-supported internet-delivered intervention for stress recovery with a group of participants using the same program with the support of the therapist on request.

In the present trial, three months after the program, medium to large effects were found in both groups, with regular or optional support from a therapist, in terms of improvement in stress, anxiety, depression, and psychological well-being. Previous studies also showed that internet-delivered CBT interventions could be effective in reducing symptoms in targeted samples suffering from elevated levels of stress, anxiety and depression (Heber et al., 2017; Svärdman et al., 2022). It has also been demonstrated that among HCWs, internet-delivered interventions can help improve psychological well-being (Smoktunowicz et al., 2021). Moreover, in this trial, no significant difference was found between the secondary outcomes in the group with regular therapist support and the group with optional support. This is in line with the results of Hadjistavropoulos et al. (2017) study, which did not find that regular support

from a therapist in ICBT would be more effective than optional support in reducing anxiety and depression symptoms. Therefore, promising results have been obtained in the present trial that an internet-delivered stress recovery program can effectively help improve other aspects of mental health – reduce stress, anxiety, depression, and improve psychological well-being.

The results of this trial should be seen in the context of the FOREST+ program itself. In addition to support from a therapist, participants in both RCT arms also received regular scheduled reminders from study administrators by emails or brief telephone interviews. The use of persuasive technologies can have an impact on adherence and thus on the efficacy of the internet-delivered program (Kelders et al., 2012). The FOREST+ program also included video and audio recordings of psychologists, psychoeducational texts, and various worksheets. Research on internet-delivered interventions for stress shows that they are more effective when there is interpersonal contact, even if it is just email reminders (Heber et al., 2017). Moreover, research shows that ICBT can be just as effective when support is provided by a clinician or technician (Titov et al., 2009, 2010). However, there is a lack of research evaluating the impact of intervention elements on program effectiveness (Garrido et al., 2019; Mukhiya et al., 2020). Future research should take this into account when assessing the efficacy of internet-delivered interventions.

In summary, the current trial showed that internet-delivered psychological support for stress recovery could significantly improve stress recovery skills of HCWs and reduce their stress, anxiety, and depression symptoms, as well as improve their psychological well-being. Research shows that internet-delivered psychosocial interventions can be a more cost-effective solution than traditional face-to-face therapies (Donker et al., 2015). Moreover, a study by Dear et al. (2021) confirmed the cost-effectiveness of the optional support format in internet-delivered intervention for pain management. The results of our trial show that stress recovery program with optional therapist support required up to four times fewer therapists and almost seven times less time from the therapist, who over the course of 6 weeks spent an average of 2 minutes per participant. Although internet-delivered interventions require fewer therapist resources, it is important to consider the financial cost of setting up and assessing internet-delivered interventions, as well as training and supervising the therapists. To conclude, internet-delivered interventions for stress recovery with optional therapist support could bring significant economic benefits and make psychological help more accessible. Which is particularly important in a sample of healthcare workers where psychological support is hardly available.

Limitations

The results obtained should be carefully considered in the context of the several limitations of the study. First of all, the present trial only assessed the impact of the intensity of the therapist support; it would be important to assess what other components have an impact on the efficacy of the internet-delivered stress recovery program (reminders from study administrators, worksheets, psychoeducational texts, video, audio recordings, etc.). Secondly, the findings of the trial cannot be generalized

to other professions, as only healthcare workers participated in the present study. Future studies should assess the suitability of the program in other samples, including other professions associated with occupational stress such as first responders and emergency service workers. Thirdly, the three-month follow-up used in the current trial is a short period of time, and future studies should consider longer follow-up periods in order to investigate the longevity of the results obtained. Fourthly, only half of the participants took part in the full 6-week program. For this reason, the results of the study should be interpreted with caution, as it implies that the engagement of the participants in the study was limited and that the results may have been influenced by natural remission instead of changes due to the received intervention. Finally, future research should also try to assess the efficacy of the internet-delivered stress recovery intervention in the context of other psychological support options. Nevertheless, despite the limitations of the study, the results provide new insights into internet-delivered CBT interventions for stress recovery among healthcare workers.

Conclusion

In conclusion, the present RCT has shown that the internet-delivered CBT intervention with optional therapists' support can effectively improve stress recovery skills – psychological detachment, relaxation, mastery, and control – as well as reduce stress, anxiety, and depression and increase psychological well-being in healthcare professionals. Furthermore, regardless of the intensity of the support received from a therapist, participants found the FOREST+ intervention easy to use and useful. In the face of stressful occupational conditions for healthcare workers and barriers to seeking or receiving psychological support, an internet-delivered CBT intervention for stress recovery may be a useful option to improve the mental health of healthcare workers.

Disclosure statement

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Study III

Role of Tailored Timing and Frequency Prompts on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Health Care Workers: Randomized Controlled Trial

Nomeikaite A., Gelezelyte O., Böttche M., Andersson G., & Kazlauskas E. (2025). Role of Tailored Timing and Frequency Prompts on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Health Care Workers: Randomized Controlled Trial. *JMIR Mental Health, 12:*e62782. doi: 10.2196/62782

Original Paper

Role of Tailored Timing and Frequency Prompts on the Efficacy of an Internet-Delivered Stress Recovery Intervention for Health Care Workers: Randomized Controlled Trial

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Abstract

Background: Prompts offer a promising strategy to promote client engagement in internet-delivered cognitive behavioral therapy (ICBT). However, if the prompts do not meet the needs of clients, they can potentially be more obtrusive rather than helpful.

Objective: The aim of this study was to test if prompts tailored based on timing and frequency, aligned with preintervention goal setting, can increase usage and the efficacy of a therapist-supported ICBT stress recovery intervention for health care workers.

Methods: The 2-arm randomized controlled trial included 87 health care workers (99% female, aged 19-68 years: mean 39.61, SD 11.49): 43 in the standard intervention group and 44 in the tailored prompts group. The primary outcome measure was the Recovery Experiences Questionnaire, and the secondary outcomes were the Perceived Stress Scale-4, the Patient Health Questionnaire-4, and the World Health Organization-5 Well-Being Index. The self-report data were collected before the intervention (September 2022), postintervention (October 2022), and 6-month follow-up (May 2023).

Results: The results showed that tailored prompts, although appreciated by the majority (39/40, 98%), did not improve intervention usage indicators, such as the number of logins (t_{85}=–0.91; *P*=.36), modules opened ($t_{83.57}$=–1.47; *P*=.15), modules completed (t_{85}=–0.71; *P*=.48), exercises completed (t_{85}=–1.05; *P*=.30), or the time spent using the program (χ^2_2=1.1; *P*=.57). Similarly, tailored prompts did not increase the effects of the intervention in terms of stress recovery skills (Cohen *d* ranging from 0.31 to 0.85), perceived stress (*d*=–0.08; –0.70), depression (*d*=–0.11; –0.38), anxiety (*d*=–0.32; –0.64), or psychological well-being (*d*=0.26; 0.46). In addition, the standard intervention group showed greater long-term stress recovery effects than the group using the internet-delivered intervention supplemented by tailored prompts (β=–0.24, *P*=.03).

Conclusions: Although the study confirmed the efficacy of the program, the merits of tailored prompts in ICBT for stress recovery were not supported. Future research is needed to test the effects of the stress recovery intervention supplemented by goal setting and tailored prompts.

Trial Registration: ClinicalTrials.gov NCT05553210; https://clinicaltrials.gov/study/NCT05553210

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KEYWORDS

internet interventions; mental health; stress; health care workers; short message service; cognitive behavioral therapy; internet-delivered cognitive behavioral therapy; psychotherapy; randomized; controlled trial; engagement; SMSl worker; usage; occupational health; provider; prompt; message

Introduction

Background

Health care workers (HCWs) are at risk of stress, burnout, and other mental health problems [1,2]. However, long working hours, night shifts, rigid schedules, and prevailing stigma can make it difficult for them to engage in traditional psychological treatment [3]. Internet-delivered cognitive behavioral therapy (ICBT) could be a viable alternative and has shown efficacy in helping HCWs develop stress recovery skills, reduce stress, anxiety, and depression, and improve overall psychological well-being [4,5]. However, findings in these studies also indicated that only half of the included participants familiarized themselves with the full content of the intervention. A qualitative study of early dropouts revealed that many identified barriers to engagement, such as a lack of time or motivation and unmet expectations or needs [6]. Across a range of diagnoses, better adherence has emerged as a predictor of better outcomes in internet interventions for adults [7]. Thus, it is crucial to find ways to motivate HCWs' engagement in internet interventions but in a way that considers individual needs and time constraints.

To enhance retention in ICBT, various persuasion techniques, such as text message reminders, have been proposed [8]. The inclusion of prompts to encourage engagement in internet interventions for healthy behavior and mental health has shown promising results [9]. Research findings are, however, inconsistent, with studies finding no significant clinical benefits of supplementary prompts in digital treatment [10]. Indeed, if prompts received are not relevant for the user, they can have the opposite effect and be more obtrusive rather than helpful [11]. Tailoring the frequency and timing of prompts could be a potential solution in internet-delivered stress management treatment [12], although there is still scarce knowledge of whether this affects engagement and intervention effects. Another suggested solution to reducing negative emotions caused by reminders is to set goals [13], such as how much time a user intends to spend on treatment. To conclude, setting usage goals and delivering tailored prompts could be a way to promote the engagement of health care workers and consequently increase the efficacy of the internet-delivered stress recovery intervention.

Objectives

In this study, we aimed to test whether the inclusion of tailored prompts aimed at achieving usage goals can increase the efficacy of an ICBT stress recovery intervention for health care workers in a randomized controlled trial (RCT). The "For Recovery from Stress" (FOREST) is a 6-week ICBT intervention [14], incorporating mindfulness and focused on stress recovery [15]. FOREST+ is the updated version of FOREST, designed to meet the needs of health care workers [5]. The following four objectives were set: (1) to analyze associations between tailored prompts and different engagement indicators in a stress recovery intervention; (2) to assess whether the intervention with tailored prompts is more effective in improving stress recovery skills as compared with the standard intervention; (3) to test if the inclusion of tailored prompts can improve the effects of the internet intervention on stress, anxiety, depression, and psychological well-being; and (4) to explore how having an option to receive tailored prompts alters the users program evaluation.

Methods

Study Design

A 2-arm RCT was conducted to investigate how usage goal setting with prompts tailored by timing and frequency would be related to the usage and the efficacy of an internet-delivered intervention for stress recovery. Eligible participants were randomized (1:1) by an independent researcher into 2 study groups: a standard intervention group (SG) or a tailored prompts group (TG), using built-in randomization functionality in the hosting platform. Before registering for the study, participants were informed that the intervention would be provided either with tailored prompts or without. Both groups started using the program after randomization in October 2022. The assessments took place on three occasions: (1) before the intervention (September 2022), (2) post intervention (October 2022), and (3) at the 6-month follow-up (May 2023). Participants' self-reported data and data on the use of the program were collected using a secure platform, Iterapi, which hosted the program [16].

Ethical Considerations

The study was carried out following the local and international ethical regulations for research with human participants. The participants' contact details (phone number and email) collected during the initial assessment were only used for contact purposes of the study and were anonymized for analysis. The study was approved by the Vilnius University Psychology Research Ethics Committee (reference number 2021-03-22/61). The trial has been registered on ClinicalTrials.gov (NCT05553210). Multimedia Appendix 1 contains the study's CONSORT-EHEALTH (Consolidated Standards of Reporting Trials of Electronic and Mobile Health Applications and Online Telehealth) checklist [17].

Recruitment and Procedure

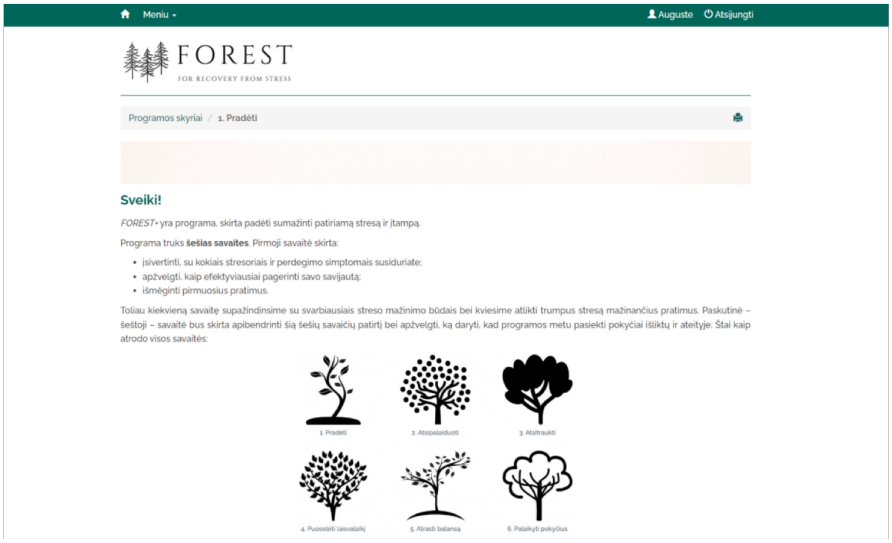
The call for participation in the intervention was disseminated nationwide in Lithuania through various social networks, emails to regional and national professional HCWs societies and groups, and health care institutions. Those interested could register for the intervention through the intervention website,

which provided detailed information about the program and the research study. After completing the registration form and the preintervention questionnaire, participants were contacted for a brief phone interview to ensure that they met the eligibility criteria for the study which are (1) currently working in a health care facility, (2) being an adult (>18 years), (3) comprehending Lithuanian, and (4) having access to a device with internet connection. Certain exclusion criteria have also been identified which are (1) high risk of suicide, (2) acute psychiatric crisis, and (3) exposure to the current interpersonal violence. Participants who did not meet the eligibility criteria (n=9) were referred elsewhere for psychological support if needed.

Intervention

FOREST+ is a 6-week stress recovery program specifically designed in close collaboration with health care professionals for health care workers in Lithuania [5]. FOREST+ was developed as a modification of FOREST for nurses [4,14]. The FOREST+ program consists of 6 modules, opened on a weekly schedule which are (1) introduction, (2) psychological detachment, (3) distancing, (4) mastery, (5) control, and (6) keeping the change alive. The modules provide psychoeducational information based on the principles of CBT, mindfulness, and 4 components of stress recovery (mastery, control, psychological detachment, and distancing), as well as various exercises such as mindfulness recordings and self-assessment of bodily tension and stress. The user interface of the program is shown in Figure 1. The language of the program was Lithuanian, and the content of the modules is described in Table 1.

Figure 1. User interface.



The program is delivered with therapist support using a low-intensity approach. Once the users had completed a weekly worksheet, they received personalized feedback from their therapist. Participants could also contact their therapist through text messaging integrated into the intervention platform. In addition to communication with the therapist, clients received support from administrators through emails to keep them informed about the progress of the program and to remind them to join a new module or complete worksheets. Administrators also called the participants for a short interview before the intervention and in the middle of the program to inform them of the progress and answer any questions they may have on the use of the intervention.

In the TG, client-administrator communication was supplemented by reminders through SMS. Prompts consisted of a short text asking if the participant had already taken the time to unwind and a link to the mindfulness exercises for that week. SMS prompts were tailored to each participant in the group during a phone interview with the study administrator before using the program. Participants were asked how actively they planned to engage with the program and whether they would need short text message reminders to achieve this. When participants indicated that supplementary prompts would be necessary, they were asked about preferences of prompt frequency (ie, once a week, twice a week, every workday, or every workday twice a day) and timing (before noon, sometime in the morning or afternoon, sometime in the evening). Participants in the SG did not schedule a plan for the tailored prompts and did not receive them.

Table 1. Description of the program modules.

Module	Description	Exercises, n
1. Introduction	The initial module introduces how to use the program and provides psychoeducational content on occupational stress. Exercises focusing on stressors and symptoms of burnout are included, as well as a short relaxation audio recording for mindful breathing.	4
2. Psychological detachment	The focus is on managing stress through body relaxation and improving sleep quality. An exercise for progressive muscle relaxation is included, as well as exercises to assess the level of tension in the body, along with a recording for relaxation before bedtime.	4
3. Distancing	The module goes further on the importance of detachment from work during leisure time. Exercises alongside the psychoeducational material are designed to identify intrusive thoughts and activities that help distract oneself from thoughts about work. Out of 2 relaxations are included which are one for raising awareness of the present and one for walking meditation.	3
4. Mastery	This module covers another part of stress recovery, nurturing leisure time and a sense of competence outside work. The exercises in this part allow the user to assess the level of physical activity and the activities that help to relax and feel a sense of mastery. A brief relaxation recording and a video of body stretching exercises are included.	3
5. Control	The ways to actively pursue work-life balance are presented in the module, and the importance of feeling in control of one's time is explained. The exercises are designed to help set daily needs and notice activities that interfere with work-life balance.	3
6. Keeping the change alive	The last module focuses on how to maintain the change after the end of the program. The exercises are designed to review the activities covered during the program and the relaxation exercises that could help maintain work-life balance. Also included is a relaxation recording for overall relaxation.	2

Measures

Demographic Questionnaire

The preintervention measures were used to collect sociodemographic and work-related information. Sociodemographic data were collected by asking questions on gender, age, education, relationship status, experience of psychological treatment or support, and the use of medication for mental health difficulties. Information on work-related aspects such as position, work status, type of service, and work experience was also included.

Recovery From Stress

An overall recovery from stress experience was measured by the Recovery Experiences Questionnaire (REQ) [15]. The REQ consists of 16 items (eg, "I take time for leisure"). Each of the items can be evaluated on a 5-point Likert-type scale, where 1 is "Totally Disagree" and 5 is "Totally Agree"; scores are calculated by adding up the points, with higher scores indicating a more pronounced stress recovery experience. The REQ showed good validity in the Lithuanian sample [18]. In this study, the REQ McDonald's Omega was excellent at all 3 measurements: ω_{T1}=0.87, ω_{T2}=0.90, ω_{T3}=0.88.

Perceived Stress

The brief Perceived Stress Scale (PSS-4) [19] was used to measure stress levels. The PSS-4 consists of 4 questions (eg, "In the last month, how often have you felt that you were unable to control the important things in your life?"). The questions are answered on a 5-point Likert-type scale, where 0 is "Never" and 4 is "Very often"; with the final score calculated by summing all the responses (reversing the scores of items 2 and 3). Higher scores show higher levels of perceived stress. Studies show good psychometric properties of the PSS-4 scale [19]. The PSS-4 McDonald's Omega in the current sample was moderate but close to the acceptable level of 0.70 [20]: ω_{T1}=0.67, ω_{T2}=0.69, ω_{T3}=0.61.

Anxiety and Depression

Participants' levels of anxiety and depression were assessed using the 4-item Patient Health Questionnaire (PHQ-4) [21]. The PHQ-4 consists of 2 items to assess depression (eg, "Feeling down, depressed, or hopeless") and 2 to assess anxiety (eg, "Feeling nervous, anxious, or on edge"). The respondent rates how much each item bothered them on a 4-point Likert-type scale, where 0 is "Not at all" and 3 is "Nearly every day." Adding the item scores for each subscale gives an estimated level of depression or anxiety. Research has shown good PHQ-4 psychometric properties in the Lithuanian sample [18]. The PHQ-4 Cronbach alpha in the current sample for the anxiety subscale was acceptable: α_{T1}=0.70, α_{T2}=0.74, α_{T3}=0.78; as well as for the depression subscale: α_{T1}=0.71, α_{T2}=0.82, α_{T3}=0.80.

Psychological Well-Being

The psychological well-being was measured with the World Health Organization-5 Well-Being Index (WHO-5). WHO-5 consists of 5 items (eg, "I have felt calm and relaxed"), which are rated on a 6-point Likert-type scale, where 0 is "At no time" and 5 is "All the time." The final percentage well-being score (ranging from 0 to 100) is calculated by summing the item scores and then multiplying the raw score by 4. Higher final scores indicate better psychological well-being. The WHO-5 has been translated and used in Lithuanian sample studies [22]. The WHO-5 McDonald's Omega in the current sample was good: ω_{T1}=0.83, ω_{T2}=0.86, ω_{T3}=0.82.

Acceptability

The postintervention measurement included questions on the user experience of the program. Participants were asked to rate the likability of the program (ranging from 1="I did not like it

at all" to 5="I liked it a lot"), usefulness (1="Not useful at all," 5="Very useful"), and whether they would recommend the program to other health care workers (1="Not at all," 5="Definitely would recommend"). In the TG, participants were also asked to evaluate the short message prompts they received (0="Very negatively," 10="Very positively").

Use

During the preintervention assessment, participants were asked how actively they expected to use the program, where 1 was "I will not use it" and 10 was "I will use it a lot." At the postintervention evaluation, participants were asked how actively they actually had used the program (1="I did not use it" and 10="I used it a lot") and how much time on average per week they had managed to devote to the program (1="Not at all" and 6=">2 hours"). The congruence of use expectations was measured by subtracting the score reflecting the preintervention expected usage from the postintervention assessment of subjective usage. Moreover, participants' usage information was exported directly from the platform. Data were collected on the number of logins, modules opened and completed (from 0 to 6), exercises completed (from 0 to 19), messages received from the therapist, and messages sent to the therapist.

Statistical Analysis

To assess the effect of the program on primary (stress recovery) and secondary outcomes (perceived stress levels, anxiety, depression, and psychological well-being), a Latent Change Modeling (LCM) approach [23] using Mplus 8.8 [24] was carried out. To estimate the within-group effects of the standard intervention and the intervention supplemented by tailored prompts, a series of multigroup LCMs were performed, reporting changes in primary and secondary outcomes from preintervention to postintervention and from preintervention to 6-month follow-up in each group separately. To calculate the between-group effects, a series of conditional LCM was computed in a full sample by regressing the intervention condition (0=SG; 1=TG) on the changes in outcome scores. Moreover, we ran a series of univariate regression analyses to explore whether prompt timing and frequency were associated with changes in outcomes in the TG. A Maximum Likelihood with Robust SE estimator was used in latent change analyses. The Full Information Maximum Likelihood algorithm was used for handling the missing data. Between-group and within-group effect sizes were calculated according to the guidelines for calculating the correct effect size in the LCM [25]. The effect sizes were interpreted according to the recommendations of Cohen (1988) [26], that is 0.20=small effect, 0.50=medium effect, and 0.80=large effect.

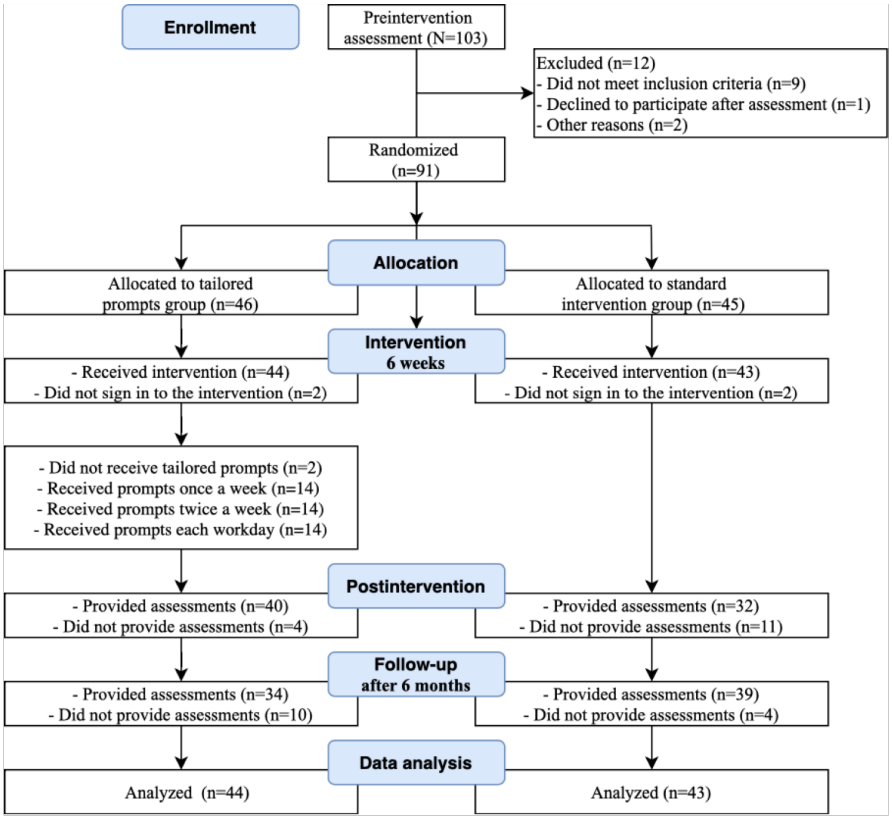
In addition, IBM SPSS (version 28) was used to compare the demographic, work-related, and psychological support factors between the TG and the SG using the Student *t* test and chi-square test. Differences between RCT groups and subgroups on program usage and evaluation factors were compared using Student *t* test and ANOVA with the Bonferroni post hoc test.

Results

Overview

The study flowchart is shown in Figure 2. More than 100 individuals registered to participate in the intervention. In total, 91 individuals met eligibility criteria and were randomized to one of the 2 study groups: TG (n=46) or SG (n=45). A total of four participants did not log in to the program (2 from each group) and were therefore not included in the data analysis. The final data analysis included 87 participants (n_{TG}=44, n_{SG}=43).

Figure 2. Study flowchart.



Participant Characteristics

The participants included in the study were almost exclusively female (86/87, 99%). Participants ranged in age from 19 to 68 (mean 39.61, SD 11.49) years. Around a quarter of the participants were licensed medical doctors (24/87, 28%), 9% (8/87) were resident doctors, 31% (27/87) nurses, and 32% (28/87) other health care workers (psychologists, social workers, complementary and alternative health professionals, public health professionals, and oral care professionals). The SG and the TGs did not differ significantly in the preintervention (baseline) measures of sociodemographic, work-related, psychological support, and mental health factors. The sample characteristics of the groups at baseline are shown in Table 2.

Table 2. Sample characteristics of standard intervention and tailored prompts groups at baseline.

	Standard intervention group (n=43)	Tailored prompts group (n=44)	Significance statistics
Gender, n (%)			χ^2_1=1.0; *P*=.31
Women	42 (98)	44 (100)	
Men	1 (2)	0 (0)	
Age (years)			t_{85}=–0.06; *P*=.95
Mean (SD)	39.53 (11.09)	39.68 (11.99)	
Range	19-68		
Education, n (%)			χ^2_2=0.7; *P*=.69
Secondary or lower	2 (5)	3 (7)	
Postsecondary or professional college	10 (23)	13 (30)	
University	31 (72)	28 (64)	
Long-term relationship, n (%)			χ^2_1=0.03; *P*=.86
No	11 (26)	12 (27)	
Yes	32 (74)	32 (73)	
Position, n (%)			χ^2_3=1.6; *P*=.67
Medical doctor	11 (26)	13 (30)	
Resident doctor	5 (12)	3 (7)	
Nurse	15 (35)	12 (27)	
Other	12 (28)	16 (36)	
Work status, n (%)			χ^2_2=1.8, *P*=.42
Part-time	2 (5)	5 (11)	
Full-time	18 (42)	20 (46)	
> Full-time	23 (54)	19 (43)	
Type of services [a], n (%)			
Outpatient	19 (44)	26 (59)	χ^2_1=1.9; *P*=.16
Inpatient	18 (42)	11 (25)	χ^2_1=2.8; *P*=.10
Rehabilitation	3 (7)	5 (11)	χ^2_1=0.5; *P*=.48
Nursing	9 (21)	4 (9)	χ^2_1=2.4; *P*=.12
Paramedics	9 (21)	5 (11)	χ^2_1=1.5; *P*=.23
Intensive care	1 (2)	5 (11)	χ^2_1=2.8; *P*=.10
Work experience, n (%)			χ^2_3=0.4; *P*=.93
< 2 years	6 (14)	7 (16)	
2-5 years	11 (26)	9 (21)	
6-10 years	3 (7)	4 (9)	
>10 years	23 (54)	24 (55)	
In psychological treatment, n (%)			χ^2_1=0.6; *P*=.44
No	38 (88)	41 (93)	
Yes	5 (12)	3 (7)	

	Standard intervention group (n=43)	Tailored prompts group (n=44)	Significance statistics
Taking medication due to mental health difficulties, n (%)			χ^2_1=1.0; *P*=.32
No	42 (98)	41 (93)	
Yes	1 (2)	3 (7)	
Recent use of other self-help apps, n (%)			χ^2_1=2.97; *P*=.09
No	41 (95)	37 (84)	
Yes	2 (5)	7 (16)	
Mental health at baseline, mean (SD)			
Recovery from stress	51.16 (9.23)	51.98 (9.06)	t_{85}=–0.42; *P*=.68
Perceived stress	7.56 (2.33)	7.52 (3.02)	t_{85}=0.06; *P*=.95
Anxiety	2.81 (1.47)	3.16 (1.66)	t_{85}=–1.03; *P*=.31
Depression	2.47 (1.50)	2.71 (1.69)	t_{85}=–0.70; *P*=.49
Psychological well-being	40.84 (15.68)	39.09 (19.23)	t_{85}=0.46; *P*=.64

[a]Multiple-answer question.

Use and Support Received

In the TG (n=44), the majority of individuals included in the study opted to receive SMS prompts (42/44, 96%), with a majority choosing to receive them once a week in the afternoon (10/47, 37%). Only 2 participants (5%) preferred not to receive supplementary prompts. The distribution of message preferences for all participants who took part in the preintervention interviews (n=47) is shown in Table S1 in Multimedia Appendix 2.

All participants included in the study logged in to the program up to 27 (mean 8.69, SD 6.02) times. Student *t* test showed no significant difference in the number of logins when comparing the TG (mean 9.27, SD 5.84) and the SG (mean 8.09, SD 6.22, t_{85}=–0.91; *P*=.36). More than half of the participants (50/87, 58%) of the full sample opened all program modules; but there was no significant difference in the number of program modules opened between the TG (mean 4.89, SD 1.82) and SG (mean 4.28, SD 2.03; $t_{83.57}$=–1.47; *P*=.15). Around one-fifth of participants (18/87, 21%) from the full sample fully completed all 6 program modules (Table 3); as previously, no difference between the TG (mean 3.25, SD 2.15) and SG (mean 2.91, SD 2.38) in completed modules was observed (t_{85}=–0.71; *P*=.48). There was no statistically significant difference between the TG (mean 12.52, SD 6.73) and SG (mean 10.95, SD 7.21) in relation to the number of program exercises (N=19) completed (t_{85}=–1.05; *P*=.30).

Table 3. Number of program modules completed.

	Total (N=87), n (%)	Standard intervention group (n=43), n (%)	Tailored prompts group (n=44), n (%)
0 modules	17 (20)	10 (23)	7 (16)
1 module	15 (17)	8 (19)	7 (16)
2 modules	3 (3)	3 (7)	0 (0)
3 modules	9 (10)	2 (5)	7 (16)
4 modules	13 (15)	4 (9)	9 (21)
5 modules	12 (14)	7 (16)	5 (11)
6 modules	18 (21)	9 (21)	9 (21)

When asked how much time participants spent using the program on average per week, 33% (24/72) indicated that they spent less than 15 minutes, 40% (29/72) spent 15 to 30 minutes, and 26% (19/72) spent more than an hour. There was no difference between the 2 RCT groups with regard to the average time spent while using the program (χ^2_2=1.1; *P*=.57).

Participants reported using the program significantly less actively at postintervention (mean 6.33, SD 2.25) than they thought they would at the time of the first measurement (mean 8.25, SD 6.33; t_{72}=6.63; *P*<.001). No significant difference was found between the 2 groups and the congruence of use expectations (measured by subtracting the score reflecting preintervention expected usage from postintervention assessment of usage; $Mean_{SG}$ –1.91, SD_{SG} 2.49; n_{SG} 33; $Mean_{TG}$=–1.93,

SD_{TG} 2.49, n_{TG} 40; t_{71}=0.03, P=.98). However, ANOVA analysis (Table S2 in Multimedia Appendix 2) showed that, on average, participants in the TG who chose to receive SMS reminders each workday (mean –3.67, SD 1.78) found themselves using the program less actively than they had expected at preintervention assessment in comparison with those who chosen to receive reminders only once a week (mean –0.39, SD 2.29; mean difference=3.28, P=.003, 95% CI 0.92-5.64).

In total, program users received from 0 to 8 messages from their therapists. There was no significant difference between therapist support messages received in the TG (mean 4.36, SD 1.93) and the SG (mean 3.98, SD 2.10; t_{85}=–0.90, P=.37). Participants sent 0 to 5 messages to their therapists, with the majority (64/87, 74%) not contacting them. One-fifth of the participants (19/87, 22%) sent 1 message to their therapist, and only 4/87 (5%) contacted the therapist more than once. No difference was found between the TG and the SG in messages sent (χ^2_2=1.1; P=.58).

Intervention Effects

The trajectories of outcomes in each group are shown in Figure 3, and Table 4 presents outcome means and SD. Within-group effect sizes and 95% CI are presented in Table 5. There was a significant change in the TG (P=.02) and a nonsignificant change in the level of stress recovery in the SG (P=.06) at the postintervention assessment (Figure 3, graph A). The effects of the change from preintervention to postintervention were small for both groups. The results were significant at the 6-month follow-up, with small effects in the TG (P=.03) and large effects in the SG (P<.001). In both groups, however, there were no significant changes in perceived stress levels at postintervention assessment (TG P=.61, SG P=.15). A significant decrease in perceived stress levels was observed at the 6-month follow-up, with moderate effects in the SG (P<.001) and moderate effects in the TG (P=.002; Table 5).

Changes in anxiety, depression, and psychological well-being in both groups were also tested (Table 5). The analysis showed a significant (P=.03) reduction in anxiety in the TG and a nonsignificant (P=.06) reduction in the SG at the postintervention assessment, with small effects. In both groups, this change was significant (P<.01) after 6 months, with moderate effects. In addition, depression levels decreased significantly (P=.04) in the TG after the intervention but were no longer significant (P=.55) at 6-month follow-up. In contrast, in the SG, the level of depression was significantly (P=.03) reduced at the 6-month follow-up but not at the postintervention (P=.21). The intervention effects on depression were small for both groups (Table 5). Psychological well-being after the intervention increased significantly (P=.02) in the SG but not in the TG (P=.09). Although, at 6-month follow-up, the increase compared with baseline was significant in both groups (P<.05), with small to moderate effects.

When comparing the TG with the SG, there was no significant difference in the level of stress recovery immediately after the intervention (β=0.01, P=.93). However, there was a significant difference between the groups when comparing the changes 6 months after the intervention (β=–0.24, P=.03), indicating that the group with the standard intervention had a greater increase in recovery from stress after 6 months as compared with the group receiving tailored prompts, with a moderate between-group effect (Table 5). As for secondary outcomes, there was no significant difference in the changes of stress, anxiety, depression, and psychological well-being after the intervention when comparing the TG with the SG, nor was there a significant difference in changes 6 months after the intervention. In the TG, there was no association between changes in outcomes after the intervention and 6-month follow-up and the frequency and timing of received prompts. However, a significant positive association was found between perceived stress levels at baseline and choosing to receive more frequent prompts (β=0.27, P=.03) and to receive them in the afternoon (β=0.42, P<.001). The full results of multiple univariate regression analyses of the intervention outcomes are presented in Table S3 in Multimedia Appendix 2.

Figure 3. Trajectories of changes in primary and secondary outcomes in the groups of participants receiving standard intervention (n=43) and intervention supplemented with tailored SMS prompts (n=44). Significant statistics are presented for the within-group outcomes from baseline to postintervention and from baseline to 6-month follow-up. PHQ-4: Patient Health Questionnaire-4; PSS-4: Perceived Stress Scale-4; REQ: Recovery Experiences Questionnaire; WHO-5: World Health Organization-5.

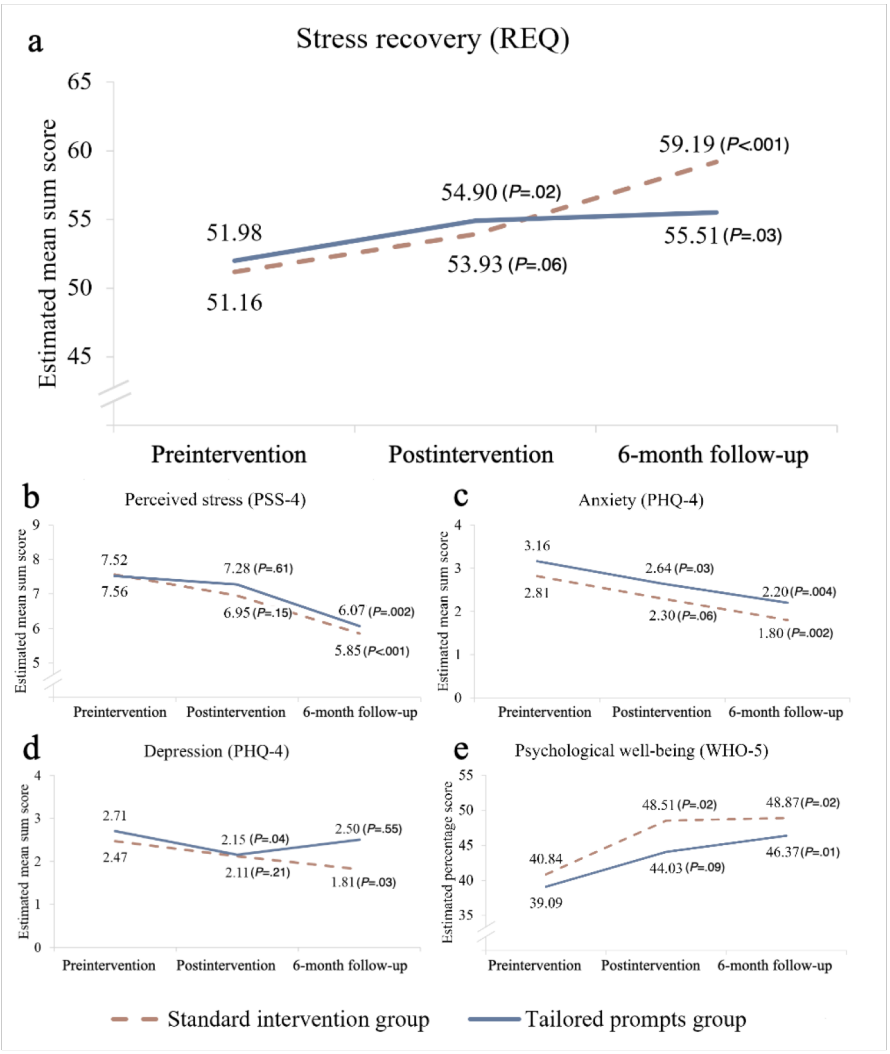


Table 4. Means and SD of study outcomes at preintervention, postintervention, and 6 months follow-up.

	Standard intervention group (n=43)			Tailored prompts group (n=44)		
	T1[a], mean (SD)	T2[b], mean (SD)	T3[c], mean (SD)	T1, mean (SD)	T2, mean (SD)	T3, mean (SD)
Stress recovery	51.16 (9.12)	53.93 (8.50)	59.19 (9.54)	51.98 (8.96)	54.90 (7.81)	55.51 (9.49)
Perceived stress	7.56 (2.31)	7.28 (2.41)	6.07 (2.51)	7.52 (2.50)	7.28 (3.11)	6.07 (3.56)
Anxiety	2.81 (1.45)	2.30 (1.62)	1.80 (1.65)	3.16 (1.64)	2.64 (1.61)	2.20 (1.69)
Depression	2.47 (1.48)	2.11 (1.61)	1.81 (1.90)	2.71 (1.67)	2.15 (1.67)	2.50 (2.04)
Psychological well-being	40.84 (15.49)	48.51 (17.45)	48.87 (19.31)	39.09 (19.01)	44.03 (18.00)	46.37 (17.40)

[a]T1: preintervention.

[b]T2: postintervention.

[c]T3: 6-month follow-up.

Table 5. Intervention effect sizes.

Group	Within-group effect size		Between-group effect size	
	Pre-post *d*[a] (95% CI)	Pre-follow-up *d* (95% CI)	Pre-post *d* (95% CI)	Pre-follow-up *d* (95% CI)
Stress recovery			0.02 (–0.40 to 0.44)	–0.49 (–0.92 to –0.07)
SG[b]	0.31 (–0.11 to 0.74)	0.85 (0.41 to 1.29)		
TG[c]	0.34 (–0.08 to 0.77)	0.38 (–0.04 to 0.80)		
Perceived stress			0.15 (–0.27 to 0.57)	0.10 (–0.32 to 0.52)
SG	–0.26 (–0.68 to 0.17)	–0.70 (–1.14 to –0.27)		
TG	–0.08 (–0.50 to 0.33)	–0.47 (–0.89- to 0.04)		
Anxiety			0.00 (–0.42 to 0.42)	0.04 (–0.38 to 0.46)
SG	–0.33 (–0.75 to 0.10)	–0.64 (–1.08 to –0.21)		
TG	–0.32 (–0.74 to 0.10)	–0.57 (–1.00 to –0.15)		
Depression			–0.13 (–0.55 to 0.29)	0.28 (–0.14 to 0.71)
SG	–0.23 (–0.65 to 0.19)	–0.38 (–0.81 to 0.04)		
TG	–0.33 [–0.75 to 0.09)	–0.11 [–0.53 to 0.31)		
Psychological well-being			–0.16 (–0.58 to 0.26)	–0.04 (–0.46 to 0.38)
SG	0.46 (0.03 to 0.89)	0.45 (0.03 to 0.88)		
TG	0.26 (–0.16 to 0.68)	0.40 (–0.03 to 0.82)		

[a]*d*: Cohen *d*.

[a]SG: standard intervention group.

[b]TG: tailored prompts group.

Acceptability

In the TG (n=44), out of those who provided a rating (n=40), most participants (39/40, 98%) rated prompting positively (5< on a scale from 0 to 10), and only 1 person (2%) did not like the prompts received (≤5). Moreover, most of the participants who provided a rating found the program to be useful (58/72, 81%) regardless of the RCT group (χ^2_4=3.6; *P*=.46). There was no significant group effect with regard to participants liking the program (χ^2_4=2.8; *P*=.60), with 88% (63/72) in the total sample indicating that they overall liked it. Most of the participants (66/72, 92%) indicated that they would recommend the program to other health care workers regardless of the group (χ^2_4=2.8; *P*=.60).

Discussion

Principal Results

The aim of this study was to test whether the inclusion of tailored prompts to pursue the individual usage intensity goal would increase engagement and efficacy of ICBT stress recovery intervention for health care workers. While users expressed satisfaction with the intervention and received supplementary prompts, results revealed that tailored prompts had no significant

effects on usage indicators and were not associated with additional stress recovery, perceived stress, anxiety, depression, or psychological well-being outcomes. The results thus bring new insights to the field of research on internet interventions and call to consider the possible effects of supplementary tailored prompts when designing or testing internet interventions.

Comparisons With Previous Work

This study was the first to support that the effects of an internet-delivered stress recovery intervention are maintained after 6 months. In contrast to previous trials, reporting positive mental health effects after 3 months [4,5], participants in the current study exhibited significant improvements when using the standard intervention in primary (stress recovery) and secondary outcomes (stress, anxiety, depression, and psychological well-being) 6 months postintervention, with a small to large effect size. However, in the intervention supplemented by tailored prompts, the decrease in depression was no longer significant at the 6-month follow-up, and the effects on stress recovery, stress, anxiety, and psychological well-being were small to moderate despite the overall positive evaluation of tailored SMS prompts. These findings affirm the efficacy of the internet-delivered stress recovery intervention in fostering enduring improvements in the well-being of health care workers, even without additional administrative resources to enhance engagement. Incorporating an optional therapist support program format [5] could further reduce costs, facilitating the scalability of the intervention to a national level.

We did not observe significant differences between the RCT groups in terms of the program's effects on stress, anxiety, depression, or psychological well-being. However, tailored prompts were associated with a smaller, albeit significantly improved, intervention effect on the primary outcome: stress recovery. A possible explanation for this result may refer to control and mastery, key elements of stress recovery, which include choosing leisure activities, deciding when and how to engage in them, and experiencing a sense of competence and self-efficacy [15]. It is possible that constant reminders to take time to unwind could inhibit the development of these skills. Moreover, the unanticipated effect of tailored prompts may refer to the thwarted sense of agency, that is, attributing improvement to oneself rather than to others, for example, researchers, which is positively related to the effectiveness of therapy [27]. Participants who did not receive tailored prompts were able to attribute success to themselves, which may have led to more developed stress-coping skills. In addition, tailored reminders to make time for the program according to the goals set act as self-monitoring, which can have negative effects, for instance, when feeling guilty about not achieving goals [13]. Finally, previous studies have also found that external motivation, that is feeling pressured to complete tasks, can sometimes be counterproductive and lead to smaller treatment gains [28]. These findings highlight the importance of designing prompts that encourage engagement while preserving participants' sense of autonomy, as this is crucial for effective change [29].

The trial did not find that tailored SMS prompts positively impacted health care workers' engagement in an internet-delivered stress recovery intervention. To begin with, we found no differences in the program use indicators (eg, number of logins and exercises completed) between the 2 study groups. Similarly, a study reported that adaptive tailoring of notification timing does not enhance the use of a smartphone-based stress management app [12]. On the other hand, we found that participants who received tailored prompts were more likely to use the program more than they expected before the intervention. However, this may also reflect a perception that the program required more of their time than they would have intended. It is also likely that SMS prompts may have an impact on other adherence variables not measured in this study, such as faster login and login duration [30]. However, we should bear in mind that while adherence is important, involvement is possibly a stronger predictor of intervention effects, and it has been suggested that it may act as a working mechanism for persuasive technologies [8]. Thus, further research should test other factors of engagement that might be influenced by including tailored prompts and clarify what works for whom to ensure optimal participant engagement.

This study yields new insights into the complex interplay between users' expectations, goal setting, engagement, tailoring, and prompting in an internet-delivered cognitive behavior therapy for recovery from stress. Tailoring such programs for health care workers poses unique challenges due to their often fluctuating and unpredictable schedules, which can render initially appropriate treatment components less suitable over time. A recent qualitative analysis highlighted that unmet expectations and workload are significant barriers to engagement in ICBT and noted that even tailored prompts to engage can be perceived as unsuitable or stressful [6]. These findings suggest that supplementary prompts, though possibly beneficial for some users (eg, those with more predictable schedules or those less motivated), may not be universally effective. Discontinuation of ICBT can hinge on the client's expectations, treatment credibility, and intrinsic motivation [28], which can be shaped through techniques such as goal setting [13], motivational interviews [31], or educational videos [32]. Reminders could also support motivation and prompt clients to reach treatment goals [33], but it is essential to allow for the ongoing adjustment of these strategies to align with users' changing needs and circumstances. Future research should further explore different factors that influence engagement and the efficacy of internet interventions and the mechanisms driving their success. These insights will be crucial for advancing the design and delivery of psychological treatments.

Limitations

The results of this study should be viewed in the context of its limitations. Even though previous research has found the tested stress recovery intervention to be effective at postintervention assessment [4,5], in the current study, no significant changes in the perceived stress at postintervention were found in comparison with baseline assessment. This could be explained by one of the shortcomings of this study, the modest sample size. As well as different measures used, as the short version of the PSS scale had relatively low reliability in our study, it may not have captured more nuanced changes. Second, the results of this study cannot be generalized to a broader population, as

participants were almost exclusively female and health care workers. Finally, the absence of a third control group that did not receive ICBT limits comparison possibilities. Despite the limitations, this novel study provides a further understanding of how internet intervention effects can be influenced by the inclusion of tailored prompts to achieve usage goals.

Conclusions

The results of this study have highlighted that some techniques for the promotion of engagement in internet interventions, in this case, SMS prompts, may not necessarily have a beneficial effect, even if they are tailored to the needs of participants. Thus, when seeking to improve stress recovery skills in a sample of health care workers, it is important to look for factors other than tailored prompts that determine engagement and treatment success. Finally, the developers of internet-delivered interventions should carefully consider if their intervention should be supplemented by tailored prompts, even if they are broadly acceptable, as they may undermine the acquisition of some skills targeted.

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Conflicts of Interest

None declared.

Multimedia Appendix 1

CONSORT-EHEALTH checklist (V 1.6.1).
[PDF File (Adobe PDF File), 320 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Additional material.
[DOCX File , 209 KB-Multimedia Appendix 2]

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Abbreviations

CONSORT-EHEALTH: Consolidated Standards of Reporting Trials of Electronic and Mobile Health Applications and Online Telehealth
FOREST: For Recovery from Stress
HCW: health care workers
ICBT: internet-delivered cognitive behavior therapy
LCM: latent change modeling
PHQ-4: Patient Health Questionnaire-4
PSS-4: Perceived Stress Scale-4
RCT: randomized controlled trial
REQ: Recovery Experiences Questionnaire
SG: standard intervention group
TG: tailored prompts group
WHO-5: World Health Organization-5 Well-Being Index

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Study IV

Exploring Reasons for Usage Discontinuation in an Internet-Delivered Stress Recovery Intervention: A Qualitative Study

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Exploring reasons for usage discontinuation in an internet-delivered stress recovery intervention: A qualitative study

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ABSTRACT

Internet-delivered cognitive behavioral therapy (ICBT) interventions can be as effective as traditional face-to-face therapy for various mental health conditions. However, a significant challenge these online interventions face is the high rate of people who start but then stop using the program. This early discontinuation can be seen as incomplete treatment and can reduce the potential benefits for users. By exploring why people stop using ICBT programs, we can better understand how to address this problem. This study aimed to examine the experiences of healthcare workers who had stopped using a therapist-guided internet-delivered stress recovery program to gain deeper insights into usage attrition. We conducted semi-structured interviews with twelve participants who were female healthcare workers ranging in age from 24 to 68 years ($M = 44.67$, $SD = 11.80$). Telephone interviews were conducted and the data were transcribed and analyzed using thematic analysis. Qualitative data analysis revealed that most participants had multiple reasons for discontinuing the program. They identified both barriers and facilitators to using the program, which could be categorized as either personal or program related. Personal aspects included life circumstances, personal characteristics, and psychological responses to the program. Program-related aspects encompassed technical factors, program content, and the level of support provided. The findings of this study can enhance our understanding of why people stop using guided internet-delivered programs. We discuss the practical and research implications, with the ultimate aim of improving the design and efficacy of internet interventions.

1. Introduction

The internet has changed the way we approach mental health care by enabling innovative internet-delivered treatments that can be just as effective as traditional face-to-face therapy (Hedman-Lagerlöf et al., 2023). To date, most of the research has focused on internet-delivered cognitive behavioral therapy (ICBT), which was found to be effective in improving different mental health aspects (Hedman-Lagerlöf et al., 2023), such as depression (Andersson and Berger, 2021), stress (Heber et al., 2017), anxiety (Andersson et al., 2019). However, such internet interventions, and in particular when there is limited therapist contact, are often characterized by high usage attrition rates, which constitute the phenomenon where a participant stops using the program (Eysenbach, 2005). Research shows that almost half of those who start the treatment do not take part in the full ICBT program (Cross et al., 2022; Waller and Gilbody, 2009). Overcoming this issue is crucial, as early discontinuation of psychological treatment can reduce its potential outcomes (Robinson et al., 2020).

People may discontinue using internet mental health interventions for various reasons. Firstly, the use of such interventions may vary depending on the individual's motivation (Alfonsson et al., 2016; Lawler et al., 2021), specific needs, and preferences (Johansson et al., 2015). While some people may find them helpful, others may prefer face-to-face interactions or other traditional therapy methods (Holst et al., 2017; Lawler et al., 2021), and a mismatch between these needs can lead to an early dropout (Gonzalez Salas Duhne et al., 2022). In addition, unmet expectations (Johansson et al., 2015) and different life circumstances that the participants face, e.g., lack of time (Waller and Gilbody, 2009),

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may also affect use of such programs. Moreover, adherence may be reduced by the fatigue that the user experiences due to the treatment burden (Heckman et al., 2015). It is worth noting that participants may discontinue using the program also due to changes in their well-being, including both deterioration (Fenski et al., 2021; Johansson et al., 2015) or a rapid improvement (Arndt et al., 2020). Thus, the reasons for discontinuing the use of internet interventions can often be related to contextual or personal characteristics.

ICBT program-related specific intervention factors may also contribute to usage attrition. First, there is evidence that guided online interventions have higher rates of program module completion compared to unguided interventions (Baumeister et al., 2014). The absence of a human connection and difficulties in establishing therapeutic alliance in internet interventions can be significant factors for usage discontinuation (Berger, 2017). A recent meta-analysis on RCTs showed that human contact before and during internet intervention could significantly increase the effects of treatment for depression and decrease dropout (Krieger et al., 2023). In addition to therapist guidance, persuasive technology elements, such as email reminders, can also be effective (Kelders et al., 2012). Nevertheless, the lack of personalization and tailored support in internet interventions can be a drawback for some individuals who require more individualized care (Johansson et al., 2015; Rozental et al., 2015). Moreover, technical difficulties, such as poor computer literacy or issues with the platform itself, can hinder the user experience and discourage people from continuing engagement in internet interventions (Lawler et al., 2021). Finally, it is known that internet interventions can lead to negative effects for a small proportion of its users (Rozental et al., 2015), and it is possible that such effects can at least be partly related to the program format and content (Johansson et al., 2015; Lawler et al., 2021). Overall, it is important to find out what factors are important in increasing participation and reducing dropout in internet interventions of various intensities and targeting different areas of mental health.

Healthcare workers face difficult working conditions that can lead to mental health problems such as burnout, anxiety, and depression (Mira et al., 2020; Sani et al., 2022). However, long working hours, hectic schedules, and the prevailing stigma of reaching out for psychological help can make regular face-to-face therapy difficult (Knaak et al., 2017). Internet interventions could help overcome these barriers to seeking psychological help and have been proven to be effective in improving some components of well-being in medical professionals (Smoktunowicz et al., 2021). The "For Recovery from Stress" (FOREST) internet intervention is a 6-week ICBT program with a focus on mindfulness, tailored for healthcare workers, and developed in close collaboration with experts from the healthcare system (Jovarauskaite et al., 2021). A previous randomized controlled trial (RCT) showed that the FOREST program was effective in helping nurses in developing stress recovery skills, reducing levels of perceived stress, depression, and anxiety, as well as increasing overall psychological well-being (Dumarkaite et al., 2023). Further research showed that the updated program FOREST+ was also effective for a broader sample of healthcare workers (Nomeikaite et al., 2023). In these two controlled trials, only about half of the FOREST/FOREST+ users completed the full 6-week program. More research is therefore needed to investigate the specific barriers faced by participants who have stopped using the program.

To improve the development and updating of ICBT programs, it is essential to actively involve clients by seeking and incorporating their feedback. By examining why participants drop out, researchers and clinicians may gain valuable insights that can be useful for intervention design, engagement strategies, and retention. The aim of this qualitative study was to analyze the experiences of healthcare workers who had discontinued an internet-delivered stress recovery program. For this purpose, a semi-structured interview was developed based on previous qualitative research on the experiences of ICBT participants (Biliunaite et al., 2021; Johansson et al., 2015; Lawler et al., 2021). Two main objectives were established: first, to examine the underlying reasons behind the usage discontinuation of an internet-delivered stress recovery program specifically designed for healthcare workers, and second to examine the barriers and facilitators encountered by users of the program.

2. Methods

2.1. Study design

The qualitative study is associated with a two-armed randomized controlled trial assessing the effectiveness of a tailored internet-delivered stress recovery intervention. The trial was registered on www.clinicaltrials.gov (NCT05553210) and was approved by Vilnius University Psychology Research Ethics Committee (Reference No. 2021-03-22/61). All participants provided informed consent to take part in both the quantitative and qualitative research at the pre-intervention assessment. The current qualitative study was reported following the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines.

2.2. Participants

Healthcare workers were invited to participate in the internet intervention through national media, social network groups, healthcare institutions, and email databases. The RCT involved 91 healthcare workers who were randomly assigned to two study groups (ratio 1:1): 1) standard intervention plan group (SIP; $n = 45$), 2) tailored intervention plan group (TIP; $n = 46$). Participants who started but then stopped using the program were included in the qualitative study. Eligibility criteria: 1) completing fewer than 4 modules (< 4 weeks), 2) at least one login to the program. Researcher AN manually reviewed the login details of all participants to the program modules and screened eligible participants for the study. A total of 24 participants had dropped out of the program by week four, 4 of whom have never logged in to the program. Of the 20 participants that met eligibility criteria, 12 were interviewed ($n_{SIP} = 6$; $n_{TIP} = 6$). Participants who did not agree to participate in qualitative interviews indicated that they did not have time for it or had little involvement in the program and therefore did not want to talk about it. The study flow is presented in Appendix 1.

The characteristics of the participants included in the qualitative study are presented in Table 1. The sample comprised 12 women aged 24–68 ($M = 44.67$, $SD = 11.80$). More than half of those included ($n = 7$) in the study were nurses or assistant nurses (58 %), three of them were doctors of medicine (25 %), and two were clinical psychologists (17 %). No significant differences were found between subjects included and subjects excluded from the qualitative study (Appendix 2).

2.3. Intervention

The 6-week therapist-supported internet intervention CBT program FOREST+ for healthcare workers (Nomeikaite et al., 2023), which is a modification of FOREST (Jovarauskaite et al., 2021) intervention for nurses, comprised six modules, delivered on a weekly schedule (see Table 2). Each program module included psychoeducational texts, relaxation instructions, worksheets, video, and audio recordings. At the end of each module, participants received short feedback from their therapist. Participants had the possibility to contact their therapist by messages within the program. In addition, users of the tailored intervention plan group set a plan of how much they intended to use the program and how many short message reminders they would need (from none to two per day). The intervention plan was drawn up during a brief telephone interview with a researcher at pre-intervention. The standard intervention plan group used the program without a tailored intervention plan and did not receive any additional message reminders. Both groups received email reminders when the new module was opened and once again to complete it if they had not done so. Participants were also

Table 1
Participant characteristics ($N = 12$).

ID	Age	Gender	Profession (field)	Modules opened	Login count	Feedback received	Group assignment	Intervention plan
P1	20	Female	Dental assistant (outpatient)	3	2	3	TIP	Twice a week
P2	43	Female	General practitioner, M.D. (outpatient)	1	2	2	SIP	–
P3	52	Female	Dental technician, M.D.	1	1	2	TIP	Once a week
P4	43	Female	General practice nurse (outpatient)	1	5	2	TIP	Each workday
P5	44	Female	General practice nurse (nursing)	2	2	2	TIP	Twice a week
P6	52	Female	General practice nurse (inpatient)	3	3	4	SIP	–
P7	64	Female	Clinical psychologist (outpatient)	1	1	0	TIP	Twice a week
P8	35	Female	Clinical psychologist (inpatient, rehabilitation, nursing)	1	2	1	SIP	–
P9	29	Female	Dietitian, M.D. (outpatient)	3	5	3	SIP	–
P10	45	Female	General practice nurse (rehabilitation)	3	5	4	TIP	No SMS reminders
P11	24	Female	Assistant nurse (inpatient)	2	3	2	SIP	–
P12	46	Female	General practice nurse (outpatient)	2	5	2	SIP	–

Note. SIP – standard intervention plan group, TIP - tailored intervention plan group.

Table 2
Description of the program modules.

Week	Module	Description
1	 Introduction	Introduction to the program and how to proceed; psychoeducation on stress and recovery from stress; assessment of stressors faced and burnout symptoms; breathing relaxation.
2	 Psychological detachment	Psychoeducation on body relaxation and improving sleep quality; body tension assessment; body scanning and sleep relaxations.
3	 Distancing	Psychoeducation on intrusive thoughts and distancing from work during leisure time; mindfulness and walking meditations; worksheets for intrusive thoughts and distancing.
4	 Mastery	Psychoeducation on stress-reducing activities and mastery; worksheet to set active and less active leisure activities; relaxation and a brief body stretching exercise.
5	 Control	Psychoeducation on the importance of work/rest balance and self-care; worksheets for identifying current needs and obstacles of recreation.
6	 Keeping the change alive	A brief summary of the program and psychoeducation on how to sustain changes in well-being; worksheets to identify what is most helpful for stress recovery; brief relaxation.

contacted by the study administrators for a short telephone interview during and after the program to encourage them to use the program and to answer any technical questions they may have.

Participants' usage of the program is shown in Table 1. All participants have opened at least one program module: 5 (41.7 %) opened one module, 3 (25.0 %) – two modules, and 4 (33.3 %) – three modules. The number of user logins to the program varied from 1 to 5. Participants received 0 to 4 feedback messages from their therapists during the program. However, none of them tried to contact the therapists.

2.4. Semi-structured interview

The semi-structured interview protocol was developed by the authors of this study (see Appendix 3). The interview structure was based on the analysis of literature, which revealed several broad topics: participant expectations for the program, motivation to engage, experience of using the program (format, content, support, and reminders), life circumstances, and personal characteristics that may have influenced the use of the program. The semi-structured interview comprised 10 mandatory questions and 20 prompting questions divided into four categories: (A) overall experience of using the program (3 mandatory questions ($n_m = 3$), 6 prompting questions $n_p = 6$), e.g., *What do you think made you stop using the program?*); (B) factors related to the program and to its use ($n_m = 3$, $n_p = 9$; e.g., *How do you feel about the fact that the program was implemented online?*); (C) personal characteristics and life circumstances ($n_m = 1$, $n_p = 3$; e.g., *To what extent might any circumstances in your life have influenced your use of the program?*); (D) recommendations and other observations ($n_m = 3$; e.g., *How do you think we could improve the FOREST+ program?*). The protocol provided the interviewer with a flexible interview structure with guidelines for prompting questions or phrases (e.g., *Tell me more about it*). For each question, an area was marked to highlight information that had already been heard so that the interviewer would not repeat questions. In addition, the interviewer had space in the interview sheet to take notes during the interview. Interviewers also had the opportunity to ask open-ended prompting questions of their own devising if they felt the interviewee had not adequately covered the topic and there was no such question in the protocol.

2.5. Procedure

Semi-structured interviews were conducted by telephone from 5 to 16 December 2023 and lasted between 10 and 34 min ($M = 20.08$, $SD = 7.30$). Prior to this, a call was made to arrange a suitable time for the participants to be interviewed so that they were in a private place where they could safely share their experiences. During the main interview, the interviewer introduced themselves as the program researcher and his/her name. The participants were informed that their honest answers were very important for the development and research of the stress recovery program for HCWs. Interviews were audio recorded. Consent to record the interview was obtained before the interview was started. The interviews ended when the interviewer felt that the topic of dropout from the program had been sufficiently covered and when the information obtained was repeated, or when the interviewee expressed that they had nothing more to add.

2.6. Characteristics of interviewers, researchers, and auditors

The interviews were conducted by trained researchers (junior researcher and clinical psychologist AN and 4 supervised and trained master students of clinical psychology). Given that AN contributed to the development of the program and studied the outcomes of the FOREST+ program as part of her dissertation research, AN only conducted the first pilot interview with one of the participants and did not conduct further interviews herself. Also, the master's program student interviewers were involved in the research process of the program as a part

of their master's thesis but had no direct contact with the participants before the interviews. AN (MSc, with a background in internet interventions and mental health of healthcare workers research; female) and DZ (MSC, clinical psychologist, non-program related researcher; male) conducted the thematic analysis. For both coders, this was the first qualitative study conducted. However, the team of auditors was made of two senior researchers that are leading researchers in the field of internet interventions (TB, PhD, and GA, PhD), and of two senior researchers, who are experienced in qualitative research (EK, PhD, and OG, PhD). Thus, the research group had strong base for discussing the content of the interviews.

2.7. Data analysis

The data analysis was based on the thematic analysis method as described by Braun and Clarke (2006), which suggests that more general themes should be extracted from smaller pieces of information. Based on Knox and Burkard's (2009) qualitative interviewing principles, an attempt was made to find consensus among the researchers on the codes, themes, and sub-themes identified. AN and DZ coded the transcribed interviews. AN coded the interviews first by identifying the codes, and then DZ coded all the interviews based on the coding system proposed by AN, with the possibility of modifying or supplementing these codes, by common decision. All data coding was done using the ATLAS.ti. Each

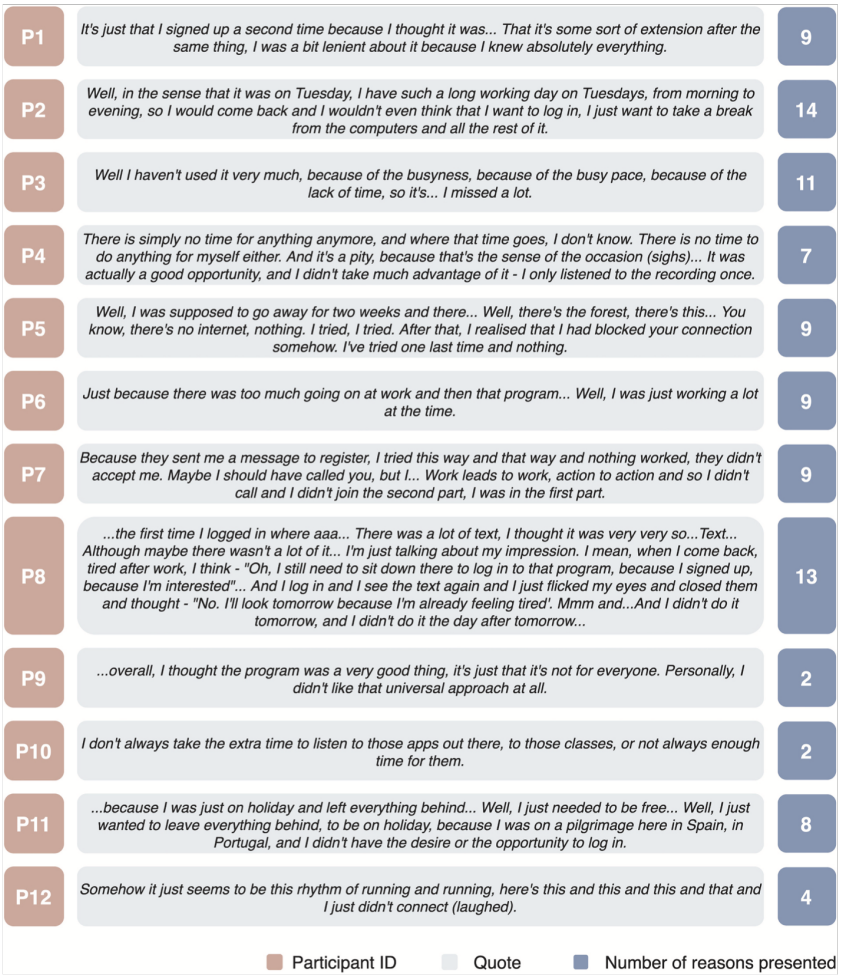

Fig. 1. Reasons for stopping participation in an internet-delivered intervention for stress recovery.

coder grouped the final codes that derived from the interviews into meaningful themes and sub-themes, as well as selected the quotes that best reflected them. This was followed by a discussion of the themes and sub-themes. To help reach consensus, the discussion was moderated by OG. This process was later reviewed by senior researchers EK and TB, and the model was adjusted in the light of feedback until consensus with all team members was reached.

3. Results

3.1. Reasons for discontinuing participation

The results of the qualitative analysis of the first mentioned reasons and the number of times the reasons for discontinuing participation in the internet-delivered stress recovery intervention were mentioned are presented in Fig. 1. The number of reasons given by participants varied from 2 to 14 ($M = 8.05$, $SD = 3.68$). The most common first-mentioned reason given by five participants (P3, P4, P6, P10, P12) was lack of time and busy pace in life. Three participants indicated that they did not like the format or nature of the program (P2, P8, P9). Few participants

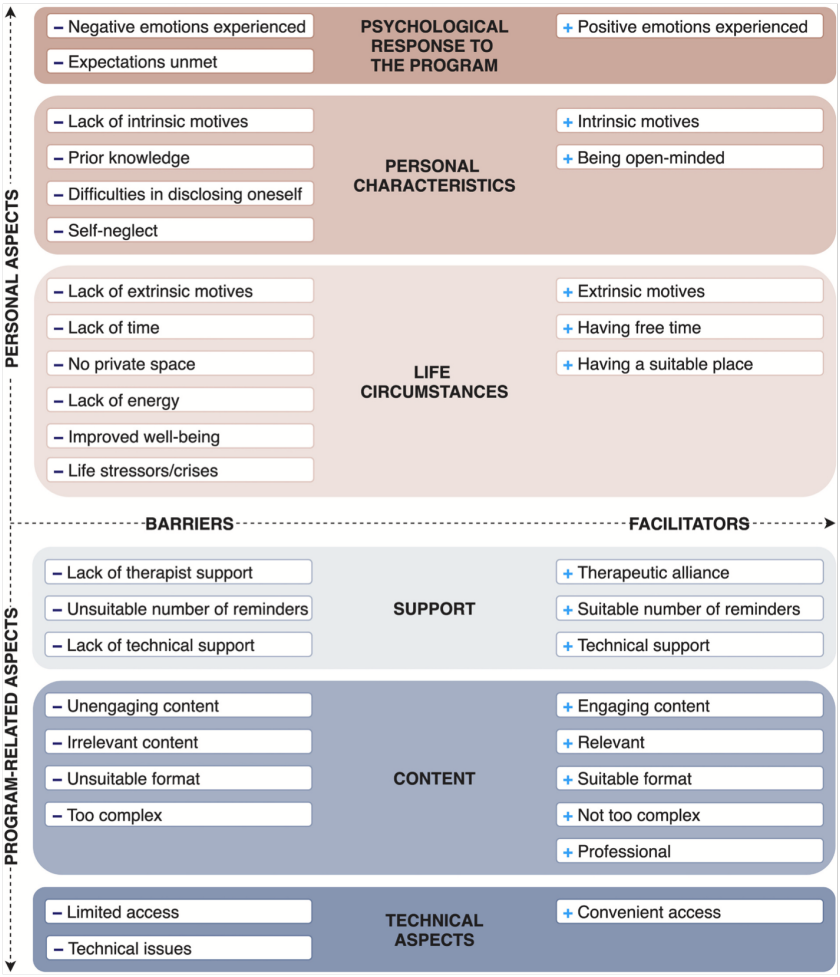

Fig. 2. Barriers and facilitators of participation in an internet-delivered intervention for stress recovery.

encountered technical difficulties when accessing the program (P5, P7). Several participants were also unable to use the program because they were away at the time (P5, P11). Two participants indicated that they felt too fatigued to use the program after work (P2, P8). Finally, one participant stated that she had stopped using the program because she had already participated in the program before (P1).

3.2. Barriers and facilitators

The full model of barriers and facilitators in relation to program use is presented in Fig. 2. In total, six key themes were identified. Three of these themes were attributed to the personal aspects dimension and the remaining three – to the program-related dimension. For each theme, facilitators and barriers to the use of the program were distinguished. In Appendix 4 we report quotes for each sub-theme and codes.

3.2.1. Psychological response to the program

A theme named psychological response to the program emerged during qualitative analysis, reflecting participants' subjective experience of the program. Some participants experienced negative emotions while using the program, such as anxiety, irritability, anger, guilt, loneliness, sadness, and self-pity, which acted as a barrier to continue participation. For example, one participant who indicated that she was currently being treated for depression stated that during the program she experienced: "*Such disappointment with my own... It is a bit disappointing that I can't manage my time so that I can't find fifteen minutes or half an hour for it.*" [P4]. Meanwhile, other participants noted positive experiences using the program, such as optimism and better self-awareness.

Participants were also asked about their expectations regarding the program and if they were met. We noted that some participants stopped using the program because it did not meet their expectations of having a live interaction with a therapist: "*Maybe my expectations were higher and just too high. I was expecting to see someone who would explain, who would... It would be interesting to listen to, and it's so... It's dull like a textbook.*" [P6]. Other expectations indicated by the participants were that the program could be more interesting and engaging, more professional, and more able to help them improve their well-being.

3.2.2. Personal characteristics

Certain personal characteristics were identified as barriers or facilitators. Users indicated that a lack of motivation led to non-use of the program, while others felt motivated to use the program for reasons such as the desire to help themselves or even professional interest: "*I think it started during the pandemic, and I think it's the third time that I've shared it and then I thought I should register myself and see what you're offering and what it's all about and I'd be interested in that too... In terms of information and maybe something for myself or my work.*" [P8].

Existing knowledge about stress reduction methods also hindered the use of the program, as participants felt that the information presented was already known to them. In addition, the use of the program was complicated by personal characteristics such as a lack of concern for one's own well-being and difficulty in revealing oneself to others. On the other hand, being open-minded (e.g., open to new experiences) acted as a facilitator.

3.2.3. Life circumstances

Participation barriers related to life circumstances included lack of time, private space, energy or extrinsic motives, stressful life experiences, or crises. Also, participants indicated that they had stopped using the program because of improved psychological well-being. Participants reported a lack of time for a variety of reasons, such as a heavy workload, childcare, household chores, obligations to others, social activities, travel, or difficulties with time management. Difficulties in accessing the program without a suitable and private location were also experienced. Moreover, participants often reported not using the program due to a lack of energy, e.g., feeling fatigued after a long working day. Several participants reported experiencing stressors or crises while using the program, such as illness, illness or loss of a loved one, difficult and stressful working conditions, and household stress. Finally, one participant felt a lack of extrinsic motives, such as incentives from the healthcare institution: "*Even, for example, in workplaces, to initiate some kind of hour, or not, like, five-minute periods, for example, and to organize something like that at that time.*" [P3].

In addition, some indicated that life circumstances acted as facilitators to use the program. Extrinsic motives such as information about the program from their healthcare institution, colleagues, relatives, and social media acted as facilitators to start using the program. While having free time and a suitable private place to use the program helped them to be more engaged.

3.2.4. Support

Participants indicated that their experience using the program may have been influenced by the support they received from the therapist or study administrators. Some felt a lack of support from their therapist: "*Well, that's the kind of feedback that's missing... The feedback would be, well, it seems that when you're there, you could immediately ask. Or the person who is communicating with you, they would feel your well-being even the next time without asking, wouldn't they, from the behavior, from the eye contact, from the facial expressions, and all the other empirical things that, well, you just see it visually and it's... I think obviously live contact would be the best thing (laughed).*" [P3] On the other hand, some participants mentioned that they had developed a therapeutic alliance during the program, which encouraged their further involvement.

Technical support was also important for participation. One participant (P5) stated that when she had technical difficulties, the study administrator helped her to solve them which was very helpful. On the other hand, one user (P7) indicated that there was a lack of technical support while using the program. In terms of support by email or message reminders, the reminders were unsuitable for some users but suitable for others. Most participants felt that reminders to use the program were important. But few participants (P8 and P9) were dissatisfied with the reminders received: "*...in my case, these reminders make me... Aaaa works in a more stressful way (laughed)*" [P9]. For two participants, there were too many reminders (P1, P9). Meanwhile, two users indicated that there could have been more reminders (P4, P10). Lastly, one participant indicated that the timing of the reminders was unsuitable (P2).

3.2.5. Content

The content of the program was also an important factor, acting either as a facilitator or as a barrier. Participants were motivated to use the program if it was perceived as professional and reliable, or if it was relevant to them and healthcare professionals in general: "*In fact, as we are now in the last few years, there are so many internal stressors, and not only internal but also external... So maybe I think it's really worth it.*" [P2]. It was also important for participants that the format of the program was appropriate. They liked the psychoeducational texts, tasks, and length of the program. In addition, it was noted as important if the program was presented in an uncomplicated and coherent way and whether the content of the program was engaging and attractive.

On the other hand, the same factors were seen differently by other participants. Usage was reduced if the content was considered unengaging, boring, or irrelevant to the user or healthcare professionals in general. Some users found the content of the program unsuitable because of an inappropriate format of communication with the therapist, tasks, redundant information, and bad timing of the program or program reminders. In addition, the content of the program was too difficult to use for some participants (unclear questions or progress, too much information). It was also noted that the program reminded them of a test situation.

3.2.6. Technical aspects

Technical aspects may also have influenced the use of the program.

For some participants, online access to the program was convenient and acted as a facilitator. For others, the log-in method was challenging and inconvenient, and there were some technical issues: "*Well, I was supposed to go away for two weeks, and there... Well, there's the forest, there's this... You know, there's no internet, nothing. I tried, I tried. After that, I realized that I had blocked your connection somehow. I've tried for the last time and nothing.*" [P5].

4. Discussion

This study specifically focused on qualitative data regarding the experiences of healthcare workers who had discontinued the use of internet-delivered stress recovery program. The aim was to get a deeper insight into the usage attrition phenomenon. The thematic analysis showed that healthcare workers who stopped using the therapist-guided program tended to have more than one reason to do so. Discontinuation was motivated by lack of time, busy pace of life, travel, fatigue, previous participation, or more program-related factors such as technical difficulties in accessing the program or simply the unsuitable nature of the program itself. The analysis of identified barriers and facilitators faced by the participants while using the program revealed the importance of both personal and program-specific factors. Personal aspects included a psychological response to the program, personal characteristics, and life circumstances. Program-related aspects included the level of support received, program content, and technical aspects. The results of the study are discussed below in more detail.

Overall, the results of our study are consistent with other qualitative studies of internet interventions. Person- or program-related facilitators or barriers to internet program use have been reported in several other studies (Arnold et al., 2020; Banerjee et al., 2017; Johansson and Andersson, 2012). However, the current study shows a small imbalance between these areas, with more program-related factors than personal aspects being identified as facilitators and more personal aspects being identified as barriers compared to program-related ones. A systematic review by Waller and Gilbody (2009) also reported that the most common reason for dropout was personal rather than because of technology or social aspects. Based on these findings, recommendations can be made at institutional and individual level, as well as for program developers and researchers, as outlined below.

Some of the most important personal factors determining engagement in online psychological support may be related to the participant's intrinsic motivation, such as the desire to help oneself or even a professional interest. The current study highlights that a lack of intrinsic motivation can act as a significant barrier for engagement in internet intervention. A previous qualitative study on treatment completers of an online program showed the importance of fostering participants' intrinsic motivation to use the program (Donkin and Glozier, 2012). Motivational interviews before ICBT program may encourage participants to use the program for more days (Soucy et al., 2021; Titov et al., 2010). On the other hand, motivational interviewing may not benefit all individuals equally (Peynenburg et al., 2022). It is therefore important to restrict motivational interviews only to those who would benefit from them, in order to avoid an additional treatment burden.

Intrinsic motivation to participate in the program can also be influenced by how the program is perceived. In the current study, some participants indicated that they found the program professional, which acted as a facilitator. However, some participants saw the program as irrelevant and unlikely to help them, which acted as a barrier. Therefore, the proper initial presentation of the program to participate may be an important aspect to consider. Similar themes emerged in a study by Banerjee et al. (2017), which found that believing that mindfulness works can motivate people to carry on. One RCT study also showed that if participants did not see the credibility of an online program based on relaxation, (i.e., that it could help them to relieve stress), it can motivate dropout (Alfonsson et al., 2016). In this context, it would be important to ensure that the internet-based psychosocial programs are presented not only in a professional manner, but also with a clear description of its mechanisms and potential benefits, which could be included in the initial call for participation and in the first module of the ICBT program, in order to foster intrinsic motivation.

In this study, we observed that a negative psychological response to the program may also lead to usage discontinuation. Some participants indicated that they experienced anxiety, self-blame, guilt, or even increased stress due to the program. Similarly, a qualitative study of an internet-based mindfulness program for healthcare workers by Banerjee et al. (2017) found emerging negative thoughts and becoming self-critical were identified as the key barriers to engaging. Greater involvement of participants in the treatment process could help reduce negative experiences. Qualitative research has shown that people who take responsibility for their treatment and attribute success to themselves benefit more (Bendelin et al., 2011). One solution to encourage participants to feel in control of their treatment is in the form of patient-driven ICBT programs. In such programs, the participant decides which intervention modules they believe they may benefit from, the pace of the program, and the amount of contact they will need with a therapist. This approach can help to increase perceived levels of control and to reduce participants' anxiety to a significantly greater extent than in a conventional ICBT program (Nissling et al., 2021). Thus, the field of internet interventions for mental health care should move towards a more patient-driven tailored approach.

User expectations are also among the personal factors that influence program use (Kazlauskas et al., 2020). Some of the participants in our study felt that the program did not meet their expectation that they would have more contact with the therapist, specifically face-to-face contact. It has been recognized that certain program users may predominantly read program content without completing the tasks/homework (Bendelin et al., 2011), thus missing out on feedback from the therapist. In the current study, it was noticed that some of the participants did not even know that feedback from a psychologist was provided during the program, even though they expressed the need for it. Therefore, it might be important for the therapist to send an introduction message to the participant before he or she has even completed the tasks of the first module. Interaction with the therapist at the very beginning of the program could encourage a positive response to therapy and lead to more positive outcomes (Haas et al., 2002; Krieger et al., 2023). In particular, guidance and the quality of guidance may become more important if the program is less suitable (Berger, 2017).

Given that research shows that ICBT programs can be beneficial, it is important to look at what works for whom. For some individuals, even a brief engagement in intervention can be sufficient to achieve the expected benefits (Bisby et al., 2023; Howard et al., 1986). It is possible to increase the likelihood of a participant receiving the right dose of treatment by as much as 12 % if the treatment is matched to face-to-face or internet-delivered, according to the patients' needs (Gonzalez Salas Duhne et al., 2022). Acceptability of internet treatment is an important factor in predicting greater engagement with the program for anxiety and depression and completing more modules (Gulliver et al., 2021). In addition, lower levels of stigma, more positive attitudes towards help-seeking and personal traits such as agreeableness have been found to lead to higher acceptability. The same is true for traditional face-to-face psychotherapy, where therapists report that their clients drop out of treatment, usually because they are not satisfied with the intervention offered or because it was not as helpful as they had hoped (Kullgard et al., 2022). Accordingly, it is important to increase the acceptability of such programs in the community of healthcare workers, which may require systemic changes, such as reducing the stigma of seeking psychological support.

In our study, we noticed that program-specific aspects can also be important in hindering or prompting the use of the program. High workload and associated fatigue were found to make it difficult to implement an internet intervention for workers in a healthcare institution. Similar results have been noted in a previous qualitative study,

which showed that participants may perceive the use of the online program as difficult and demanding (Halmetoja et al., 2014). However, research suggests that the optimal dosing of a low-intensity guided treatment is 4–6 sessions (Robinson et al., 2020). It is therefore important to find a balance between the right dose of treatment to achieve effects without overburdening the user. In this context, it may also be important to take a more work-focused approach to ICBT for healthcare workers, for example by including more content on workload (e.g. Asplund et al., 2019, 2023). Alternatively, given the nature of HCWs' work and time constraints, it may be important to consider ultra-brief treatment adaptations. Especially in the light of research indicating that for some individuals, <3 sessions may be enough to achieve symptom relief (Fenneli and Teasdale, 1987; Saunders et al., 2019). In addition, unsuitable timing of the program can be an important factor influencing engagement as well, as research shows that the more days that elapse between sessions, the more likely a participant is to drop out of the program (Linnet et al., 2023). Therefore, the tailored timing of the program and reminders could help reduce the burden felt by the participants and make it more easily accessible. Institutional incentives to use the program, perhaps even in the form of dedicated time during the workday, may also be important considering the findings of this study.

It is also important to find ways to make internet interventions more engaging and user-friendly. The results of this study are in line with those of Alfonsson et al. (2016), which reported that finding the ICBT treatment interesting and engaging was an important factor in helping participants complete the program. One solution to encourage engagement could be to optimize the user interface of such applications (Hentati et al., 2021). Including gamification principles in internet interventions could also potentially boost participant engagement (Cugelman, 2013). It is also important to explore other technological solutions, such as virtual reality, to find more engaging treatments (Ma et al., 2021). Given that lack of social support can act as a barrier, another way to encourage engagement would be to include a social element in such programs, allowing healthcare professionals to share their experiences with other professionals. Studies have shown the importance of social relationships in engaging with and staying in online programs, as well as determining their outcomes (Cross et al., 2022; Vöhringer et al., 2020). Participants in this qualitative study also mentioned that the inclusion of a chat forum could act as a facilitator, suggesting that it may be important to consider ways of promoting sense of community in programs for health workers.

This is to our knowledge the first qualitative study to explore reasons for usage discontinuation in an online stress recovery intervention for healthcare workers. Moreover, as the participants were informed about the qualitative study at pre-intervention assessment, it was possible to successfully recruit most of the program dropouts. Another advantage of the study is that the participants were interviewed immediately after the end of the program, which allowed us to capture their experiences less distorted by time. However, the results of this exploratory study need to be seen in the context of the limitations of qualitative research (Greenhalgh and Taylor, 1997). Firstly, the results cannot be generalized to usage attrition in internet interventions in general, as participants were healthcare workers. In addition, all participants were female, and further research is needed to evaluate the experiences of male healthcare professionals in using internet interventions. Also, the interviews were conducted by several different interviewers, therefore participants' answers may vary depending on this. Another drawback of the study is that there is a potential bias in the results, as the first author of the paper is writing a dissertation based on the study and is involved in the program efficacy trial. However, to reduce bias, an additional coder, non-program related, was included in the study. Thus, despite the limitations of the study, the results provide valuable insights into the usage attrition of internet interventions.

5. Conclusions

The results of this study will hopefully increase our knowledge about factors that can influence usage attrition from internet-delivered mental health interventions for healthcare workers. We recognize that there is usually no single reason for discontinuing a program, thus a holistic approach to fostering program engagement is important. The themes identified illustrate that participants face both personal and program-related facilitators and barriers to using the internet-delivered psychosocial program. The results indicate that factors that are important in face-to-face therapy may also be important in internet interventions – where unrealistic expectations and doubts about the effectiveness of treatment can lead to an early withdrawal. However, some of the methods currently used to encourage participation in such programs can also act as barriers for some people. This points to the need to move towards a more personalized and patient-driven approach to psychological treatment. Therefore, the technical features of the program should act as more engaging and stimulating depending on the needs of the client. The role of the institution behind the treatment, which ensures support and facilitates the use of internet programs for healthcare workers, is also important and should be further investigated.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.invent.2023.100686.

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SUMMARY IN LITHUANIAN

1 ĮVADAS

Psichikos sutrikimai išlieka viena opiausių šiuolaikinės visuomenės problemų (Ferrari ir kt., 2022; McGrath ir kt., 2023; WHO, 2022a)*. Vienas esminių psichikos sutrikimų rizikos veiksnių yra lėtinis stresas, dažnai kylantis darbinėje aplinkoje (Rugulies ir kt., 2023). Skaičiuojama, kad apie 15 proc. darbingo amžiaus suaugusiųjų visame pasaulyje patiria psichikos sveikatos sunkumų (WHO ir ILO, 2022), o tai sukelia didelę socialinę ir ekonominę naštą visuomenei (Arias ir kt., 2022). Tam tikros profesinės grupės, pavyzdžiui, sveikatos priežiūros darbuotojai, dėl specifinių darbo sąlygų patiria ypač didelį stresą ir dėl to yra labiau pažeidžiamos (pvz., De Cieri ir kt., 2019). 2022 metais Lietuvoje atliktas tyrimas parodė, kad iš 1081 apklaustų sveikatos priežiūros specialistų, 21,4 proc. patyrė stiprų stresą, 23 proc. išgyveno stiprius depresijos simptomus, o 27,4 proc. – stiprų nerimą (Kavaliauskas, Nomeikaitė ir kt., 2024).

Tinkamas poilsis ir atsigavimas nuo streso gali padėti sumažinti neigiamą jo poveikį bei skatinti psichologinę gerovę (Geurts ir Sonnentag, 2006). Atsigavimas nuo streso apibrėžiamas kaip procesas, kurio metu žmogaus funkcinės sistemos, aktyvuotos streso metu, grįžta į įprastą veikimo lygį (Geurts ir Sonnentag, 2006). Sonnentag ir Fritz (2007) išskiria keturis pagrindinius šio proceso komponentus: psichologinis atsitraukimas (tai ne tik fizinis atsitraukimas nuo darbo situacijos, bet ir gebėjimas psichologiškai atsiriboti nuo darbo bei su juo susijusių minčių), atsipalaidavimas (tai procesas, kurio metu sumažinama ilgalaikė fiziologinė ir psichologinė įtampa, siekiant atkurti iki streso buvusią organizmo būseną), meistriškumas (tai kompetencijos, gebėjimų ar pasiekimų patyrimas veiklose, nesusijusiose su darbu) ir kontrolės jausmas (tai laisvės ir pasirinkimo galimybės jausmas sprendžiant, ką, kada ir kaip veikti laisvalaikiu).

Tyrimai rodo, kad vienas veiksmingiausių būdų mažinti profesinį stresą yra kognityvinė elgesio terapija (KET; Richardson ir Rothstein, 2008). Vis dėlto reikšminga visuomenės dalis dažnai nesulaukia reikiamos pagalbos (Haakenstad, Yearwood ir kt., 2022) dėl paslaugų ar specialistų trūkumo, ilgų laukimo eilių ar didelių tokių paslaugų kainų (Andersson ir Titov, 2014; Fullen ir kt., 2020; Mojtabai ir kt., 2011). Lietuva nėra išimtis šių iššūkių kontekste. Nors šalyje veikia daugiau nei šimtas psichikos sveikatos centrų, teikiančių paslaugas privalomuoju sveikatos draudimu apdraustiems asmenims, dauguma jų įsikūrę miestuose, todėl kaimo vietovių gyventojams

* Cituojamos literatūros sąrašas pateiktas 47 psl.

pagalba išlieka sunkiai prieinama (Lietuvos Respublikos Sveikatos Apsaugos Ministerija, 2022). Pagalbos paiešką apsunkina ir kultūriniai veiksniai – giliai įsišakniję įsitikinimai, kad problemas reikia spręsti savarankiškai, kad emocijų reiškimas yra silpnumo požymis ar kad negalima „apsunkinti“ kitų savomis problemomis (Dadašev ir kt., 2016).

Atsižvelgiant į tai, kad 93 proc. aukštų pajamų šalių gyventojų naudojasi internetu (Tarptautinė telekomunikacijų sąjunga, 2024), skaitmeninės psichikos sveikatos priemonės tampa vis perspektyvesnės plečiant prieigą prie psichologinės pagalbos priemonių. Internetu teikiama kognityvinė elgesio terapija (IKET) laikoma plačiausiai naudojama ir labiausiai empiriškai pagrįsta skaitmenine intervencija (Andersson, Titov ir kt., 2019). IKET paprastai teikiama per saugią, struktūruotą internetinę platformą, kurioje pateikiami terapiniai moduliai, papildyti interaktyviais elementais, tokiais kaip namų darbai ir specialistų grįžtamasis ryšys (Vlaescu ir kt., 2016). Kai IKET teikiama su psichologo parama, jos poveikis gali prilygti įprastai psichologinei pagalbai (Carlbring ir kt., 2018; Hedman-Lagerlöf ir kt., 2023), o dėl mažesnio specialisto įsitraukimo ji yra ekonomiškesnė alternatyva (Buntrock, 2024; Donker ir kt., 2015; Kählke ir kt., 2022; Rohrbach ir kt., 2023). IKET galima naudotis interneto svetainėje ar mobiliojoje programėlėje kompiuteryje, planšetėje ar išmaniajame telefone (Andersson, Titov ir kt., 2019). Tokiu būdu asmenys gali dalyvauti psichologinėje intervencijoje jiems patogiu metu ir vietoje (Andersson, 2016; Donker ir kt., 2015), o didesnis privatumas ieškant pagalbos sumažina galimą stigmą (Chen ir kt., 2024).

Pastaraisiais metais internetinių psichologinių intervencijų veiksmingumas buvo tiriamas ir Lietuvoje (Biliūnaitė, Kazlauskas ir kt., 2021; Dumarkaitė ir kt., 2022, 2023; Eimontas, Rimšaitė ir kt., 2018). Viena tokių programų yra Vilniaus universiteto mokslininkų sukurta internetinė intervencija „For Recovery from Stress“ (FOREST), skirta padėti sveikatos priežiūros specialistams stiprinti gebėjimą atsigauti nuo streso, remiantis kognityvine elgesio terapija ir dėmesingo įsisąmoninimo principais.

IKET integravimas į įprastinę psichologinės pagalbos sistemą išlieka sudėtingas procesas (Titov ir kt., 2019; Gilbody ir kt., 2015). Nors daugiau nei pusė dalyvių patiria reikšmingus pokyčius, visišką atsigavimą pasiekia tik apie trečdalis (Andersson, Carlbring ir kt., 2019). Be to, apie ketvirtadalis dalyvių nereaguoja į intervenciją, o maždaug 5,8 proc. gali patirti savijautos pablogėjimą (Rozental ir kt., 2017, 2019). Vienas svarbiausių veiksnių, mažinančių intervencijų veiksmingumą, yra didelis dalyvių nubyrėjimo lygis, nes beveik pusė žmonių nebaigia viso programos kurso (Eysenbach, 2005; Waller ir Gilbody, 2009; Haller ir kt., 2023; Cross ir kt., 2022).

Vis dažniau pabrėžiama, kad siekiant suprasti psichologinių intervencijų veiksmingumą būtina analizuoti aktyviąsias jų sudedamąsias dalis – procesus, kurie sukelia pokyčius (Holmes ir Craske, 2014; Holmes ir kt., 2018). Norint paaiškinti dalyvių įsitraukimą ir IKET rezultatus, svarbu atsižvelgti į technologinius, aplinkos ir individualius veiksnius (Ryan ir kt., 2018). Nustatant veiksnius, kurie nuosekliai daro įtaką pagalbos rezultatams – pokyčius lemiančius procesus ar jų atsiradimo aplinkybes – galima identifikuoti, kokie pagalbos būdai yra veiksmingiausi, kam ir kokiomis sąlygomis (Kazdin, 2007, 2009). Tokia analizė leidžia individualizuoti psichologinę pagalbą, geriau atliepti žmonių poreikius ir sukurti alternatyvius sprendimus tiems, kam įprastos intervencijos nėra veiksmingos (Kraemer ir kt., 2002).

1.1. Pokyčių ilgalaikiškumas

Kognityvinė elgesio terapija pasižymi ilgalaikiu poveikiu įvairiems psichikos sutrikimams (Hofmann ir kt., 2012). Kadangi internetu teikiama kognityvinė elgesio terapija (IKET) tampa vis plačiau prieinama, svarbu įvertinti, ar šis poveikis išlieka ir teikiant ją skaitmeniniuose formatuose. Literatūros apžvalgos duomenimis, IKET su psichologo parama gali užtikrinti net iki penkerių metų išliekančius teigiamus pokyčius įvairiems psichikos sutrikimams (Andersson ir kt., 2018). Šie rezultatai rodo, kad IKET poveikio ilgalaikiškumas yra panašus į pastebimą įprastoje terapijoje, tačiau būtina tolesnė analizė skirtingose populiacijose ir kontekstuose.

1.2. Psichikos rodiklių tarpusavio sąveika

Tyrimai rodo, kad internetinė kognityvinė elgesio terapija gali ne tik sumažinti suvokiamą stresą, bet ir palengvinti nerimo ir depresijos simptomus (Svärdman ir kt., 2022). Kadangi depresijos ir nerimo simptomai dažnai yra tarpusavyje susiję ir linkę keistis kartu laikui bėgant (Jacobson & Newman, 2017), kuriant IKET programas, skirtas atsigavimui nuo streso, svarbu vertinti ne tik poveikį stresui, bet ir su juo susijusių psichikos sveikatos pokyčių tarpusavio sąveiką. Gilesnis supratimas, kaip vienos simptomų srities pokyčiai ilgainiui veikia kitas, gali suteikti vertingų įžvalgų apie terapinius procesus ir padėti pritaikyti IKET intervencijas asmenims, turintiems kompleksinių ar persipinančių psichikos sveikatos poreikių.

1.3. Psichologo parama

Internetu teikiama kognityvinė elgesio terapija dažniausiai vykdoma su psichologo įsitraukimu, kai specialistas padeda klientui naudotis programa, teikia grįžtamąjį ryšį, atsako į klausimus ir suteikia bendrą palaikymą (Andersson, 2014). Ši pagalba yra labiau techninio ir palaikančiojo, o ne psichoterapinio pobūdžio (Titov, Andrews, Davies ir kt., 2010).

Tyrimai rodo, kad tam tikrą ribą viršijanti specialisto parama nebūtinai lemia didesnius pokyčius internetinėse intervencijose (Titov, 2011), o kai kurios be paramos teikiamos programos gali būti veiksmingos ir lengvai prieinamos asmenims, kurie kitu atveju nesikreiptų pagalbos (Karyotaki ir kt., 2017). Taip pat paramos poreikis gali skirtis priklausomai nuo konkrečios psichikos būklės (Andersson ir kt., 2014). Todėl, siekiant taupyti išteklius ir padidinti IKET prieinamumą, svarbu ieškoti būdų, kaip pritaikyti terapeuto pagalbos lygį prie individualių naudotojo poreikių.

1.4. Programos naudojimas ir priminimai

Didelis IKET naudotojų nubyrėjimo lygis kelia reikšmingą iššūkį. Tyrimai rodo, kad net pusė dalyvių nebaigia visos IKET programos (Cross ir kt., 2022; Waller & Gilbody, 2009). Mažesnis įsitraukimas, t. y. kiek naudotojas laikosi programos pagal jos numatytą struktūrą (Donkin ir kt., 2011), yra reikšmingai susijęs su mažesniu internetinių intervencijų poveikiu suaugusiesiems (Haller ir kt., 2023). Todėl itin svarbu tirti, kodėl naudotojai nutraukia IKET anksčiau laiko, kokios kliūtys mažina įsitraukimą (Waller & Gilbody, 2009) ir kaip paskatinti tęstinį naudojimą.

Psichologo parama ir priminimai yra dažniausiai taikomos priemonės, skatinančios nuoseklų programos naudojimą (Kelders ir kt., 2012). Vis dėlto tyrimų rezultatai yra nevienareikšmiai – vieni autoriai nustato reikšmingą priminimų naudą (Webb ir kt., 2010), kiti teigia, kad papildomi priminimai nelemia pokyčių (Gandy ir kt., 2016), o kai kuriais atvejais dažnesni priminimai netgi gali būti susiję su mažesne nauda (Walters ir kt., 2024). Manoma, kad jei priminimai laikomi neaktualiais ar per daug įkyriais, jie gali kelti neigiamas emocijas ir bloginti naudotojo patirtį (Lehto & Oinas-Kukkonen, 2011). Pritaikant priminimų dažnumą ir laiką pagal individualius poreikius (pvz., Morrison ir kt., 2017) arba skatinant dalyvius nustatyti asmeninius tikslus, pvz., laiką, kurį jie planuoja skirti intervencijai, būtų galima veiksmingiau skatinti nuoseklų programos naudojimą (Meschtscherjakov ir kt., 2023). Vis dėlto įrodymų apie tokio pritaikymo poveikį įsitraukimui ir psichikos pokyčiams vis dar trūksta.

1.5. Naudotojų patirtis

Nors IKET veiksmingumas yra plačiai tirtas, vis labiau pabrėžiama, kad siekiant optimizuoti intervencijas būtina giliau suprasti naudotojų patirtis ir požiūrį. Yardley ir kolegos (2015) pasiūlė „į asmenį orientuotą“ požiūrį į internetinių intervencijų kūrimą, grindžiamą dviem pagrindiniais principais: (1) išsamus naudotojų psichosocialinio konteksto ir jų požiūrio į intervencijos elementus supratimas – dažnai pasiekiamas per kokybinius tyrimus – leidžia geriau numatyti bei interpretuoti naudojimo ir veiksmingumo rezultatus; (2) pagrindinių principų, grindžiančių intervencijos kūrimą, nustatymas, pabrėžiant kaip konkretūs elementai sprendžia kontekstui būdingas elgesio problemas. Taigi, naudotojų patirties analizė kokybiniuose tyrimuose gali suteikti vertingų įžvalgų apie tai, kaip tobulinti IKET programas, siekiant didesnio įsitraukimo ir geresnių psichikos sveikatos rezultatų.

1.6. Mokslinis naujumas

Empiriniai duomenys rodo, kad FOREST programa gali reikšmingai paskatinti atsigavimo nuo streso procesą slaugytojų imtyje, o psichologinio atsitraukimo, atsipalaidavimo ir meistriškumo sritys išlieka pagerėjusios iki trijų mėnesių (Dumarkaitė ir kt., 2023). Taip pat pastebimi ilgalaikiai teigiami pokyčiai suvokiamo streso, depresijos ir psichologinės gerovės rodikliuose. Tačiau lieka neaišku, ar programa būtų veiksminga platesnei sveikatos priežiūros specialistų grupei bei kokie veiksniai lemia psichikos pokyčius ir įsitraukimą į intervenciją. Svarbu ištirti, ar teigiami psichikos sveikatos pokyčiai išlieka ilgesnį nei trijų mėnesių laikotarpį ir ar egzistuoja sąsajos tarp skirtingų psichikos sveikatos rodiklių. Be to, nors IKET su psichologo parama siejama su geresniais rezultatais (Heber ir kt., 2017), nėra aišku, ar pagalba teikiama tik pagal poreikį būtų pakankama atsigavimo nuo streso intervencijoje. Vienas pagrindinių iššūkių – didelis dalyvių nubyrėjimo rodiklis, todėl būtina nustatyti ankstyvo IKET nutraukimo priežastis ir ieškoti būdų, kaip skatinti nuoseklų įsitraukimą. Nors priminimai dažnai taikomi kaip priemonė tęstiniam naudojimui skatinti (Kelders ir kt., 2012), jų poveikis įsitraukimui ir ilgalaikiams psichikos sveikatos pokyčiams kol kas išlieka nepakankamai ištirtas.

1.7. Tikslas ir uždaviniai

Pagrindinis šios disertacijos tikslas – ištirti veiksnius, susijusius su ilgalaikiais sveikatos priežiūros darbuotojų psichikos sveikatos pokyčiais po internetu teikiamos KET intervencijos, skirtos atsigavimui nuo streso.

Tikslui pasiekti, buvo išsikelti penki uždaviniai, formuluoti kaip šio mokslinio tyrimo klausimai:

1. Ar psichikos sveikatos pokyčiai išlieka po internetinės atsigavimo nuo streso intervencijos praėjus trims ir šešiems mėnesiams? [*Tyrimai II ir III*]
2. Ar egzistuoja ilgalaikiai ryšiai tarp skirtingų psichikos sveikatos rodiklių (suvokto streso, nerimo ir depresijos simptomų, psichologinės gerovės)? [*Tyrimas I*]
3. Ar pasirenkama psichologo parama naudojantis programa yra pakankama, kad reikšmingai pagerintų psichikos sveikatą ir paskatintų tęstinį programos naudojimą, palyginti su įprasta psichologo parama teikiama programoje? [*Tyrimas II*]
4. Ar individualiai pritaikytas priminimų laikas ir dažnumas, suderinti su išankstiniais kliento programos naudojimo tikslais, gali pagerinti programos naudojimą ir psichikos sveikatą? [*Tyrimas III*]
5. Remiantis dalyvių patirtimi, kokie veiksniai lemia ankstyvą internetinės atsigavimo nuo streso intervencijos nutraukimą? [*Tyrimas IV*]

2 METODIKA

Doktorantūros tyrimai buvo atlikti Vilniaus universiteto Psichologijos instituto Psichotraumatologijos centre. Tyrimai patvirtinti Vilniaus universiteto psichologijos tyrimų etikos komiteto (Nr. 2021-03-22/61).

2.1. Tyrimų dizainas

Disertacijoje buvo taikytas mišrus metodas, apimantis keturis empirinius tyrimus: (1) atsitiktinių imčių kontroliuojamo tyrimo (Dumarkaitė ir kt., 2023) antrinė duomenų analizė (I tyrimas), (2) atsitiktinių imčių kontroliuojamas tyrimas, kuriame nagrinėjamas psichologo paramos vaidmuo (II tyrimas), (3) atsitiktinių imčių kontroliuojamas tyrimas, kuriame analizuojamas priminimų vaidmuo (III tyrimas), ir (4) kokybinis tyrimas (IV tyrimas).

2.2. Tyrimų dalyviai

Dalyviai buvo kviečiami per įvairias sveikatos priežiūros įstaigas, nacionalinę žiniasklaidą, socialinius tinklus ir sveikatos priežiūros darbuotojams skirtas internetines grupes. Visi norintys galėjo užsiregistruoti tyrimui programos internetinėje svetainėje. Iš dalyvių buvo gautas informuotas sutikimas dalyvauti tyrime ir skelbti jo rezultatus. Duomenys buvo renkami naudojant tą pačią platformą, kurioje veikė ir pati programa – „Iterapi“. Ši sistema talpinama specialiuose serveriuose Linšiopingo universitete (Švedijoje) ir užtikrina aukštą duomenų stabilumo bei saugumo lygį (Vlaescu ir kt., 2016).

Tyrimuose galėjo dalyvauti suaugę (18 metų ir vyresni) sveikatos priežiūros darbuotojai, mokantys lietuvių kalbą ir turintys galimybę naudotis išmaniuoju įrenginiu su interneto prieiga. Dalyviai nebuvo įtraukiami į intervenciją, jei: patyrė ūmią psichologinę krizę, didelę savižudybės riziką, nuolatinį tarpasmeninį smurtą, arba turėjo priklausomybę nuo alkoholio ar narkotikų (taikyta tik I tyrime).

Į programą užsiregistravo 548 asmenys. Po tinkamumo vertinimo 495 sveikatos priežiūros darbuotojai gavo prieigą prie programos. Iš jų: 111 dalyvavo I tyrime, 196 – II tyrime, 87 – III tyrime. Iš III tyrimo dalyvių 12 asmenų dalyvavo kokybiniame tyrime (IV tyrimas).

2.2. Intervencija

„For Recovery from Stress“ (FOREST) – tai internetinė kognityvinės elgesio terapijos intervencija, grindžiama dėmesingo įsisąmoninimo

principais ir orientuota į atsigavimą nuo streso (Jovarauskaitė ir kt., 2021). Programa sukurta Vilniaus universiteto Psichotraumatologijos centre bendradarbiaujant su Linšiopingo universiteto Elgesio mokslų ir mokymosi katedra. Atnaujinta programos versija, FOREST+, buvo sukurta siekiant pritaikyti intervenciją platesnei sveikatos priežiūros darbuotojų grupei.

Šešių savaičių trukmės programa susideda iš šešių modulių, pateikiamų kas savaitę: (1) Pradėti, (2) Atsipalaiduoti, (3) Atsitraukti, (4) Puoselėti laisvalaikį, (5) Atrasti balansą, (6) Palaikyti pokyčius. Kiekviename modulyje pateikiami psichoedukaciniai tekstai, vaizdo ir garso įrašai bei interaktyvūs pratimai ir darbalapiai. Dalyviams teikiamas rašytinis psichologo grįžtamasis ryšys bei administratorių priminimai paskatinti dalyvavimą.

2.4. Tyrimų instrumentai

Tyrimuose naudoti savistabos klausimynai: Atsigavimo nuo streso klausimynas (REQ), Suvokto streso skalė (PSS-10) ir jos trumpoji versija (PSS-4), Generalizuoto nerimo sutrikimo skalė (GAD-7), Paciento sveikatos klausimynas (PHQ-10) ir jo trumpoji versija (PHQ-4) bei PSO geros savijautos rodiklis (WHO-5). Papildomai buvo renkami demografiniai duomenys, taip pat vertintas pasitenkinimas programa ir jos naudojimas.

Kokybiniame tyrime buvo taikytas pusiau struktūruotas interviu protokolas, parengtas tyrimo autorių, remiantis esama literatūra ir Knox ir Burkard (2009) kokybinių interviu principais.

2.5. Duomenų analizė

Kiekybiniuose tyrimuose (I–III) duomenys buvo analizuojami naudojant IBM SPSS ir Mplus 8.2–8.8 (Muthén ir Muthén, 1998–2017). Ilgalaikiams pokyčiams vertinti taikytas latentinio pokyčio modeliavimo metodas (angl. *Latent Change Modeling*; Duncan ir kt., 2013). II ir III tyrimuose buvo atlikta latentinio pokyčio modelių serija, o I tyrime papildomai taikyta kryžminio vėlavimo panelinė analizė (angl. *Cross-lagged Panel Analysis*; Selig ir Little, 2012). Grupiniai ir grupės vidaus efekto dydžiai buvo apskaičiuoti pagal Feingold (2009) pateiktas latentinio pokyčio modeliavimo efekto dydžių skaičiavimo gaires.

Kokybiniame tyrime (IV tyrimas) pusiau struktūruoti interviu buvo transkribuoti ir analizuoti dviejų nepriklausomų tyrėjų naudojant ATLAS.ti programinę įrangą. Duomenys buvo analizuojami taikant teminę analizę pagal Braun ir Clarke (2006) rekomendacijas.

Pokyčių ilgalaikiškumas (II ir III tyrimai). II ir III tyrimai parodė reikšmingą teigiamą poveikį daugumai psichikos sveikatos rodiklių iškart po intervencijos. Abejų tyrimų rezultatai taip pat parodė, kad psichikos sveikatos pagerėjimas išliko atitinkamai po trijų ir šešių mėnesių nuo intervencijos pabaigos. II tyrime reikšmingi ($p < 0,01$) teigiami pokyčiai po trijų mėnesių stebėsenos išliko visose keturiose atsigavimo nuo streso (REQ) srityse: psichologinio atsitraukimo ($d = 0,65$), atsipalaidavimo ($d = 0,40$), meistriškumo ($d = 0,45$) ir kontrolės ($d = 0,36$). III tyrimo rezultatai taip pat parodė reikšmingą ($p < 0,001$) bendro atsigavimo nuo streso balo padidėjimą ($d = 0,85$) praėjus šešiems mėnesiams po intervencijos, lyginant su pradiniu matavimu.

II tyrime po trijų mėnesių buvo stebimas reikšmingas ($p < 0,001$) psichologinės gerovės ($d = 0,58$) padidėjimas ir sumažėjęs suvoktas stresas ($d = -0,70$), depresijos ($d = -0,57$) bei nerimo ($d = -0,49$) simptomai. III tyrimo rezultatai parodė, kad šie pagerėjimai taip pat išliko po šešių mėnesių – psichologinė gerovė ($d = 0,45$), suvoktas stresas ($d = -0,70$), depresija ($d = -0,38$) ir nerimo simptomai ($d = -0,64$) išliko reikšmingai ($p < 0,05$) geresni nei prieš intervenciją.

Psichikos rodiklių tarpusavio sąveika (I tyrimas). Pirmajame tyrime nustatyta, kad po intervencijos išlikę aukštesni nerimo lygiai prognozavo didesnį suvokto streso ($\beta = 0,38$, $p < 0,01$) ir depresijos ($\beta = 0,55$, $p < 0,001$) lygį po trijų mėnesių. Tuo tarpu aukštesnė psichologinė gerovė po intervencijos prognozavo mažesnį streso lygį ($\beta = -0,30$, $p < 0,01$).

Psichologo parama (II tyrimas). Antrame tyrime nustatyta, kad šešių savaičių trukmės intervencijoje terapeutai iš pasirenkamos paramos grupės skyrė vidutiniškai po dvi minutes kiekvienam dalyviui – beveik septynis kartus mažiau nei terapeutai iš reguliarios paramos grupės.

Rezultatai parodė, kad, kaip ir standartinės programos naudotojai, dalyviai, naudojęsi programa su pasirenkama parama, po intervencijos patyrė reikšmingą ($p < 0,01$) pagerėjimą psichologinio atsitraukimo ($d = 0,31$), atsipalaidavimo ($d = 0,21$) ir meistriškumo ($d = 0,30$) srityse, tačiau ne kontrolės ($d = 0,13$, $p = 0,205$). Be to, analizė atskleidė nedidelius, bet reikšmingus tarpgrupinius skirtumus psichologinio atsitraukimo ($\beta_{pre\text{-}post} = 0,21$, $p = 0,004$) ir atsipalaidavimo ($\beta_{pre\text{-}post} = 0,16$, $p = 0,047$) pokyčiuose, rodydama didesnį vidutinį pagerėjimą grupėje, kuri gavo reguliarų palaikymą. Vis dėlto po trijų mėnesių stebėsenos reikšmingų skirtumų tarp grupių

nenustatyta, o reikšmingas ($p < 0,01$) pagerėjimas psichologinio atsitraukimo ($d = 0,42$), atsipalaidavimo ($d = 0,36$), meistriškumo ($d = 0,45$) ir kontrolės ($d = 0,27$) srityse išliko ir pasirenkamos paramos grupėje.

Dalyviai, kuria naudojosi programa su pasirenkama parama, taip pat patyrė reikšmingus pagerėjimus psichologinės gerovės, suvokto streso, depresijos ir nerimo simptomų rodikliuose tiek iškart po intervencijos ($p < 0,01$), tiek po 3 mėnesių ($p < 0,001$). Pokyčių tarp grupių laikui bėgant nenustatyta.

Reguliarios paramos grupės dalyviai dažniau jungėsi prie programos ($p = 0,003$), bet kiti naudojimosi rodikliai reikšmingai nesiskyrė ($p > 0,50$). Be to, nepriklausomai nuo paramos tipo, daugiau nei 75 proc. dalyvių programą vertino kaip naudingą ($\chi^2(2) = 0,62$, $p = 0,734$), 85 proc. – kaip patinkančią ($\chi^2(2) = 1,53$, $p = 0,466$), o 90 proc. – kaip lengvai naudojamą ($\chi^2(2) = 1,38$, $p = 0,501$).

Programos naudojimas ir priminimai (III tyrimas). III tyrimo rezultatai parodė, kad nors dauguma dalyvių (98 proc.; $n = 39/40$) teigiamai vertino individualiai pritaikytus priminimus, jie nepadidino dalyvių naudojimosi programa rodiklių ($p > 0,50$). Individualizuotų priminimų grupėje reikšmingas ($p < 0,05$) bendro streso atsigavimo balo pagerėjimas buvo nustatytas tiek iškart po intervencijos ($d = 0,34$), tiek po 6 mėnesių ($d = 0,38$), lyginant su pradiniu matavimu. Tačiau lyginant su standartinės intervencijos grupe, skirtumų po intervencijos nenustatyta ($\beta = 0,01$, $p = 0,93$). Po šešių mėnesių buvo pastebėtas reikšmingas skirtumas ($\beta = -0,24$, $p = 0,03$), rodantis, kad standartinės intervencijos grupėje streso atsigavimo pagerėjimas buvo didesnis.

Dalyviai, naudoję programą su individualizuotais priminimais, po 6 mėnesių taip pat parodė reikšmingą psichologinės gerovės ($d = 0,40$) pagerėjimą ir sumažėjusius suvokto streso ($d = -0,47$), depresijos ($d = -0,11$) bei nerimo simptomus ($d = -0,57$). Tarpgrupinių skirtumų matuojant iškart po intervencijos ir praėjus 6 mėnesiams nenustatyta.

Naudotojų patirtis (IV tyrimas). Ketvirtasis, kokybinis tyrimas atskleidė pagrindinius veiksnius, susijusius su programos naudojimusi ir programos nutraukimu. Dažniausiai dalyviai nurodė laiko stoką, per didelį darbo krūvį, nuovargį ar techninius sunkumus. Be to, analizuojant dalyvių patirtis paaiškėjo, kad tiek asmeniniai veiksniai (motyvacija, psichologinis atsakas, gyvenimo aplinkybės), tiek programos ypatumai (turinio aktualumas, techninis prieinamumas, psichologo parama) susiję su programos nutraukimu.

4 DISKUSIJA

4.1. Pokyčių ilgalaikiškumas

Šioje disertacijoje vertinta internetinė intervencija „For Recovery from Stress“ (FOREST), kuri ankstesniuose tyrimuose (Dumarkaitė ir kt., 2023) parodė vidutinio ar didelio stiprumo poveikį keturiose atsigavimo nuo streso srityse. Ji taip pat padėjo sumažinti suvokiamą stresą, depresijos ir nerimo simptomus bei pagerinti psichologinę savijautą. Tačiau, stebėjimo po trijų mėnesių rezultatai parodė, kad kontrolės, nerimo ir depresijos pokyčiai neišliko reikšmingi.

Doktorantūros tyrimai (II ir III; Nomeikaitė ir kt., 2023; 2025) parodė, kad atnaujinta internetinės atsigavimo nuo streso intervencijos versija, kurioje buvo sustiprinta kontrolės sritis, svarbi atsigavimo nuo streso procesui (Sonnentag ir Fritz, 2007), užtikrino teigiamus pokyčius iki trijų mėnesių visose psichikos sveikatos srityse, įskaitant kontrolę. Ilgalaikis depresijos ir nerimo sumažėjimas gali būti siejamas su sustiprėjusiu kontrolės jausmu, kurio stoka dažnai susijusi su neigiamu savęs vertinimu ir emociniu išsekimu (Rosenfield, 2009). Šešių mėnesių stebėjimo rezultatai patvirtino šių pokyčių stabilumą, atitinkantį ankstesnių tyrimų duomenis (Svärdman ir kt., 2022).

Be to, septyni iš dešimties naudotojų nurodė pagerėjusią psichologinę savijautą, o beveik pusė – fizinę sveikatą, taip patvirtinant teoriją, kad efektyvus atsigavimas nuo streso atkuria vidinius išteklius ir stiprina tiek psichinę, tiek fizinę sveikatą (Sonnentag ir Fritz, 2007).

4.2. Psichikos rodiklių tarpusavio sąveika

Atliekant antrinę duomenų analizę (I tyrimas; Truskauskaitė ir kt., 2024), nustatyta, kad aukštesnis psichologinės gerovės lygis po intervencijos prognozavo mažesnį suvokiamą stresą po trijų mėnesių. Tai atitinka atsigavimo nuo streso teoriją (Sonnentag ir Fritz, 2007), pagal kurią teigiamos emocijos veikia kaip vidiniai ištekliai, stiprinantys pasitikėjimą savimi ir savivertę (Philippe ir kt., 2018). Tai, savo ruožtu, gali padėti žmonėms įveikti kasdienius iššūkius ir veikti kaip apsauga nuo streso (Cohen ir Williamson, 1988).

Tuo tarpu didesnis nerimo lygis po intervencijos buvo susijęs su didesniu suvoktu stresu ir depresijos simptomais po trijų mėnesių. Šie duomenys rodo, kad IKET programose gali būti naudinga integruoti terapinius mechanizmus, mažinančius pasikartojančias neigiamas mintis – vieną iš pagrindinių nerimo palaikymo veiksnių (Gu ir kt., 2015). Be to, pradiniai nerimo ir gerovės

rodikliai gali būti naudojami siekiant asmeniškai pritaikyti intervencijas, pasiūlant papildomus išteklius (pvz., modulius) asmenims, kurie patiria kompleksinių sunkumų (Hadjistavropoulos ir kt., 2024).

4.3. Psichologo parama

II doktorantūros tyrimo rezultatai parodė (Nomeikaitė, Andersson ir kt., 2023), kad reguliari psichologo parama raštu nesuteikė papildomos naudos ilgalaikiams psichikos sveikatos rezultatams, lyginant su paramos pagal poreikį formatu. Taip pat ši parama neturėjo reikšmingo poveikio ir programos naudojimui. Nors reguliarios paramos dalyviai jungėsi dažniau, kitų įsitraukimo į programą rodiklių skirtumai tarp grupių nebuvo reikšmingi. Be to, pasirinktinis paramos formatas buvo kelis kartus mažiau reikalaujantis išteklių – terapeutai skyrė vidutiniškai vos dvi minutes dalyviui per visą šešių savaičių programą.

Šie duomenys atitinka ankstesnius tyrimus (Berger ir kt., 2011; Bisby ir kt., 2022; Johansson ir Andersson, 2012), rodančius, kad pagal poreikį teikiama parama su automatiniais priminimais yra pakankama palaikyti įsitraukimą ir pasiekti reikšmingus pokyčius. Šiame doktorantūros tyrime intervencijos dalyviai periodiškai bendravo su tyrėjais ir programos administratoriais, o tai galėjo prisidėti prie palaikymo jausmo net ir be reguliaraus terapeuto dalyvavimo. Taigi, svarstant psichologų vaidmenį internetinėse intervencijose, svarbu atsižvelgti ne tik į kliento ryšį su terapeutu, bet ir su pačia programa (Berger, 2017).

4.4. Programos naudojimas ir priminimai

FOREST programos naudojimo analizė parodė (Dumarkaitė ir kt., 2023; Nomeikaitė, Andersson ir kt., 2023), kad tik apie pusė dalyvių susipažino su visa intervencijos medžiaga, o visas užduotis atliko penktadalis, kas atitinka ankstesnių IKET tyrimų duomenis (Cross ir kt., 2022). Bandymas pagerinti įsitraukimą individualiai pritaikytais SMS priminimais (Nomeikaitė ir kt., 2025) nebuvo sėkmingas. Priešingai nei ankstesniuose tyrimuose (Kelders ir kt., 2012), priminimai neturėjo poveikio prisijungimų, atliktų užduočių ar modulių skaičiui, taip pat ir psichikos sveikatos rodikliams.

Dar daugiau, nustatyta, kad priminimus gavę dalyviai po šešių mėnesių patyrė mažesnį atsigavimo nuo streso pagerėjimą. Tikėtina, kad priminimai, skirti priminti atlikti atsipalaidavimo pratimus, galėjo nejučia susilpninti dalyvių kontrolės ir kompetencijos jausmą, kurie yra svarbūs atsigavimo nuo streso veiksniai (Sonnentag ir Fritz, 2007). Šis rezultatas atitinka literatūrą,

pagal kurią išorinė motyvacija, ypač kai ji suvokiama kaip spaudimas atlikti užduotis, gali veikti priešingai ir trukdyti terapiniams pokyčiams (Alfonssoni ir kt., 2016); Deci ir Ryan, 2000b, 2000a). Tai patvirtina, jog IKET programose būtina atidžiai derinti paramos lygį, kad jis stiprintų, o ne silpnintų vidinę motyvaciją.

4.5. Naudotojų patirtis

Pirminio FOREST veiksmingumo tyrimo (Dumarkaitė ir kt., 2023) bei vėlesnių doktorantūros tyrimų (II ir III tyrimas; Nomeikaitė, Andersson ir kt., 2023; Nomeikaitė ir kt., 2025) rezultatai parodė, kad dauguma naudotojų programą vertino teigiamai. Aštuoni iš dešimties ją laikė naudinga ir patenkinančia, o devyni iš dešimties – lengvai naudojama ir rekomenduotų ją kitiems sveikatos priežiūros darbuotojams.

Vis dėlto nemaža dalis dalyvių nutraukė programos naudojimą anksčiau lsiko. Siekiant geriau suprasti šį reiškinį, atliktas kokybinis tyrimas (IV tyrimas; Nomeikaitė, Geleželytė ir kt., 2023). Rezultatai parodė, kad naudotojų patirtį veikė tiek asmeniniai, tiek su programa susiję veiksniai. Asmeniniai aspektai apėmė psichologinį atsaką į programą, individualius motyvacijos bei savistabos skirtumus ir gyvenimo aplinkybes. Su programa susiję veiksniai – turinio aktualumas, techninis prieinamumas, užduočių sudėtingumas ir paramos lygis – galėjo tiek padėti, tiek trukdyti įsitraukimui. Panašiai kaip ir ankstesniuose tyrimuose (Johansson ir kt., 2015; Waller ir Gilbody, 2009), priežastys, dėl kurių buvo nutrauktas naudojimas, dažniau buvo asmeninės nei susijusios su programa – laiko stoka, nuovargis, motyvacijos sumažėjimas ar kiti gyvenimo įsipareigojimai.

Sveikatos priežiūros darbuotojai dažnai susiduria su dideliu darbo krūviu ir nuovargiu, todėl jų įsitraukimą į psichologines intervencijas riboja laiko stoka ir energijos trūkumas. Šie veiksniai, kaip rodo ir ankstesni tyrimai (Cross ir kt., 2022), didina gydymo naštą ir mažina motyvaciją užbaigti intervenciją. Todėl svarbu taikyti lankstesnes ir mažesnių pastangų reikalaujančias priemones, tokias kaip „pastangas optimizuojančios intervencijos“ (Baumel ir Muench, 2021), kurios leidžia palaipsniui įsitraukti ir pritaikyti užduotis individualiems poreikiams.

Apibendrinant, nors FOREST programa buvo priimtina ir daugumai naudinga, siekiant padidinti jos poveikį būtina siekti individualaus pritaikymo bei atsižvelgti į dalyvių kasdienius iššūkius. Asmeniškai pritaikyta psichologinė pagalba gali padėti užtikrinti didesnį įsitraukimą bei ilgalaikį psichinės sveikatos pagerėjimą.

4.6. Tyrimų ribotumai

Vertinant doktorantūros tyrimų rezultatus, svarbu atsižvelgti į kelis ribotumus. Pirma, dalyvavimas IKET programoje galėjo būti paveiktas struktūruotos atsitiktinių imčių kontroliuojamo tyrimo aplinkos (Kelders ir kt., 2012), todėl būtina tirti programos veiksmingumą realiomis sąlygomis. Duomenys buvo renkami tik trimis laiko momentais naudojant savistabos klausimynus, tad ateityje tikslinga taikyti dažnesnius vertinimus, pvz., taikant momentinį ekologinį vertinimą (Shiffman ir kt., 2008). Be to, šešių mėnesių stebėjimas laikytinas gana trumpu, todėl reikėtų analizuoti ir ilgesnio laikotarpio pokyčius – ankstesni tyrimai rodo, kad IKET streso valdymo programų poveikis gali išlikti net iki trijų metų (Ruwaard ir kt., 2007).

Dėl išteklių apribojimų buvo analizuojami tik du programos komponentai – psichologo parama ir individualiai pritaikyti priminimai. Ateities tyrimai turėtų identifikuoti, kurie elementai (pvz., dėmesingo įsisąmoninimo praktikos ar konkretūs moduliai) lemia efektyvumą.

Kitas ribotumas susijęs su įvertinimo instrumentais. Kai kurie klausimynai (pvz., PSS-4) pasižymėjo žema patikimumo verte, todėl galėjo riboti jautrumą streso pokyčiams. Tai apsunkina rezultatų palyginimą tarp tyrimų ir rodo poreikį taikyti nuoseklius, patikimus vertinimo įrankius.

Tyrimų imčių sudėtis taip pat riboja rezultatų apibendrinimą. Dauguma dalyvių buvo savanoriškai užsiregistravusios moterys, dirbančios sveikatos priežiūros srityje, o tai kelia klausimų dėl rezulatų pritaikomumo vyrams ar kitoms profesinėms grupėms. Šiuo metu jau vykdomi tyrimai, vertinantys FOREST tinkamumą ir kitoms grupėms, pavyzdžiui, paaugliams (Želvienė ir kt., 2023).

Nepaisant ribotumų, šis doktorantūros projektas buvo pirmasis sistemingai nagrinėjęs veiksnius, lemiančius IKET veiksmingumą sveikatos priežiūros darbuotojų streso atsigavimo kontekste. Atsitiktinių imčių tyrimų dizainas sustiprino rezultatų patikimumą, o kokybinių duomenų įtraukimas leido geriau suprasti naudotojų patirtis ir veiksnius, formuojančius sėkmingą įsitraukimą į internetines intervencijas.

IŠVADOS

1. Internetinė kognityvinės elgesio terapijos intervencija yra veiksminga gerinant sveikatos priežiūros darbuotojų atsigavimo nuo streso procesą, taip pat stiprinant jų psichologinę gerovę bei mažinant suvokiamą stresą, depresijos ir nerimo simptomus. Šie pokyčiai išlieka iki šešių mėnesių po programos pabaigos.
2. Po internetinės intervencijos nerimo lygis siejosi su mažesniu suvokiamo streso ir depresijos lygiu po trijų mėnesių. Didesnė psichologinė gerovė iš karto po intervencijos buvo susijusi su mažesniu suvokiamo streso lygiu po trijų mėnesių. Šie rezultatai pabrėžia nerimo mažinimo ir psichologinės gerovės stiprinimo svarbą internetinėse atsigavimo nuo streso intervencijose sveikatos priežiūros darbuotojams.
3. Tiek su reguliariai teikiama, tiek su esant poreikiui pasirenkama psichologo parama internetinė intervencija buvo veiksminga palaikant atsigavimo nuo streso procesą, psichologinę gerovę, sumažėjusį suvokiamą stresą, depresijos bei nerimo simptomus. Psichologo paramos lygis neturėjo reikšmingos įtakos programos naudojimo rodikliams. Pasirenkamos paramos formatas, kai vietoje kassavaitinio psichologo bendravimo su klientu raštu dalyvis gali kreiptis į psichologą pagal poreikį, reikalavo mažiau psichologo laiko, todėl buvo efektyvesnis naudojamų resursų požiūriu.
4. Individualiai pritaikyti priminimų laikai ir dažnumas nepagerino programos naudojimo rodiklių ir netgi galėjo trukdyti atsigavimo nuo streso procesui. Nors dauguma naudotojų individualiai pritaikytus priminimus, siunčiamus trumpųjų žinučių formatu, vertino teigiamai, tai gali būti ne pati veiksmingiausia priemonė siekiant paskatinti sveikatos priežiūros darbuotojų įsitraukimą į intervenciją.
5. Remiantis atliktu kokybiniu tyrimu, įsitraukimas į internetines atsigavimo nuo streso intervencijas apima įvairius asmeninius ir su programa susijusius veiksnius. Asmeniniai veiksniai, tokie kaip gyvenimo aplinkybės, asmeninės savybės, psichologinis atsakas į programą, bei su programa susiję veiksniai, įskaitant techninius elementus, turinio tinkamumą ir gaunamos pagalbos lygį, gali palengvinti arba apsunkinti naudotojo patirtį. Siekiant skatinti dalyvavimą internetinėse intervencijose reikalingas holistinis požiūris, apimantis tiek individualius poreikius, tiek programos struktūrą.

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ABOUT THE AUTHOR

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The doctoral dissertation by Augustė Nomeikaitė was prepared between 2021 and 2025 at the Center for Psychotraumatology, Institute of Psychology, Faculty of Philosophy, Vilnius University. The doctoral research aimed to explore factors associated with sustained mental health improvements among health care workers following an internet-delivered cognitive behavioral therapy intervention for stress recovery. It examined the long-term effects of the intervention, interrelations between mental health outcomes, the role of guided support, the impact of tailored prompts, and users' experiences with the intervention. A mixed-methods approach was employed, comprising four published studies: two randomized controlled trials, one qualitative study, and one secondary data analysis. Overall, the dissertation demonstrates the lasting efficacy of an internet-delivered stress recovery intervention in supporting the mental health of health care workers, informs the resource-efficient design of internet-delivered interventions, and highlights the importance of a person-centered approach in digital mental health care.

NUO / SINCE 1579

Fragmentas iš Vilniaus jėzuitų kolegijos rektoriaus Jakubo Vujeko (1541–1597) didžiausios apimties ir reikšmingiausio XVI a. lietuvių kalbos rašto paminklo, pamokslų rinkinio *Postilla catholicka* (Vilnius, 1599), Mikalojaus Daukšos (tarp 1527 ir 1538–1613) vertimo iš lenkų į lietuvių kalbą.

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Fragment from the Lithuanian edition of *Postilla catholicka* (Vilnius, 1599), a collection of sermons written by the Rector of Vilnius Jesuit College Jakub Vujek (1541–1597) and the most significant and largest example of 16th c. Lithuanian writing, translated from the Polish by Mikalojus Daukša (1527/1538–1613).

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