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Using Digital Interventions for Occupational Mental Health Problems: A Scoping Review

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Abstract

This thesis aims to provide an overview of how, in practice, digital interventions for occupational mental health (OMH) problems are used in occupational health care. The research method of a scoping review was used to map literature on the subject field, including 22 articles in total.

The research data was collected based on the PCC (population, context and concept) approach of a scoping review method by the Joanna Briggs Institute. The data was analysed using the Neuman Systems Model's theoretical framework and three prevention levels – primary, secondary and tertiary. The use of digital interventions for OMH problems was explored from two perspectives: 1) a client and 2) a health care professional.

The study results indicated that the digital interventions for OMH problems are used in the workplace and health care settings mainly for stress, depression, anxiety and distress, and sleep disturbances and, to some extent, burnout symptoms. The interventions are used at all prevention levels to promote OMH, prevent, manage or treat the OMH problems and support the clients' recovery and return to optimal wellness. The most used and effective digital intervention activities for OMH problems were online therapies, especially cognitive-behavioural therapy (CBT). The Finnish research literature pointed out the use of low-threshold online therapy and self-help interventions for OMH problems via the website Mielenterveystalo.fi for individuals from the whole country. Online therapies are also included in the Finnish Current Care Guidelines (Käypä hoito -suositus) for depression.

This study's results can primarily inform healthcare professionals about the practical use of the interventions. However, the results will also be useful for customers, employers and technology developers, as digital interventions are developed in a multi-professional manner.

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Language: English   **Key words:** occupational health, mental health problems, digital interventions, Neuman Systems Model, prevention, scoping review

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EXAMENSARBETE

Författare: Kärt Aavik
Utbildning och ort: Sjukskötare, Vasa
Handledare: Marie Hjortell

Titel: Användning av digitala interventioner för arbetsrelaterade psykiska hälsoproblem: en scoping review

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Abstrakt

Syftet med detta examensarbete är att ge en överblick av hur digitala interventioner för arbetsrelaterade psykiska hälsoproblem i praktiken används i företagshälsovården. Som forskningsmetod användes scoping review för att kartlägga ämneslitteraturen som bestod av totalt 22 artiklar.

Forskningsdata samlades in enligt PCC-metoden (population, context, concept) för Joanna Briggs Instituts scoping review metod. Data analyserades med hjälp av den teoretiska referensramen om omvårdnadsteori för Neumans systemmodell och tre nivåer av primär, sekundär och tertiär prevention. Användningen av digitala interventioner för arbetsrelaterade psykiska problem undersöktes ur 1) klientens och 2) sjukvårdspersonalens synpunkt.

Studieresultaten visade att digitala interventioner för arbetsrelaterade psykiska hälsoproblem används på arbetsplatsen och i hälsovården främst för stress, depression, ångest, sömnstörningar och i viss utsträckning också för utbrändhet. Interventioner används på alla förebyggande nivåer för att främja mentalhälsa, förebygga, hantera eller behandla psykiska hälsoproblem och stödja klientens återhämtning och återgå till optimal hälsa. De mest använda och effektiva digitala interventionsåtgärderna för de psykiska problemen var online-terapier, särskilt kognitiv beteendeterapi (KBT). I den finska forskningslitteraturen påpekades användningen av lågtröskelbehandling och självhjälpsinsatser via webbplatsen Mielenterveystalo.fi för individer från hela landet. Onlineterapier ingår också i Finlands nationell Käypä hoito (God medicinsk praxis) - rekommendationer för depression.

Studiens resultat kan i första hand informera hälso- och sjukvårdspersonal om den praktiska användningen av interventionerna. Resultaten kommer dock också att vara användbara för klienter, arbetsgivare och teknikutvecklare, eftersom digitala insatser utvecklas på ett multiprofessionellt sätt.

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Språk: Engelska   **Nyckelord:** företagshälsa, psykiska hälsoproblem, digitala interventioner, Neumans systemmodell, scoping review, översiktsstudie
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OPINNÄYTETYÖ

Tekijä: Kärt Aavik
Koulutus ja paikkakunta: Sairaanhoitaja, Vaasa
Ohjaaja: Marie Hjortell

Nimike: Digitaalisten interventioiden käyttö työperäisiin mielenterveysongelmiin: kartoittava tutkimus

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Päivämäärä: 4.5.2021 **Sivumäärä:** 60   **Liitteet:** 9

Tiivistelmä

Tämän opinnäytetyön tavoitteena on antaa yleiskatsaus siihen, miten digitaalisia interventioita käytetään työperäisiin mielenterveysongelmiin työterveyshuollossa käytännössä. Tutkimusmenetelmänä käytettiin kartoittavaa kirjallisuustutkimusta, jonka lähteinä oli yhteensä 22 tutkimusaihetta koskevaa artikkelia. Tutkimustieto kerättiin Joanna Briggs -instituutin scoping review menetelmän PCC (population, context, concept) -lähestymistavan mukaan. Tiedot analysoitiin käyttäen Neuman Systems Model järjestelmämallin teoreettista viitekehystä sekä kolmea preventiotasoa: primaaria, sekundaaria ja tertiääriä ennaltaehkäisyä. Digitaalisten interventioiden käyttöä työperäisiin mielenterveysongelmiin selvitettiin 1) asiakkaan ja 2) terveydenhuollon ammattilaisen näkökulmasta.

Tutkimustulokset osoittivat, että digitaalisia interventioita käytetään työperäisiin mielenterveysongelmiin sekä työpaikoilla että terveydenhuollossa lähinnä stressiin, masennukseen, ahdistuneisuuteen sekä unihäiriöihin, ja jossain määrin työuupumuksen oireisiin. Interventioita käytetään kaikilla ennaltaehkäisyn tasoilla työperäisen mielenterveyden edistämiseen, mielenterveysongelmien ehkäisyyn, hallintaan tai hoitoon sekä asiakkaiden palautumiseen ja optimaaliseen hyvinvoinnin saavuttamiseen. Käytetyimpiä ja tehokkaimpia digitaalisia interventiotoimia ovat verkkoterapiat, erityisesti kognitiivinen käyttäytymisterapia (KKT). Suomalaisessa tutkimuskirjallisuudessa nostettiin esille matalan kynnyksen verkkoterapia ja omatoimisten interventioiden käyttö yksityishenkilöille suunnatun Mielenterveystalo.fi-sivuston kautta sekä masennuksen Käypä hoito -suositukseen kuuluvat nettiterapiat.

Tutkimuksen tulokset antavat ensisijaisesti tietoa terveydenhuollon ammattilaisille digitaalisten interventioiden käytöstä käytännössä. Tulokset ovat hyödyllisiä myös asiakkaille, työnantajille ja teknologian kehittäjille, sillä digitaalisia interventioita kehitetään moniammatillisesti.

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1 Introduction

My interest in occupational health care originates from twenty-year work-life experience outside the health care field, already before starting nursing studies. Being part of significant changes in a large company's internal and external operational environments, I have seen and experienced how increasing uncertainty in work-life and growing demands set on employees affect their wellbeing, including mental health.

The Finnish occupational health care system and services, looking after employees' health, especially from a preventive perspective, are bound by several laws. At the same time, an employer can engage its employees with comprehensive additional health care services. The nursing studies have enabled me to learn more about occupational health care services and related laws and regulations, providing a better overall picture on this subject. The prior experiences have sparked especially the interest to further investigate in this thesis the aspect of employees' mental health problems and interventions provided by occupational health care.

When following news media and publications before and during the thesis writing process, I frequently ran into news and stories related to mental health disorders among employees, including depression and its consequences. People have, often anonymously, shared their experiences of how and why they ended up on sick leave and long-term or permanent absenteeism, i.e., retirement from the work-life (Yle, 2019a; Yle, 2019b; Yle, 2019c). Some have chosen to change their profession instead of returning to their jobs (Yle, 2020a).

In the ongoing digital transformation of health care services, availability and personal use of information, together with novel communication technologies, lead to new ways of managing our health and care through mobile applications (mHealth), Internet-based self-care programmes (eHealth) and wellness technology. During the last years, occupational health care providers have also started to increasingly offer their clients digital services and interventions, which are discussed more particularly in this thesis's theoretical part. (International Labour Organization, 2019.)

Digital health care interventions, including those for promoting and treating mental health, have now been used for several years. The new ones are developed continuously, mainly by private occupational health care service providers. Several employers have already reported positive results of declining absences after starting to enable digital interventions to their employees (Yle, 2020b). Furthermore, there is even more future potential in digital applications that support mental health as a rapidly evolving area with many innovations (Tivi, 2019).

During the thesis writing, the world is struggling to survive from the novel coronavirus and COVID-19. These uncertain times with substantial health risk are creating people an additional psychological burden. In addition to health risks, many are in danger of losing their jobs or becoming laid off temporarily. Employers have implemented distant working disciplines, if only possible due to the nature of the work, to protect the employee health and safety by minimising the risk of virus spread at occupational facilities.

Providing personal health care services with the physical meeting is currently either minimised or disabled entirely, which has pushed health care providers even more to use existing or completely new digital interventions to meet the increased service demand (Mielenterveysliitto, 2020). Thereby, having alternatives for digital health care services and interventions has become even more critical to support people despite their physical location.

2 Background

This chapter presents the central concepts of the thesis work – the role of occupational health care and nurses, various aspects related to employees' occupational mental health and digital interventions provided for preventing mental health problems. I describe the occupational health care (OHC) setting in Finland since the country-specific legal frameworks affect the services related to occupational health and safety.

In this study, employees are referred to as individuals, persons, workers, users, patients, and clients. Occupational mental health (OMH) is also referred to as mental health in the workplace or workplace mental health.

2.1 Occupational mental health situation in Finland

According to KELA (2019), mental health disorders were the most common reason for receiving sickness benefits in Finland in 2018. Changes and increasing demands towards employees and structural changes in society are seen as challenging peoples' coping and mental health at work. The growing amount of mental health related absences from working life is harmful to all parties: to employees themselves, to employers, and society overall. In addition to employers, several parties and organisations looking after the work-life and wellbeing of employees – such as the Finnish institute of health and welfare (THL) and Finnish work pension companies – have also raised this issue, endangering the future of working life and workforce. Moreover, they point out the expenses the absenteeism from work-life – especially the permanent one – is causing to our society. (KELA, 2019.)

In 2019, the cost of mental health problems in Finland was already 5,3 per cent of Gross Domestic Product (GDP). This share has increased during recent years and is among the highest in the European Union (EU). Mental health is seen as a major predictor of short working lives. The Finnish Institute of Occupational Health (Työterveyslaitos) has appealed to employers to use preventive measures for mental health problems. It has, among other actions, developed in cooperation with employers and mental health experts a toolkit for promoting mental health at workplaces. (Työterveyslaitos, 2019a; 2019b.)

Correspondingly, the alarming signals from the work-life are seen in statistics: mental and behavioural disorders, especially depression, are the main reason for retirement due to disability. According to the Finnish Centre for Pensions, the total amount of disability pension recipients in Finland was 197,000 persons at year-end 2019. More than half of those – 52 per cent or 103,000 persons – suffered from mental and behavioural disorders. Of this figure, nearly 30 per cent of persons suffered from depression and 25 per cent from schizophrenia. The disability retirees due to depression occur in all age groups between 16 to 60+ years, while the largest groups are the oldest (55-64 yrs.) and the middle-age retirees (45-54 yrs.). (Finnish Centre for Pensions, 2020: 5, 12.)

Since spring 2020, the corona pandemic has changed the way of working for many employees. It has also placed an even more significant burden on mental health for many profession groups, such as nurses and teachers. It will be interesting to follow the future

statistics of disability pensions by the Finnish Centre for Pensions, how the pandemic possibly affects the employees' mental health.

2.2 Occupational health care

Finland is an exceptional country, where occupational health care services for employees are defined and secured by several laws, as well as looked after by special authorities and organisations, such as the Finnish Ministry of Social Affairs and Health (MSAH), the National Institute for Health and Welfare and the Finnish Institute of Occupational Health (FIOH). The major laws, which need to be complied with, are the Occupational Health Care Act (No. 1383/2001), Occupational Health and Safety Act (No. 738/2002), Act on Occupational Safety and Health Enforcement and Cooperation on Occupational Safety and Health at Workplaces (No. 44/2006) and legislation on occupational accidents and occupational diseases.

2.2.1 The role of occupational health care

According to WHO (2020), occupational health "deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards". In Finland, the essential role of OHC in collaboration with the employer is to promote employees' health and working ability, functional capacity and working safely. The aim is to promote also the functioning of the work community in an efficient way. Additionally, the role includes preventing work-related diseases and accidents for individuals where the focus is on minimising the work-related risks and hazards. (Työturvallisuuskeskus, 2020; Työterveyslaitos, 2020a.)

Employers are responsible for providing OHC services to all employees equally and free of charge. The statutory services which the employer is obliged to organise are such as work-related health examinations, workplace survey, support for work capacity and clarification of illnesses or symptoms related to work (Occupational Safety and Health Authority, 2020a). Additionally, employers can voluntarily organise to their employees, also medical and other health care services. The services included in OHC are defined in the occupational health care agreement between OCH and employer. They are affected by workplace conditions, the nature of work and changes in that. (Työterveyslaitos, 2020a.)

A multi-professional team provides OHC services, usually comprising occupational health physician, nurse, physiotherapist and psychologist. The purpose of the team is to support workplaces by designing and implementing needed services and monitoring the effectiveness of collaboration together with the client, i.e., employer. The multi-professional team can also include other health care experts and external partners, depending on the needs, for example, from diverse health care associations. (Työterveyslaitos, 2020b.)

The Finnish Ministry of Social Affairs and Health states in their recent strategy alignment 'The policy for the work environment and wellbeing at work until 2030' (2019a), that working life, the contents of work, the ways and modes of working, as well as Finland's workforce, are transforming. The employers, employees, and OHC must collaborate and take measures to increase workers' working ability and return to work. According to this publication, the most significant causes of temporary and permanent disability are caused by musculoskeletal conditions and mental health disorders. Thereby, measures must be targeted at preventing, treating, and rehabilitating these health conditions to reduce disability.

2.2.2 The role of occupational health nurses

In Finland, to be qualified as an occupational health nurse (OHN), one with a registered nurse degree needs to complete the in-service training in occupational health care according to the Occupational Health Care Act (1383/2001) and the Government Decree (708/2013). (Työterveyslaitos, 2020b.)

OHN is a health promotion expert and utilises methods promoting employees' wellbeing, physical, mental, and social health to prevent illnesses. OHN has a wide variety of responsibilities, including appropriate and financial overall planning, coordination, monitoring of implementation and effectiveness, and developing the quality of the employers' OHC according to needs. (Työterveyslaitos, 2020c.)

The OHN implements, for example, job surveys, health inspections and health counselling, first aid preparedness planning, health care education and OHC nursing. The nurses

promote and monitor employees' functional capacity independently and in cooperation with OHC professionals, and they develop OHC activities according to the needs of the workplace. (Työterveyslaitos, 2020c.)

Naumanen-Tuomela (2001) finds it necessary that OHC nurses "have life and work experience, and they work in a neutral, holistic, ethical, and confidential way". OHNs must update their evidence-based knowledge and develop competencies continuously since they have a crucial role in promoting employees' health (Naumanen, 2007). It also includes closely following the changes in working life and society and how that affects the employees, work environment and communities. The central requirement is multidisciplinary knowledge of health, work, the client, and the employer or organisation. (Työterveyslaitos, 2020c.)

OHN is often the first health care professional meeting the client in the OHC setting. They need to thoroughly familiarise themselves with the clients' situation, get a holistic insight, and evaluate the next-step actions. In these meetings, in addition to health promotion interventions, assessing the employee's working ability, recognising the work-related risks and symptoms of potential somatic illnesses and psychological disorders is essential. For example, Ikonen (2012) found that the role of OHNs is crucial in detecting insomnia, burnout, and depressive disorders. Familiarising themselves with the clients' work environment at the physical working premises helps OHNs assess the risks and prevent harm caused by chemical or biological factors and stress (Naumanen, 2009).

2.3 Occupational mental health

This chapter defines occupational mental health (OMH) and discusses different aspects affecting employees' mental health in an occupational context. The factors influencing wellbeing at work, employees' working ability and psychosocial risks are described. Additionally, some common mental health related problems, such as distress, burnout and anxiety and their relation to depression (Carolan et al., 2017), are discussed.

Mental health is one of the cornerstones of people's health. According to Leka & Jain (2014), the definition of mental health is varying on different cultures, assessments and

professional theories. According to WHO (2018a), mental health is "a state of wellbeing in which an individual realises his or her abilities, can cope with the normal stresses of life, can work productively and can contribute to his or her community". To promote mental health, we need actions that improve psychological wellbeing and create a favourable environment supporting that. As stated in the European Framework for Action on Mental Health and Well-being (2016), mental health can also be seen as a human right and a key resource to promote and protect the population's wellbeing.

Mental disorders are "clinically significant conditions characterised by altered thoughts, emotions or behaviour with associated distress or impaired functioning" (WHO, 2005). They can generally be classified in two main ways: ICD (International Classification of Disease) or DSM (Diagnostic and Statistical Manual of Mental Diseases). ICD is the official world classification, also used by the World Health Organization (WHO). In contrast, DMS is used for clinical diagnosis mainly in the US; however, it influences diagnosing even globally as being considered more accurate (Tyrer, 2014).

Mental health problems are referring to symptoms that are associated with a mental disorder. The symptoms are not severe enough to be diagnosed as a mental disorder; however, they cause significant suffering and affect work performance negatively. One example of these problems is stress, leading to various symptoms related to mental disorders, such as distress. (WHO, 2005.)

By occupational mental health (OMH) is meant the mental health related to work and the workplace. There are several factors, both inside and outside of the workplace, affecting the OMH. Occasionally, mental health problems are stated not being an employer's responsibility as they develop outside the workplace. However, as summarised by Memish et al. (2017) and Gillen et al. (2017), there is a growing amount of evidence on the increased risk of mental health related disorders, such as anxiety, burnout, and distress, which are caused by improper psychosocial work conditions. These conditions affecting mental health are often also referred to as "work stressors", which can occur on an individual or team level or an organisational level. (Gillen et al., 2017.)

2.3.1 Wellbeing at work

According to the Finnish Ministry of Social Affairs and Health (MSAH), wellbeing at work is a joint effort of employers and their employees. When employees feel well, they are more productive and committed to their work, and they have fewer sick leave incidents. The foundation of wellbeing is that the work environment is safe and healthy, the employees are treated fairly, and there are good management and leadership practices in place. Wellbeing at work is also a personal experience. Employees need to do their best to maintain their working ability and professional skills. Creating a good working atmosphere is everyone's responsibility. (MSAH, 2020.)

Traditionally, occupational health care has considered work as a potential cause of hazards. It has emphasised adverse health effects of work and poor mental conditions affecting the ability to work. However, it is essential to understand the balance between both the positive and negative impact of work and their so-called causal pathways (Figure 1.). According to Waddell and Burton (2006), 'work is the best form of welfare' and improves the wellbeing most effectively for the working individuals and their families and societies. Whereas the opposite applies – the (long-term) absenteeism from work life is found harmful to both physical and mental health of an individual and affects their communities. (Waddell & Burton, 2006.)
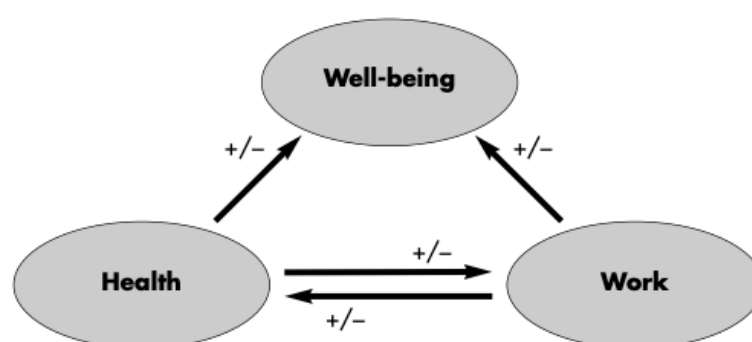

Figure 1. Possible causal pathways between health, work and wellbeing by Waddell and Burton (2006)

People's wellbeing is affected by several factors. The individuals' characteristics and behaviour and their physical and psychological environment are included in the factors outside the workplace. The same factors are applicable also in the workplace. However, several psychosocial hazards, such as violence or poor communications and leadership, can affect wellbeing. An individual's working ability and psychosocial effects of workload, and their impact on wellbeing are discussed further in this chapter. (Waddell & Burton, 2006.)

The factors of individual characteristics and behaviour and the physical and psychological work environment have a dynamic relationship between cause and effect. In different people, diverse causes may produce a similar effect, or similar causes can produce various effects, depending on are they coming from inside or outside of the workplace. As an example, about causes and effects, in mental health conditions, depression can develop due to the person's disposition to the disorder or due to personal situation, e.g., loss of a family member or losing the job. Another example is that because of too much work for an extended period, one might become anxious and stressed when other experiences, for example, burnout or insomnia. (Waddell & Burton, 2006.)

Unfortunately, unhealthy practices are increasing at many workplaces, such as 'presenteeism' and 'leaveism', which harm employees' wellbeing. According to Carpenter (2019), 'presenteeism' means employees are at work, but they do not function with full capacity as they are unwell and suffering, for example, from mental health conditions. 'Presenteeism' is challenging to observe and measure; however, it is causing further harm to employees' health and economic losses to employers. 'Leaveism' means that people are working during their time off, e.g., outside working hours, during their vacation or on sick leave. (Chartered Institute of Personnel and Development, 2020.)

A recent study surveying health, wellbeing and absence in the UK workplaces confirmed that 'presenteeism' and 'leaveism' are increasingly prevalent. Both are also seen masking the decreasing absence rates from work. A significant majority of respondents (89 per cent) had observed 'presenteeism', and 73 per cent of respondents had observed some form of 'leaveism' at their workplaces. In companies experiencing 'presenteeism', also 'leaveism' is more common. (Chartered Institute of Personnel and Development, 2020.)

Furthermore, in the same study, technology was reported harming employee wellbeing by 86 per cent of respondents, as they could not detach outside their working hours. Nevertheless, taking care of both 'presenteeism' and 'leaveism' would be essential to recognise and manage by employers as absenteeism. In that, cooperation with occupational health care is vital to address those unhealthy practices and provide support. (Chartered Institute of Personnel and Development, 2020.)

According to Perkins et al. (2009), wellbeing and mental health are increased by appropriate employment. Also, for people who have experienced mental ill-health, the recovery process is enhanced, and the chance of relapse is reduced when returning to work. Instead of treating mainly the symptoms of mental health conditions, a broader focus has been put on recovery and promoting wellbeing and a holistic approach to meaningful and satisfying lives. (Perkins et al., 2009.)

2.3.2 Working ability

This chapter discusses employees' working ability and changes in that, various viewpoints of promoting and maintaining working ability, including the importance of early support and employers' roles and occupation health.

During the last decades, the working ability has had varying definitions in a diverse context, and it has evolved dynamically (Lederer et al., 2013). It can be seen related to work disability as an opposite state to working ability. The latest working ability concept has moved towards emphasising individuals' strengths instead of weaknesses and opportunities in work disability. Working ability is also seen as a natural part of working life, which can vary during one's lifetime. (Lederer et al., 2013.)

The working ability has several dimensions. On the one hand, it includes an individual's resources when, on the other hand, it is affected by work-related factors. The individual resources are health and functional capacities, competence and skills, values, attitudes and motivation. The work-related factors include the content, environment, organisation of the work and leadership. Additionally, the environment outside work, such as family and other social affairs, and operational environment and society, has its influence. This

whole entity can be called a **work-life balance**. All the mentioned factors interact with each other and change continuously, so to maintain working ability, a person needs to find a proper balance between all of them. (European Agency for Health and Safety at Work, 2016.)

In Finland, the working ability has been studied widely, with developing its concepts and methods. Ilmarinen (2019) sees a clear connection between working ability and wellbeing. Especially, the qualitative aspects of working ability should be emphasised to improve wellbeing at work. The positive effects of the balance between personal resources and work improve both working ability and workplace wellbeing. (Ilmarinen, 2019.)

Concentrating rather on working ability instead of work disability has meant that OHC interventions' focus has changed to meet employees' new needs and the work's changing nature. The interventions focus more on promoting and maintaining all employees' working ability when earlier it concentrated on preventing work absenteeism and improving return to work. (Lederer et al., 2013.)

Due to its diverse context, the working ability is challenging to impact and, thereby, also to promote (Ilmarinen, 2019). The working ability requires management and cooperation between the employer, superiors, employees and occupational health care. OHC supports working ability based on agreed workplace practices and working ability support model, which is retailed according to the workplace's needs. The model includes, among others, the interventions and measures for early support for the working ability of the employees. (Työterveyslaitos, 2020d.)

The early mediation discussions between an employee and a superior are essential starting points to reflect factors affecting employee's working ability. OHC can provide expertise during any phase of these discussions. Also, any of these parties can request occupational health care to assess and promote the employee's working ability. In this situation, the main task of OHC is to find out whether possible health problems are affecting the working ability and coordinate the treatment and rehabilitation if needed. One concrete intervention for that is using occupational health consultation, which enables one to take a stand on health and work coordination. (Työterveyslaitos, 2020d.)

2.3.3 Psychosocial workload factors

According to the Occupational Safety and Health Authority in Finland (2020b), psychosocial workload factors are related to the content and organisation of work and social interaction in the work community. Additionally, physical factors, chemical or biological agents, or the risk of accidents are considered psychosocial workload factors.

Psychosocial workload affects the work communities and organisations in several ways. The workload factors can lead to decreased job satisfaction, absenteeism, people leaving the companies they work for, and depletion of know-how. Companies might also experience economic effects, such as lost revenues, legal expenses or court cases. (Gillen et al., 2017.)

Having a balanced psychosocial workload fosters employee's working ability and health. The timely higher workloads might also be considered stimulating, like in a supportive work environment where an individual's work, motivation and competencies are in place. Simultaneously, harmful workloads – such as lasting too long on an excessively high level – must be prevented; it is not enough to react only to its consequences. (European Agency for Occupational Safety and Health at Work, 2020.)

Having a balanced psychosocial workload fosters employee's working ability and health. The timely higher workloads might also be considered stimulating, like in a supportive work environment where individual's work, motivation and competencies are in place. Poor organisation, content, and work conditions and complications in the occupational community's social atmosphere can cause psychosocial risks. These can affect employees' health negatively mentally, physically and socially, causing, for example, stress, burnout or depression. (WHO, 2005; European Agency for Occupational Safety and Health at Work, 2020.)

In addition to affecting mental health, the psychosocial workload and risks also connect to numerous physical, i.e., somatic conditions and symptoms. To bring some examples, Pikhart and Pikhartova (2015) describe in their review a relationship between psychosocial risks and chronic diseases, finding a consistent and robust connection of depression and social isolation and cardiovascular diseases (CVD). Freimann et al. (2016) studied work-

related psychosocial risk factors and mental health problems and found those impacting the occurrence of musculoskeletal pain. Furthermore, Buruck et al. (2019) have found a connection between psychosocial areas of work-life predicting chronic low back pain. The psychosocial workload study by Skyberg et al. (2003) found an association with sick building syndrome (SBS) symptoms and physical work environment; the latter had less influence on SBS symptoms than the psychosocial factors.

Similarly, as in the working ability, the employee, employer, and occupational health care have an essential role in ensuring appropriate psychosocial workload management. In case the employee or the employer does not have sufficient knowledge for identifying and assessing the psychosocial risks, they can use the expertise of OHC. The employer has to make sure the psychosocial workload factors have been identified, evaluated and described in the workplace report of OHC. That information helps to prevent harmful psychosocial workload and implement the right interventions accordingly. (Occupational Safety and Health Authority, 2020c.)

2.3.4 Occupational mental health problems

As discussed in the previous chapters, work-related matters affect people's wellbeing and mental health in multiple manners. The purpose of this chapter is to give a brief overview of some of the work-related adverse psychological reactions and mental health problems, such as stress, burnout, anxiety, insomnia and depression as a mental disorder, and their association with each other.

Development of mental health problems can happen due to several reasons: biological, environment-related, social or psychological (WHO, 2005). In the European context, people use approximately one-third of their daily time at their work, which is a significant amount of time (Eurostat, 2019). The workplace is an essentially social context affecting people's mental health. Increasing evidence shows that in OMH, both the content and context of work affect the development of mental health problems which are also a growing cause of long-term sickness absence of employees (Hoffen et al., 2020).

Depression is a mental disorder where a person experiences a complete loss of interest and pleasure, combined with depressive moods, such as feeling sad and irritated (WHO, 2018c). When depressed, an individual has strong feelings of guilt or despair, sleep or eating disorder, low energy level, and concentration. There can also occur other cognitive, behavioural or dysfunctional symptoms which impact persons' functional ability significantly when coping with their daily tasks. As discussed already earlier in this work, depression has a major effect on working individuals and their work-life context. (WHO, 2018c.)

Stress is considered typical and should not necessarily be seen as an adverse reaction. It is caused by activation in the nervous system, and its purpose is to help an individual adapt to an enduring pressure state. When experiencing work-related stress, an employee's work requirements and personal abilities or expectations are not corresponding to each other. If an individual's adaption to the pressure is inadequate, recovery is insufficient, and the stress state is severe and prolonged, the condition is called distress. Distress becomes a risk to worker's health, which can further lead to numerous health complications, including burnout. (Aarnisalo et al., 2017.)

Burnout is not an illness but a syndrome, which occurs as emotional exhaustion at the workplace (Lopez-Lopez et al., 2019). It often includes symptoms of severe overall fatigue, cynicism and reduced commitment to work (Aarnisalo et al., 2017). Often, anxiety disorders and substance abuse, like alcohol, coincide with burnout and depression (Ahola, 2007). Utsugi et al. (2005) have also found a significant association between the level of occupational stress and insomnia and short sleep.

According to Aarnisalo et al. (2017), burnout develops gradually in the interaction between one's personality, work and surrounding community. Sometimes burnout can also occur due to an employee's desperate attempt to adapt oneself to and survive in a present situation during a more extended period. It is not clear whether burnout leads to depression or vice versa. There exists research material from both viewpoints, so each patient needs a careful assessment individually. (Aarnisalo et al., 2017.)

Additionally, the official clinical diagnostic criterium of burnout is still not available, making it challenging to distinguish it from depression. Burnout is also diagnosed as depression or exhaustion to provide treatment (Bakusic et al., 2017). Currently, only Latvia and Italy are still the only two European countries that have classified burnout as an occupational disease (Eurofound, 2018: 7).

Britannica Academic (2020) describes that anxiety can arise in response to seemingly harmless situations, or it might be "the product of subjective, internal emotional conflicts the causes of which may not be apparent to the person himself". Experiencing anxiety to some extent in everyday life is a normal reaction in psychologically threatening situations (Mark & Smith, 2012). However, constant, severe, frequent or chronic anxiety is usually considered as a sign of an emotional disorder, i.e., an anxiety disorder. In that case, the person often worries continuously about everyday life-related matters, for example, work-related or economic factors. The intense anxiety causes nervousness and physical symptoms, such as dizziness, weakness, tremors, sweating, muscle tone and palpitations. The persons usually have also difficulties with concentration. (Mark & Smith, 2012; Aarnisalo et al., 2017.)

According to Aarnisalo et al. (2017), anxiety disorders and depression often coincide; their risk factors, symptoms and treatments are similar. Usually, there are fear-symptomatic anxiety symptoms, such as panic attacks and fear of social situations occurring in parallel with depression symptoms. In the occupational setting, Mark and Smith (2012) concluded that work demands, extrinsic efforts and overcommitment were associated with increased anxiety levels. (Aarnisalo et al., 2017.)

The systematic review and meta-analysis by Koutsimani et al. (2019) concluded that burnout and depression share many similar symptoms, such as concentration and sleep problems, exhaustion, changes in appetite and low self-esteem, and they likely develop simultaneously. However, they are still two different constructs. According to the authors, some individuals who are more prone to experiencing higher anxiety levels also develop more likely burnout.

The factors leading to depression, also in occupational context, are individual. The psychological, social, and biological factors – for example, gender, genetic predisposition to mental or somatic illnesses, or changes in life events – all affect employee's holistic health and wellbeing (Aarnisalo et al., 2017). According to studies, somatic illnesses or chronic diseases increase the risk of depression. It can also be the other way around: long-term depression can lead to somatic disorders, such as cardiovascular diseases (CVD), heart failure, neurological and musculoskeletal diseases or diabetes type 2. (Aarnisalo et al., 2017; Angermann & Ertl, 2018; Koutsimani et al., 2019.)

This chapter described only some selected examples of mental health problems and their association with depression. When meeting clients in occupational health care, a thorough assessment of employees' wellbeing and how they perceive it, including an overview of the nature and relation to their work, is required. The factors and somatic conditions which challenge the OMH are essential to recognise. After recognising the risk factors, those need to be tackled by implementing suitable interventions.

2.4 Digital interventions for mental health

This chapter discusses digital mental health interventions, referred to as eMental health interventions or web-based psychological interventions, i.e., interventions delivered via the Internet, mobile technology or a computer programme (Carolan et al., 2017). Occupational eMental health interventions and insights provided into different technologies enabling these interventions are studied more particularly.

The working life is in continuous change, affected by new generations and development of science, technology and societies. As a result, also occupational health perspective has to change. The digitalisation of processes and services require new ways and methods of working individually, as teams and in interaction and collaboration with the client and employer. (Turku University of Applied Sciences, 2018.)

Interventions for mental health should be included in the integrated health and wellbeing strategy and delivered through OHC at any stages: prevention, early identification, support, and rehabilitation of workers (WHO, 2019). The technology development has brought along new opportunities, like providing cost-effective means for delivering

behavioural health interventions and consequently preventing non-infectious diseases. At the same time, there are also obstacles in implementation, such as high costs, limited usability and lack of standardisation and evidence on effectiveness. There are also questions raised about the privacy matters and use of the data collected. (International Labour Organization, 2019.)

2.4.1 Digital interventions

Digital interventions are provided through electronic health (eHealth) and mobile health (mHealth). eHealth has been becoming prevalent by the year 2000. It has various definitions, such as a more technical approach provided by Oh et al. (2005), describing it as "the use of emerging information and communications technology (ICT), especially the Internet, to improve or enable health and healthcare". Lehr (2014) presents eHealth from a broader perspective – "not only as technical development but also a new way of working, an attitude, and a commitment of networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology" (in Wiencke et al., 2016).

Mobile health, i.e., mHealth, is a part of eHealth. It is defined by WHO "as medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices" (WHO Global Observatory for eHealth, 2011). Smartphones have brought even more potential to access and improve mental health care quality (Torous et al., 2018).

Digital interventions are not a privilege for users only in high-income countries with sufficient infrastructure. As an example, WHO is developing technology-supported interventions "to help address the mental health treatment gap, particularly in low and middle-income countries" (Carswell et al., 2018). WHO has developed a guided mental health intervention for depression for people in communities affected by adversity. This intervention is for psychoeducation and training for behavioural activation. It includes therapeutic techniques, such as stress management, identifying strengths and increasing social support, and preventing relapse. (Carswell et al., 2018.)

Digital interventions can be used in health care for various purposes, either in interaction with health care personnel or independently by the patient or client. These interventions can be, such as, for encouraging and supporting behavioural health changes and managing chronic illnesses. Digital technologies and interventions have also become increasingly common for primary prevention and diagnosing and treating patients. (Michie et al., 2017.)

2.4.2 Digital interventions for occupational mental health

Occupational eMental health (OeMH) interventions have been developing rapidly, and there are several reasons for that. For example, in addition to technological development and changes in people's behaviour in utilising various services effectively online, employers request more flexible and (cost) efficient occupational health care services (Turku University of Applied Sciences, 2018). Interventions provided as eMental health services are enabled via various ICT solutions, mostly by online platforms accessible from personal computers, smartphones or tablets (Phillips et al., 2020: 561).

Lehr et al. (2016) describe occupational eMental health as combining occupational health psychology and eMental health. They define OeMH as "a generic term that describes the use of information and communication technology to deliver psychoeducation, health risk assessment, workplace health promotion, preventive interventions (universal, selected, or indicated), treatment, relapse prevention, and return-to-work assistance for the mental health of workers as well as to improve occupational health-care delivery, professional education (e-learning), and online research in the field of occupational mental health".

The approach of OeMH covers both individual and organisational focuses. OeMH strives to improve the quality of working life and protect and promote employees' health, safety, and wellbeing. Lehr et al. (2014) summarise that OeMH covers a broad range of interventions utilising diverse technologies (Figure 2.), such as the Internet, mHealth (including smartphone applications), serious gaming and gamification, videoconferencing, telephone and instant messaging, virtual reality and vHealth, and social media (Lehr et al., 2014 in Wiencke et al., 2016: 259-260).
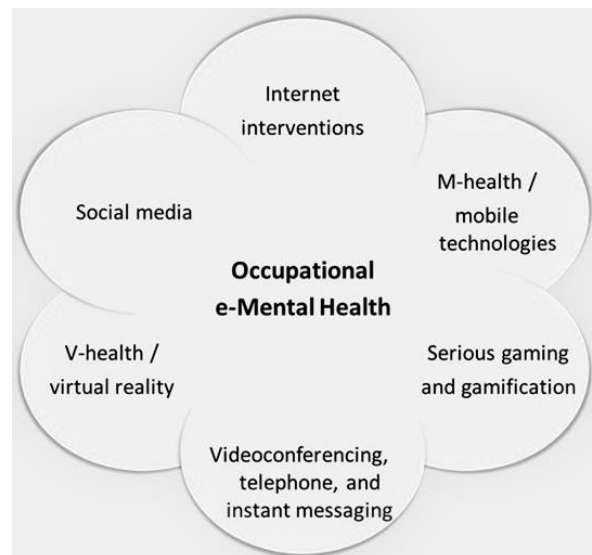
Figure 2. Overview of the current approaches and upcoming trends in occupational eMental health (Lehr et al., 2014 in Wiencke et al., 2016: 260)

The main characteristics of eMental health services are that they are mostly based on established psychotherapy methods, such as cognitive behavioural therapy (CBT), involving self-help types of psychological treatments. Their duration is often relatively short. Furthermore, the essential characteristics are that the interventions include human contact and interaction in various forms of communications, personal guidance by a therapist or a coach, and possible peer or support group discussions. (Phillips et al., 2019.)

3 Aim and definition of the research problem

Using digital interventions for OMH problems is an emerging topic in research and various health care settings. As discussed in this thesis's theoretical background, OMH problems are becoming increasingly prevalent, and the use of digital interventions is growing. The private occupational health care providers are especially actively developing digital interventions to enable better care for their clients. Furthermore, the COVID-19 pandemic has increased the demand for digital remote services by occupational health care to support their clients' wellbeing.

This scoping review aims to provide an overview of the use of digital interventions for OMH problems in an occupational health care setting. It is done by mapping the literature on the subject field. Hence, this review seeks to provide occupational and other health care professionals with an overview and examples of using digital interventions for OMH problems on prevention and health promotion activities with their clients. Furthermore, the thesis aims to offer insights for future research on digital interventions and OMH problems.

Thereby, the research question (RQ) is formed as follows:

• How are digital interventions for occupational mental health problems used in occupational health care in practice?

4 Theoretical framework

The theoretical framework I chose for this study is the systems model by Betty Neuman (Figure 3). This nursing theory describes that people are cared for from a holistic perspective by orienting their health as an optimal state of system stability. Neuman has defined a wellness-illness continuum which refers to continuous energy flow between the client system and the environment. She perceives when more energy is generated than used, the client moves, as a result, towards wellness. On the contrary, when less energy is generated than required, the client moves towards illness and eventually death. (Neuman & Fawcett, 2011: 23-24.)
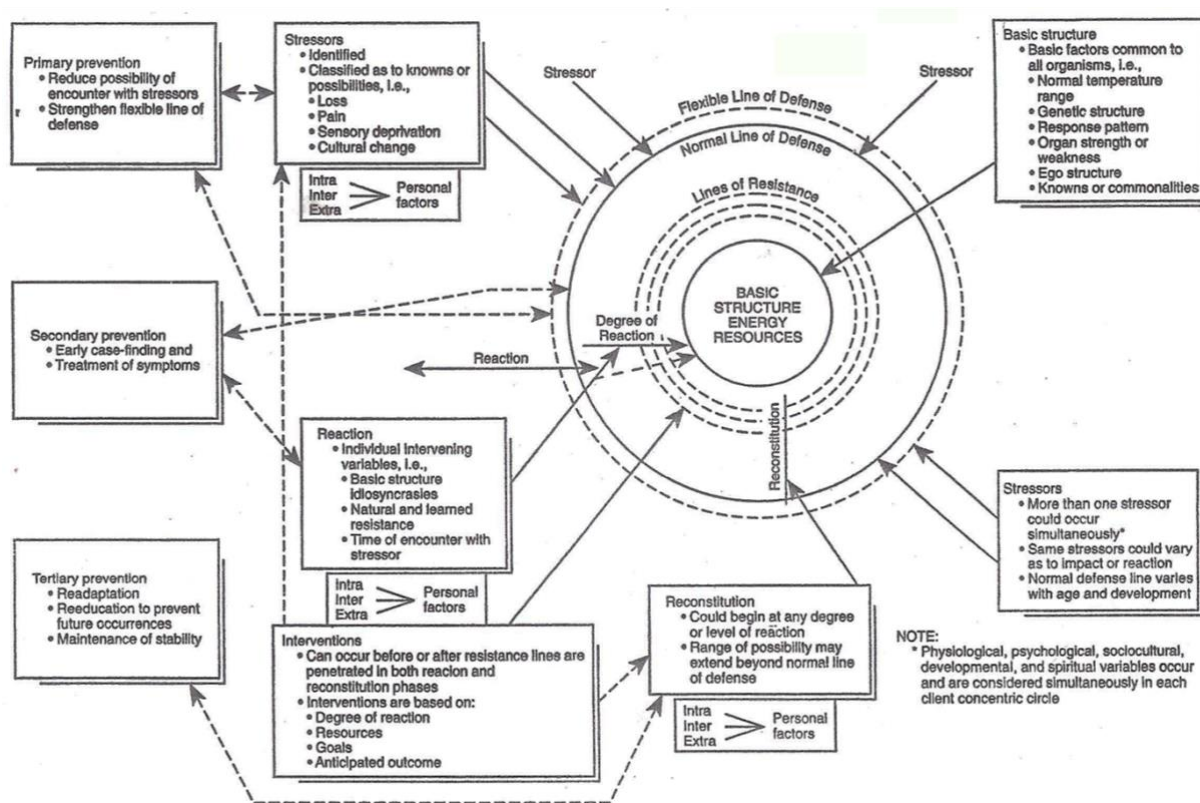

Figure 3. The Neuman Systems Model; original diagram copyright 1970 by Betty Neuman (Neuman & Fawcett, 2011)

4.1 Overview of the theory

The Neuman Systems Model is comprehensive and might be perceived as complex; however, the theory's concepts are presented in a systematically logical manner. The main concepts of the theory are *holistic approach, open system* (including function, input and output, feedback, negentropy, and stability), *environment, the client system* (including five client variables, basic structure, lines of resistance, normal line of defence, and flexible line of defence), *health* (from wellness to illness), *stressors, degree of reaction, prevention as intervention* (on three levels) and *reconstitution*. (Alligood, 2018; Nursing theory, 2020.)

In the model, the focus is on the client as an open system – conceptualised as inner core and basic energy resources – and on the client's responses to stressors. The client may be not only an individual but also a family, group, or community. The stressors can be intra- or interpersonal and extra personal in nature and arise from the internal, external, and created environments. It is essential to identify the effects of the stressors since they potentially disrupt the balance in the client's system and affect wellness. (Neuman & Fawcett, 2011; Başoğul & Buldukoğlu, 2020.)

The client's system and state of stability are affected by five dynamic variables – physiological, psychological, sociocultural, developmental, and spiritual. The relation between these variables determines the individual's reaction to the stressors. The inner core is surrounded with defence lines as lines of resistance, normal line of defence, and flexible line of defence. The usual level of health, i.e., wellness, is known as the normal line of defence that is protected by a flexible line of defence. A flexible defence line's task is to help maintain the balance and keep stressors invading the system. The resistance lines are activated if the stressors are getting through the normal defence line, and they act as a defence mechanism to return or maintain wellness. The resistance lines refer to the client's coping systems learnt over time. (Neuman & Fawcett, 2011; Bademli & Dulan, 2017; Alligood, 2018.)

4.2 Nursing interventions in the model

The nurses' main concern is to support keeping the stability in the client's system by initiating actions to preserve, attain and maintain the optimal health or wellbeing of the client at the right time (Neuman & Fawcett, 2011: 25). In the Neuman Systems Model, the prime nursing intervention is prevention. There are three levels of prevention – primary, secondary and tertiary. The **primary prevention**'s objective is health promotion and maintaining the client's wellness. It aims at identifying and minimising the risk factors and preventing possible reaction to the stressors or hazards. Thereby, primary prevention should occur before the client reacts to a stressor or a combination of stressors. At this stage, the interventions should strengthen the flexible defence line and keep the stressors and their response minimal. (Neuman & Fawcett, 2011: 26-27.)

Secondary prevention includes early-case finding and treating the symptoms. It concentrates on stressor-related symptoms and how to minimise their adverse effects, i.e., strengthening the internal resistance lines. Based on that, the suitable interventions are prioritised, to reach the ideal client system stability or wellness, and preserve energy. Reconstitution is a result of secondary prevention, and it can start after implementing the chosen interventions for the purpose. It is described as an increase in the client's energy related to the stressors' degree of reaction. (Neuman & Fawcett, 2011: 27-29.)

After some level of system stability is reached by reconstitution, **tertiary prevention** can begin. The tertiary prevention's goal is to maintain the client's optimal wellness by protecting reconstitution or, if required, restart the wellness recovery intervention. Successful reconstitution on the tertiary prevention level depends on how effectively the client can prevent additional stressor or relapse reactions. It means that maintaining wellness requires the client to adjust to the stressors and integrate all needed factors to optimise the use of the resources. As interventions, it could include re-education and reinforcing the client's readaptation skills to prevent future occurrences. (Neuman & Fawcett, 2011: 28-29.)

As mentioned at the beginning of this chapter, in the Neuman Systems Model, health promotion is a part of the primary prevention level. This view differs, for example, from Nola Pender's Health Promotion Model, according to which health promotion and

prevention are two different entities. As stated earlier in this work, the prevention of hazards is also a central focus of occupational health. Interventions for mental health should be delivered through OHC at any prevention stage of prevention, early identification, support, and rehabilitation. (Neuman & Fawcett, 2011: 29.)

The Neuman Systems Model helps nurses to assess the client's situation, variables affecting their stability level, and internal and external stressors they are encountering. Furthermore, it supports in selecting and implementing interventions form a suitable level of prevention for the client. The ultimate goal is to preserve, restore, and reconstitute the client's optimal health and wellness. Thereby, I consider the Neuman Systems Model as a useful nursing approach for OHC purposes. (Neuman & Fawcett, 2011; Bademli & Duman, 2017; Başoğul & Buldukoğlu, 2020.)

5 Research methodology

The research method I selected for my thesis is a scoping review. This research method has become an increasingly popular approach in the evidence synthesis of health care (Levac et al., 2010). The latest academic guideline for scoping review was published in 2020 by the international research organisation Joanna Briggs Institute (JBI) with Peters et al. (2020). Thereby, to ensure my study's quality, I follow their latest guidelines, where relevant, when conducting the research.

The framework for scoping reviews was presented originally by Arksey and O'Malley in 2005. It has been extended and refined through several scientists' work, for example, by Levac et al. (2010) and Munn et al. (2018). Tricco et al. (2016) found in their scoping review of scoping reviews that exploring the literature's extent, mapping and summarising the evidence, and informing future research were the three most common reasons for using this method.

A scoping review differs from other research methods in several ways. This method allows looking into the research with broader questions than, for example, systematic reviews. A scoping review is a useful method, for example, identifying existing evidence in a given

field or specific characteristics/concepts in evidence sources, analysing gaps in the literature, clarifying definitions or mapping key characteristics/concepts on a particular research field reporting or discussing these. (Peters et al., 2020.)

Moreover, scoping reviews can be used before identifying further study needs and conducting further research, such as a systematic review. At the same time, it is essential to keep in mind that if an author wishes to use the research results, for example, as the basis for a trustworthy clinical guideline, to answer a clinically meaningful question, or provide evidence to inform practice or policy, a systematic review is a better approach than a scoping review. (Peters et al., 2020.)

One of the recommendations in the JBI scoping review manual also applies to the title of the research. The title should be clear and reflect the study's core elements. It should not be formulated as either a question or a conclusion, and there should be consistency in the title, research's objective and questions, and inclusion criteria. Furthermore, the recommendation is to include the phrase "...: a scoping review" in the title, so the document's type is identified visibly. I have aimed at defining the name of this thesis according to these instructions. (Peters et al., 2020.)

The framework of my scoping review is built up based on Arksey's and O'Malley's (2005) original iterative process:

1.   Identifying the research question
2.   Identifying relevant studies
3.   Study selection
4.   Charting the data
5.   Collating, summarising and reporting the results

Levac et al. (2010) and Peters et al. (2020) have provided more updated details to this framework's stages. Thereby, each step of the next chapters' research structure is modified according to these authors' theoretical frameworks.

5.1 Identifying research questions

The research questions help define and align the research's objective (Peters et al., 2020). According to Levac et al. (2010), a scoping review's research questions should be broad. However, they must be defined clearly and include the scope of inquiry for population, concept and context (PCC) of the research as it affects search strategies. The authors recommend linking the purpose of the scoping study to the research question(s). By this, the researcher can clarify the basis for completing the study. It also helps to choose relevant studies and extract data later in the process. (Levac et al., 2010; Peters et al., 2020.)

In this study, a scoping review is chosen as the research method to map the literature using digital interventions for employees' OMH problems. The occupational mental health problems are limited to those described earlier in section 2.2.4, such as stress, distress, anxiety, burnout, insomnia, and other sleep disorders. Additionally, as mental health problems have a robust association with mental disorders such as depression and anxiety disorders, also those are included in the search plan.

In the research question, the population includes employees in the context of the workplace setting, where the aforementioned digital interventions are often implemented. These employees also referred to as workers and users, can also be in the role of patients and clients using these interventions in the context of the OHC setting. Moreover, any health care setting is included in the context. The reason for this is to obtain a broader overview of digital interventions used for mental health problems, as the employees can care for their work-related mental health problems broadly in various health care settings. The concept of this study is digital interventions for OMH problems. Furthermore, in the research, possible gaps in research and future research topics are identified while mapping the evidence.

5.2 Identifying relevant literature

According to Peters et al. (2020), developing the search strategy is essential when starting the research process for collecting the relevant literature. In a scoping review, it is necessary to research the sources broadly and comprehensively. In addition to published sources, unpublished or so-called grey or difficult-to-locate literature can be used. It is essential to document the search strategy clearly as it is a fundamental scientific validity element in a scoping review. (Peters et al., 2020.)

When identifying relevant sources for the scoping review, at this phase, the researcher develops a plan wherefrom to search the material, and which terms and keywords are relevant for the search. One needs to develop and align the inclusion criteria with the objectives and questions of the study. Additionally, the researcher needs to decide which sources to use, the time span of publications, and the language of the materials used. (Levac et al., 2010; Peters et al., 2020.)

5.2.1 Selecting key terms and keywords

Firstly, the key terms and keywords were identified for the literature search according to the PCC approach based on JBI guidelines for scoping review (Peters et al., 2020) and the theoretical background literature used. The keywords are defined both in English and in Finnish. To focus the search with multiple terms and keywords, Boolean operators' AND' and 'OR' and 'NOT' were used to find relevant sources (Appendix 1, Table 1.).

The reason for choosing the Finnish keywords and using the Finnish electronic databases for the literature search was to get an even broader overview of the literature comprising the possible Finland-specific perspective of the research subject, including publications from national authorities. The selected electronic databases are described further in the next chapter. Various disconnects of words (*) were used to identify relevant content since the Finnish words are inflected.

5.2.2 Inclusion and exclusion criteria

The inclusion and exclusion criteria defined to refine relevant literature for the research is presented in Table 2. Since the research area is broad and includes searching and previewing literature in English and Finnish, I decided to include the literature search all full-text published sources and exclude unpublished sources. Only those sources concerning the population of adult working-age employees between the age range of 18 to 64 years old were included in the research data. Both the literature published in English and Finnish were included in the search, excluding literature in all other languages. Since the digital interventions' study field is relatively new, the publication period for the included material was delimited for the last ten years between 2010–2020.

Table 2. Inclusion and exclusion criteria to the literature search

Inclusion criteria	Exclusion criteria
Literature related to digital interventions used for OHM problems in the context of workplace or health care setting, including occupational health care	Literature with no mention of digital interventions used for OMH problems in the context of workplace or health care setting or occupational health care
Adult working-age employees, clients and patients (18-64 years old)	No children, adolescent and older adults as clients and patients (under 18 and over 64 years old)
All published literature	Unpublished literature
Full-text access to the material	No access to the full-text material
Published in English and Finnish	Published in other languages than English and Finnish
Published between 2010–2020	Publications published earlier than 2010
Literature available via electronic databases	Literature not available via electronic databases

The literature for the scoping review was searched via electronic databases. When planning the subject for this thesis at the beginning of the research, I searched the literature for the theoretical background information via the Google Scholar database. Some of the relevant literature was identified via that process and included in the search results. This phase is described in the section "5.3.1 Initial limited search".

Before selecting the optimal databases for the second search using relevant keywords, an information specialist of Tritonia Academic Library's in Vaasa, Finland, was consulted. The databases chosen for that phase of the literature search in English were The Cumulative Index to Nursing & Allied Health (CINAHL) with full text (EBSCO), MEDLINE (EBSCO), Academic Search Elite (EBSCO) and Springer Link, as those provide an extensive entrance to the sources relevant on the health care field. Additionally, ABI/Inform Global (ProQuest), as a database outside the nursing field, was included as recommended by the information specialist. This database was included to provide an additional perspective to the research subject since the occupational health related subjects are closely associated with business and economics, affecting employees' health and wellbeing.

For the Finnish literature search, the recommended electronic databases used were Medic, Juuli and Julkari. Medic contains references to Finnish medical and healthcare science articles, monographs, dissertations and research papers, including indexing of more than 90,000 references in Finnish and English (Tritonia LibGuides, 2020a). The database Juuli contains information on Finnish organisations' research publications, as Finnish universities, universities of applied sciences, and hospital districts (Juuli, 2020). Julkari is the shared open publication archive of the Ministry of Social Affairs and Health's administrative branch organisations, Department of Health and Welfare (THL), which provides a useful perspective from Finnish authorities' view. Publications in Julkari have mainly open access as pdf files. (Julkari, 2020.)

5.3 Study selection

In a scoping review, the study selection phase is not linear but rather an iterative process. The literature is searched from selected databases, and the search strategy is refined along the process to extract the results. The found sources are reviewed based on inclusion and exclusion criteria. As a recommendation by JBI, the three-step search strategy was used in the research (Peters et al., 2020). These steps include the first initial limited search and the second search by using relevant selected keywords. As the third step, additional sources are searched from the reference list of identified material. (Levac et al., 2010; Peters et al., 2020.)

The process of the literature search is presented in the PRISMA flowchart (Appendix 2). The use of the Prisma flowchart has several purposes. According to Moher et al. (2009), it aims, for example, to help improve the research findings' reporting or be used to report systematic reviews of other types of research, particularly evaluations of interventions. The flowchart adapted from the original PRISMA statement (Moher et al., 2009) was modified based on the search strategy of the scoping review process by the JBI (Peters et al., 2020).

The literature search process is described in detail in the next sections, so only a summary of the results is visualised in the PRISMA flowchart. Firstly, five research articles were chosen based on the initial search as relevant and qualified literature for the data collection and further analysis. After this, the second search was conducted in the five recommended electronic databases for English content using relevant keywords and inclusion-exclusion criteria. As a result, 14 article sources were selected for the final data analysis. The total amount of all sources in English chosen for the final data analysis was n=19.

The search rounds were conducted in the Finnish databases with defined keywords and refined with additional criteria mentioned in the next chapters. In total, three literature sources (n=3) in Finnish were identified as eligible for the final data analysis. Thereby, altogether, 22 (n=22) literature sources were included in the research part of my thesis, as presented in the PRISMA flowchart.

5.3.1 Initial limited search

The first initial search includes the articles searched and previewed for the theoretical background of this study. The preliminary keywords for the initial literature search related to the research topic were identified from various sources. Textbooks and other literature related to occupational health care and mental health in English and Finnish were reviewed. I familiarised myself with online sources, such as visiting the WHO, THL, and Finlex for occupational health related legislation in Finland, to mention some. Furthermore, occupational health care has been a topic of interest for several years, and I was familiar with some terminology based on my earlier work experience.

The Google Scholar database was used to search and identify relevant literature for the thesis's theoretical background between 7 January and 22 April 2020. In this search were used the following keywords with Boolean operators: "digital interventions" AND "mental health" AND "occupational health" AND "employees" OR "workers".

Through the initial search, 86 search results were identified, out of which six sources were relevant to the research area. Five of these sources were literature review articles available as full-text content and one as an e-book chapter. All these sources contained evidence-based content. Nevertheless, while reviewing the reference lists of the eligible sources, the e-book chapter was removed from the final list of initial search results since it was found from the reference list of one of the review articles. Thereby, after reviewing the titles, abstracts, full text of the sources and reference lists, the final number of chosen sources was five (Table 3). These selected sources are described further in Appendix 3.

5.3.2 Second search by using relevant keywords

After defining the search strategy and identifying relevant keywords, the actual literature search of English sources was conducted across the selected four databases. The search rounds were run in different databases during 2 October – 7 November 2020, and the results are presented in Table 3. The first search round provided 11952 search results in total. The number of sources was extensive in three databases accessed via EBSCO:

CINAHL with Full Text (n=1372), MEDLINE (n=1767) and Academic Search Elite (n=8113). The results from the Springer Link database were n=222 and ABI/INFORM Global n=478.

Table 3. Literature search results from selected databases (sources in English)

Database	Google Scholar	CINAHL with Full Text (EBSCO)	MEDLINE (EBSCO)	Academic Search Elite (EBSCO)	Springer Link	ABI/ INFORM Global	Total number of literature found
Language of the literature	English	English	English	English	English	English	English
Initial search	86	N/A	N/A	N/A	N/A	N/A	86
1st search	N/A	1372	1767	8113	222	478	11952
2nd search (refined with MeSH terminology, articles only)	N/A	287	117	467	N/A	40	911
Chosen sources based on title and abstract, excluding protocols	N/A	5	21	12	12	3	53
Chosen sources based on text and excluding duplicates based on screening reference lists	5	0	7	1	5	1	19

For refining the amount of literature with more relevant results, the suggested subject terms of Medical Subject Headings (MeSH) were used to narrow down the keywords and improve the search in databases used via EBSCO. MeSH is a thesaurus maintained by the U.S. National Library of Medicine. Its terms are used in medical literature and information for indexing, cataloguing, and searching biomedical and health-related information (National Library of Medicine, 2020).

The MeSH keywords with Boolean operators used in the database searches were: "occupational health services" OR "occupational health nursing" AND "mental health" AND "telemedicine (e-Health)" AND "internet-based intervention" AND "psychological distress" OR "occupational stress" OR "anxiety disorders" OR "depression" OR "occupational burnout" OR "sleep initiation and maintenance disorders". To clarify the selection further, according to MeSH, the term "telemedicine" covers mobile health,

telehealth, eHealth and mHealth. The term "sleep initiation and maintenance disorders" also encloses insomnia. Furthermore, after applying the pre-defined inclusion-exclusion criteria, the data articles were included only. The reason was that several eligible sources – six out of 19 in total – were review articles and the found sources provided an opportunity to concentrate on the evidence-based literature.

During the reading process, the duplicate sources – articles and one electronic book chapter – were further excluded based on screening the reference lists. Eventually, the number of literature was reduced into a total of 14 most relevant sources for the data analysis: CINAHL with Full Text (n=0), MEDLINE (n=7), Academic Search Elite (n=1), Springer Link (n=5) and ABI/INFORM Global (n=1). The final selection of these sources in English is presented in Appendix 4.

For the literature in Finnish, the searches were conducted in three Finnish electronic databases with defined inclusion-exclusion criteria. These search results are presented in Table 4. The first search result in two databases provided 201 sources (Medic n=101; Juuli n=100). Since noticing that the keywords could be further improved, the first search round was conducted in Julkari after some modifications in the keywords. These database-specific changes are described further below.

Table 4. Literature search results from selected databases (sources in Finnish)

Database	Medic	Juuli	Julkari	Total
Language of the literature	Finnish	Finnish	Finnish	
Initial search	N/A	N/A	N/A	
1st search	101	100	N/A	201
2nd search (keywords improved according to FinMeSH terminology)	44	52	76	172
Chosen sources based on title and abstract or introduction text or screening the content with keywords and index terms	17	2	24	43
Chosen sources based on text	2	1	0	3

Despite using relevant keywords, the search result included a large amount of irrelevant content for the research. I decided to check the keywords in FinMeSH, the medical subject headings in Finnish in Finto (2020), to improve the results. Based on that, the following new keywords were included in the search: "hoitomenetelm*", "e-interventio*", "työterveyshoi*", "tele*", "netti*", "internet*" and "mobiili*". After this, various combinations of defined keywords were used to identify relevant data.

On the second search in the database Medic, the combination of keywords – "hoitomenetelm*", "e-interventio*", "työtervey*", "työterveyshuol*", "työterveyshoi*", "mielenterveyshäiriö*", "mobiili*", "tele*", "mielenterveyspalvelu*", "digitaali*", "työntekij*", excluding (NOT) "lapse*", "lasten*"," lapsi*","teini-ikä*", "opisk*" – gave the result of 44 sources (n=44). After reviewing these sources based on title and abstract or introduction text, 17 potential sources were left for previewing the content for final eligibility. Unfortunately, five of these sources, including review articles in trade magazines, required logon, although the search filter for full-text content had been selected. Thereby, the final number of eligible sources from Medic was two sources (n=2).

The first search in the database Juuli gave the result of 100 sources (n=100). In Juuli, there is no option to choose full-text literature, so instead, Open Access content was selected. Also, the second search was refined with FinMeSH terminology and tested with several combinations of keywords to identify relevant results. The second search round gave 52 sources (n=52). Based on the title and abstract or introduction text or searching the sources' content by keywords, only one (n=1) eligible source was found for reading and data analysis.

In Julkari, the first search round was conducted only after refining the keywords with FinMeSH terminology. The Julkari database does not have all similar functionalities as the other databases, so the literature search needed a different approach than in the other cases. The keywords can only be filtered by title, index terms, author or date of publication. The first search round in Julkari provided the result of 76 potential sources. Out of all these, the sources were screened by title or content with keywords and index terms 24 sources (n=24). Finally, no sources (n=0), which would fulfil the inclusion criteria, were identified, so no sources were included in the final data analysis.

In total, three sources in Finnish were selected for the data analysis. All these three sources were not published in a scientific journal but in trade and periodical magazines. However, as the articles were written based on evidence-based research, I considered those eligible for inclusion. The final selection of sources in Finnish is presented in Appendix 5.

5.4 Charting the data

Charting the data means the data extraction process, and its purpose is to summarise the results associated with the scoping review's aim and research questions (Peters et al., 2020). The Microsoft Excel 2020 software programme was used for the data charting. As recommended by the JBI manual, the data was charted according to the structure of the charting table form "JBI template source of evidence details, characteristics and results extraction instrument", which was modified to become suitable for the data presentation purposes. The data extracted in Finnish was translated into English to provide the readers of this thesis better comprehension of the literature reviewed.

Thereby, the data is structured as follows:
- Number of the source (No.)
- Bibliographic data of the source
- Country of origin (where the study was conducted or published)
- Type of literature/methods
- Aim of the study
- Population
- Concept: digital intervention type; the purpose of usage
- Context

The data from eligible sources are presented in appendices 3–5.

5.5 Data analysis

This phase of the research contains analysing the collected data. As the purpose of a scoping review is on a very high level, the analysis methods are flexible. They have to be tailored according to the researcher's objectives and what is aimed at achieving. In a scoping review, mapping results and using qualitative content analysis are done rather descriptively than analytically. The occurrence of concepts, characteristics, populations, for example, can be investigated with quantitative data, also with more advanced methods than simple frequency counts. (Peters et al., 2020.)

All eligible sources were read thoroughly, and the data collated according to the structure is described in chapter 5.3. The literature characteristics were mapped by using descriptive quantitative analysis, i.e., descriptive statistics. The characteristics were chosen to present as the following categories: "Year of publication", "Research method", and "Type of OMH".

Furthermore, variables were grouped into categories by frequency distribution, which is one of the nominal measurement process levels to classify variables (LoBiondo-Wood & Haber, 2018: 298). "The number of the source" column indicates each respective article source (in square brackets), numbered in Appendices 3–5. Also, "Type of publication" and "Type of literature" information are included to provide more information on where the articles originate. The quantitative analysis results of the characteristics of the literature are summarised and presented in Appendix 6.

The process of creating subheadings, as the description of categories, was two-folding. I pondered how to analyse the data to be transparent and, at the same time, combine the theoretical and practical approach useful for further utilisation. Thereby, both deductive and inductive approaches were used when analysing the data.

In the deductive process, the three levels of prevention – primary, secondary and tertiary – according to the Neuman Systems Model's theoretical context described in chapter 4 were used as categories to structure the data. Furthermore, the categories and goals as subheadings and intervention types were structured as codes and presented in Appendix 6. Thereby, at this phase, a deductive research approach was used to create the structure

before starting the data analysing process (Bengtsson, 2016). The goals and intervention types were modified during data analysis, presenting only those relevant to the research content.

The data relevant to the research question was analysed inductively and descriptively, using qualitative content analysis. The "Concept" part of the PPC (population/concept/context) approach was used to structure, condense and summarise the findings of the use of digital interventions for OMH problems. Furthermore, the stages of data analysing identified by Bengtsson (2016) were followed. During these stages, which can be modified flexibly according to the researcher's need, the data is itemised into meaning units condensed further into smaller meaning units. After this, the meaning units are labelled with codes understandable concerning the content, followed by identifying sub-headings and categories. (Bengtsson, 2016.)

The digital intervention activities identified in the research literature are described as condensed meaning units (CMU) in Appendices 7.1–7.3. In the research, the inductive and deductive approaches merged as combining the condensed meaning units built up during the content analysis and the predefined theoretically grounded categorisation structure based on the Neuman Systems Model.

As recommended for ensuring the quality and trustworthiness of the analysis by Bengtsson (2016), each of the data analysing stages was performed several times. Furthermore, the analysing process was made transparent by presenting it in Appendices 7.1–7.3. During reading and rereading the eligible sources, the sentences related to the various meaning units, i.e., the text relevant to the research question, were identified and highlighted in the original digital and printed article sources. During the initial reading and analysing process of the sources, the key content relevant to the research question was extracted into appendices 2–4. The same data was used to compile the first versions of the condensed meaning units, presented in Appendices 7.1–7.3.

Moreover, when reviewing the articles, the previously collected data was repeatedly improved by revising the existing condensed meaning units, referring to interventions as an activity, or adding the new ones where seen needed. To present the connection

between the meaning units and the literature, each source's number related to the unit was recorded in the separate column "Number of the source". The original numbering of the sources is found from Appendices 3–5. Describing the data analysing results is continued in chapter 7.

6 Ethical considerations

When conducting the research, it is essential to act in an ethically responsible and sustainable way. The ethical considerations shall be taken into account before the research begins and the possible risks of using the research method evaluated. This research at hand is guided by the ethical principles and guidelines of Responsible Conduct of Research (RCR) according to the Finnish National Board on Research Integrity (TENK) and the research community, and Ethical recommendations for thesis writing at universities of applied sciences by ARENE. (TENK, 2019; ARENE, 2020.)

As always in the research field of human sciences, the ethical perspective of human participants' must be taken into account (TENK, 2019). In this study, a scoping review is used as the research method for mapping the literature, and no human participants were directly involved in the research. The study follows the latest guidelines of a scoping review method by the Joanna Briggs Institute (Peters et al., 2020). It was pointed out under the methodology discussion chapter that the outcome of this scoping review should not be used for the recommendation of a practice or a policy, which should also be considered as an essential ethical viewpoint.

This study follows the good principles of research ethics and the responsible conduct of research. The research data should be preserved and made available to other researchers (TENK, 2019). Therefore, this study aims to introduce the research results openly and responsibly, which is the precondition for critical evaluation and the scientific process. As an author, I have acquainted myself with the topic of my thesis and the research thoroughly. The collected data and results of this research are presented in the appendices of this study. The study has been conducted by citing the authors and publications used, not copying any content, preventing fraud and aiming at accuracy in all research phases.

There are no conflicts of interest or financial sources used in the research conduction to report. The reference material has been reviewed thoroughly, the data collected for the thesis are analysed, and the results are presented carefully and in a truthful manner. Since writing the thesis as a student at Novia University of Applied Sciences, also the educational institution's thesis guidelines and writing instructions are followed.

7 Presentation of results

This chapter presents the literature's general characteristics and the results applicable to the research question.

7.1 Literature characteristics

The quantitative results of the literature sources' characteristics identified for this scoping review are presented in Appendix 6. The literature sources were published between 2011 and 2020. The yearly number of publishing varied between one and five, and the number of published articles has been higher (n=5 per year) during the last three years. Two Finnish articles were published in 2019 (Neittaanmäki & Kaasalainen, 2019; Terveys ja talous, 2019) and one in 2015 (Stenberg et al., 2015). This data is indicated in the column "The number of the source" in Appendix 6.

The type of literature included to the research was articles, of which 19 (n=19) were published in scientific journals, two (n=2) in periodical publications and one (n=1) in a trade magazine. The scientific articles were grounded on different research methods. The methods were mainly systematic literature reviews (n=3) and randomised controlled trials (n=3). For the three articles published in non-scientific publications in Finland (Neittaanmäki & Kaasalainen, 2019; Terveys ja talous, 2019; Stenberg et al., 2015), the research method was not applicable (N/A).

The studies included the working population from 16 different countries from different continents. Most of the studies considered employees in European countries as Finland, Germany, Norway, Spain, Sweden, The Czech Republic, Turkey and the UK. There were studies also from North America: US and Canada, Asia: China, Hong Kong, Japan and

Singapore, and Australia. In two systematic review articles (Proper & Oostrom, 2019; Tan et al., 2014), the working population's countries were not specified in the text.

The framework of OMH problems is defined in chapter 2.3.4. The articles addressed digital interventions related to OMH problems, such as stress (n=16), depression (n=14), anxiety and distress (n=13), sleep disturbances including insomnia (n=10), and burnout (n=3).

7.2 Results related to the research question

The research question was, "How are the digital interventions for occupational mental health problems used in occupational health care in practice?". As aiming to obtain an overview on the research subject from the perspective of occupational health, the data indicating the use of the digital interventions were grouped into three categories according to the Neuman Systems Model: (1) primary, (2) secondary, and (3) tertiary prevention. The categories' subheadings and codes were constructed based on this theoretical framework.

The results related to the research question are presented in Appendices 7.1, 7.2 and 7.3. To highlight the interventions that are continuing throughout different prevention levels were marked in the same colour in appendices. In presenting the results, employees and workers are referred to as clients. Since there are many sources applicable to several interventions, the relevant source numbers are indicated in the columns "No. of sources". By this, the long list of authors as references in the text was minimised. The results are presented in the below chapters, and the findings are discussed further in chapter 7.

7.2.1 Primary prevention

The results categorised under primary prevention are presented in Appendix 7. The primary prevention includes using digital interventions identified in the research literature to reduce the possibility to encounter stressors and/or increase client resistance. As classified with the Neuman Systems Model's support, the intervention types used for this purpose were to provide health promotion and maintain the client, i.e., employee wellness (Neuman & Fawcett, 2011: 26–27, 29). These two interventions are often going hand in

hand and overlapping at least to some extent. However, the interventions are kept separate to indicate the difference in approach.

Health promotion (Appendix 7, Code 1) is considered to include a wide variety of health and wellbeing interventions affecting mental health, where the health care personnel have a more active role as an information provider and the client a less active role as an information recipient. In the other intervention type of maintaining wellness (Appendix 7, Code 2), the client is expected to have an active role in implementing these activities/interventions independently, where the health care provider could act as a support.

Promoting and improving workplace (mental) health and wellbeing by digital interventions to avoid OMH problems (CMU 1.1) were highlighted in several sources (Carolan et al., 2017; Howarth et al., 2018; Phillips et al., 2019; Proper & Oostrom, 2019; De Angelis et al., 2020; Hennemann et al., 2018, Muuraiskangas et al., 2016; Wang et al., 2016; Kraaji et al., 2020; Ornek & Esin, 2020 & Berkel et al., 2011). For example, the study by Howarth et al. (2018) included, among other activities, educating by web-based interventions, especially workers above 50 years and older on major health topics, such as stress management but also on healthy ageing, diet, physical activity and tobacco use (CMU 1.2).

According to the literature by Berkel et al. (2011), Carolan et al. (2018) and Terveys ja Talous (2019), digital interventions were also used for providing health coaching to help clients in building balance and performance routines (CMU 1.3). Proper & Oostrom (2019) described using digital interventions to protect and promote occupational safety and health (CMU 1.4). Hennemann et al. (2018) suggested an intervention as education on eHealth interventions helping "to establish a realistic perception of OeMH as an extension to existing instruments in occupational health" (CMU 1.5).

Under the second intervention type of maintaining wellness (Code 2), the clients were using the digital interventions to sustain their occupational wellbeing (CMU 2.1) (Phillips et al., 2019; Muuraiskangas et al., 2016; Peter et al., 2019; Kraaji et al., 2020; Berkel et al. 2011). Moreover, according to Carolan et al. (2017), Philips et al. (2019) and Stenberg et al.

(2015), various digital interventions were used to strengthening primarily psychological wellbeing by preventing symptoms of stress, depression and insomnia, and increasing resilience skills (CMU 2.2).

Participating in mindfulness practice or coping training for preventing stress and other OMH problems (CMU 2.3) were also popular interventions conducted digitally (Carolan et al., 2017; Howarth et al., 2018; Muuraiskangas et al., 2016; Berkel et al., 2011). Two studies (CMU 2.4) included digital intervention for providing happiness training based on positive psychology principles (Carolan et al., 2017; Carolan et al., 2018).

7.2.2 Secondary prevention

According to Neuman & Fawcett (2011: 28), secondary prevention aims to reduce the degree of reaction to stressors and provide treatment of symptoms. The first defined intervention type at this level is considered to focus on managing or reducing OMH problems (Code 3), which can be seen more as a proactive and independent activity by the client himself or herself. As presented in Appendix 8 in respective columns of "No. of sources", most of the literature described using digital interventions for assessing, managing and/or reducing personal stress levels and reactions, depression and anxiety and distress (CMUs 3.1–3.3). Additionally, the clients used digital interventions for managing and reducing sleep disturbances, including insomnia (CMU 3.4) and, to some extent, also burnout symptoms (CMU 3.5).

Some literature described the clients using mindfulness practice or coping skills to intervene in the primary prevention level. They continued to use these interventions at this secondary level to manage and prevent occurring stress and other OMH problems (CMU 3.6). In two of the articles by De Angelis et al. (2020) and Matthewson et al. (2020), the focus of interventions was mostly on managing and relieving the negative psychological impact of the COVID-19 pandemic on the health care personnel, such as increased depression, anxiety, and stress among this working population (CMU 3.7).

The second intervention type includes providing treatment for OHM problems (Code 4), where a health care professional has an active role in implementing the intervention

together with the client. Here the most used intervention activity was delivering online therapy with tailored feedback and problem-solving training, e.g., through Cognitive Behavioural Therapy (CBT), Acceptance and Commitment Therapy (ACT) or Prolonged Exposure (PE) therapy. This activity was mentioned in 12 sources indicated in the respective column in Appendix 6.2 (CMU 4.1).

Similar digital intervention activities as presented under primary prevention and health promotion – providing education and/or e-coaching (CMU 1.3) – are also utilised at this secondary prevention level. Health care personnel provided these activities to help clients manage OMH problems, build and maintain balance and performance routines, and follow-up and support by the professionals (CMU 4.2). Additionally, as described in the article by Matthewson et al. (2020), health care personnel had an active role in providing the clients psychologically informed support related to the COVID-19 pandemic as a digital intervention (CMU 4.3).

7.2.3 Tertiary prevention

According to the Neuman Systems Model, tertiary prevention aims to support the client's internal/external resources for reconstitution or returning to wellness following treatment (Neuman & Fawcett, 2011: 28–29). The structured results are presented based on the literature in Appendix 9. Delivering online therapy by different methods as an intervention activity (CMU 5.1) also continues at the tertiary prevention level. At this stage, health care professionals continue to support the reconstitution of the client's resources, i.e., recovery (Code 5).

Similarly, as at the primary and secondary level, the intervention of providing education and/or e-coaching continues with the support of health care personnel at the tertiary level (CMU 5.2). During this intervention, health care professionals support the client to maintain the balance and performance routines and moving towards optimal wellness. Furthermore, as described by Hennemann et al. (2018) and Kraaji et al. (2020), providing support to the client on behavioural change or in after-care or assisting in returning to work after absenteeism are intervention activities that can be delivered digitally (CMU 5.3).

The second intervention type of tertiary prevention is the client returning to optimal wellness after treatment (Code 6). According to Neuman, the tertiary level interventions can start at any stage after the treatment when the client has reached a sufficient degree of stability (Neuman & Fawcett, 2011: 29). The digital therapy interventions (CMU 6.1) also continue at this stage with a client's active role to reach their optimal wellness. The clients also continued utilising the mindfulness practice and coping skills to maintain stability and reach optimal wellness (CMU 6.3).

8 Discussion

This chapter discusses the results of this scoping review study from two aspects. As advised by the JBI (Peters et al., 2020), the result findings are reviewed related to the research question and the limitations of this study's methodology.

8.1 Discussion on results

Based on the study results, digital interventions are used for various OMH problems – mainly for stress, depression, anxiety and distress, and for sleep disturbances and, to some extent, for burnout symptoms. The purposes of using the interventions are diverse. As structured according to the Neuman Systems Model, clients and health care professionals are using the digital interventions in all three prevention categories: primary, secondary and tertiary.

Furthermore, the use of digital interventions for OMH problems was explored from two perspectives: 1) a client and 2) a health care professional. By utilising the nursing theory and structuring the results based on these two user approaches, the intention was to point which of these parties has the responsibility of implementing the intervention.

Most of the interventions described in the literature were primarily used for the promotion of mental health and prevention of OMH problems, i.e., on the primary level. Additionally, the interventions were used widely to manage or treat various OMH problems, i.e., on the

secondary level. The digital interventions were also used as tertiary prevention, i.e., in activities supporting the clients' recovery and returning to optimal wellness.

Digital intervention activities targeting OMH problems were used either at one prevention level or as a cyclical process of interventions continuing over different levels. For example, a one-level primary preventive intervention for maintaining wellness by the client was participation in happiness training based on positive psychology principles (Carolan et al., 2017; De Angelis et al., 2020).

Examples of the digital interventions used as a cyclical process, marked in colours in appendices 7.1, 7.2 and 7.3, are as follows:
- education and/or coaching to help clients in building balance and performance routines (CMUs 1.3, 4.2, 5.2);
- mindfulness or coping skills practice to prevent or manage stress and other OMH problems (CMUs 2.3, 3.6, 6.2);
- therapy with tailored feedback and problem-solving training (CMUs 4.1, 5.1, 6.1).

The best results in relieving OMH problems were achieved when the clients used the digital interventions in collaboration or with the support of health care professionals or peer groups either digitally or face-to-face (Schiller et al., 2018; Carola et al., 2018; Hennemann et al., 2018; Kraaj et al., 2020, among other).

According to the literature, the most used and effective digital intervention activities for OMH problems were online therapies with tailored feedback and problem-solving training by different therapy methods. Therapies were also considered as psychoeducation requiring guidelines on helpful versus harmful thoughts, as an example (Yuen et al., 2015; Peter et al., 2019).

Especially, providing CBT as a treatment for OMH problems and support in client recovery and returning to wellness was pointed out as the most effective intervention in several sources (Carolan et al., 2017; Howarth et al., 2018; Phillips et al., 2019; Peter et al., 2019; Cavanagh et al., 2020, among other). Personalised support and feedback in therapy or e-

coaching were essential factors in successfully implementing the digital interventions (Berkel et al., 2011; Carolan et al., 2018; Terveys ja talous, 2019; Kraaji et al., 2020).

Finnish literature results pointed out the use of online therapy available via the website Mielenterveystalo.fi in Finland as a low-threshold digital intervention for OMH problems for individuals from the whole country (Stenberg et al., 2015; Neittaanmäki & Kaasalainen, 2019). Furthermore, the website provides a large number of online self-help interventions to individuals to prevent, identify, manage and relieve the symptoms of OMH problems. Online therapies are also included in the Current Care Guidelines (Käypä hoito -suositus) for depression, used as evidence-based clinical practice guidelines by health care (Stenberg et al., 2015).

Two of the sources also included the focus on the COVID-19 pandemic's effect on employees' mental health (De Angelis et al., 2020; Matthewson et al., 2020). The concept paper by De Angelis (2020) included the digital intervention planned to promote workplace mental health to manage the negative psychological impact of the COVID-19 pandemic, such as increased depression, anxiety, and stress among the working population. Matthewson et al. (2020) described the digital intervention as a telephone support service for relieving anxiety and mental health concerns of health care personnel regarding the COVID-19 situation.

Although most literature included positive outcomes of using digital interventions for OMH problems, several challenges were discovered. Some studies identified the barriers related to engagement, access, or digital interventions for OMH problems (Muuraiskangas et al., 2016; Wang et al., 2016; Carolan et al., 2018; Hennemann et al., 2018). Using the digital interventions were described as requiring individuals a proactive approach with sufficient self-discipline, adherence, and engagement to independently utilise the interventions and achieve the cognitive change as a successful result (Berkel et al., 2011; Carolan et al., 2017).

It is important to present the failed adoption cases since they provide learning points for future research and utilisation of digital interventions. One of the articles described a case study implementing an unguided digital intervention in two Finnish workplace settings

with a failed adoption (Muuraiskangas et al., 2016). The intervention used was based on acceptance and commitment therapy (ACT), and it aimed to teach skills for stress management and mental wellbeing. According to this study, the process failed to integrate the intervention into everyday activities at the workplace. Moreover, the study identified several barriers to participating in the intervention at an individual level, such as lack of time, lack of perceived need, and perceived benefits.

In addition to OMH problems, the literature described that the digital interventions were also used for other health conditions and purposes, such as weight control and preventing obesity (Howarth et al., 2018; Berkel et al., 2011), diabetes (Proper & Oostrom, 2019; Kraaij et al. (2020), musculoskeletal disorders (Proper & Oostrom, 2019) and preventing cardiovascular disorders (CVD) (Kraaij et al., 2020). Furthermore, the interventions were used to increase physical activity (Howarth et al., 2018) and reduce substance, i.e., alcohol abuse (Howarth et al., 2018; Phillips et al., 2019; Neittaanmäki & Kaasalainen, 2019; Stenberg et al., 2015), use of tobacco products (Howarth et al., 2018) and compassion fatigue (Wood et al., 2017).

Besides occupational health, digital interventions were described to affect several individual work-related factors positively. For example, Carolan et al. (2017) and Howarth et al. (2018) reported using interventions targeting increased work effectiveness, productivity and job satisfaction. Furthermore, the interventions were used for improving levels of social support and job performance (Ornek & Esin, 2020), work engagement (Berkel et al., 2011; Carolan et al., 2017) and quality of working life (Phillips et al., 2019).

8.2 Discussion on methodology

Research on a scoping review methodology has evolved over the past 15 years. Within its flexibility, the method has been interpreted and utilised in several different ways. Thus, finding the proper approach to using this research method required much reflection before and during the study process. The scoping review guidelines updated in the summer of 2020 by the Joanna Briggs Institute clarified and helped understand and use the methodology. However, I still experienced uncertainty during the research process, whether interpreting the guidelines in the right manner and within the flexibility allowed.

Scoping review, like any other research method, can have several kinds of limitations. According to Peters et al. (2020), there is, for example, a possibility the researcher is omitting relevant sources of information, and the availability of relevant information related to the research question is affecting the outcome of the review.

The primary factor affecting this research's limitations is having no previous experience of a scoping review methodology. During the nursing studies and previous research projects, I had not come across literature that used this method. Consequently, a significant amount of time was spent studying to understand the methodology by reading the guidelines and example studies from different fields.

One of the study's limitations can be considered that the eligible literature included only the published evidence-based article sources searched via electronic databases described in chapter 5. No unpublished and grey literature that should ideally be included in the scoping review (Peters et al., 2020) was used in this study. Furthermore, there was no relevant literature published by the Finnish health care authorities identified for the research. On the other hand, a fair amount of eligible literature, including several review articles, were identified and used in the research. The literature was also studied in two languages: English and Finnish.

The decision to analyse the research data based on the Neuman Systems Model and the three prevention levels was made after already charting the data according to the PCC approach. That meant the literature had to be revisited frequently to build up the structuring of the results and analyse them. The results are interpreted according to the personal best possible understanding of combining the nursing theory and the literature reviewed. Thus, one of the limitations of this study can be considered working on the research alone. When working solo, there is no possibility to discuss the perceptions or results with other researchers to expand or elucidate the various points of view when constructing new knowledge on the study's subject.

The unavailability of some of the sources identified during the electronic databases search process can also be considered a limitation. Even if implementing the predefined inclusion criteria and choosing to display the literature results with full access only, there were

identified several articles, for example, in the Finnish database Medic, which required login for access.

Concurrently, the thesis process has provided me with an opportunity to enhance my research skills. It can be concluded that conducting the research was a continuous learning process on both the research subject and utilising the scoping review methodology.

9 Conclusions and recommendations

The scoping review aimed to provide an overview concerning the use of digital interventions for OMH problems in an occupational health care setting in practice. For achieving this goal, the literature on this subject field was mapped, and examples of using digital interventions for OMH problems were provided.

Since there is no methodological quality and formal synthesis assessment as part of a scoping review, it should be noted not to produce recommendations to change a practice or a policy (Peters et al., 2020). Therefore, the results of this study are instead to be used to inform practice.

Occupational wellbeing is a rather popular research topic. The literature on the subject field of digital interventions for OMH problems in English presented a fair amount of research from various aspects of using digital interventions related to OMH problems. Nevertheless, even if OMH problems, including especially depression, are widely discussed in public and statistically proven to cause absences from working life, there was very little published literature available from the perspective of Finnish occupational health care and workplace settings. I was also expecting to identify more literature on the research subject from the health care authorities, especially from the Finnish Institute of Occupational Health (TTL), when searching the Finnish content.

The study results can be utilised by occupational and other health care professionals; however, they are also a useful resource for employers and employees. The health care professionals can utilise this study to enhance their awareness on using digital interventions related to OMH in prevention and health promotion activities, which are the

key focuses of occupational health care, through the examples identified. The research concluded that digital interventions are used for various OMH problems and that using the interventions is diverse. In addition to OMH, the interventions are used in the workplace to affect positively several other health conditions and individual work-related factors.

The Neuman Systems Model is a useful theory for occupational health care. It helps to understand the clients holistically while also considering the environment and stressors affecting their wellbeing. This nursing theory could be utilised in a more versatile manner in future occupational health care research and parallel with practice.

There are several further research opportunities on the subject field of this thesis. Using digital interventions for OMH problems can be explored from a client's perspective or a health care professional as a user. Both parties have an essential role when implementing the activities. Currently, digital interventions for OMH problems appear to be studied mainly from the clients' perspective only. Thereby, it would be valuable to study and identify the factors required to implement interventions from the healthcare professionals' perspective successfully.

During the current COVID-19 pandemic, a topical research subject would study the pandemic's effect on employees' wellbeing and OMH from various perspectives. For many, the workplace setting has moved from office into the home environment, meaning changes in working ways. Thereby, it would be relevant to study how digital interventions have been utilised in health care or workplace settings during this period. The current research could also be continued further, for example, by looking into the use of digital interventions from the health and nursing viewpoint of the specific working population, as employees of particular professions and/or employer groups.

The development of digital interventions in health care is continuous, and interventions are inevitably increasing. When developing digital interventions for supporting OMH, relevant research should be used as a basis. Here, the collaboration between health care, users (clients), and developers of the interventions is critical.

There are promising digital developments ongoing related to eMental health interventions contributing to more research possibilities and practical implications. For example, artificial intelligence (AI) provides a significant potential for preventing mental health disorders, improving diagnostics and developing more personalised treatment applications, where it can be utilised to collect personalised data and inform personalised feedback strategies (Neittaanmäki & Kaasalainen, 2019). Nevertheless, at least for the time being, the successful implementation of digital interventions seems to require also human contact.

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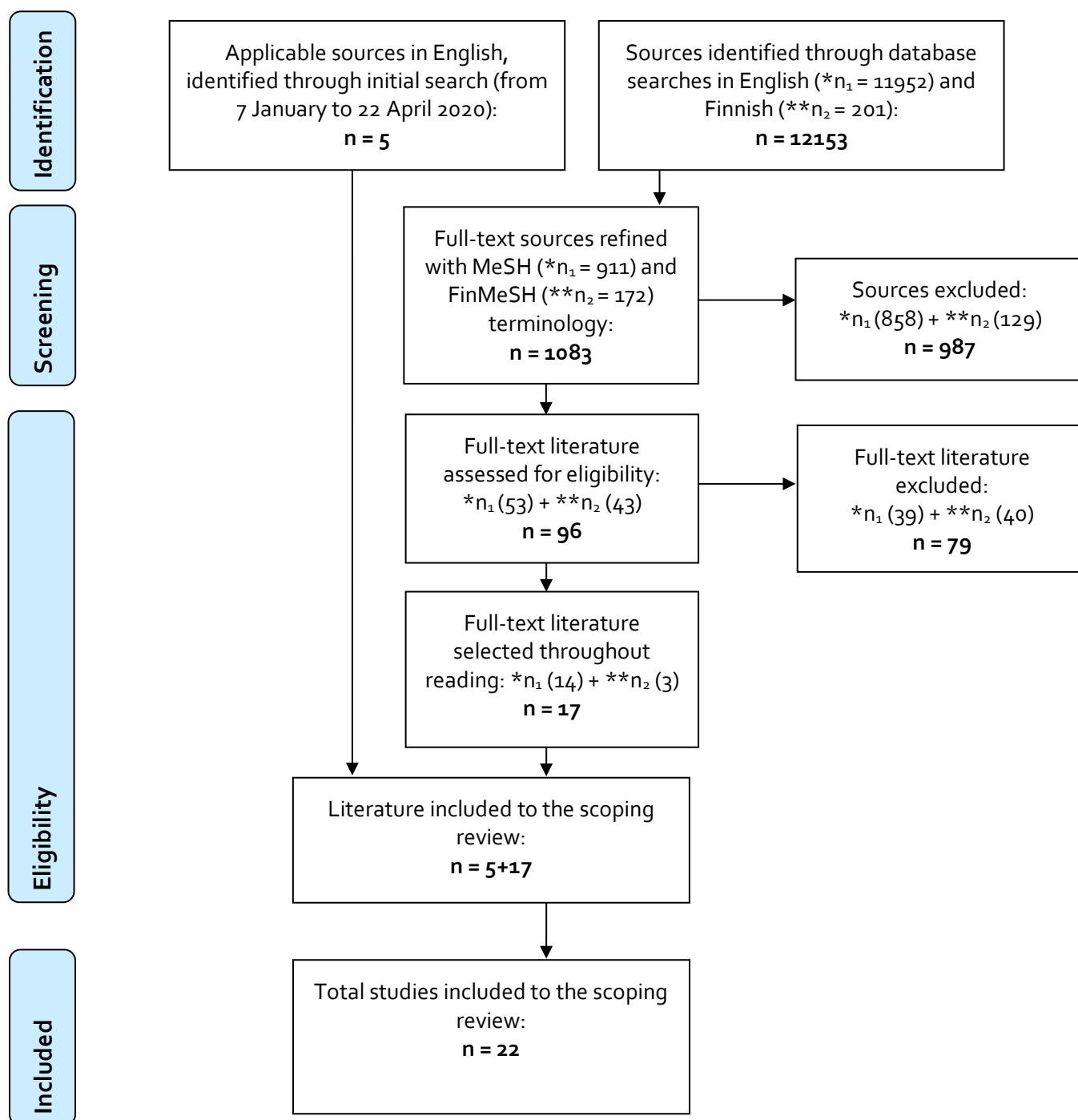
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APPENDIX 1. Table 1. Defining terms and keywords based on PCC categorisation

PCC	Term	Keywords in English with Boolean operators	Keywords in Finnish with Boolean operators
Population (P)	Employees, workers, patients and clients	employees OR workers OR patients OR clients	työntekij* OR potila* OR asiak*
	18 years old and above	NOT child NOT children NOT adolescent NOT teenagers	NOT laps* NOT murrosikäi* NOT teini-ikä* NOT opisk*
Concept (C)	Digital interventions	AND digital interventions AND work-related mental health OR occupational mental health OR digital mental health OR occupational e-mental health AND mental health problems OR occupational mental health problems OR mental health disorders OR mental illness OR stress OR distress OR anxiety OR anxiety disorder OR depression OR burnout OR insomnia OR sleep disorders	AND digitaali* interventio* OR digitaali* mielenterveyspalvelu* OR digitaali* mielenterveystyö* AND "työperäi* mielentervey*" OR mielentervey* OR "työ* liittyv* mielenterveysongelm*" OR mielenterveyshäiriö* OR stressi* OR ahdistu* tai ahdistuneisuu* OR ahdistuneisuushäiriö* OR masennu* OR uupumu* OR unettomuu* OR unihäiriö*
	occupational mental health problems		
Context (C)	Workplace setting	AND workplace OR	AND työpaik* OR terveydenhoi* OR terveydenhuo* OR työtervey* OR työterveyshuol*
	Health care settings	health care OR	
	Occupational health care setting	occupational health care	

APPENDIX 2. The PRISMA Flowchart

Identification

| Applicable sources in English, identified through initial search (from 7 January to 22 April 2020): **n = 5** | Sources identified through database searches in English (*n_1 = 11952) and Finnish (**n_2 = 201): **n = 12153** |

Screening

Full-text sources refined with MeSH (*n_1 = 911) and FinMeSH (**n_2 = 172) terminology: **n = 1083**

Sources excluded: *n_1 (858) + **n_2 (129) **n = 987**

Full-text literature assessed for eligibility: *n_1 (53) + **n_2 (43) **n = 96**

Full-text literature excluded: *n_1 (39) + **n_2 (40) **n = 79**

Eligibility

Full-text literature selected throughout reading: *n_1 (14) + **n_2 (3) **n = 17**

Literature included to the scoping review: **n = 5+17**

Included

Total studies included to the scoping review: **n = 22**

*n_1 = sources in English
**n_2 = sources in Finnish

The PRISMA flowchart modified according to the search strategy of the scoping review process by JBI (Peters et al., 2020), adapted from the PRISMA statement by Moher et al., 2009.

APPENDIX 3. The results of initial limited search

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used) / methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#1	Carolan et al. (2017). *Improving employee wellbeing and effectiveness: systematic review and meta-analysis of web-based psychological interventions delivered in the workplace.* Journal of medical Internet research, 19(7), e271.	USA Germany The Netherlands UK Japan Australia Sweden	Article in scientific journal (Google Scholar)/ systematic literature review / 21 randomized controlled trials (RCTs)	"To identify the effectiveness of occupational digital mental health interventions in enhancing employee psychological well-being and increasing work effectiveness and to identify intervention features associated with the highest rates of engagement and adherence."	Employees generally from working population; organisations working in education, health, local authorities, banking, research, education and security; a call center; manufacturing; technology; sales; chemicals; human resource; insurance; transport and communication; 1 study of managers from medium and large companies, 1 study employed caregivers of people with dementia.	Psychological interventions delivered via the Internet, mobile technology (app), or a computer program (for CBT, ACT) / Aimed at increasing psychological well-being (e.g., by reducing symptoms of stress or depression, enhancing resilience skills, mindfulness training, stress and mood management, happiness training with positive psychology, reduce insomnia (e.g., with CBT), emotional regulation) or work effectiveness (e.g., by increasing engagement or productivity).	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used) / methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#2	Howarth et al. (2018). *The impact of digital health interventions on health-related outcomes in the workplace: A systematic review.* Digital Health, Vol. 4. 2055207618770861	USA, Australia, Netherlands, Sweden, Japan, Norway and Singapore	Article in scientific journal (Google Scholar) / systematic literature review	"To assess the impact of pure digital health interventions in the workplace on health-related outcomes."	Employees of public and private offices, academic or hospital settings and manufacturing plants; (desk-based or office workers, nurse or health professionals, employees from a government department, large unnamed organizations, manufacturing plant employees or a mix of businesses and organizations combined together).	Digital interventions delivered through the use of a computer, tablet, smartphone or email, either as a website, app or downloadable software, excluding wearable technology / Purposes of usage: treatment of insomnia (digital CBT), health promotion, managing and reducing stress and anxiety, education to reduce stress (e.g. meditation skills/mindfulness MBSR online course), improving mental health; Other purposes: increasing activity level, alcohol self-help, to better manage risk for alcohol-related problems, weight management, healthy nutrition, education/guidance on the major health topics, to increase physical activity.	Workplace setting
#3	Phillips et al. (2019). *Effectiveness of occupational e-mental health interventions: a systematic review and meta-analysis of randomized controlled trials.* Scandinavian journal of work, environment & health, 45(6), 560–576.	USA, Germany, Japan, Netherlands, UK, Sweden, Finland, Norway, Australia, Hong Kong	Article in scientific journal (Google Scholar) / Systematic literature review and meta-analysis of randomized controlled trials (RCT)	"To investigate the effectiveness of occupational e-mental health interventions aimed at stress, depression, anxiety, burnout, insomnia, mindfulness, well-being, and alcohol misuse and their potential treatment moderators."	An employee population for any occupation	ICT-based eMental Health (eMH) interventions for treatment of any mental health condition, including stress, depression, anxiety, burnout, insomnia, mindfulness, well-being, and alcohol misuse; the majority of eMH interventions based mainly on CBT.	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used) / methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#4	Proper & Oostrom (2019). *The effectiveness of workplace health promotion interventions on physical and mental health outcomes – a systematic review of reviews.* Scandinavian Journal of Work, Environment & Health, 45(6), 546-559.	Not informed	Article in scientific journal (Google Scholar) / Systematic review	"This systematic review aimed to provide an overview of the effectiveness of health promotion interventions at the workplace on physical and mental health outcomes related to chronic diseases."	Workers (employees) with non-specified occupation	Web-based psychological interventions delivered via the Internet, mobile technology, or a computer program; Health promotion and prevention of mental illness	Workplace and health care settings
#5	Tan et al. (2014). *Preventing the development of depression at work: a systematic review and meta-analysis of universal interventions in the workplace.* BMC Med 12, 74.	Not informed	Article in scientific journal (Google Scholar) / systematic review	"To study the impact of mental health interventions for preventing depression in the workplace."	Working population with non-specified occupation	Interventions aimed at universal prevention of depression, including internet-based interventions.	Workplace setting

APPENDIX 4. The results of the 2nd literature search in English

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#6	Carolan et al. (2018). *Employees' Perspectives on the Facilitators and Barriers to Engaging With Digital Mental Health Interventions in the Workplace: Qualitative Study.* JMIR Mental Health, 5(1), e8.	UK	Article in scientific journal (MEDLINE) / Qualitative study, semi structured interviews	"The aim of this research was to get a better understanding of the facilitators and barriers to engaging with digital mental health interventions in the workplace."	Employees from six UK-based organizations: two local authorities, two universities, one third sector (not for profit) organization, and one telecommunication organization.	"A web-based stress management intervention (WorkGuru - a modular program that is based on the principles of cognitive behavioral therapy (CBT), positive psychology, mindfulness, and problem solving) with and without access to an online facilitated discussion group, e-coach included."	Workplace setting
#7	De Angelis et al. (2020). *H-WORK Project: Multilevel Interventions to Promote Mental Health in SMEs and Public Workplaces.* International Journal of Environmental Research and Public Health, 17(21), 8035.	Italy Spain Germany The Netherlands The Czech Republic	Article in scientific journal (MEDLINE) / Concept paper with mixed-method approach (qualitative and quantitative methods; subjective and objective data)	"To describe the study design, research questions and methods of a large, international intervention project - The EU 2020 H-WORK - aimed at improving employee mental health and well-being in small medium enterprises (SMEs) and public organisations."	Employees and managers from all levels of SMEs (from manufacturing, hospitality and ICT) and public sector (two healthcare organisations, two higher education institutions, and one governmental organisation).	" Digital interventions under EU 2020 H-WORK project addressing the impact of Covid-19 on workplace mental health; for promoting mental health, to deal with the negative psychological impact of the current pandemic, such as increased depression, anxiety, and stress among the working population."	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#8	Hennemann et al. (2018). *Acceptance and barriers to access of occupational e-mental health: cross-sectional findings from a health-risk population of employees.* International Archives of Occupational and Environmental Health, 91(3), 305–316.	Germany	Article in scientific journal (MEDLINE) / Cross-sectional study	"To examine acceptance and person-centered barriers to potential uptake of OEMH for work-related distress in employees with an elevated risk of early retirement."	Employees with an elevated risk of early retirement	"Preventive or curative OEMH (Occupational e-mental-health) interventions, including psychoeducation, health risk assessment, workplace health promotion or return-to-work assistance. For example, a psychodynamic web-based after-care supporting return-to-work of former inpatients, self-help for employees with sleep-problems, stress management or focus on particular occupational groups."	Workplace setting
#9	Matthewson et al. (2020). *Implementation and analysis of a telephone support service during COVID-19.* Occupational Medicine, Volume 70, Issue 5, July 2020, Pages 375–381.	UK	Article in scientific journal (MEDLINE) / Qualitative study	"To describe implementation and analysis of a psychology-led COVID-19 telephone support line in a National Health Service OHS (occupational health services)."	Health care workers of public hospitals	A psychology-led telephone support line to offer information and guidance, signpost to resources and refer to a further half-hour support call with a mental health practitioner where required self-identified. "Purpose to relieve anxiety/mental health concerns regarding COVID-19 situation."	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#10	Muuraiskangas et al. (2016*). Process and Effects Evaluation of a Digital Mental Health Intervention Targeted at Improving Occupational Well-Being: Lessons From an Intervention Study With Failed Adoption.* JMIR Mental Health, 3(2), e13.	Finland	Article in scientific journal (MEDLINE) /Case study (intervention)	"The aim of this paper is to study the effects of an unguided digital mental health intervention in occupational well-being and the factors that influence the adoption of the intervention."	Employees of two information and communication technology (ICT) companies	"A digital training app available in a mobile and a Web-based version; the intervention was based on acceptance and commitment therapy (ACT) and its aim was to teach skills for stress management and mental well-being, improving occupational wellbeing."	Workplace setting
#11	Peter et al. (2019). *Effectiveness of an Online CBT-I Intervention and a Face-to-Face Treatment for Shift Work Sleep Disorder: A Comparison of Sleep Diary Data.* International Journal of Environmental Research and Public Health, 16(17).	Germany	Article in scientific journal (MEDLINE) /Comparative study	"To compare the sleep outcomes of CBT-I between the online and outpatient samples. In the online sample, the study assessed if CBT-I improved wellbeing, symptoms of insomnia, and daytime sleepiness. In the outpatient sample, the study assessed if CBT-I improved symptoms of depression, insomnia symptoms, and daytime sleepiness."	Shift-work employees of an engineering and technology company	Online cognitive behavioral therapy for insomnia (CBT-I) intervention and compared sleep outcomes to a face-to-face outpatient treatment.	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#12	Wang et al. (2016). *Preferred Features of E-Mental Health Programs for Prevention of Major Depression in Male Workers: Results From a Canadian National Survey.* Journal of medical Internet research, 18(6), e132.	Canada	Artcile in scientific journal (MEDLINE) / Cross-sectional study	"The objective of this study was to (1) estimate and compare the proportions of Internet use for medical information, preferred design features, and likely use of e-mental health programs; (2) examine factors associated with the likely use of e-mental health programs; and (3) understand potential barriers to the use of e-mental health programs among Canadian working men, who were at high risk of a major depressive episode (MDE)."	Employees, self-employed and family enterprise workers (English and French speaking male workers)	E-mental health programs for prevention of Major Depression.	Workplace setting
#13	Yuen et al. (2015). Randomized *Controlled Trial of Home-Based Telehealth Versus In-Person Prolonged Exposure for Combat-Related PTSD in Veterans: Preliminary Results.* Journal of Clinical Psychology, 71(6), 500–512.	USA	Article in scientific journal (Academic Search Elite) / RCT	"The present study is an ongoing randomized controlled trial comparing the effectiveness of prolonged exposure (PE) delivered via in person or home-based video telehealth modalities."	Military employees	Prolonged exposure (PE) therapy for stress and PTSD, through either home-based telehealth or standard in-person office-based care	Health care setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#14	Cavanagh et al. (2020). *The Use of Digital Health Technologies to Manage Insomnia in Military Populations.* J. technol. behav. sci. 5, 61–69 (2020).	USA Sweden UK The Netherlands China Canada	Article in scientific journal (Springer link) / Rapid literature review (of RCTs)	"To examine the available literature to provide an overview of the potential use of digital health technologies, specifically mobile and internet-based technologies, to deliver insomnia treatment. In addition, this review presents findings of market research investigating the availability of digital health technologies for CBT-I."	Military employees in the US and abroad	"Digital health technologies, such as mobile applications and internet-based programs, have been identified as ways to increase access to CBT-I treatment for the employees; for treatment of insomnia, sleep disturbances."	Workplace and health care setting
#15	Kraaij et al. (2020). *Personalized support for well-being at work: an overview of the SWELL project.* User Model User-Adap Inter 30, 413–446.	The Netherlands	Article in scientific journal (Springer link) / Case study (project overview)	"To reflect on the lessons learned in the SWELL (smart reasoning systems for well-being at work and at home" project that addressed the design of user-centered ICT applications for self-management of vitality in the domain of knowledge workers." ("The SWELL project addresses mHealth for well-being at work from a multi-disciplinary view, addressing both mental and physical well-being aspects.")	Employees (knowledge workers) of ICT companies	Stress (in knowledge workers) / "Personalized coaching: an e-coach for tailored coaching during the work day; a personalized mHealth intervention for improving cardiovascular health; and personalized coaching aimed at improved self-efficacy", to support well-being at work, reduce and control stress; app for health promotion at work	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
# 16	Ornek & Esin, (2020). *Effects of a work-related stress model based mental health promotion program on job stress, stress reactions and coping profiles of women workers: a control groups study.* BMC Public Health 20, 1658.	Turkey	Article in scientific journal (Springer link) /Quasi-experimental research design (pre-test post-test non-equivalent control groups)	"To examine the effects of the work-related stress model-based Workplace Mental Health Promotion Programme on the job stress, social support, reactions, salivary immunoglobulin A and Cortisol levels, work absenteeism, job performance and coping profiles of women workers."	Female industry workers (textile factory)	"Mental health promotion program on job stress, stress reactions and coping profiles, interventions including reminder messages, videos, and WhatsApp texts were at the follow-up stage."	Workplace setting
#17	Schiller et al. (2018). *A randomized controlled intervention of workplace-based group cognitive behavioral therapy for insomnia.* Int Arch OccupEnviron Health 91, 413–424.	Sweden	Article in scientific journal (Springer link) / RCT	"The present study aimed to investigate if a workplace-based intervention could improve sleep among employees with moderate insomnia symptoms."	Employees (various working areas: store, office, warehouse or logistics although two-thirds worked in offices; regular, irregular and flexible working time)	Interventions for insomnia, sleep disturbances. "The sleep school was a CBT-based program involving both theory and practice, developed and led by a trained, certified clinical psychologist."	Workplace setting

No.	Bibliographic data of the source	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#18	Berkel, van et al. (2011). *Mindful "Vitality in Practice": an intervention to improve the work engagement and energy balance among workers; the development and design of the randomised controlled trial.* BMC Public Health 11, 736.	The Netherlands	Article in scientific journal (Springer link) / RCT /	"To describe Phase I of the study of the Mindful "Vitality in Practice" intervention, the systematic development of the intervention as well as the study design and baseline characteristics of the study population for the Phase II randomised controlled trial (RCT)."	Employees of two Dutch research institutes in the governmental sector	Combining interventions for mental health and energy balance (to avoid mental health problems and obesity) with "8-weeks customized mindfulness training, followed by 8 sessions of e-coaching and supporting elements, such as providing fruit and snack vegetables at the workplace, lunch walking routes, and a buddy system"; to improve the work engagement and energy balance-related behaviours, increasing physical activity, preventing mental health disorders.	Workplace setting
#19	Wood et al. (2017). *Reduction of burnout in mental health care providers using the provider resilience mobile application.* Community Mental Health Journal, 53(4), 452-459.	USA	Article (ABI/INFORM Global) / Pilot study	"This pilot study examined the usability, acceptability, and effectiveness of a free Provider Resilience (PR) mobile application (app) designed by the National Center for Telehealth and Technology to reduce provider burnout."	Outpatient mental health care providers (community-based outpatient care site)	Using Provider Resilience (PR) mobile application (app) to reduce burnout and compassion fatigue.	Workplace setting

APPENDIX 5. The results of the 2nd literature search in Finnish

No.	Bibliographic data of sources	Country of origin	Type of literature (Database used)/ methods	Aim of the study	Population	Concept: digital intervention type and purpose of usage	Context
#20	Neittaanmäki & Kaasalainen (2019). *Informaatioteknologia ja tekoäly tukena mielenterveyspalveluissa. (Information technology and artificial intelligence (AI) backed by mental health services.)* Talous ja yhteiskunta, 47 (3), 42-47.	Finland	Article in Periodical publication (Artikkeli aikakauslehdessä) (JUULI) / N/A	To study the potential of information technology and AI in the development of preventive mental health services.	**Youth and working-age population /**	Internet therapies (e.g., CBT and Mielenterveystalo.fi) for sleep disorders, depression, anxiety, alcohol overuse. Future: AI to help in prevention of mental health disorders, diagnostics and development of more personalised treatment applications, by collecting personalised data and using it to inform personalised feedback strategies.	Health care setting
#21	Stenberg et al. (2015). *Nettiterapiat työterveyden työkaluina. (Online therapies as tools for occupational health.)* Duodecim, 2015, vol. 131, no. 13-14, p. 1297-1301	Finland	Article in trade journal (Artikkeli ammattilehdessä) (MEDIC) / N/A /	To provide an overview what is known about online therapies	**Employees** (non-specified occupations)	Online therapies, also as part of the Current Care Guidelines (Käypä hoito -suositus) for depression, CBT, moderated peer forums, Internet-based psychoeducation, and SMS based interventions for mood and anxiety disorders and alcohol overuse in Finland.	Health care setting
#22	Terveys ja talous (2019). *Valitse digitaalinen työhyvinvointivalmentaja avuksi henkiseen kuormitukseen (Digital workplace wellbeing coach to help with mental load).* Terveys ja talous, 2019, vol. 81, no. 1, s. 16-17	Finland	Article in Periodical publication (Artikkeli aikakauslehdessä) (MEDIC) /N/A	To describe the piloting of the use mobile application for municipal employees to help building stress management, balance and performance routines.	**Municipal employees** of city of Joensuu, Finland	Piloting mobile application, personal remote coach and coaching program to help employees build stress management, balance and performance routines.	Workplace setting

APPENDIX 6. Characteristics of the literature

Year of publication	Frequency (n=22)	Number of the source (No.)
2020	5	[#7, #9, #14, #15, #16]
2019	5	[#3, #4, #11, #20, #22]
2018	4	[#2, #6, #8, #17]
2017	2	[#1, #19]
2016	2	[#10, #12]
2015	2	[#13]
2014	2	[#5, #21]
2011	1	[#18]

Research method	Frequency (n=22)	Number of the source (No.)	Type of publication	Type of literature
Systematic literature review	3	[#1, #2, #3]	Scientific journal	Article
Randomized controlled trial (RCT)	3	[#13, #17, #18]	Scientific journal	Article
Systematic review	2	[#4, #5]	Scientific journal	Article
Qualitative study	2	[#6, #9]	Scientific journal	Article
Case study	2	[#10, #15]	Scientific journal	Article
Cross-sectional study	2	[#8, #12]	Scientific journal	Article
N/A	2	[#20, #22]	Periodical publication	Article
N/A	1	[#21]	Trade journal	Article
Concept paper	1	[#7]	Scientific journal	Article
Comparative study	1	[#11]	Scientific journal	Article
Rapid literature review	1	[#14]	Scientific journal	Article
Quasi-experimental research design	1	[#16]	Scientific journal	Article
Pilot study	1	[#19]	Scientific journal	Article

Type of OMH problem (n=5)	Frequency	Number of the source (No.)
Stress	16	[#2, #3, #4, #5, #6, #7, #8, #9, #10, #12, #13, #15, #16, #17, #18, #22]
Depression	14	[#1, #2, #3, #4, #5, #6, #7, #9, #11, #12, #13, #18, #20, #21]
Anxiety, distress	13	[#1, #2, #3, #4, #5, #6, #7, #9, #10, #13, #18, #20, #21]
Insomnia/Sleep disturbances	10	[#2, #3, #6, #8, #11, #12, #14, #17, #18, #20]
Burnout	3	[#3, #17, #19]

APPENDIX 7. Content analysis for the RQ

CATEGORY	1. PRIMARY PREVENTION			
SUB-HEADING (GOAL)	Reducing possibility of encounter with stressors and/or increasing client resistance			
CODE (Intervention type)	1. Health promotion (health care personnel)	No. of the source	2. Maintaining the client wellness (client)	No. of the source
CONDENCED MEANING UNIT (CMU) (intervention as activity)	1.1 To promote and improve workplace health, mental health and wellbeing to avoid OMH problems	[#1, #2, #3, #4, #5, #7, #8, #10, #12, #15, #16, #18]	2.1 To sustain (occupational) wellbeing	[#3, #10, #11, #15, #18]
	1.2 To educate/guide on the major health topics, as stress, depression, anxiety (also healthy ageing, diet, physical activity and tobacco use)	[#2, #3, #5]	2.2 To strengthen psychological wellbeing, e.g., by preventing symptoms of stress, depression, insomnia, increasing resilience skills	[#1, #3, #21]
	1.3 To provide education and /or e-coaching to help clients in building balance and performance routines	[#2, #6, 18, #22]	2.3 To participate in mindfulness practice or coping skills ' training, to prevent stress and other OMH problems	[#1, #2, #10, #18]
	1.4 To protect and promote the occupational health and safety	[#4]	2.4 To participate happiness training or interventions based on positive psychology principles	[#1, #7]
	1.5 To educate in using eHealth interventions, supporting the use of OeMH	[8]		

APPENDIX 8. Content analysis for the RQ

CATEGORY	2. SECONDARY PREVENTION			
SUB-HEADING (GOAL)	Reducing degree of reaction to stressors and providing treatment of symptoms			
CODE (Intervention type)	3. Managing or reducing OMH problems (client)	No. of the source	4. Treatment of OMH problems (health care personnel)	No. of the source
CONDENCED MEANING UNIT (CMU) (intervention as activity)	3.1 To manage or reduce stress (reactions)	[#2, #3, #4, #5, #6, #7, #8, #9, #10, #12, #13, #15, #16, #17, #18, #22]	4.1 To provide therapy with tailored feedback and problem-solving training, e.g., by Cognitive Behavioural Therapy (CBT), Acceptance and Commitment Therapy (ACT), Prolonged Exposure (PE) therapy	[#1, #2, #3, #4, #5, #10, #11, #13, #14, #17, #20, #21]
	3.2 To manage and reduce symptoms of depression	[#1, #2, #3, #4, #5, #6, #7, #9, #11, #12, #13, #18, #20, #21]	4.2 To provide education and e-coaching to help clients in managing OMH problems, building and maintaining balance and performance routines, with follow-up and support	[#1, #2, #3, #5, #6, #7, #8, #9, #11, #12, #14, #17, #18, #20, #21, #22]
	3.3 To manage and reduce symptoms of anxiety and distress	[#1, #2, #3, #4, #5, #6, #7, #9, #10, #13, #18, #20, #21]	4.3 To provide psychologically informed support related to COVID-19 pandemic	[#9]
	3.4 To manage and reduce symptoms of insomnia and sleep disturbances	[#2, #3, #6, #8, #11, #12, #14, #17, #18, #20]		
	3.5 To manage and reduce symptoms of burnout	[#3, #17, #19]		
	3.6 To manage stress and other OMH problems with mindfulness practice or coping skills	[#1, #2, #10, #18]		
	3.7 To manage and relieve the negative psychological impact especially of the current COVID-19 pandemic, such as increased depression, anxiety, and stress	[#7, #9]		

APPENDIX 9. Content analysis for the RQ

CATEGORY	3. TERTIARY PREVENTION			
SUB-HEADING (GOAL)	Supporting internal/external resources for reconstitution or returning to optimal wellness following treatment			
CODE (Intervention type)	5. Supporting client resources for reconstitution (health care personnel)	No. of the source	6. Returning to optimal wellness (client)	No. of the source
CONDENCED MEANING UNIT (CMU) (intervention as activity)	5.1 To provide therapy with tailored feedback and problem-solving training, e.g., by Cognitive Behavioural Therapy (CBT), ACT (Acceptance and Commitment Therapy)	[#1, #2, #3, #4, #5, #10, #11, #14, #17, #20, #21]	6.1 To participate in therapy with tailored feedback, e.g., by Cognitive Behavioural Therapy (CBT), ACT (Acceptance and Commitment Therapy)	[#1, #2, #3, #4, #5, #10, #11, #14, #17, #20, #21]
	5.2 To provide education and / or e-coaching to help clients in recovering from OMH problems, in maintaining balance and performance routines, with follow-up and support	[#1, #2, #3, #5, #6, #7, #8, #9, #11, #12, #14, #17, #18, #20, #21, #22]	6.2 To continue mindfulness practice and utilising coping skills, to manage and prevent stress and other OMH problems	[#1, #2, #10, #18]
	5.3 Providing support to behavioural change, after-care, assist in returning to work after absenteeism	[#8, #15]		