Funded by
the European Union

MENTBEST

Protecting
mental health
in times of change.

MENTBEST

Protecting mental health in times of change

Two Scoping Reviews

Document date: 27/09/2023
Document version: V0.2
Deliverable No: D1.1

Funded by
the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

MENTBEST Consortium

Full Name	Short Name	Beneficiary Number	Role
EUROPEAN ALLIANCE AGAINST DEPRESSION	EAAD	1	Coordinator
INSTITUTO DE SAUDE PUBLICA DA UNIVERSIDADE DO PORTO	ISPUP	2	Beneficiary
UNIVERSIDAD AUTONOMA DE MADRID	UAM	3	Beneficiary
NATIONAL SUICIDE RESEARCH FOUNDATION	NSRF	4	Beneficiary
REGION HOVEDSTADEN	PCC	5	Beneficiary
DET NATIONALE FORSKNINGSCENTER FOR ARBEJDSMILJØ	NFA	6	Beneficiary
EESTI-ROOTSI VAIMSE TERVISE JA SUITSIDOLOOGIA INSTITUUT	ERSI	7	Beneficiary
STIFTUNG DEUTSCHE DEPRESSIONSHILFE UND SUIZIDPRAEVENTION	GDF	8	Beneficiary
QENDRES SE SHENDETIT DHE MIREQENIES KOMUNITARE	CCHW	9	Beneficiary
KATHOLIEKE UNIVERSITEIT LEUVEN	KUL	10	Beneficiary
MONSENSO A/S	MSS	11	Beneficiary
PINTAIL LTD	PT	12	Beneficiary
KENTRO EREVNON NOTIOANATOLIKIS EVROPIS ASTIKI MI KERDOSKOPIKI ETAIREIA	**SEERC**	**13**	**Beneficiary**
FUNDACIO INSTITUT HOSPITAL DEL MAR D INVESTIGACIONS MEDIQUES	IMIM	14	Beneficiary

Version Control

Version	Changes	Date
0.1	Initial draft for Project Coordinator and consortium review	15/09/2023
0.2	Submission to HaDEA	27/09/2023

D1.1: Two Scoping Reviews

Contents

1. Executive Summary 4

2. Introduction and Background 4

2.1 Role of this Deliverable in the Project 4

2.2 Theoretical background and Research Questions of the two Scoping Reviews 6

2.2.1 Vulnerable groups 7

2.2.2 Mechanisms of vulnerability 8

2.2.3 Initiatives to protect mental health and prevent mental illness 8

2.2.4 Opportunities in times of change 8

2.2.5 The need for further work 8

3. Approach 9

3.1 Scoping Reviews Protocols: Literature Searches and Inclusion Criteria 10

3.2 Screening Process, Data extraction & Evidence Synthesis 14

3.3 Challenges and Contingency actions 14

4. Results 15

4.1 Literature Searches and Screening 15

4.2 Evidence Synthesis 18

4.2.1 Evidence synthesis for SR2 18

4.2.2 Evidence synthesis for SR1 25

5. Impact and Conclusion 41

6. Appendix A - Reference list 43

7. Appendix B – Narrative Summary and Outcome Measures 54

1. Executive Summary

Deliverable 1.1 – Two scoping reviews is the first deliverable for Work Package 1 – Mental Health Epidemiology and Interventions. The purpose of the two scoping reviews was to collect and synthesise review-level evidence on existing interventions to protect mental health for general and specific populations in Europe and to identify any changes in the prevalence and severity of mental health problems in Europe. Following on from these reviews, we made recommendations to inform the development of the COMBINA intervention.

The report was drafted by the lead of WP1, South East European Research Center (SEERC; Ana Vivas, Lina Gega, Theofilos Gkinopoulos and Georgia Papaioannou) and reviewed by MENBEST consortium partners.

2. Introduction and Background

2.1 Role of this Deliverable in the Project

The overarching aim of MENTBEST is to support vulnerable groups (*migrants/refugees, older people, younger people, long-term unemployed, and those with mental disorders*) in the general population especially at risk of being disadvantaged by dramatic societal change, of experiencing stressors, and of suffering (further) negative impacts on their wellbeing, including mental health.

MENTBEST will first characterise the scale of change-related mental health challenges in Europe and then working with patients, healthcare and other stakeholders, identify interventions and tools that best build resilience and maintain mental health.

By expanding existing MENTBEST partner expertise in community-based interventions to reduce depression and suicidal behaviour (EAAD 4-Level-Intervention) and including the identified interventions and tools, MENTBEST will create and then deliver and validate in five model regions across five countries (Spain, Ireland, Estonia, Greece, Albania), a comprehensive community-based intervention, known as COMBINA.

An innovative addition will be the MENTINA App, tested via a randomised controlled trial (RCT) of app-based self-monitoring and self-management technologies for mental health, which use AI and n=1 longitudinal statistics to create individualised predictive models and provide users preventive and self-management support.

MENTBEST is an ambitious project, led by the European Alliance Against Depression (EAAD) with a multi-disciplinary consortium of a further 13 partners, collectively covering 10 countries.

Work Package 1 – Mental Health Epidemiology and Interventions (WP1) as the first research package in MENTBEST, has the overarching aim of providing evidence-based high quality information about the effectiveness of existing interventions that address mental health problems, and about the scale of change-related mental health challenges in Europe, with a focus on the five vulnerable populations addressed by MENTBEST (*migrants/refugees, older people, younger people, long-term unemployed, and those with mental disorders*. The specific four objectives of WP1 as stated in the DoA are:

- To provide high-quality data to the evidence base of the prevalence and severity of rapidly changing mental health needs across Europe in the general population, taking into consideration demographic and vulnerability factors such as age (younger and older age), education, and socio-economic status level (e.g., poverty and unemployment) and migrant status.

- To identify and aggregate information about published interventions that have addressed (a)sub-clinical mental health symptoms and (b) mental disorders with a focus on the identified vulnerable populations.
- To select from these, the most promising interventions to be included in COMBINA and the MENTINA app. These interventions must collectively address (a) the specified vulnerable groups, (b) mental disorders (depression, anxiety disorders, suicide prevention) and/or (c) sub-clinical mental health challenges (e.g. subthreshold depressive syndromes, mental distress, resilience building)
- To address the existing knowledge gap on mental health data in South-east Europe.

In terms of WP1 tasks, the work is organised around four main tasks as shown in the Table below.

TASK	LEAD	PARTNERS	OUTPUTS
1.1. Scoping Reviews x 2: *- Epidemiological studies* *- Clinical studies*	SEERC	NSRF, NFA, ISPUP, UAM	Report on prevalence data + intervention effects, costs, acceptability
1.2. Intervention selection *- Stakeholder consultation*	NSRF	SEERC, ISPUP, EAAD	List of selected interventions for COMBINA & MENTINA
1.3. Database hub creation + data analysis with 2 databases	NFA	SEERC, NSRF	Report of database hub creation + findings of analysis
1.4. New data collection system + survey in Greece with migrants	SEERC	NSRF, NFA, ISUP	New database

This report describes the work and outputs of two scoping reviews (Task 1.1.), culminating in *Deliverable 1.1 – Two Scoping Reviews* (D1.1):

- **Scoping Review 1 –SR1-** aimed at a) providing high quality data on the **prevalence** of sub-diagnostic mental health conditions (primarily depressive, anxiety and stress related symptoms) for the countries in which Comprehensive Community-Based COMBINA intervention will be implemented (Albania, Estonia, Spain, Ireland and Greece) and beyond, including demographic, and modifiable risk-vulnerability factors; and b) identifying any **changes in the prevalence** of mental health conditions associated with rapid and major social, economic, political, digital and other changes.
- **Scoping Review 2 –SR2**- aimed at a) identifying and critically reviewing **existing interventions** focused on improving and preventing mental disorders and sub-clinical mental health conditions, and b) mapping the interventions, and **identifying gaps**, as they have been applied to the five vulnerable groups (children and adolescents, older people, migrants, unemployed, people with a history of mental disorders).

Through the successful delivery of these scoping reviews, D1.1. addresses two of the main specific objectives of MENTBEST as reflected in the DoA. Specifically:

- SR1 addresses SO1: *to characterise the scale and severity of mental health challenges associated with rapid societal, economic, environmental and other change in Europe, particularly for five vulnerable groups (migrants/refugees, older people, younger people, long-term unemployed, those with mental disorders)*
- SR2 addresses SO2: *to identify and synthesize published, high-quality interventions that address these challenges and/or are particularly focused on the vulnerable groups*.

Furthermore, the present deliverable (D1.1) is crucial in providing information and guiding the adaptation and design of the EAAD 4-level intervention programme, to create the new comprehensive community-based intervention **COMBINA** (see Figure 1)**.**

Specifically, D1.1. will inform T1.2 (intervention selection), and Work Package 2: COMBINA Development (WP2). That is, D1.1. directly relates to one of the objectives of WP2 as indicated in the DoA "*To create COMBINA by using the results (data and interventions) identified by WP1 to extend and adapt the EAAD 4-level programme for sub-clinical mental disorders and specific vulnerable groups."*

D1.1 will also inform Work Package 4: COMBINA Evaluation (WP4) by aggregating and summarising information (SR2) about the outcomes employed to assess the effectiveness of existing interventions, and on the economic evaluation (if reported) of the existing interventions. Further, by identifying important gaps in knowledge, which require further work. Specifically, identified gaps of knowledge in terms of populations, mental health outcomes, and geographical distribution could inform the other objectives of WP1 relating to *addressing the knowledge gap on mental health data in South-east Europe,* and the desk research of WP2 and WP4*.*

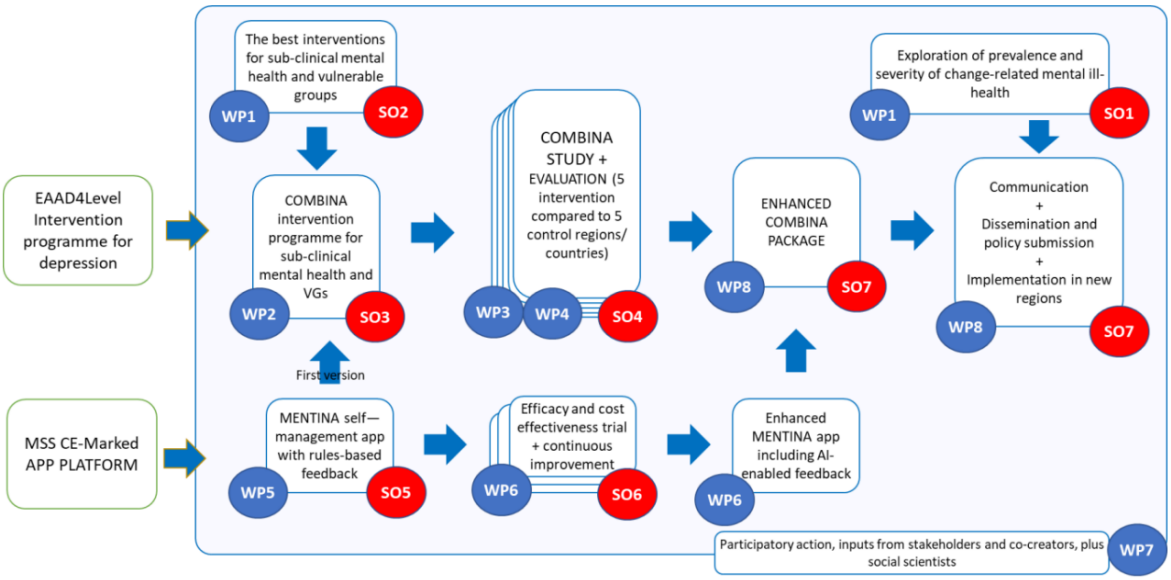

Figure 1. MENTBEST approach and inter-relations between WPs**.**

2.2 Theoretical background and Research Questions of the two Scoping Reviews

To formulate specific research questions that best reflect MENTBEST objectives and are time current and relevant to the current state-of-the art, we conducted desk research and defined the theoretical background that guided the design of the two scoping reviews. We present this below and have included it in the protocols published in the Open Science Framework- OSF- (see Section 3.1 for the links).

The wider socio-economic, environmental and political context – hereafter referred to as "global stressors" - can impact on mental wellbeing and mental health. *Mental wellbeing* denotes the presence and strength of a positive emotional and functional state, which can vary from languishing (poor wellbeing) to flourishing (strong wellbeing). *Mental health* denotes the absence or presence and severity of symptoms aligned with diagnosable clinical conditions, such as depression or anxiety.

Mental health exists in a trajectory from non-clinical/sub-clinical states below a diagnostic threshold, to mild, moderate and severe clinical symptoms above a diagnostic threshold. Poor mental health means that people move along the trajectory in a direction from non-clinical and subclinical states towards clinical states, or in a direction from less to more severe clinical symptoms.

Mental wellbeing and mental health are two independent but interrelated concepts. Diagnosable mental health conditions are a risk factor for poor mental wellbeing; however, people with life-long diagnosable conditions can flourish. On the contrary, the absence of diagnosable conditions does not guarantee high levels of mental wellbeing. The distinction between mental health, or illness, and mental wellbeing is important because it determines the nature of our interventions, ranging from mental health promotion to harm minimisation, risk reduction, illness prevention and treatment.

In September 2022, the President of the European Commission, Ursula Von der Leyen, identified mental health protection and promotion as major strategic goals for the Union amid pan-European dramatic economic, societal and environmental challenges (European Commission, 2022). Drawing on the future for population mental health in the 21st century, Fuhrer and Keyes (2019) refer explicitly to a time for action to protect mental health and prevent mental illness in light of current major societal challenges. These challenges, which have been catalysed by recent global shocks such as the COVID-19 pandemic and the war in Ukraine, give way to isolation, population displacements, energy crises, economic downturns, alongside global megatrends such as climate change, an ageing population, and digitalisation (Charlson et al., 2021; Cianconi et al., 2020; Godinic et al., 2020; Naslund et al., 2020).

Global stressors can have a major and disproportionate effect on the mental health and wellbeing of populations around the world, posing major challenges for the identification and mitigation of risk factors for poor mental health and the support of those who are already experiencing diagnosable mental health conditions (Moen, 2022; Santomauro et al., 2021). Epidemiological studies have confirmed the cross-country impact of global stressors on people's mental health and wellbeing. Examples include the COVIDiSTRESS global survey (Yamada et al., 2021), the Global Burden Disease Study (Santonauro et al, 2021) and the European Social Survey (Alvarez-Gavez et al., 2022). Digitalization and transition to a digital life in the aftermath of crises, such as the recent pandemic, has altered wellbeing) parameters and increased the rates of subclinical mental health conditions (subsyndromal anxiety and depression) (Naslund et al., 2020; Gurvich et al., 2021).

2.2.1 Vulnerable groups

Specific groups of people within the general population are more likely to experience the negative effects of dramatic economic, societal and environmental changes on their health and wellbeing (Red Cross EU Office, 2023). For example, individuals and families with low income, or who are unemployed long-term, are at greater risk of mental distress and poorer wellbeing as a consequence of economic downturns (Batic-Mujanovic et al., 2017; Buffel et al., 2015). Children and adolescents (Adjei et al, 2022) and older adults (Pruchno et al., 2021) are also at greater risk of poor mental health in the face of adverse circumstances. Asylum-seekers and refugees have higher rates of persistent depression and post-traumatic stress disorder (PTSD) compared to the general population (Blackmore et al 2020). Finally, the negative effects of an unexpected crisis like the COVID-19 pandemic are more pronounced among people with pre-existing mental health or addiction problems (Gega and Aboujaoude, 2021).

2.2.2 Mechanisms of vulnerability

Several mechanisms and mediating factors may account for increased mental health vulnerability of certain population groups to economic, societal and environmental challenges, including disparities in stress exposure and protective resources (Moen, 2022), barriers to accessing and using mental health services (Satinsky et al, 2019), stigmatisation, social exclusion, ostracism or discrimination (Galanaki & Gkinopoulos, 2023). Still, the majority of people within vulnerable groups do not develop mental health problems in the face of adversity and external stressors (Cuijpers, Furukawa, & Smit, 2021). Two people with the same vulnerabilities have different mental health outcomes if insurance mechanisms and protective interventions are available and accessible at a time when is most needed, like periods of change, stress, uncertaintly or crisis.

2.2.3 Initiatives to protect mental health and prevent mental illness

Initiatives to promote good mental health, prevent mental health problems and mitigate vulnerabilities include psychosocial and lifestyle interventions that aim to improve mental health literacy or mental wellbeing, build resilience, combat stigma, enhance self-help competency, minimise risk factors and reduce threshold symptoms of clinical conditions. Such interventions may be developed and delivered in the context of stressors like the COVID-19 pandemic (e.g. Bryant et al., 2022), life-related transitions due to ageing and retirement (e.g. Cassanet et al., 2022), migration (e.g. Ciaramella et al., 2022; Uphoff et al, 2020) and climate change (Massazza et al., 2022). Interventions to protect mental health may be offered universally to a country's general population (Papola et al., 2020) or to targeted vulnerable or underserved groups defined by specific characteristics such as age and migration status (Goodkind et al., 2020; Soltan et al., 2022).

2.2.4 Opportunities in times of change

Digitally enabled interventions can leverage the power of social media and telecommunication technologies to protect and improve mental health (Ratheesh & Alvarez-Jimenez, 2022; Torous et al., 2020; Zhou et al, 2021). Technology enables us to reach geographically and ethnically diverse populations and to shift delivery from individual to community-based approaches, which are important considerations for interventions that are scalable and durable across different settings and populations (Kubzansky et al., 2023). In light of environmental and climate considerations, the concept of sustainable mental health interventions is a positive step towards prevention and future proofing both the workforce that supports mental health interventions and the spaces and methods through which such interventions are delivered (Royal College of Psychiatrists, 2021).

2.2.5 The need for further work

Amidst complex global trends and shocks, we need to understand how a) the prevalence and severity of diagnosable mental health conditions, b) the direction of mental health trajectories and c) the levels of mental wellbeing have changed over time in the general populations. We also need to understand how and why changes in mental health and wellbeing may occur in the context of global (or local) trends and shocks and may differ betweem specific vulnerable population groups compared to the general population. To address these gaps, we conducted SR1.

There is also a plethora of empirical studies and reviews investigating the effectiveness of psychosocial and lifestyle intervention for clinical and non-clinical populations. We cannot assume that interventions designed for clinical populations are suitable and effective for non-clinical populations

because the mechanisms mediating psychological wellbeing are different to those causing mental health problems (Kinderman et al., 2015). Still, some interventions can be effective for both clinical and non-clinical populations, albeit with different effect sizes (van Agteren et al., 2021). To this end, we need to identify and organise existing evidence on psychosocial and lifestyle interventions, especially those delivered online (but not restricted to these). To address this gap, we conducted SR2.

Based on the theoretical background and the objectives of MENTBEST and WP1 described above, we formulated the following **specific research questions**:

- **SR1:** How have the prevalence and severity of mental disorders, the direction of mental health trajectories, and the levels of mental wellbeing, changed over time in Europe's general population and vulnerable groups, i.e., those targeted by MENTBEST (long-term unemployed, children and adolescents, older people, migrants/refugees and people with existing mental illness).

  We focused on symptoms aligned with depression, self-harm, anxiety and Post Traumatic Stress Disorder (PTSD), as well as stress and burnout.

  Our secondary research questions were: (a) How and why changes in mental health and wellbeing differ across vulnerable groups and between vulnerable groups and the general population? (b) Which changes in mental health and wellbeing have been reported in the context of specific economic, societal or environmental stressors? (c) How do changes in mental health and wellbeing differ across European countries?

- **SR2:** What interventions can be effective in protecting the mental health of the general population and the specific vulnerable groups targeted by MENTBEST (i.e., long-term unemployed, children and adolescents, older people, migrants/refugees and people with existing mental illness)?

  Furthermore, our secondary research questions were: what interventions – or ingredients of interventions – are effective a) for both the general population and vulnerable groups, b) for the general population but not vulnerable groups, and c) for the specific groups but not the general population.

3. Approach

To answer our research questions, we determined the best approach was to summarise the most up-to-date review-level evidence in a 'review of reviews' (RoR). We decided that a scoping RoR is more appropriate than a traditional umbrella review given the heterogeneity, volume and range of reviews on; i) psychosocial and lifestyle interventions to protect mental health across different countries and populations (SR2) and ii) prevalence of mental health problems, and the different ways in which trajectories of mental health and illness, and domains of mental wellbeing, are measured across different countries and populations (SR1). A scoping RoR naturally "scopes" what evidence is available and what gaps need to be addressed and what the focus of future systematic reviews should be. Therefore, a quality appraisal of the included records was not necessary. Still, we ensured that we captured the highest quality type of reviews in the form of systematic reviews and meta-analyses.

We used Arksey and O'Malley's (2005) scoping review framework – enhanced by Peters et al (2015) - which involves three steps: a) conducting a systematic literature search of multiple bibliographic

databases, b) using a set of inclusion/exclusion criteria to identify and select relevant reviews, and c) presenting a narrative synthesis of findings referred to as 'charting the evidence'. We report review-level conclusions and not individual study findings following the checklist of the PRISMA-SCR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping reviews) by Tricco et al. (2018).

The two SRs were led by SEERC with a significant contribution in terms of work effort (see Section 3.2) from beneficiaries National Suicide Research Foundation (NSRF) and Det Nationale Forskningscenter for Arbejdsmiljø (NFA) as indicated in the DoA. Instituto de Saude Publica da Universidade do Porto (ISPUP) (WP2 Lead) and Universidad Autonoma de Madrid (UAM) provided a smaller, but important contribution in relation to defining the overall methodology and providing feedback at key points of the design and implementation. Feedback from ISPUP was particularly important given the interdependency of Task 1.1. with the development of COMBINA in WP2.

A working group was created which also included the participation of Katholieke Universiteit Leuven (LUCAS) (WP4 Lead) who were interested in receiving evidence-based information of mental health measures employed in intervention and prevalence studies, and EAAD and Pintail (PT) when needed. This working group met online on a bi-weekly basis. In total the working group met seven times, and minutes and relevant documents were shared with the T1.1 working team and the whole consortium for feedback via the MENTBEST SharePoint site. Given the particular relevance of SR2 (interventions) for WP2, it was decided to prioritise this subtask so as to obtain meaningful results and conclusion as soon as possible. The overall methodology, objectives and research questions of T1.1 were also discussed with the whole consortium at the project kick-off meeting in Madrid on 8-9 May 2023. Below we summarise the steps followed to conduct the two scoping RoRs.

3.1 Scoping Reviews Protocols: Literature Searches and Inclusion Criteria

Two independent literature searches were conducted by Theofilos Gkinopoulos [TG] (SEERC) in the following electronic databases: Ovid PsycINFO, Ovid MEDLIBE Databases, Ovid Embase, Cochrane Database of Systematic Reviews (CDSR), Web of Science Core Collection, EBSCO CINAHL, Database of Promoting Effectiveness Reviews (DoPHER). We undertook two comprehensive literature searches to identify eligible reviews using mapped terms for each domain of the review: (A) Population, (B) Study Design. Boxes 1 and 2 below describe the key search terms under each of the two domains of interest for SR1 and SR2, respectively.

We used different spellings and Boolean operators to capture terms with the same meaning. Domains A and B were combined with the 'AND' Boolean operator. We applied filters to limit our search to meta-analyses, scoping reviews and systematic reviews. Both search strategies combined search terms drawn from subject headings (e.g. MESH in Medline) with free-text terms to achieve optimum sensitivity and specificity. Searches were restricted to literature published in the English language, and to the last three years, 2021-2023 inclusive.

Box 1: Search terms under each domain of interest for SR1 (prevalence)

(A)Population

- Mental, psychological, emotional, health, disorder, illness, stress
- adjustment, acute stress disorder
- anxiety/anxious, generalized anxiety disorder
- depression/depressive, dysphoria, dysthymia, affective, mood
- self-destructive behavior, suicide, self-inflicted, self-injury, self harm
- burnout, burn-out, burn out
- sub-clinical, subclinical, subsyndromal, sub clinical, threshold, sub-threshold
- non-clinical, non clinical, nonclinical
- migrants, immigrants, refugee, displace
- employment or work or job or occupation or retirement

(B)Outcomes

- Symptoms (of all the conditions and presentations included under "population"
- Wellbeing
- Quality of life, disability

(C)Study Design

- meta-analysis, meta-synthesis
- systematic review, overview
- integrative research review, research integration, scoping review, evidence review
- review, overview, look, examination, update, summary
- epidemiological studies, cross-sectional, longitudinal, survey

Box 2: Search terms under each domain of interest for SR2 (Interventions)

(A)Psychosocial and lifestyle interventions

Cognitive behaviour therapy (CBT), behavioural activation, acceptance commitment therapy (ACT), rational emotive therapy (RET), counselling, bibliotherapy, psychoeducation, problem solving therapy, schema-focused therapy, stress management, multicomponent therapy, integrative psychotherapy, inter-personal therapy, relaxation, mindfulness, sleep interventions, coping strategies, art therapies, compassion-based therapy, medication adherence, concordance, compliance, self-management, positive psychology.

(B) Online interventions

Technology, digital, computer, online, internet, web, multimedia, blended, android, app, avatar, blog, CD-ROM, phone, chat room, cyber, DVD, eHealth, email, portal, eosych or epsych, elearning, blended learning, telecomm, telemedicine, teleconferencing.

(C) General and vulnerable populations

mental/psychological/emotional health disorder/wellbeing/illness, non-clinical/sub-clinical, threshold, adjustment/acute stress disorder, anxiety, generalized anxiety disorder, depression, dysphoria, dysthymia, affective, mood, self-destructive behavior, suicide, self-inflicted injury, self harm, stress, burnout, migrant, immigrant, refugee, displaced person, employment, work, job, occupation, retire, pension.

(D) Reviews

meta-analysis, meta-synthesis, systematic review, umbrella review, integrative review, scoping review, overview, summary, evidence synthesis

We then screened (see Section 3.2.) all titles and abstracts identified from our search and retrieved the full texts of potentially relevant reviews for further screening using the inclusion/exclusion criteria listed below. Boxes 3 and 4 below summarize the inclusion and exclusion criteria of studies for SR1 and SR2, respectively.

Box 3: Inclusion and Exclusion Criteria for SR1 (Prevalence)

Population

Included: sub-clinical presentations of mental health problems or poor mental health in the general population; Children & adolescents, aged 7-24 years; Older adults aged 60+ years; long-term unemployed (more than 2 years); People with pre-existing mental health problems; migrants/refugees; European populations, reviews with mixed populations from geographical regions other than Europe will be included as long as they report their results separately for Europe as a whole or for specific European countries.

Excluded: Clinical populations for whom the intervention is offered as treatment rather than in the context of mental health promotion or illness prevention; Neurological disorders (e.g., dementia, Parkinson's disease, Huntington, brain-damage etc.); People with physical illness (but we will include people with a comorbid history of physical and mental health illness); informal caregivers; Non-European populations, context/countries that are not easily transferable to Europe (e.g., Africa) but we will include ethnically diverse populations within European countries.

Data Reported

Included: Change in prevalence, incidence and severity of mental health problems and in mental health trajectories and levels of mental wellbeing across time, countries in Europe, or/and populations of interest for MENTBEST; data from European countries and mixed data including other countries/continents as long as they report separately the data for Europe.

Excluded: "Absolute" prevalence rather than "change" in prevalence.

Mental health measures/outcomes

Included: Anxiety, stress, depression, mood, well-being, resilience and self-harm, suicide, PTSD. Use validated measurement tools for mental health assessment.

Excluded: Clinical outcomes such as schizophrenia, psychosis or neurological disorders

Types of reviews

Included: Systematic reviews, meta-analysis of epidemiological, cross-sectional, longitudinal surveys.

Excluded: Narrative reviews, reviews of qualitative studies.

Box 4: Inclusion and Exclusion Criteria for SR2 (Interventions)

Population

Included: sub-clinical presentations of mental health problems or poor mental health in the general population; Children & adolescents, aged 7-24 years; Older adults aged 60+ years; long-term unemployed (more than 2 years); People with pre-existing mental health problems; migrants/refugees; European populations, reviews with mixed populations from geographical regions other than Europe will be included as long as they report their results separately for Europe as a whole or for specific European countries.

Excluded: Clinical populations for whom the intervention is offered as treatment rather than in the context of mental health promotion or illness prevention; Neurological disorders (e.g., dementia, Parkinson's disease, Huntington, brain-damage etc.); People with physical illness (but we will include people with a comorbid history of physical and mental health illness); informal caregivers; Non-European populations, context/countries that are not easily transferable to Europe (e.g., Africa) but we will include ethnically diverse populations within European countries.

Intervention

Included: Psychological; Social; Behavioral; Art or cultural; Lifestyle.

Excluded: Pharmacological (e.g., tablets, injections)-but will be included as controls; Cognitive training, brain training (e.g., neurofeedback); Digital sensors and wearables (other than smart phones and watches), gaming, virtual/augmented reality, robots.

Comparators

Included: Intervention 2 vs Intervention 2 (active control); intervention vs usual care/ no intervention/waiting list/ placebo (non-active control).

Excluded: Intervention 1a vs intervention 1b (incremental differences within the same intervention)

Outcomes

Included: Anxiety or stress symptoms, depression or mood problems, well-being or resilience, self-harm or suicide, medication adherence & compliance

Excluded: Social and educational outcomes (e.g., parenting interventions to improve parent-child relationship and reduce the risk of child abuse)

Types of reviews

Included: Systematic reviews, meta-analysis that report a systematic literature search, include explicit inclusion/exclusion criteria, conduct a critical appraisal of the included studies, provide an organized presentation and synthesis of the characteristics and findings of the included studies, report findings of RCTs or non-randomized comparative studies (e.g., cohorts or case controls with comparison groups).

Excluded: Narrative reviews, reviews of qualitative studies, reviews of studies without a comparison group.

Adhering to open science practices, we drafted two full protocols before conducting the two scoping reviews. The documents were reviewed by the T1.1 working group and were shared with the whole consortium in Share Point, so that they also had the opportunity to provide feedback. The final versions of the protocols were made available publicly before starting the screening phase in the Open Science Framework (OSF) repository:

- SR2 is available at: https://osf.io/ysb5k/?view_only=094880fd9f6c4370a07d78d863b7617b
- SR1 is available at: https://osf.io/596z7/?view_only=ca18346c033c43f88fbecee63580c5aa

3.2 Screening Process, Data extraction & Evidence Synthesis

Four screening phases were conducted using the inclusion/exclusion criteria listed in Section 3.1, two for each SR: one to screen all titles and abstracts identified from our search and retrieve the full texts of potentially relevant reviews, and a second one to further screen the full texts. The screening phases and data extraction were managed and done using the software COVIDENCE (Covidence - Better systematic review management).

TG (SEERC), Katie Mullins [KM] (NSRF) and Georgia Papaioannou [GP] (SEERC) worked in screening and data extraction for SR2 (interventions); whereas TG (SEERC), Klara Johannes-Jacobsen [KJ] (NFA), Jonas Jensen [JJ] (NFA) and GP (SEERC) worked on screening and data extraction for SR1 (prevalence). Ana Vivas [AV] (SEERC) and Lina Gega [LG] (SEERC) monitored the work for quality assurance and resolved doubts regarding the application of inclusion/exclusion criteria, and ensured the standardisation of data extraction, and further worked on Evidence Synthesis to be shared with T1.1 working team and the consortium.

The excel tables with the data extracted for each SR were exported from COVIDENCE software and reviewed for quality by AV and LG. To facilitate the description of the key findings in relation to MENTBEST objectives and inter-related WPs (WP2) and tasks (T1.2), matrix tables were created for each SR which included a narrative description of key patterns and observations from the assembled review-level evidence (see Section 4).

Specifically, to answer our research questions, the evidence was summarised as to which review-level interventions are effective in relation to the populations of interest, the different outcomes of interest, and taking into consideration four different dimensions of effectiveness: a) protective against external stressors, b) good value for money, c) scalable, d) sustainable and e) transferable.
For each outcome we followed a RAG (red-amber-green) system to present the relevant evidence:

- Red (R): There is evidence that the intervention is ineffective or harmful
- Amber (A): There is some evidence of effectiveness but the evidence is limited
- Green (G): There is evidence of effectiveness.
- Unclear (U): There is no evidence.

In addition, we made recommendations in 5 levels:

- Level 1 - strongly recommended intervention (consistent evidence from multiple reviews)
- Level 2 - recommended intervention (generally consistent but some equivocal evidence)
- Level 3 - optional intervention (inconsistent evidence)
- Level 4 - optional intervention (little or no evidence)
- Level 5 - not recommended (evidence of ineffectiveness or harm)

3.3 Challenges and Contingency actions

The work carried in T1.1 progressed according to the DoA and there were no deviations. There were important challenges associated with T1.1, since systematic and scoping reviews are time consuming and typically required a year or more to complete. Therefore, we took key decisions (e.g., conduct RoRs) at the kick-off meeting in Madrid, and in the first online meetings with T1.1 working team to ensure that we could conduct the two SRs in a shorter time without jeopardising the quality of the work, and producing at the same time meaningful results for MENTBEST and the inter-related WPs and tasks.

Furthermore, we produced a clear internal timeline with milestones (see Gantt chart below) for completion of both SR2. AV monitored on a weekly basis together with TG that the work progressed according to schedule. As indicated above progress was discussed on bi-weekly basis with the rest of T1.1. working team, and it was reported to the whole consortium and MENTBEST management team on the monthly MENTBEST online meetings. A substantial amount of work had to be carried out during the summer and this posed some challenges in terms of organising the work so that it would not conflict with the vacations periods of people working on the screening and extraction of data. This was partially resolved by replacing a reviewer on vacation with another one when needed and allowing a greater time interval to extract data.

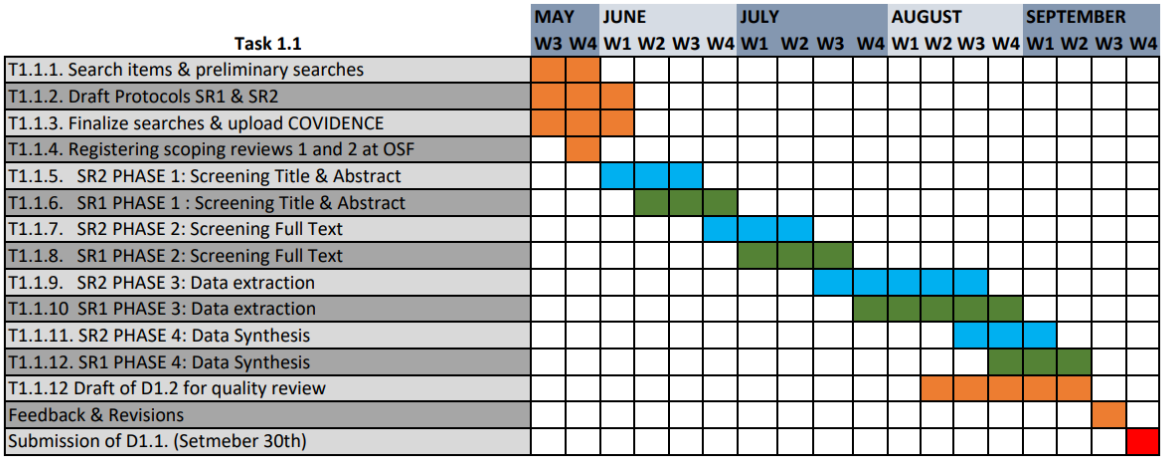

Figure 2. Internal Gantt chart for T1.1.

Finally, an unexpected challenge was that many reviews did not summarise the information we needed to answer our research questions, e.g., the breakdown of countries from which the reviewed studies recruited participants or gender distribution. In this case, we decided to retrieve the primary papers cited in the review to be able to obtain the information and provide a high-quality evidence synthesis.

4. Results

4.1 Literature Searches and Screening

The electronic literature searches identified **1982** and **2299** citations for SR2 and SR1, respectively (see Figures 3 and 4). After removing duplicates, **1696** and **2277** records were screened for eligibility for SR2 and SR1, respectively. The final number of reviews included were **18** and **11** in SR2 and SR1, respectively. The most frequent reasons for exclusion in SR2 were reviews that focused on clinical populations or other populations not of interest for MENTBEST, and reviews that did not include mental health outcomes of interests for MENTBEST. The most frequent reasons for exclusion in SR1 were reviews that did not report change but reported only prevalence data a one-time point, and reviews that reported intervention studies and included populations not of interest for MENTBEST.

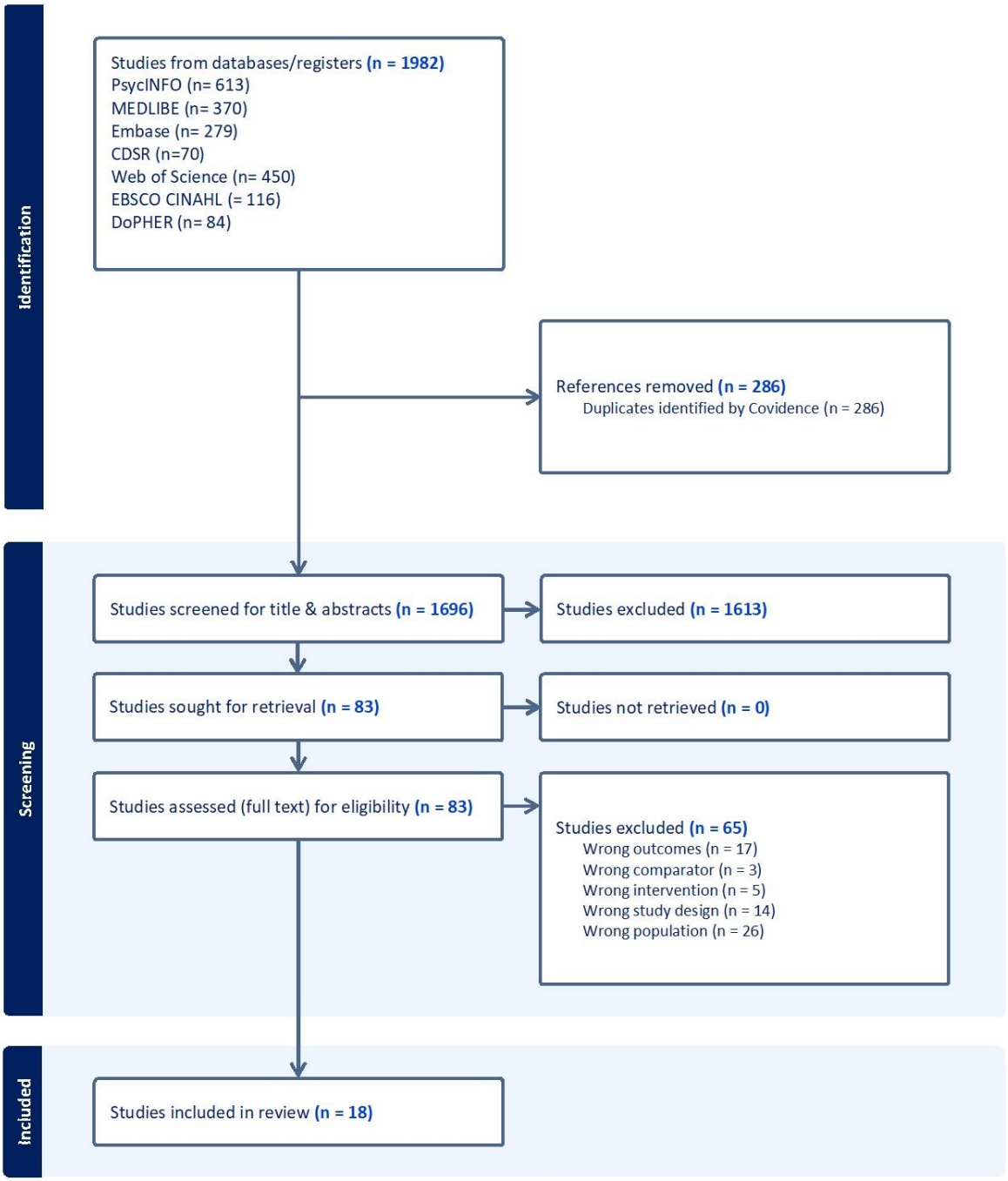

Figure 3. Prisma flowchart of literature search and screening for SR2 (Intervention).

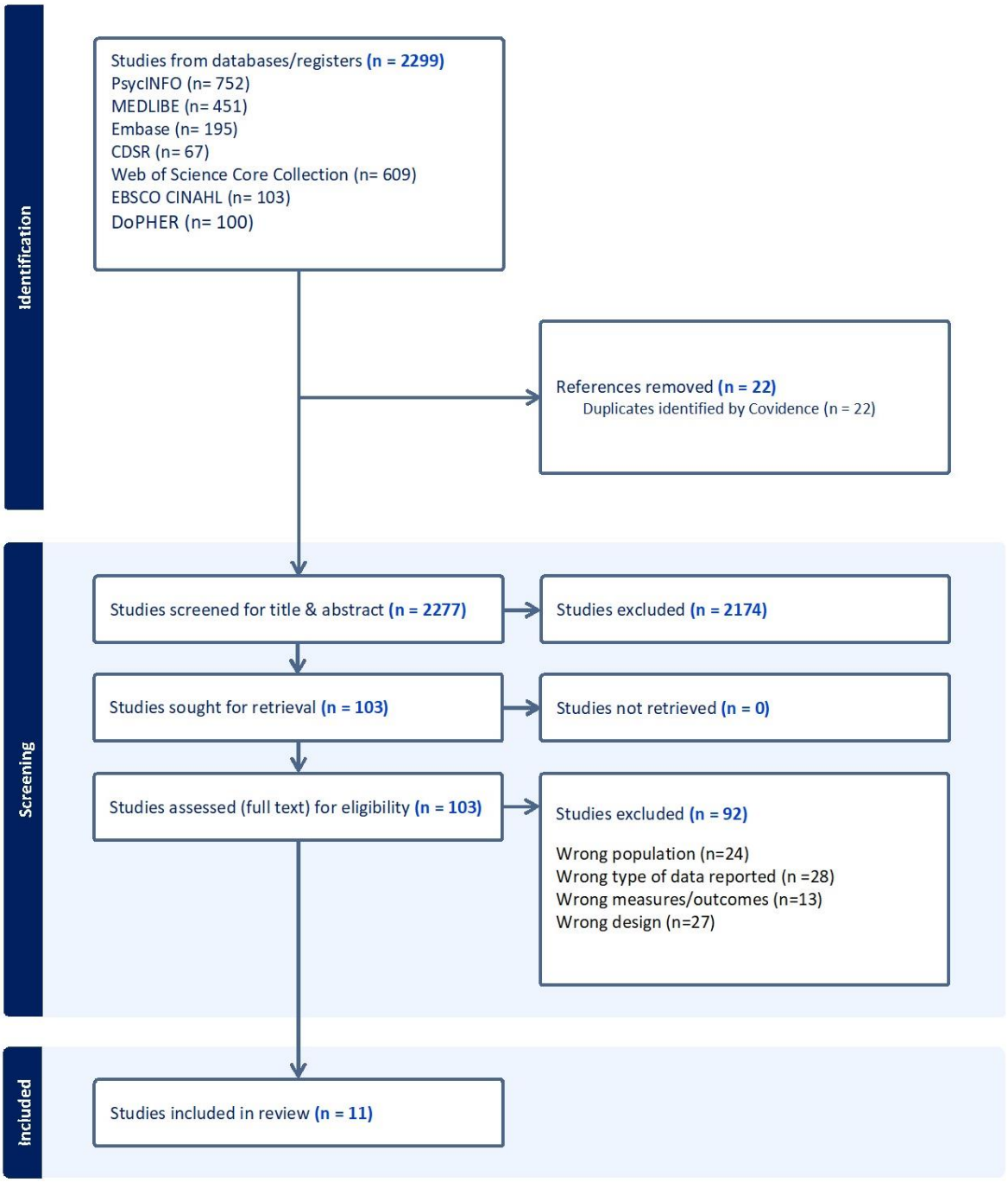

Figure 4. Prisma flowchart of literature search and screening for SR1 (Prevalence).

4.2 Evidence Synthesis

4.2.1 Evidence synthesis for SR2

4.2.1.1 Summary of the reviews included and gaps identified

Our scoping review of reviews included 18 papers that captured interventions and active ingredients that could be used with non-clinical, sub-clinical or at-risk populations to protect mental health and prevent mental health conditions by changing outcomes associated with depression and low mood, anxiety and stress, self-harm and suicidality, and by improving wellbeing and resilience. In total (see Table 1) the reviews included 346 interventions studies worldwide, and 179 in European countries (not necessarily within the European Union), and synthesized data for 114,304 participants in total and for 43,032 participants recruited in European countries. The majority of the reviews (n= 17) included Randomised Control Trial –RCT- studies, which is the gold-standard for testing the effectiveness of interventions, exclusively or mixed designs including as well quasi-experimental or longitudinal intervention studies.

All reviews except one related either exclusively to children and adolescents, or to mixed populations of children, adolescents and adults. Only 1 review related exclusively to older adults and did not include children (deOliveira et al 2023). As our searches were limited to the last 3 years, our review of reviews reflects the increased interest in child and adolescent mental health and wellbeing, compared to the relative absence of recent reviews pertaining to the general adult population, migrants, unemployed people, and adults with a history of mental health conditions. Notable was also the near absence of evidence synthesis for cost-effectiveness, with only 1 review available (Anna-Kaisa et al 2022). Follow-ups within the studies included in the reviews varied from 2 weeks to 2 years.

Many of the reviews indicated that we cannot extrapolate conclusions about mechanisms or effects of interventions from one population to another. For example, in the case of mindfulness-based interventions delivered at schools for adolescents, such interventions have no effect on preventing depression or anxiety in the general adolescent population, as they do in clinical adolescent populations. Another example is the role of parental involvement which is an important factor for in-person psychological interventions for depression and for suicide prevention but not for digital interventions for adolescents.

With regard to European geographical distribution, the reviews included studies from as many as 18 countries or as few as 2 countries. Our inclusion criteria specified that reviews should include studies with European populations, even if they are mixed with worldwide populations outside Europe. In total 346 studies were included in the 18 reviews and 131 of them were conducted in European countries. The geographical distribution of the 131 studies, which were conducted in a period spanning from 1980 to 2022, was dominated by North-west European countries (see Figure 5 and Table 1). This seems to support the gap in mental health knowledge in South East Europe reported in the literature, in this case in terms of non-pharmacological interventions that address mental health challenges in the general population or/and in the five MENTBEST vulnerable groups.

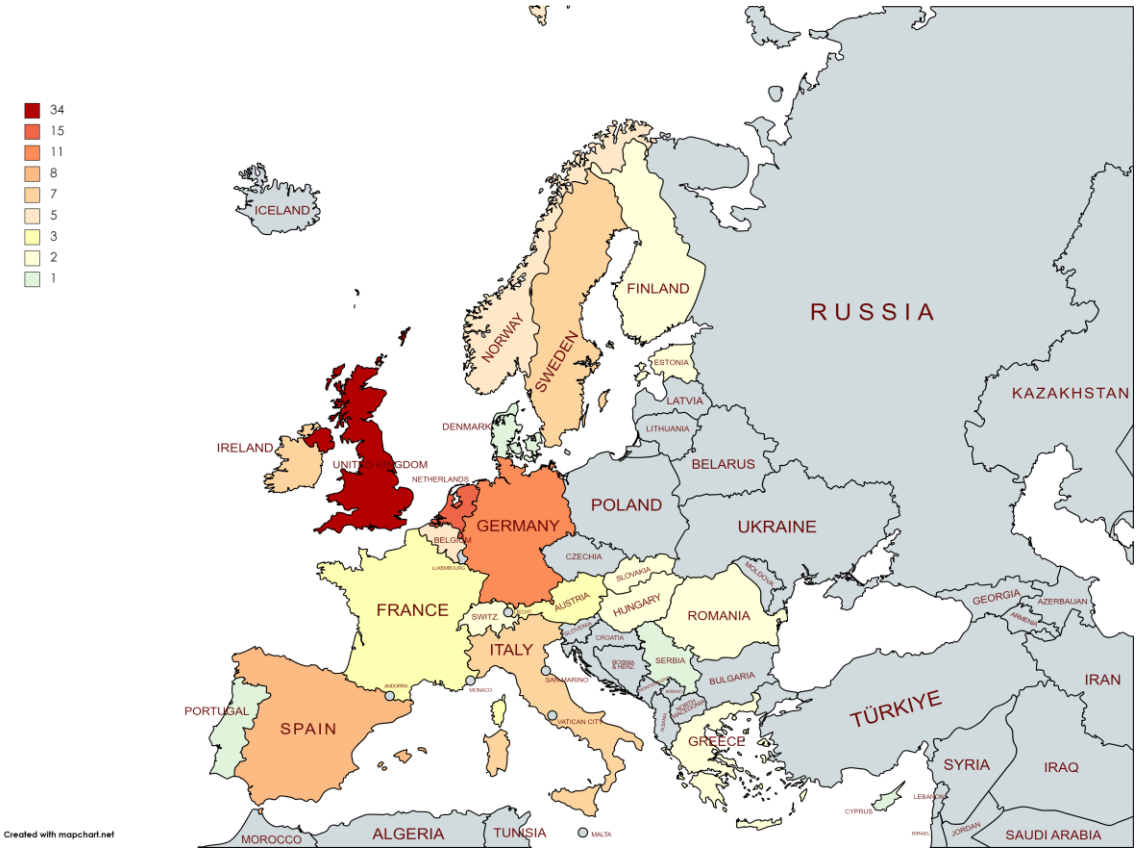

Figure 5: European geographical distribution of intervention studies included in the 18 reviews of SR2. The colour code reflects the frequency of studies, with darker hues reflecting larger numbers of intervention studies.

The reviews were divided into two groups when it came to mode of intervention delivery: reviews that included digital interventions and telemedicine (n=8), and reviews that included interventions delivered in person (n=10) either in groups or one-to-one. There were no studies in any of the reviews that used a blended method of digital and face-to-face delivery – though some guidance for digital interventions may have included in-person contact.

In terms of global (societal, economic and environmental) stressors within which the reviews were conducted, 6 mentioned the COVID-19 pandemic, 1 referred to disasters such as terrorism and natural catastrophes due to climate change, and 1 referred to an 'obesity epidemic'.

Finally, with regard to outcomes of interest, the majority of reviews included intervention studies that measured a change in both anxiety/stress measures (n=12) and depression/mood measures (13), with 7 reviews including well-being and resilience measures and 4 reviews including self-harm or suicidal outcomes (see Table 4 in Appendix B for a detailed description of outcomes).

Table 1: Population and study characteristics in the included reviews in SR2

First author and year	Meta-analysis?*	Type of reviewed studies	Number of reviewed studies (Eur**)	Recruitment countries	Number of participants Total & Europe	Age (years) Gender (% women)
Ang 2022	Yes	RCTs	22 (9 Eur)	**Eur**: Belgium, UK, Finland, Germany, Ireland, Switzerland. **World:** USA, Iran, China Australia, New Zealand, Indonesia.	2,876 1,895 (Eur)	18-47 69%
Anna-Kaisa 2022	No	RCTs	5 (3 Eur)	**Eur:** Netherlands, UK **World:** Australia	3,428 2,444 (Eur)	8-12 51%
Bahji 2021	Yes	RCTs	44 (16 Eur)	**Eur:** Denmark, UK, Norway, Spain, Netherlands **World:** USA, Australia, Iran, New Zealand, Canada, Taiwan.	5,406 3,062 (Eur)	10-19 76%
Belski 2022	No	RCTs	7 (2 Eur)	**Eur:** Northern Ireland, Germany **World:** USA, Hong-Kong, Taiwan	589 287 (Eur)	8-16 53%
Bonardi 2022	No	RCTs	9 (3 Eur)	**Eur:** Sweden, Spain, UK, France, Serbia **World:** USA, Australia, Canada, Oman, Malaysia, Iran, China	938 472 (Eur)	15-81 80%
Boydstun 2021	No	Case studies	3 (3 Eur)	**Eur:** Italy, Greece **World:** None	283 283 (Eur)	6-52 38%
Breslin 2023	No	RCTs	13 (13 Eur)	**Eur:** UK, Italy, Belgium, Netherlands **World:** None	13,018 13,018 (Eur)	4-12 49%
Buttazzoni 2021	Yes	RCTs Cohort	12 (2 Eur)	**Eur:** UK, Italy **World:** Australia, New Zealand, USA, Korea, Japan	1,372 100 (Eur)	14-25 77%
deOliveira 2023	Yes	RCTs Quasi-experimental	31 (2 Eur)	**Eur:** Sweden, Italy **World:** USA, Australia, Canada, Israel, China	5,042 146 (Eur)	60+ 64%
Dewa 2021	Yes	RCTs Cross-sectional Longitudinal Uncontrolled	42 (42 Eur)	**Eur:** Ireland, UK, Belgium, Netherlands, Cyprus, Sweden **World:** Australia, USA, Canada, Israel, Taiwan	23,319 3,766 (Eur)	13-26 55%

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

First author and year	Meta-analysis?*	Type of reviewed studies	Number of reviewed studies (Eur**)	Recruitment countries	Number of participants Total & Europe	Age (years) Gender (% women)
Diaz-Garcia 2021	Yes	RCTs	11 (6 Eur)	**Eur:** Netherlands, Belgium, Germany **World:** Australia, USA	1,063 754 (Eur)	11-18 20%
Dippel 2022	Yes	RCTs	19 (2 Eur)	**Eur:** UK, Norway, **World:** Australia, USA	1,553 (127 Eur)	3-18 56%
Domhardt 2021	No	RCTs	25 (4 Eur)	**Eur:** UK, Sweden, Netherlands **World:** USA, Australia	4,884 (923 Eur)	3-26 61%
Fulambarkar 2023	Yes	RCTs	9 (2 Eur)	**Eur:** Belgium, Finland **World:** Australia, USA, Hong-Kong	5,046 (491 Eur)	12-18 not reported
Gaynor 2023	Yes	RCTs	17 (6 Eur)	**Eur:** UK, Norway, Spain **World:** USA, Australia, Taiwan, Brazil	2,893 (658 Eur)	11-19 not reported
Hale 2021	No	RCTs Non-randomised 1-group pre-post Cohort	28 (4 Eur)	**Eur:** Germany, Sweden, Switzerland, Norway, UK, Portugal, Spain, France **World:** Iran, Egypt, Hong-Kong, USA, Brazil, Chile, Australia, India, Korea, Canada	6,430 (1,574 Eur)	9-20 not reported
Meza 2023	No	RCT	18 (9 Eur)	**Eur:** Germany, Norway, Spain, UK **World:** USA, Australia	3,009 (870 Eur)	12-18 not reported
Walsh 2022	Yes	RCTs Quasi-experimental 1-group pre-post	31 (3 Eur)	**Eur:** Netherlands, Austria, Estonia, France, Germany, Hungary, Slovenia, Spain, Ireland, Italy, Romania. **World:** Australia, India, USA	33,155 (12,165 Eur)	11-18 51%

Eur=European Countries (not necessarily within the European Union)

* All the included records were systematic reviews but not all included a meta-analysis.

**Eur = Number of studies within the reviews that included European participants

Note: the full references of the 18 reviews are included in the reference list of the report.

4.2.1.2 Recommended interventions

The recommendations below are based on Table 2, which summarises, as described in Section 3, the review-level evidence to answer our research questions (see Tables 3, 4 and 5 in Appendix B for a narrative summary of the effectiveness of the interventions, a detailed summary of the outcomes measures, and of the interventions, respectively, included in the reviews):

1. There is strong evidence to support the use of online, smartphone-based and telephone-facilitated interventions to reduce anxiety and depression in young adults, older adults, children and adolescents (Bonardi et al 2022, Buttazzoni et al 2021, deOliveira et al 2023).

2. Active music therapy is a worthwhile intervention to tackle emotional difficulties and mood problems in children (Belski et al 2022).

3. A simulation of adverse circumstances for skills training can improve self-efficacy in non-clinical populations, including healthcare professionals and children (Boydstun et al 2021).

4. For children and adolescents – across mixed clinical and non-clinical populations – active approaches are better than doing nothing (e.g. a waiting list) for reducing self-harm and suicidal ideation (Bahji et al 2021), especially in schools and medical settings (Gaynor et al 2023).

5. Selective and indicated preventative interventions for children with anxiety are effective and cost-effective (Anna-Kaisa et al 2022).

4.2.1.3 Mechanisms

- Changing young people's self-perception, fear, hopelessness and thought-related distress are significant mechanisms of change with digital interventions for health promotion, illness prevention and treatment across different clinical and at-risk populations of young people (Domhardt et al 2021).

- Good quality social connection in digital interventions is an important mediator for depression, anxiety and wellbeing outcomes for young people. Poor quality social connection can be a risk factor for worse outcomes (Dewa et al 2021).

- Non-specific interventions can be easier to implement for reduction of suicidal ideation and self-harm prevention in the general adolescent population and are no different in outcomes compared to specific psychotherapeutic interventions (Walsh et al 2022); however, some elements commonly found in effective interventions for suicide prevention in clinical populations are specific, i.e. lethal means restriction, self-harm monitoring and safety planning (Meza et al 2023)

- Family involvement:
    a. does not confer any added value on digital interventions for depression in children and adolescents (Domhardt et al 2021).

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

b. is valuable for in-person interventions for depression in children and adolescents (Dippel et al 2022).
c. is a common element across preventative interventions with evidence of efficacy for reducing self-harm and suicide (Meza et al 2023).

4.2.1.4 Unclear or mixed evidence

- The effect of online resilience building interventions was equivocal: one review (Ang et al 2022) found evidence in support of them, whereas another review (Diaz-Garcia et al 2021) does not support them. The first review included interventions for anxiety and depression.

- The effect of physical activities on young people's wellbeing and mental health was equivocal: one review of a specific activity called 'The Daily Mile' (Breslin et al 2023) found it ineffective for wellbeing, but effective for emotional difficulties, whereas another review of activities such as yoga, sports and physical education (Hale et al 2021) found them effective for wellbeing and quality of life, but not for anxiety and depression.

4.2.1.5 Not recommended interventions

- Mindfulness-based interventions are not recommended for depression and anxiety in adolescents in school settings and have a non-specific effect on stress and no more than any other activity (Fulambarkar 2023).

- Universal interventions to prevent anxiety in children and adolescents are not cost-effective (Anna-Kaisa et al 2022).

- Specific psychotherapeutic approaches are no better than non-specific supportive care for reducing self-harm and suicide ideation in young people (Gaynor et al 2023).

Table 2. Summary of evidence in the included reviews in SR2 in relation to MENTBEST objectives

	MENTBEST CONTEXT			LEVEL OF EVIDENCE*							
First author and year	**Target population ****	**Outcomes of interest *****	**External stressors ******	**Clinical effectiveness – outcomes of interest*****				**Value for money**	**Delivery methods that enable wide reach and access**	**Long term follow-ups (1+ year)**	**Delivered across different settings and countries^** Total number *(Europe, World)*
				A	**B**	**C**	**D**				
Ang 2022	1, 3	A, B, C	i	L2	L2	L2	-	-	Yes - digital	No	12 *(6, 6)*
Anna-Kaisa 2022	3	A	None	L2	-	-	-	L2, L5	No – in person	Yes	3 *(2, 1)*
Bahji 2021	3	B, D	None	-	L2	-	L1	-	No -in person	Yes	11 *(5, 6)*
Belski 2022	3	B	None	L2	L2	-	-	-	No – in person	No	5 *(2, 3)*
Bonardi 2022	1, 3	A, B	i	L1	L1	-	-	-	Yes – internet, telephone, peers	No	12 *(5, 7)*
Boydstun 2021	1,3	A, B, C	i, ii	L1	L1	L2	-	-	Yes – online simulation	No	2 *(2, 0)*
Breslin 2023	3	A, B, C	i, iii	L2	L2	L5	-	L4	No – in person	No	4 *(4, 0)*
Buttazzoni 2021	3	A, B	None	L1	L1	-	-	-	Yes – smartphone-based	No	7 *(2, 5)*
deOliveira 2023	4	A, B	i	L1	L1	-	-	-	Yes - online or telephone	Yes	7 *(2, 5)*
Dewa 2021	3	A, B, C	i	L2	L1	L2		-	Yes – digital	NR	11 *(6, 5)*
Diaz-Garcia 2021	1, 3	C	None	-	-	L5	-	-	Yes - online	Yes	5 *(3, 2)*
Dippel 2022	3	B	None	-	L1	-	-	-	No - in-person (1-to-1 or group)	Yes	4 *(2, 2)*
Domhardt 2021	3	A, B, C	None	L1	L1	L1	-	-	Yes - internet, mobile phone	NR	5 *(3, 2)*
Fulambarkar 2023	3	A, B	None	L5	L5	-	-	-	No – schools	NR	5 *(3, 2)*
Gaynor 2023	3	D	None	-	-	-	L5	-	No – schools, ER, services	Yes	7 *(3, 4)*
Hale 2021	3	A, B, C	None	L3	L3	L1	-	-	No – in-person	Yes	18 *(8, 10)*
Meza 2023	3	D	None	-	-	-	L2	-	No – in-person	NR	6 *(4, 2)*
Walsh 2022	3	D	None	-	-	-	L1	-	No – classroom based	Yes	14 *(11, 3)*

* Level of evidence: Level 1 (L1) = clear evidence in support of the reviewed interventions; Level 2 (L2) = weak evidence in support of the reviewed interventions; Level 3 (L3) = unclear or mixed evidence; Level 4 = (L4) evidence gap (no evidence), Level 5 (L5) = evidence of ineffectiveness or lack of cost-effectiveness

** Target population: 1=General adult population; 2=Unemployed**; 3=Children and adolescents**; 4=Older Adults; 5=Migrants; 6=Adults with mental health conditions

*** Outcomes of interest: A. anxiety or stress, B. depression or mood problems, C. well-being or resilience, D. self-harm or suicide.

**** External stressors: specific economic, societal or environmental changes: i=covid, ii=disasters (terrorism, natural disasters), iii='obesity epidemic'

^ Number of European and worldwide countries outside Europe that generated the evidence

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

4.2.1.6 Limitations

One of the limitations of our review of reviews is that we restricted our searches in the last three years (2021, 2022, 2023) on the assumption that recent reviews will supersede previous ones and have more up-to-date evidence. In this way, we identified reviews that spoke to current priorities in terms of protecting mental health and we found that nearly all reviews focused on children and young people. The fact that we did not find any reviews of interventions for the protection of mental health relevant to migrants, unemployed people or people with existing mental health conditions shows that there has not been up-to-date evidence synthesis after 2020.

Many reviews did not summarise the information we needed to answer our research questions, e.g. the breakdown of countries from which the reviewed studies recruited participants or gender distribution. In this case, we retrieved the primary papers cited in the review to be able to ascertain how many studies included European participants, from which countries and what percentage of the sample were women.

We excluded reviews that specified in their inclusion criteria that the populations had a specific diagnosis or scored above a diagnostic threshold (e.g. Axelsdottir et al 2021, Cuijpers et al 2023). Still, many of our reviews included a mix of clinical and non-clinical populations (e.g. Dippel et al 2021). Some reviews reported their findings separate for interventions used for preventative vs treatment purposes, whereas other reviews pooled all types of interventions together.

In some reviews we could infer that the interventions were for the general population rather than clinical samples. For example, Buttazonni et al (2021) made reference to disorders but at closer inspection it was in the context of public health initiatives. deOliveira et al 2023 inferred that all types of elevated symptoms were included – not only clinical populations - and there was no specific criterion for including populations with a diagnosis or scoring above a specific cut-off.

4.2.2 Evidence synthesis for SR1

4.2.2.1 Summary of the reviews included and gaps identified

Our scoping review of reviews included 11 papers that captured change in prevalence and severity of mental disorders, the direction of mental health trajectories, and the levels of mental wellbeing, over time, or/and across countries or populations in Europe. In total (see Table 6) the reviews included 915 epidemiological studies worldwide, and 207 in European countries (not necessarily within the European Union), and synthesized data for 5,080,255 participants in total and for 1,369,344 participants from European countries.

With regard to geographical distribution, the number of countries included in the reviews varied from 7 to 38. Our inclusion criteria specified that reviews should include studies with European populations, even if they are mixed with worldwide populations outside Europe. In total 915 studies were included in the 11 reviews and 207 of them included European countries. The geographical distribution of the 207 studies was dominated by North-west European countries (see Figure 6 and Table 6). This aligns with the findings of SR2, and seems to support the gap in mental health knowledge in South East Europe reported in the literature, in this case in terms of data about mental health challenges in the general population or/and in the five MENTBEST vulnerable group.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

Figure 6: European geographical distribution of epidemiological studies included in the 11 reviews of SR1. The colour code reflects the frequency of studies, with darker hues reflecting larger numbers of studies.

Table 6: Population and study characteristics in the included reviews in SR1

First author and year	Meta-analysis?*	Number of reviewed studies	Type of reviewed studies	Recruitment countries	Number of participants Total & Europe	Age (years) and gender distribution (% women)	Mentbest target population**	Mentbest outcomes of interest ***	Mentbest context of 'stressors' $
Aarah-Bapuah 2022	No	21 (4 Eur)	Cross-sectional	**Eur**: Spain, Italy, Netherlands **World**: China, Turkey, USA, India	56,026 1,073 (Eur)	6-19 (47,4%)	3	1, 2,4	Covid-19
Cenat 2022	Yes	64 (27 Eur)	Longitudinal	**Eur**: Ireland, Spain, UK, France, Germany, Estonia, Italy, Netherlands, Austria, Sweden **World**: China, Australia, USA, Brazil, Singapore, Japan, Argentina, Colombia, Canada	304,188 102,596 (Eur)	40,92 (66,51%)	1	1, 2, 4	Covid-19
Daniel-Calveras 2022	No	23 (23 Eur)	Longitudinal, cross-sectional, prospective cohort, retrospective cohort	**Eur**: Greece, UK, France, Germany, Denmark, Netherlands, Sweden, Switzerland, Norway **World:** N/A	80,651 (Eur)	9-22 (<25%)	3,5	1, 2, 4	Disasters (political conflict/violence)
Deng 2023	Yes	191 (34 Eur)	Longitudinal, cross-sectional	**Eur**: Greece, Spain, UK, France, Germany, Portugal, Italy, Netherlands, Switzerland, Hungary, Austria, Romania, Croatia, Sweden, Poland, Lithuania, Scotland **World**: USA, Jordan, Saudi Arabia, Argentina, Indonesia, Ecuador, China, Brazil, United Arab Emirates, Nepal, Turkey, India, South Korea, Egypt, Australia, Iran, Canada, Mexico, Hong-Kong, Bangladesh, Qatar	1,389,477 51,732 (Eur)	8-18 not reported	3	1, 2	Covid-19

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

First author and year	Meta-analysis?*	Number of reviewed studies	Type of reviewed studies	Recruitment countries	Number of participants Total & Europe	Age (years) and gender distribution (% women)	Mentbest target population**	Mentbest outcomes of interest ***	Mentbest context of 'stressors' $
Diamond 2022	Yes	78 (29 Eur)	Longitudinal	**Eur:** Spain, UK, France, Germany, Italy, Netherlands, Norway, Sweden, Iceland **World**: Australia, Israel, USA, Canada, Brazil, Indonesia, China	16,484 3,312 (Eur)	24-84 (47%)	6	1	Trauma (e.g., physical/sexual attack, terrorist attack, natural disaster etc)
Kauhanen 2023	No	21 (10 Eur)	longitudinal, repeated cross-sectional	**Eur**: Spain, UK, Germany, Italy, Iceland **World**: China, USA, Australia, India, Canada	96,000 13,339 (Eur)	3-24 not reported	3	1, 2, 3	Covid-19
Ludwig-Walz 2022	Yes	22 (21 Eur)	Cross-sectional	**Eur**: Germany, Netherlands, Iceland, Norway, Switzerland, UK **World**: Israel	868,634 784,675 (Eur)	10-19 Not reported	3	1,2	Covid-19
Madigan 2023	Yes	53 (12 Eur)	Longitudinal	**Eur**: Spain, UK, Germany, Italy, Netherlands **World**: USA, China, Canada, Australia, Israel	40,807 3,784 (Eur)	10-18 >50%	3	1, 2	Covid-19
Newnham 2022	No	234 (26 Eur)	Longitudinal	**Eur**: Norway, Sweden, Netherlands, Italy, Austria, Germany, UK, Iceland, Ireland, Spain **World**: China, USA, Japan, Mexico, Chile, Puerto Rico, Turkey, Armenia, Nepal, Sri Lanka, Indonesia, Australia, South Korea, Taiwan, Thailand, New Zealand, Vanatu	285,966 52,974 (Eur)	6-99 not reported	1,3,4	1, 2	Covid-19, Disasters (earthquake, hurricane/tornado, tsunami)
Rigutto 2021	No	80 (17 Eur)	Cross-sectional, longitudinal (retrospective & prospective), open cohort	**Eur**: France, Germany, Norway **World**: Turkey, Tunisia, USA, Kenya, Japan, Israel	1,844,092 177,278 (Eur)	13-90 not reported	1	1, 2	Disasters (terrorism)
Walinski 2023	No	128 (4 Eur)	Longitudinal, cross-sectional	**Eur**: Spain, UK, Belgium, Finland, Germany, Portugal,	97,930 (Eur)	6-65 not reported	1	1, 2,4	Climate change (floods, storms, fires)

First author and year	Meta-analysis?*	Number of reviewed studies	Type of reviewed studies	Recruitment countries	Number of participants Total & Europe	Age (years) and gender distribution (% women)	Mentbest target population**	Mentbest outcomes of interest ***	Mentbest context of 'stressors' $
				Greece **World**: USA, Canada, Australia, Mexico, China, South Korea, Japan, Taiwan, Vietnam, Kazakhstan, Brazil, Colombia, Israel, Singapore					

* All the included records were systematic reviews but not all included a meta-analysis.

** Mentbest target population: 1=General population; 2=Unemployed; 3=Children and adolescents; 4=Older Adults; 5=Migrants; 6=People with history of mental health conditions

*** Mentbest outcomes of interest: 1. anxiety or stress, 2. depression or mood problems, 3. well-being or resilience, 4. self-harm or suicide.

$ whether the interventions were applied in the context of specific economic, societal or environmental stressors.

Note: The full references for the 11 reviews are included in the reference list of the report

All reviews except one related either exclusively to children and adolescents (6), or to mixed populations of children, adolescents, adults (4). Only 1 review related exclusively to people with pre-existing mental health challenges (PTSD; Diamond et al. 2022), and 1 review related to MENTBEST intersectional vulnerability, that is children and adolescents who were unaccompanied refugees living in European countries (Daniel-Calveras et al. 2022). This trend aligns well with the one observed in SR2 and supports our conclusion that our reviews of reviews likely reflect the increased interest, in recent years, in child and adolescent mental health and wellbeing, compared to the relative absence of recent reviews pertaining to unemployed people, and older adults.

In terms of global (societal, economic and environmental) stressors within which the reviews were conducted, 7 mentioned the COVID-19 pandemic, 4 referred to disasters such as terrorism (1), political conflict/violence (1) and natural catastrophes due to climate change (2), and 1 referred to traumatic events (e.g., car accidents and physical assault). As our searches were limited to the last 3 years, our review of reviews reflects worldwide interest on the impact of the most recent and predominant global stressor, covid-19 pandemic, on mental health.

Finally, with regard to outcomes of interest, the majority of reviews reported change on both anxiety/stress measures and depression/mood measures (10), with 1 review reporting exclusively change on anxiety/stress measures (Diamond et al., 2022), 1 review including in addition well-being and resilience measures, and 4 reviews including self-harm and suicide measures as well.

4.2.2.2 The impact of global (societal, economic and environmental) stressors on mental health

The table below includes a narrative summary of the changes (over time and in comparison with other groups) in the prevalence and severity of diagnosable mental health problems, direction of mental health trajectories and levels of mental wellbeing in the populations of interests for MENTBEST, and in in the context of the global stressors of interest for MENTBEST.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
Aarah-Bapuah 2022	3 Covid-19	n/a	n/a	Increase of **suicidal behaviours**, before vs during Covid-19 pandemic. High prevalence of **depressive symptoms**. High prevalence of **anxiety/stress symptoms**. Higher prevalence of **anxiety symptoms** in adolescent as compared to children	The COVID-19 pandemic impacted negatively the mental health of children and adolescents. Adolescents had more of the psychological impact compared to children, and female adolescents were at higher risk of experiencing anxiety, depression, and stress.
Cenat, 2022	1 Covid-19	n/a	Higher **prevalence of anxiety and depression** in North America compared to Europe (and the other countries). Significant decrease in severity of **anxiety** and **depression** at the last follow-up compared to baseline Not significant changes in **psychological distress** (baseline vs follow ups) Not significant increase of **suicidal ideation** between baseline and follow-up	n/a	Decrease in the prevalence of mental health problems at the last follow up (June 2020) relative to the baseline, although prevalence remains higher during the pandemic compared to pre-pandemic times. The regions with the highest prevalence of symptoms of mental health problems are North America for anxiety, depression, and PTSD, Latin America for psychological distress, and Europe for insomnia. Being a female is associated with a higher prevalence of anxiety and depression symptoms. With regard to age, only the prevalence of anxiety tended to decrease with age.
Daniel-Calveras 2022	3,5 Disasters (political conflict/violence)	n/a	Years after their arrival, URM had a lower risk of treated **major depressive**	n/a	High prevalence of PTSD, depression and anxiety in URM (Unaccompanied Refugee Minors) who came to Europe.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
			and anxiety disorders than Swedish-born youth One study reported greater rate of **deaths by suicide** among URM compared to general population but one study found no suicide deaths among URM.		Compared to the general population under the age of 18, it is unclear whether URM are at a higher risk of presenting PTSD, depression and anxiety. Exposure to trauma reported by URM, being unaccompanied, being female, being older, and awaiting a decision after applying for asylum increased the risk of developing mental health problems
Deng, 2023	3 Covid-19	n/a	n/a	The prevalence of **depressive and anxiety symptoms** was substantially higher for youths from the Eastern Mediterranean and European Regions compared to other regions. Students in high school reported a higher prevalence of **depressive and anxiety symptoms** compared to middle and elementary school students, and students in middle school reported higher prevalences of depressive symptoms compared to elementary Youths with high electronics usage reported a higher prevalence of **depressive and anxiety symptoms** compared to youths with low electronics usage.	The prevalence estimates differed significantly based on geographical regions for all assessed outcomes. While the prevalence estimates for the Region of the Americas and the European Region were similar to the overall pooled prevalence, prevalence estimates from the South-East Asian Region and the Eastern Mediterranean Region were substantially elevated compared with other regions studied. Girls exhibited higher prevalence estimates for depression and anxiety symptoms as compared to boys. The prevalence of depressive symptoms was positively correlated with age and grade level, while the prevalence of anxiety symptoms was positively correlated with education levels and grade levels only. The prevalence of depressive and anxiety symptoms was over 15% lower in children and adolescents with low electronics usage compared to those with high electronics usage. Overall, the prevalence of mental health symptoms increased as the pandemic progressed, although signs of recovery and stabilization were observed

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
				The prevalence **of anxiety symptoms** rapidly increased during the first 5 months of the pandemic, before transitioning to a more gradual rate of increase during the summer and the following fall school semester. After 2020, a slight downward trend in the prevalence of anxiety symptoms can be identified starting in the winter semester of 2021.	
Diamond, 2022	6 Trauma	n/a	The highest **PTSD prevalence** was seen at 1-month post-trauma, with a pooled prevalence of 27.0%. At 3 months, it had fallen to 17.6%. Prevalence of PTSD remained relatively stable over the subsequent timepoints. At the 24-month time-point, 20.7% of individuals were still experiencing PTSD. There were no significant differences in **PTSD prevalence** between intentional or unintentional trauma exposure at 1, 3, 6, or 12 months following exposure.	n/a	In the month following trauma, an estimated 27% of individuals were experiencing PTSD. While there was a significant reduction in prevalence from 1 to 3 months, after this time the rates of PTSD remained relatively stable. The only significant reductions occurred when later prevalence rates were compared to the 1-month prevalence. At the 2-year follow-up, 21% of individuals exposed to trauma were still experiencing PTSD. PTSD is likely to be extremely persistent over time if left untreated

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
			Mean age of the sample was negatively associated with the prevalence of PTSD at 1 month. A higher proportion of males in the sample was associated with less recovery over time		
Kauhanen 2023	3 Covid-19	Decreased **mental well-being** (before vs after Covid-19 pandemic) was reported by two studies	n/a	Increased **depressive symptoms** were reported by eight studies, while one study each reported improve depressive symptoms or no significant difference after the pandemic started. Increased (before vs after pandemic) **anxiety symptoms** were reported by eight studies, while one study found no significant difference Increased **psychological distress** was found by all four studies. Increased in stress or emotional stress were found in two studies, while one study reported no difference in physiological and behavioral **stress**. Five studies found that **mental health symptoms** had worsened more in girls than boys	Most of the 21 studies reported a longitudinal deterioration in symptoms for different mental health outcomes especially for adolescents and young people. The mental health changes for younger children aged 0–9 years and the influence of gender, age and existing mental issues was limited in the included studies There were no cross-cultural studies identified that compared how different policies, namely lockdowns, school closures and other social restrictions, may have affected the mental health of the children and young people The findings reflect the impact during the early phase of the pandemic since the majority of the included studies collected during pandemic data at a very early stage of pandemic.

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
				Mental health symptoms increased more in older than younger participants during the pandemic Three studies found greater effects in those who already had poor mental health before the COVID-19 pandemic	
Ludwig-Walz 2022	3 Covid-19	n/a	**Clinically relevant depression rates** increased significantly after the pandemic (as compared with before) in females but not for males	A strong increase in **depression symptoms** at the beginning of the COVID-19 pandemic (spring/summer 2020) as compared to pre-pandemic and a fattening over time The highest effect estimate was determined for the Netherlands and the lowest for Norway	Studies-comparing effects before and during the COVID-19 pandemic-revealed a significant increase of general depression symptoms for total, female and male children and adolescents Increase for male adolescents was higher, in particular for the age category 16–19 years A dose–response-relationship in that estimates for general depression symptoms were significantly higher when public health and social measures were more stringent or school closure (partial) occurred An increase in clinically relevant depression rates could be shown for total and female children and adolescents, graded as 'low' regarding certainty of evidence
Madigan 2023	3 Covid-19	n/a	n/a	Strong evidence of an increase in **depression symptoms** after (during) the pandemic as compared with before Good evidence that **depression symptoms** increased among female individuals and slightly	Evidence of an increase in depression symptoms during the COVID-19 pandemic in children and adolescents Anxiety symptoms increased slightly during the pandemic Tends to be greater reactivity and episodicity of mood, whereas anxiety has greater intraindividual stability over time

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
				increased among male individuals. Good evidence that **depression symptoms** increased in study estimates of children and adolescents by a slight to small magnitude Very good evidence of an increase in depression symptoms among study estimates from Europe and good evidence of an increase among study estimates from North America Good evidence that **anxiety symptoms** increased slightly (before vs during pandemic) Good evidence that changes in **anxiety symptoms** differed slightly between female and male, and modest evidence of a difference between children and adolescents	Increases occurred equally for samples of children and adolescents displaying clinical, threshold, subthreshold, and even low levels of depression symptoms before the pandemic Increases in depression symptoms were greater among samples of female individuals vs samples of male individuals Some evidence that changes in depression and anxiety symptoms during the COVID-19 pandemic were larger for samples drawn from higher income backgrounds.
Newnham 2022	1,3,4 Covid-19, Disasters (climate change)			Prevalence of overall **psychological symptoms (anxiety/stress and depression**) was different from zero directly after the disaster. A significant slope indicating that the prevalence of overall psychological symptoms reduced over time.	Overall, mental health rates showed a gradual improvement over time, but trajectories varied by mental health outcome The prevalence of PTSS significantly improved in the years following exposure, and the trajectory of recovery did not differ by age. In contrast, the prevalence of depression and anxiety symptoms remained elevated for years following disasters, and children and adolescents reported significantly higher rates compared to adults at all timepoints

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
				Depression symptoms did not improve over time, and with children reporting significantly higher levels of depression symptoms initially and over time, but no differences by disaster type Higher levels of **anxiety symptom prevalence** reported by children and adolescents, and borderline effect for Time, indicating no significant change over time for child and adult population Higher levels of **anxiety symptoms** in populations affected by earthquakes and industrial disasters Prevalence in those experiencing a pandemic was significantly higher than those not experiencing a pandemic, which was even more pronounced at 6–12 months, but disappeared after 12 months	Disaster type significantly influenced the pattern of recovery: earthquakes were associated with higher prevalence of PTSS and anxiety compared to other hazards, with lasting effects; and industrial disasters were associated with significantly higher rates of combined mental health concerns at baseline, and anxiety levels over time.
Rigutto, 2021	1 Disasters (terrorism)	n/a	higher prevalence of **PTSD** in individuals both directly and indirectly exposed to terrorist attacks Rates of new-onset **major depressive disorder** post	In Tunisia, following the Bardo Museum terrorist attacks, 40.6% of museum employees endorsed **depressive symptoms** after 4–6 weeks	Directly and highly exposed individuals with chronic physical sequelae following the incident, and underprepared (often volunteers) first-line workers, are populations with higher rates of PTSD after terrorist attacks Populations that are geographically and culturally close to the victim population, as well as loved ones of victims, seem to have higher rates

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
			9/11 were 26% amongst individuals who were in the vicinity of the attacks, and 45% amongst those with a trauma-exposed close associate One study suggested that the majority of individuals directly exposed to terrorism, do not suffer from major depression disorder in isolation Some evidence suggests that individuals who lost a loved one to a terrorist act are more than twice as likely as direct witnesses to develop **major depression disorder** Individuals having survived a terrorist attack, especially those having suffered physical injuries, appear to report higher rates of **anxiety disorders** than the general population Following the 13 November 2015 terrorist attacks which took place in Paris, 11.2% of resident physicians reported anxiety disorders. In	Only 2.4% of resident physicians reported **depressive symptoms** after the 2015 terrorist attack in Paris	of major depression and anxiety disorders than the general population after a terrorist attack

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
			Denmark, rates of anxiety disorders saw a 16% increase following the Oslo bombings, and a 4% increase following 9/11. Scoring high on the Terrorism Catastrophizing Scale or having a loved one who was exposed to the attack increase a person's chances of developing an anxiety disorder		
Walinski 2023	1 Climate change (floods, storms, fires)	n/a	In the UK six to 12 months after the extreme weather event of flooding, the point prevalence for **PTSD** was significantly increased in those affected in comparison with the lifetime prevalence in the general population The main predictors of developing a mental health condition after a flood disaster are socioeconomic vulnerability, long-term displacement, persistent material damage, and insurance- related problems	Children prone to rumination have an increased risk of developing **symptoms of depression** after experiencing a flood	With progressive global warming, a greater mental health burden on the general population and an increased need for care for mental disorders are to be expected. Heat makes many mental disorders worse, with subsequent increases in morbidity and mortality. Natural disasters raise the prevalence of, above all, PTSD, depression and anxiety disorders of those affected. Mentally ill people as well as children and adolescents belong to those groups of people who are particularly vulnerable to the effects of climate change

First author and year	Mentbest target population* And Context of stressors	Changes in Levels of mental well-being	Changes in prevalence and severity of mental health problems	Changes in direction of mental health trajectories	Conclusions
			Temperature variations explained more than 60% of suicide variation in Finland Food insecurity in British families, for example, was associated with maternal depression The forced, permanent displacement of people increased the probability of their developing anxiety and affective disorders		

* Mentbest target population: 1=General population; 2=Unemployed; 3=Children and adolescents; 4=Older Adults; 5=Migrants; 6=People with history of mental health conditions

4.2.2.3 Limitations

Some of the limitations reported for SR2 are also relevant for SR1.

As discussed in SR2, one of the limitations of our review of reviews is that we restricted our searches in the last three years (2021, 2022, 2023) on the assumption that recent reviews will supersede previous ones and have more up-to-date evidence. In this way, we identified reviews that spoke to current priorities in terms of understanding the prevalence, scale and severity of mental health challenges associated with a transforming society, and we found that the majority of reviews focused on children and young people. It is notable the absence since 2020 of recent reviews investigating changes in the mental health of unemployed people, particularly in the context of economic downturns and financial hardship that many European countries have faced in the last decade.

One limitation specific to SR1 is that we included only reviews that reported a **change** in mental health, having as a rationale that this was the most appropriate way to addresses MENTBEST-SO1. That is, *to characterise the scale and severity of mental health challenges associated with rapid societal, economic, environmental changes in Europe,* and in the MENTBEST populations of interest. However, change was not quantified consistently across reviews or clearly reported in some of the reviews. Some reviews reported change by comparing prevalence data at baseline (pre) vs post- time points (e.g., of a disaster or different pandemic wave). An example is Cenat 2022 who reported changes in prevalence and severity of mental health problems (anxiety, depression, psychological distress and suicidal ideation) at several time-points during COVID-19 pandemic vs baseline. One review (Daniel-Calveras 2022) reported prevalence of mental health disorders in a sample of unaccompanied refugee minors as compared to the general youth population. Another review (Aarah-Bapuah 2022) reported change on one of the mental health outcomes (suicidal behaviours) by comparing pre- and during COVID-19 pandemic time points but compared prevalence data for the other outcomes (anxiety/stress and depression/mood) in relation to previous reviews that included the same studies. Therefore, understanding and quantifying changes in prevalence of mental health problems associated with global stressors may be a difficult task, particularly for stressors that cannot be easily tied to a particular time point (e.g., digitalization and ageing population).

Finally, as noted in SR2, many reviews did not summarise the information we needed to answer our research questions, and so we needed to retrieve the primary papers cited in the review to be able to ascertain some of the information.

5. Impact and Conclusion

This report describes the work conducted in relation to Task 1.1. and summarises the results from two Scoping reviews of reviews that addressed two of the main objectives of MENTBEST (SO1 and SO2).

To address MENTBEST SO2, we conducted a scoping review (SR2) of reviews of existing interventions to promote mental health in the general population and the vulnerable groups of interest for MENTBEST. To provide evidence-based guidance for the development of COMBINA (WP2) we evaluated the evidence on the effectiveness of the intervention, taking into consideration four different dimensions (protective against external stressors, good value for money, scalable, sustainable and transferable) using the RAG (read-amber-green) system, and made recommendations in 5 levels (strongly recommended intervention; recommended intervention; optional intervention-inconsistent

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

evidence; optional intervention-little or no evidence; not recommended-evidence of ineffectiveness or harm). We also produced important insights into potential mechanisms that may contribute to the effectiveness of the recommended interventions. Further high-quality Tables summarising and synthesising information at the review level and relating to outcomes, interventions (active ingredients) and delivery mode were included in the Appendices. #

To address MENTBEST SO1, we conducted a scoping review (SR1) of reviews capturing change, associated with global stressor, in prevalence and severity of mental disorders, the direction of mental health trajectories, and the levels of mental wellbeing, over time, or/and across countries or populations in Europe. We provided a high-quality aggregation and synthesis of the information, at the review level, pertaining the key studies characteristics of interest for MENTBEST, and changes on mental health outcomes of interest for MENTBEST in Europe, and in relation to the populations and stressor contexts of interest for MENTBEST.

In addition, with identified important gaps in knowledge in evidence synthesis after 2020 pertaining to both interventions (SR2) and change in prevalence and severity of mental health problems (SR1), which will feed into the other objectives of WP1 relating to *addressing the knowledge gap on mental health data in South-east Europe,* and the desk research of WP2 and WP4.

This report will be made available to the MENTBEST consortium via the MENTBEST Teams Channel. And the recommendations and key results will be discussed in a series of meetings with the relevant WPs.

Finally**,** a number of issues and areas for **further research** were identified.

- To capture evidence about clinical effectiveness of interventions to protect the mental health of migrants and the long-term unemployed, we need to extend the literature searches for reviews competed before 2021 and/or conduct a review of primary clinical studies specific to these two population groups.
- To capture evidence about the cost-effectiveness of interventions to protect mental health, we need to extend the literature searches for reviews before 2021 and/or conduct a review of primary economic studies on specific interventions for mental health prevention or promotion.

6. Appendix A - Reference list

Aarah-Bapuah, M., Sarpomaa Oppong, S., Ohenewaa Yawson, A., Dzansi, G., & Adjorlolo, S. (2022). Covid-19 and Mental Health of Children and Adolescents: A Systematic Review. *Cogent Psychology*, *9*(1). https://doi.org/10.1080/23311908.2022.2111849

Aboujaoude, E., & Gega, L. (2021). Editorial Perspective: Missing the forest for the trees – how the focus on digital addiction and gaming diverted attention away from wider online risks. Child and Adolescent Mental Health, 26 (4), 369-371.

Adjei, N. K. et al. (2022) Impact of poverty and family adversity on adolescent health: a multi-trajectory analysis using the UK Millennium Cohort Study. The Lancet Regional Health – Europe, 13, 100279. DOI: https://doi.org/10.1016/j.lanepe.2021.100279.

Alvarez-Galvez, J., Carretero-Bravo, J., Suarez-Lledo, V., Ortega-Martin, E., Ramos-Fiol, B., Lagares-Franco, C., et al. (2022). Social inequalities in multimorbidity patterns in Europe: A multilevel latent class analysis using the European Social Survey (ESS). SSM-Population Health, 20, 101268. https://doi.org/10.1016/j.ssmph.2022.101268

Anderson, E. C., Carleton, R. N., Diefenbach, M., & Han, P. K. J. (2019). The relationship between uncertainty and affect. Frontiers in Psychology, 10, 2504. https://doi.org/10.3389/fpsyg.2019.02504

Ang, W. H., Chew, H. S., Dong, J., Yi, H., Mahendren, R., & Lau, Y. (2022). Digital Training for Building Resilience: Systematic Review, meta-analysis, and meta-regression. *Stress and Health*, *38*(5), 848–869. https://doi.org/10.1002/smi.3154

Anna-Kaisa, V., Virpi, K., Mervi, R., Elisa, R., Terhi, L., Marjo, K., André, S., & Eila, K. (2021). Review: Economic evidence of preventive interventions for anxiety disorders in children and adolescents – a systematic review. *Child and Adolescent Mental Health*, *27*(4), 378–388. https://doi.org/10.1111/camh.12505

Arksey, H., & O'Malley, L. (2005). Scoping Studies: Towards a Methodological Framework. International Journal of Social Research Methodology: Theory & Practice, 8(1), 19–32. https://doi.org/10.1080/1364557032000119616

Bahji, A., Pierce, M., Wong, J., Roberge, J. N., Ortega, I., & Patten, S. (2021). Comparative efficacy and acceptability of psychotherapies for self-harm and suicidal behavior among children and adolescents. *JAMA Network Open*, *4*(4). https://doi.org/10.1001/jamanetworkopen.2021.6614

Batic-Mujanovic, O., Poric, S., Pranjic, N., Ramic, E., Alibasic, E., & Karic, E. (2017). Influence of Unemployment on Mental Health of the Working Age Population. Materia Socio-medica, 29(2), 92–96. https://doi.org/10.5455/msm.2017.29.92-96

Belski, N., Abdul-Rahman, Z., Youn, E., Balasundaram, V., & Diep, D. (2021). Review: The effectiveness of musical therapy in improving depression and anxiety symptoms among children and adolescents – a systematic review. *Child and Adolescent Mental Health*, *27*(4), 369–377. https://doi.org/10.1111/camh.12526

Blackmore, R., Boyle, J. A., Fazel, M., Ranasinha, S., Gray, K. M., Fitzgerald, G., Misso, M., & Gibson-Helm, M. (2020). The prevalence of mental illness in refugees and asylum seekers: A systematic review and meta-analysis. PLoS Medicine, 17(9), e1003337. https://doi.org/10.1371/journal.pmed.1003337

Bonardi, O., Wang, Y., Li, K., Jiang, X., Krishnan, A., He, C., Sun, Y., Wu, Y., Boruff, J. T., Markham, S., Rice, D. B., Thombs-Vite, I., Tasleem, A., Dal Santo, T., Yao, A., Azar, M., Agic, B., Fahim, C., Martin, M. S., … Thombs, B. D. (2022). Effects of COVID-19 mental health interventions among children, adolescents, and adults not quarantined or undergoing treatment due to COVID-19 infection: A systematic review of Randomised Controlled Trials. *The Canadian Journal of Psychiatry*, *67*(5), 336–350. https://doi.org/10.1177/07067437211070648

Boydstun, C. D., Pandita, S., Finkelstein-Fox, L., & Difede, J. (2021). Harnessing Virtual Reality for Disaster Mental Health: A systematic review. *Translational Issues in Psychological Science*, *7*(3), 315–331. https://doi.org/10.1037/tps0000282

Breslin, G., Hillyard, M., Brick, N., Shannon, S., McKay-Redmond, B., & McConnell, B. (2023). A systematic review of the effect of the Daily Mile^{TM} on Children's Physical Activity, physical health, mental health, wellbeing, academic performance and cognitive function. *PLOS ONE*, *18*(1). https://doi.org/10.1371/journal.pone.0277375

Bryant, R. A., Dawson, K. S., Keyan, D., Azevedo, S., Yadav, S., Tran, J., Rawson, N., & Harvey, S. (2022). Effectiveness of a Videoconferencing-Delivered Psychological Intervention for Mental Health Problems during COVID-19: A Proof-of-Concept Randomized Clinical Trial. Psychotherapy and Psychosomatics, 91(1), 63–72. https://doi.org/10.1159/000520283

Buffel, V., van de Straat, V., & Bracke, P. (2015). Employment status and mental health care use in times of economic contraction: a repeated cross-sectional study in Europe, using a three-level model. International Journal for Equity in Health, 14, 29. https://doi.org/10.1186/s12939-015-0153-3

Bulhões, C., Ramos, E., Severo, M., Dias, S., & Barros, H. (2021). Trajectories of depressive symptoms through adolescence and young adulthood: social and health outcomes. European Child & Adolescent Psychiatry, 30(1), 65–74. https://doi.org/10.1007/s00787-020-01493-9

Buttazzoni, A., Brar, K., & Minaker, L. (2021). Smartphone-based interventions and internalizing disorders in youth: Systematic Review and meta-analysis. *Journal of Medical Internet Research*, *23*(1). https://doi.org/10.2196/16490

Cassanet, W., McKenzie, A., & McLean, L. A. (2023) Psychosocial interventions to support retirement well-being and adjustment: a systematic review, Educational and Developmental Psychologist, DOI: 10.1080/20590776.2022.2161360

Cénat, J. M., Farahi, S. M., Dalexis, R. D., Darius, W. P., Bekarkhanechi, F. M., Poisson, H., Broussard, C., Ukwu, G., Auguste, E., Nguyen, D. D., Sehabi, G., Furyk, S. E., Gedeon, A. P., Onesi, O., El

Aouame, A. M., Khodabocus, S. N., Shah, M. S., & Labelle, P. R. (2022). The global evolution of mental health problems during the COVID-19 pandemic: A systematic review and meta-analysis of longitudinal studies. *Journal of Affective Disorders*, *315*, 70–95. https://doi.org/10.1016/j.jad.2022.07.011

Charlson, F., Ali, S., Benmarhnia, T., Pearl, M., Massazza, A., Augustinavicius, J., & Scott, J. G. (2021). Climate Change and Mental Health: A Scoping Review. International Journal of Environmental Research and Public Health, 18(9), 4486. https://doi.org/10.3390/ijerph18094486

Cianconi, P., Betrò, S., & Janiri, L. (2020). The Impact of Climate Change on Mental Health: A Systematic Descriptive Review. Frontiers in Psychiatry, 11, 74. https://doi.org/10.3389/fpsyt.2020.00074

Ciaramella, M., Monacelli, N. & Cocimano, L.C.E. (2022). Promotion of Resilience in Migrants: A Systematic Review of Study and Psychosocial Intervention. Journal of Immigrant and Minority Health 24, 1328–1344.

Cuijpers, P., Furukawa, T.A., & Smit, F. (2021). Most at-risk individuals will not develop a mental disorder: The limited predictive strength of risk factors. World Psychiatry, 20, 224–225.

Cuijpers, P., Smit, F., & Furukawa, T. A. (2021). Most at-risk individuals will not develop a mental disorder: the limited predictive strength of risk factors. World Psychiatry : Official Journal of the World Psychiatric Association (WPA), 20(2), 224–225. https://doi.org/10.1002/wps.20852

Daniel-Calveras, A., Baldaquí, N., & Baeza, I. (2022). Mental health of unaccompanied refugee minors in Europe: A systematic review. *Child Abuse & Neglect*, *133*, 105865. https://doi.org/10.1016/j.chiabu.2022.105865

de Oliveira, P. B., Dornelles, T. M., Gosmann, N. P., & Camozzato, A. (2023). Efficacy of telemedicine interventions for depression and anxiety in older people: A systematic review and meta-analysis. *International Journal of Geriatric Psychiatry*, *38*(5). https://doi.org/10.1002/gps.5920

Deng, J., Zhou, F., Hou, W., Heybati, K., Lohit, S., Abbas, U., Silver, Z., Wong, C. Y., Chang, O., Huang, E., Zuo, Q. K., Moskalyk, M., Ramaraju, H. B., & Heybati, S. (2022). Prevalence of mental health

symptoms in children and adolescents during the Covid-19 pandemic: A meta-analysis. *Annals of the New York Academy of Sciences*, *1520*(1), 53–73. https://doi.org/10.1111/nyas.14947

Dewa, L. H., Lawrance, E., Roberts, L., Brooks-Hall, E., Ashrafian, H., Fontana, G., & Aylin, P. (2021). Quality Social Connection as an active ingredient in digital interventions for young people with depression and anxiety: Systematic scoping review and meta-analysis. *Journal of Medical Internet Research*, *23*(12). https://doi.org/10.2196/26584

Diamond, P. R., Airdrie, J. N., Hiller, R., Fraser, A., Hiscox, L. V., Hamilton-Giachritsis, C., & Halligan, S. L. (2022). Change in prevalence of post-traumatic stress disorder in the two years following trauma: A meta-analytic study. *European Journal of Psychotraumatology*, *13*(1). https://doi.org/10.1080/20008198.2022.2066456

Díaz-García, A., Franke, M., Herrero, R., Ebert, D. D., & Botella, C. (2021). Theoretical adequacy, methodological quality and efficacy of online interventions targeting resilience: A systematic review and meta-analysis. *European Journal of Public Health*, *31*(Supplement_1), i11–i18. https://doi.org/10.1093/eurpub/ckaa255

Dippel, N., Szota, K., Cuijpers, P., Christiansen, H., & Brakemeier, E. (2022). Family involvement in psychotherapy for depression in children and adolescents: Systematic review and meta-analysis. *Psychology and Psychotherapy: Theory, Research and Practice*, *95*(3), 656–679. https://doi.org/10.1111/papt.12392

Domhardt, M., Engler, S., Nowak, H., Lutsch, A., Baumel, A., & Baumeister, H. (2021). Mechanisms of change in digital health interventions for mental disorders in youth: Systematic review. *Journal of Medical Internet Research*, *23*(11). https://doi.org/10.2196/29742

European Commission (2022, Sept 14) 2022 State of the Union Address by President von der Leyen (SPEECH/22/5493). Retrieved from: https://ec.europa.eu/commission/presscorner/detail/ov/speech_22_5493

Fuhrer, R., & Keyes, K. M. (2019). Population Mental Health in the 21st Century: Time to Act. American Journal of Public Health, 109(S3), S152–S153. https://doi.org/10.2105/AJPH.2019.305200

Fulambarkar, N., Seo, B., Testerman, A., Rees, M., Bausback, K., & Bunge, E. (2022). Review: Meta-analysis on Mindfulness-based interventions for adolescents' stress, depression, and anxiety in school settings: A cautionary tale. *Child and Adolescent Mental Health*, *28*(2), 307–317. https://doi.org/10.1111/camh.12572

Galanaki, E., & Gkinopoulos, T. (2023 in press). Ostracism in the era of COVID-19: Intrapersonal, interpersonal, and intergroup perspectives. In M.H.Bowker & A. Buzby (Eds.) Getting lost: Psycho-political withdrawal in the covidian era. London: Phoenix Publishing.

Gaynor, K., O'Reilly, M. D., Redmond, D., Nealon, C., Twomey, C., & Hennessy, E. (2023). A meta-analysis of targeted interventions for reducing suicide-related behaviour and ideation in adolescents: Implications for trial design. *Comprehensive Psychiatry*, *122*, 152374. https://doi.org/10.1016/j.comppsych.2023.152374

Gega L, Aboujaoude E (2021) How digital technology mediated the effects of the COVID-19 pandemic on mental health: the good, the bad and the indifferent. Frontiers in Digital Health. 3, 126. https://www.frontiersin.org/article/10.3389/fdgth.2021.733151.

Gega, L, Jankovic, D, Saramago, P, Marshall, D, Dawson, S, Brabyn, S, Nikolaidis, GF, Melton, H, Churchill, R & Bojke, L (2022) Digital interventions in mental health: evidence syntheses and economic modelling. Health Technology Assessment, 26(1):1-182. https://doi.org/10.3310/RCTI6942

Godinic, D., Obrenovic, B., & Khudaykulov, A. (2020). Effects of Economic Uncertainty on Mental Health in the COVID-19 Pandemic Context: Social Identity Disturbance, Job Uncertainty and Psychological Well-Being Model. International Journal of Innovation and Economic Development.

Goodkind, J. R., Bybee, D., Hess, J. M., Amer, S., Ndayisenga, M., Greene, R. N., Choe, R., Isakson, B., Baca, B., & Pannah, M. (2020). Randomized Controlled Trial of a Multilevel Intervention to Address Social Determinants of Refugee Mental Health. American Journal of Community Psychology, 65(3-4), 272–289. https://doi.org/10.1002/ajcp.12418

Gurvich, C., Thomas, N., Thomas, E. H., Hudaib, A. R., Sood, L., Fabiatos, K., Sutton, K., Isaacs, A., Arunogiri, S., Sharp, G., & Kulkarni, J. (2021). Coping styles and mental health in response to societal changes during the COVID-19 pandemic. The International Journal of Social Psychiatry, 67(5), 540–549. https://doi.org/10.1177/0020764020961790

Hale, G. E., Colquhoun, L., Lancastle, D., Lewis, N., & Tyson, P. J. (2021). Review: Physical activity interventions for the mental health and well-being of adolescents – a systematic review. *Child and Adolescent Mental Health*, *26*(4), 357–368. https://doi.org/10.1111/camh.12485

Kauhanen, L., Wan Mohd Yunus, W. M., Lempinen, L., Peltonen, K., Gyllenberg, D., Mishina, K., Gilbert, S., Bastola, K., Brown, J. S., & Sourander, A. (2022). A systematic review of the mental health changes of children and young people before and during the COVID-19 pandemic. *European Child & Adolescent Psychiatry*, *32*(6), 995–1013. https://doi.org/10.1007/s00787-022-02060-0

Kinderman, P., Tai, S., Pontin, E., Schwannauer, M., Jarman, I., & Lisboa, P. (2015). Causal and mediating factors for anxiety, depression and well-being. British Journal of Psychiatry, 206, 456–460. doi: 10.1192/bjp.bp.114.147553

Kubzansky, L.D., Kim, E.S., Boehm, J.K. et al. (2023). Interventions to Modify Psychological Well-Being: Progress, Promises, and an Agenda for Future Research. Affec Sci., 4, 174–184. https://doi.org/10.1007/s42761-022-00167-w

Léger-Goodes, T., Malboeuf-Hurtubise, C., Mastine, T., Généreux, M., Paradis, P. O., & Camden, C. (2022). Eco-anxiety in children: A scoping review of the mental health impacts of the awareness of climate change. Frontiers in Psychology, 13, 872544. https://doi.org/10.3389/fpsyg.2022.872544

Ludwig-Walz, H., Dannheim, I., Pfadenhauer, L. M., Fegert, J. M., & Bujard, M. (2022). Increase of depression among children and adolescents after the onset of the COVID-19 pandemic in Europe: A systematic review and meta-analysis. *Child and Adolescent Psychiatry and Mental Health*, *16*(1). https://doi.org/10.1186/s13034-022-00546-y

Madigan, S., Racine, N., Vaillancourt, T., Korczak, D. J., Hewitt, J. M., Pador, P., Park, J. L., McArthur, B. A., Holy, C., & Neville, R. D. (2023). Changes in depression and anxiety among children and adolescents from before to during the COVID-19 pandemic. *JAMA Pediatrics*, *177*(6), 567. https://doi.org/10.1001/jamapediatrics.2023.0846

Martin, F., Sashidharan, S.P. (2023). The Mental Health of Adult Irregular Migrants to Europe: A Systematic Review. Journal of Immigrant and Minority Health, 25, 427–435. https://doi.org/10.1007/s10903-022-01379-9

Massazza, A., Eaton, J., Elshazly, M., Charlson, F., & Augustinavicius, J. (2022). Opportunities for the Use of Brief Scalable Psychological Interventions to Support Mental Health and Wellbeing in the Context of the Climate Crisis. Intervention, 20(1), 128-135. https://doi.org/10.4103/intv.intv_30_21

Massazza, A., Kienzler, H., Al-Mitwalli, S., Tamimi, N., & Giacaman, R. (2023). The association between uncertainty and mental health: a scoping review of the quantitative literature. Journal of Mental Health (Abingdon, England), 32(2), 480–491. https://doi.org/10.1080/09638237.2021.2022620

Meza, J. I., Zullo, L., Vargas, S. M., Ougrin, D., & Asarnow, J. R. (2023). Practitioner review: Common elements in treatments for youth suicide attempts and self-harm – a practitioner review based on review of treatment elements associated with intervention benefits. *Journal of Child Psychology and Psychiatry*. https://doi.org/10.1111/jcpp.13780

Mezzina, R., Gopikumar, V., Jenkins, J., Saraceno, B., & Sashidharan, S. P. (2022). Social Vulnerability and Mental Health Inequalities in the "Syndemic": Call for Action. Frontiers in Psychiatry, 13, 894370. https://doi.org/10.3389/fpsyt.2022.894370

Moen, P. (2022). The uneven stress of social change: Disruptions, disparities, and mental health. Society and Mental Health. https://doi.org/10.1177/21568693221100171

Montoro-Ramírez, E. M., Parra-Anguita, L., Álvarez-Nieto, C., Parra, G., & López-Medina, I. (2022). Effects of climate change in the elderly's health: a scoping review protocol. BMJ Open, 12(4), e058063. https://doi.org/10.1136/bmjopen-2021-058063

Naslund, J. A., Bondre, A., Torous, J., & Aschbrenner, K. A. (2020). Social Media and Mental Health: Benefits, Risks, and Opportunities for Research and Practice. Journal of Technology in Behavioral Science, 5(3), 245–257. https://doi.org/10.1007/s41347-020-00134-x

Newnham, E. A., Mergelsberg, E. L. P., Chen, Y., Kim, Y., Gibbs, L., Dzidic, P. L., Ishida DaSilva, M., Chan, E. Y. Y., Shimomura, K., Narita, Z., Huang, Z., & Leaning, J. (2022). Long term mental health trajectories after disasters and pandemics: A multilingual systematic review of prevalence, risk and protective factors. *Clinical Psychology Review*, *97*, 102203. https://doi.org/10.1016/j.cpr.2022.102203

Papola, D., Purgato, M., Gastaldon, C., Bovo, C., van Ommeren, M., Barbui, C., & Tol, W. A. (2020). Psychological and social interventions for the prevention of mental disorders in people living in low- and middle-income countries affected by humanitarian crises. The Cochrane Database of Systematic Reviews, 9(9), CD012417. https://doi.org/10.1002/14651858.CD012417.pub2

Peters, M. D., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. International Journal of Evidence-Based Healthcare, 13(3), 141–146. https://doi.org/10.1097/XEB.0000000000000050

Pruchno, R., Wilson-Genderson, M., Allison, H., & Cartwrigh, A. (2021). Trajectories of Depressive Symptoms Experienced by Older People: Effects of Time, Hurricane Sandy, and the Great Recession. The Journals of Gerontology, 76, 974–85.

Ratheesh, A., & Alvarez-Jimenez, M. (2022). The future of digital mental health in the post-pandemic world: Evidence-based, blended, responsive and implementable. The Australian and New Zealand Journal of Psychiatry, 56(2), 107–109. https://doi.org/10.1177/00048674211070984

Red Cross EU Office (2023, March 24) No health without mental health: the EU's long-awaited comprehensive approach to mental health. Retrieved from: https://redcross.eu/latest-

news/no-health-without-mental-health-the-eu-s-long-awaited-comprehensive-approach-to-mental-health

Rigutto, C., Sapara, A. O., & Agyapong, V. I. (2021). Anxiety, depression and posttraumatic stress disorder after terrorist attacks: A general review of the literature. *Behavioral Sciences*, *11*(10), 140. https://doi.org/10.3390/bs11100140

Royal College of Psychiatrists (2021) Our planet's climate and ecological emergency: a position statement. Retrieved from: https://www.rcpsych.ac.uk/improving-care/working-sustainably/college-position

Santomauro, D.F., Mantilla Herrera, A.M., Shadid, J. et al. (2021). Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. The Lancet, 398, 1700–1712. https://doi.org/10.1016/S0140-6736(21)02143-7

Satinsky E, Fuhr DC, Woodward A, Sondorp E, Robert B. (2019) Mental health care utilisation and access among refugees and asylum seekers in Europe: a systematic review. Health Policy. 123:851–63.

Soltan, F., Cristofalo, D., Marshall, D., Purgato, M., Taddese, H., Vanderbloemen, L., Barbui, C., & Uphoff, E. (2022). Community-based interventions for improving mental health in refugee children and adolescents in high-income countries. The Cochrane Database of Systematic Reviews, 5(5), CD013657. https://doi.org/10.1002/14651858.CD013657.pub2

Tai A. K. (2022). The mental health needs of displaced people exposed to armed conflict. The Lancet. Public health, 7(5), e398–e399. https://doi.org/10.1016/S2468-2667(22)00088-3

Tricco, C.A., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, K., Levac, D., Moher, D., Peters, M. D. J., et al. (2018). PRISMA extension for scoping reviews (PRISMA ScR): Checklist and Explanation. Annals of Internal Medicine, 169 (7), 467-473. https://doi.org/10.7326/M18-0850.

Trujillo, S., Giraldo, L.S., López, J.D. et al. (2021). Mental health outcomes in communities exposed to Armed Conflict Experiences. BMC Psychol, 9, 127. https://doi.org/10.1186/s40359-021-00626-2

Uphoff, E., Robertson, L., Cabieses, B., Villalón, F. J., Purgato, M., Churchill, R., & Barbui, C. (2020). An overview of systematic reviews on mental health promotion, prevention, and treatment of common mental disorders for refugees, asylum seekers, and internally displaced persons. The Cochrane Database of Systematic Reviews, 9(9), CD013458. https://doi.org/10.1002/14651858.CD013458.pub2

van Agteren, J., Iasiello, M., Lo, L., Bartholomaeus, J., Kopsaftis, Z., Carey, M., & Kyrios, M. (2021). A systematic review and meta-analysis of psychological interventions to improve mental wellbeing. Nature human behaviour, 5(5), 631–652. https://doi.org/10.1038/s41562-021-01093-w

Walinski, A., Sander, J., Gerlinger, G., Clemens, V., Meyer-Lindenberg, A., & Heinz, A. (2023). The effects of climate change on Mental Health. *Deutsches Ärzteblatt International*. https://doi.org/10.3238/arztebl.m2022.0403

Walsh, E. H., McMahon, J., & Herring, M. P. (2022). Research review: The effect of school-based suicide prevention on suicidal ideation and suicide attempts and the role of intervention and contextual factors among adolescents: A meta-analysis and meta-regression. *Journal of Child Psychology and Psychiatry*, *63*(8), 836–845. https://doi.org/10.1111/jcpp.13598

Westberg, K. H., Nyholm, M., Nygren, J. M., & Svedberg, P. (2022). Mental Health Problems among Young People-A Scoping Review of Help-Seeking. International Journal of Environmental Research and Public Health, 19(3), 1430. https://doi.org/10.3390/ijerph19031430

Yamada, Y., Ćepulić, D. B., Coll-Martín, T., Debove, S., Gautreau, G., Han, H., Rasmussen, J., Tran, T. P., Travaglino, G. A., COVIDiSTRESS Global Survey Consortium, & Lieberoth, A. (2021). COVIDiSTRESS Global Survey dataset on psychological and behavioural consequences of the COVID-19 outbreak. Scientific Data, 8(1), 3. https://doi.org/10.1038/s41597-020-00784-9

Zhou, X., Edirippulige, S., Bai, X., & Bambling, M. (2021). Are online mental health interventions for youth effective? A systematic review. Journal of Telemedicine and Telecare, 27(10), 638–666. https://doi.org/10.1177/1357633X211047285

7. Appendix B – Narrative Summary and Outcome Measures

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

Table 3. Narrative summary of the effectiveness of the interventions as reported in the reviews included in SR2.

First author and year	Outcomes of interest	Follow-up points	Clinical effectiveness	Cost-effectiveness /value for money
Ang 2022	Resilience, anxiety, stress, depression	Post, 6m	Digital interventions for resilience training improved resilience, anxiety, and depressive symptoms but not stress in adults. Internet delivery with a flexible schedule was more effective than face-to-face delivery. Evidence quality was low or very low.	Not reported
Anna-Kaisa 2022	Anxiety	Post, 6m, 2yrs	Mostly small or modest effects in favour of preventative interventions for anxiety in children compared to usual care or no intervention.	Universal school-based prevention was not cost-effective vs. usual teaching. Selective parent training and indicative child- and parent focused CBT prevention likely cost-effective vs. usual care or no intervention.
Bahji 2021	Self-harm, suicide, depression	Post, 12m	All therapies - dialectical behaviour, eclectic, family-based, mentalisation-based - were associated with reductions in self-harm and suicidal ideation in children compared to usual care. Usual care achieved reductions in self-harm and suicidal ideation in children because it usually involved some supportive, non-directive therapy. Family-based therapy associated with short-term reductions in depressive symptoms in children – but no other therapies achieved the same. Wating list control groups experienced worsening conditions, with increases in self-harm, depression and suicidal ideation compared with participants receiving usual care.	Not reported
Belski 2022	Depression, anxiety	Post, 13 & 26wks	Music therapy can improve depressive symptoms at short- and intermediate-term for children. Some evidence that music therapy can be effective in improving anxiety short-term for children.	Not reported
Bonardi 2022	Depression, anxiety	Post, 6wks	Self-guided, internet-based CBT, lay-delivered telephone intervention, and peer-moderated education and support intervention reduced worry, anxiety and depression in the context of covid-19 pandemic. No trials in children or adolescents were identified.	Not reported

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Health and Digital Executive Agency (HADEA). Neither the European Union nor the granting authority can be held responsible for them.

First author and year	Outcomes of interest	Follow-up points	Clinical effectiveness	Cost-effectiveness /value for money
Boydstun 2021	Trauma, depression, anxiety, stress, self-efficacy and coping as indices of resilience.	Post	VR as a tool for disaster-related training in non-clinical populations can increase self-efficacy. For children it reduced anxiety and panic associated with terrorism and earthquakes. For adults, it reduced stress and depression associated with traumatic events. VR can be delivered via immersive headsets or online non-immersive simulation. Some studies were small and uncontrolled.	Not reported
Breslin 2023	Emotional difficulties, conduct problems, hyperactivity, peer problems, wellbeing, self-perception	Post	A physical activity initiative called 'The Daily Mile: had no effects on wellbeing outcomes. improved self-perception mainly for those with low self-perception at baseline. reduced total emotional difficulties, hyperactivity and peer problems (in a single-group pre-post pilot study).	Additional costs were associated with intervention vs usual care due to extra staff needed
Buttazzoni 2021	Anxiety, depression	Post, 2 & 4 weeks	Smartphone-based interventions can reduce symptoms of anxiety and depression in young people.	Not reported
deOliveira 2023	Anxiety, depression	6, 8, 10, 12, 16, 36, 48 & 52wks	Online and telephone-delivered psychological interventions are largely effective in reducing anxiety and depression in older adults.	Not reported
Dewa 2021	Anxiety, depression, wellbeing	Not reported	Strong evidence that good quality social connection in digital interventions can help improve depression outcomes for young people. Weaker evidence that good quality social connection can improve anxiety and well-being. Limited evidence of gaming as means to improving outcomes through quality social connection. Worse depression and anxiety outcomes in negative interactions = poor quality social connection through social networking sites.	Not reported
Diaz-Garcia 2021	Resilience, hardiness, quality of life or well-being	Post, 3,6 & 12m	Overall effect of online resilience training on direct and proximal resilience measures was not significant.	Not reported
Dippel 2022	Depression	Post, 1, 3, 4, 6, 9, 12, 18 & 24m	Family involvement in psychological interventions for children and young people delivered in person, one-to-one or in groups, has a small but significant effect on reducing depressive symptoms against active control conditions without family-involvement.	Not reported
Domhardt 2021	Depression, anxiety, risky drinking behaviour, insomnia,	Not reported	Emotional and affective mediators – i.e. emotional self-perception, fear, hopelessness, thought-related distress – are strong predictors of change	Not reported

First author and year	Outcomes of interest	Follow-up points	Clinical effectiveness	Cost-effectiveness /value for money
	academic general worries, eating-related worries, hostility, stress.		with digital interventions for young people with risk factors or existing problems. Parenting behaviour mediators – i.e. appropriate education, skills in setting clear boundaries, severity and inconsistent education, change in parenting behaviour – are not predictors of change with digital interventions for young people with risk factors or existing problems.	
Fulambarkar 2023	Anxiety, depression, stress	Not reported	The overall effect of mindfulness-based interventions for adolescents on stress, depression and anxiety was small and only when compared to non-active controls (e.g. waiting list). The separate effect of mindfulness-based interventions for stress was moderate against non-active controls, but for depression or anxiety was non-significant. Mindfulness-based interventions for adolescents have no effect on stress, depression or anxiety when compared to active controls (e.g. relaxation, class on substance abuse).	Not reported
Gaynor 2023	Suicide attempts, self-harm, suicidal ideation.	Post, 8, 10, 12, 22 24wks, 2, 3, 6, 12 & 18m	No significant differences between specific types of psychotherapy (e.g. dialectical behaviour therapy, youth support therapy, family therapy) and usual care, (e.g. non-directive support, review, monitoring) on self-harm and suicidal behaviour. Small effect on suicidal ideation overall - no effect on suicidal ideation in clinical settings. Large effect of specific interventions in schools and ER when usual care may be passive (e.g. doing nothing). Usual care across all settings had an effect over time for two reasons: i) TAU was often of a high standard with a range of active psychiatric, psychological and social components (ii) the natural recovery rate associated with suicidal behaviour is very high.	Not reported
Hale 2021	Quality of Life, self-esteem, psychological well-being, psychological ill-being (e.g. stress depression)	Post, 3, 6 & 12m	Physical activities such as yoga, high intensity interval training, Taekwondo, physical education – often combined with nutrition advice – can improve psychological wellbeing and quality of life compared to no intervention or a sedentary intervention. There was no effect of physical activities on anxiety or depression measures compared to no intervention or sedentary interventions.	Not reported
Meza 2023	Suicide, self-harm	Not specified	Common elements of suicide and self-harm prevention interventions for young people that characterise interventions supported by evidence for efficacy:	Not reported

First author and year	Outcomes of interest	Follow-up points	Clinical effectiveness	Cost-effectiveness /value for money
			therapy and skills training (e.g. emotion regulation skills) to both young people and their parents relationship-building and therapeutic alliance individualised case conceptualization and tailoring lethal means restriction self-harm monitoring and safety planning.	
Walsh 2022	Suicidal ideation, suicide attempts	Post, 3, 4, 6, 12, 17, 18, 20m	School-based preventative interventions can reduce adolescent suicidal ideation and suicide attempts compared to no intervention. The school-based preventative interventions are broad and include universal, selective, and indicated intervetnions, as well as interventions based on social and emotional learning, depression prevention, health promotion, and health and physical education curriculum. Number needed to treat: implement intervention is 1-2 classrooms to reduce the incidence of suicide attempts and suicidal ideation in one adolescent. Interventions are more effective in preventing suicide attempts if they have a duration of ≤1 week, involve multiple stakeholders and have a 12-month follow-up.	Not reported

Post: at the end of the intervention; m=months; wks=weeks; yrs=years

Table 4 Outcome measures included (and reported) in the reviews of SR2

	First author and year	Anxiety or stress measures	Depression or mood measures	Well-being or resilience measures	Self-harm or suicide measures
1.	Ang 2022	PSS, DAS, HADS, GAD-7, STAI, TPSS, SAS	DASS, PHQ-9, CES-D, BDI-II, PHQ-4, SDS, HADS, CDI	CD-RISC, D-RS, BRS, RS, RRC-ARM, RYDM, ROCO	N/A
2.	Anna-Kaisa 2022	ADIS	N/A	N/A	N/A
3.	Bahji 2021	N/A	Depression severity (*various outcome measures in the primary studies but not reported in the review*)	n/a	Self-harm frequency (*participants with more than 1 episodes of self-harm, including suicide attempts and non-suicidal self-injury*); suicidal ideation (*various outcome measures in the primary studies but not reported in the review*)
4.	Belski 2022	N/A	CES-DC, CDI	N/A	N/A
5.	Bonardi 2022	GAD-7, DASS	DASS	N/A	
6.	Boydstun 2021	Peer distress scale	BDI	CGAS	N/A
7.	Breslin, 2023	SDQ	SDQ	SPPC	N/A
8.	Buttazzoni, 2021	DASS, APSQ, STAI, GAD-7, RCADS	DASS, BDI, PHQ-A, CES-D, CDRS, RCADS, MFQ	N/A	N/A
9.	de Oliveira, 2023	HAM-A, GAS	BDI, CES-D, HAM-D, GDS PHQ-9	N/A	N/A
10.	Dewa, 2021	BPRS, CDRS, HADS, DASS, RC-MAS	BPRS, MADRS, CES-D, PHQ-9, HADS, CES-D, DASS, CDI	SWEMWBS, PSSS, SWLS	N/A
11.	Diaz-Garcia, 2021	N/A	N/A	CD-RISC, CSS, RS	N/A

First author and year	Anxiety or stress measures	Depression or mood measures	Well-being or resilience measures	Self-harm or suicide measures
12. Dippel 2022	N/A	K-SADS/K-SADS-ED/K-SADS-PL, F-SADS, BDI/BDI-II, CES-D, DEP13, HAM-D, CDI, F-SADS, CDRS-R, ChIPS/P-ChIPS, SCID-I/P, PHQ-9, MFQ, DISC-IV, GRID-HAMD	N/A	N/A
13. Domhardt 2021	CGAS, PSWQ, SPAI-C/P, ADIS-C/P	DASS, CDI, CES-D, BDI-II, DDS	DNRF, DDQ-M/DDQ, F-Q, BAC, RAPI, BYAACQ, TLFB	N/A
14. Fulambarkar 2023	CAMM, SCS-SF, SOC, STAI, SMFQ, PSS, YSR, ERQ-CA, EAC, AFQY8, CRSQ, DASS-21, EDE-Q, WEMWBS, DERS, RRS, BRIEFSR, AOSPAN, SCARED, SCL-90R, COPE, CDI-S, SCL-90-R, MASC, PANAS, DES, STAXI-2, CRSQ, CSE, CPSS	CAMM, SCS-SF, SOC, STAI, SMFQ, PSS, YSR, ERQ-CA, EAC, AFQY8, CRSQ, DASS-21, EDE-Q, WEMWBS, DERS, RRS, BRIEFSR, AOSPAN, SCARED, SCL-90R, COPE, CDI-S, SCL-90-R, MASC, PANAS, DES, STAXI-2, CRSQ, CSE, CPSS	N/A	N/A
15. Gaynor 2023	N/A	N/A	N/A	NIMH DISC IV, C-SSRS, BSSI, SASII, SIQ-JR, SSI, C-SSRS, KSADS, SIQ, SITBI, DSHIS, LPC, RTSHI, BSS, ISO-30
16. Hale 2021	HADS, SDQ	HADS, BRUMS, K-POMS-B, BDI, SDQ	WHOQOL-BREF-26, PedsQL, KIDSCREEN-27, SF-12v2, KINDL-R, TSCS, PSDQ, PSPP, RSE, SPPC, SPPA, BRUMS, SEIS, CERQ, FS, SEARS-SF,	N/A

	First author and year	Anxiety or stress measures	Depression or mood measures	Well-being or resilience measures	Self-harm or suicide measures
				PANAS, CDRS, K-POMS-B, K10, CDSR-R, QIDS, SPAS	
17.	Meza 2023	N/A	N/A	N/A	CAFAS
18.	Walsh 2022	N/A	N/A	N/A	YRBS, Paykel Hierarchical Suicidal Ladder

APSQ: Anxiety and Preoccupation about Sleep Scale BDI-II: Beck's Depression Index II; BRS: Brief Resilience Scale; CD-RISC: Connor-Davidson Resilience Scale; CDI: Children's Depression Inventory; CES: Current Experience Scale; CES-D: Centre for Epidemiological Studies – Depression; CGAS;Children's Global Assessment of Functioning; D-RS: Dutch-Resilience Scale; DASS: Depression, Anxiety, Stress Scale; GAD: General Anxiety Disorder Scale; GAS: Geriatric Anxiety Scale; GDS: Geriatric Depression Scale; HADS-A: Hospital Anxiety and Depression Scale-Anxiety Subscale; LAD: Learning and Attentional Disabilities; MADRS: Montgomery–Åsberg Depression Rating Scale; MFQ: Mood Feelings Questionnaire; N/A: Not Applicable; PAJ: Positive Affect Journaling; PCQ: Patient Care Questionnaire; PSS: Perceived Stress Scale; PSSS: Perceived Social Support Scale; RCADS: Revised Child Anxiety and Depression Scale; RC-MAS: Revised Children's Manifest Anxiety Scale; ROCO: Resilience and Optimism during COVID-19; RS: Resilience Scale; RYDM: Resilience Youth Development Module; SAS: Self-rating Anxiety Scale; SCARED: Screen for Child Anxiety Related Emotional Disorders; SDS: Self-rating Depression Scale; SDQ: Strength and difficulties questionnaire; SMART-3RP: Stress Management and Resiliency Training-Relaxation Response Resilience Programme; SPPC: Self Perception Profile for children; STAI: State-Trait Anxiety Inventory; SWEMWBS: Short Warwick–Edinburgh Mental Well-being Scale; SWLS:Satisfaction With Life Scale; TPSS: The Parental Stress Scale; YRBS: Youth Risk Behavior Survey

Table 5 Interventions and comparators

First author & year	Types of interventions	Comparators (number of studies)	Digital	In-person	Details of interventions
Ang 2022	Cognitive behaviour therapy (CBT), counselling, psychoeducation, stress management, mindfulness	Usual Care (3) Active control (1) Waitlist control (5)	20	13	Digital training: audio disc (4.5%), Internet (54.5%), mobile/tablet application (31.2%) or a combination of Internet and mobile applications (9.1%). Frequency of the training: 1 every day – 1 every 2 weeks Duration: 10 min - 100 min. T Number of sessions: 1 - 84 Length of intervention: 7 - 168 days. Support: a service provider (18.2%), self-help (59.1%), combination of provider and self-help (22.7%).
Anna-Kaisa 2022	Universal school-based CBT (1), selective parent training (1), two indicated CBT (1).	Usual teaching (1) No intervention (2)	-	6	The universal CBT-based preventive intervention (FRIENDS) aimed to develop skills to counter the cognitive, emotional and behavioural aspects of anxiety. From the 14 school-led interventions, five were led by class teachers, four by PSHE (personal, social and health education) coordinators, three by learning support assistants and two by head teachers. Two external health facilitators assisted them in delivering the intervention. Health-led FRIENDS was delivered by two health facilitators. The facilitators were either school nurses or psychology assistants, external to the school, with the class teacher providing support.
Bahji 2021	Cognitive behaviour therapy (CBT), Behavioural activation	Usual care (13), Enhanced usual care (3)	3	16	Brief interventions: Brief motivational interviewing sessions, hospital admission tokens, brief app-based interventions, youth-nominated support teams. Parent modality: emotion regulation training.
Belski 2022	Musical therapy (7)	Usual care (2)	-	2	Music therapy components: there must be an element of music interaction between a music therapist and the patient/participant. 3 The practices of music therapy can be categorized as: (a) active, which involves the creation of music; (b) receptive, which involves listening to music; and (c) active and receptive, a combination of both techniques.
Bonardi 2022	Cognitive behaviour therapy (CBT), Mindfulness, Coping strategies, Positive psychology	Waitlist (1), No-intervention (1), cognitive training (1)	1	2	Internet/self-administered (3); (N=1): 3 weeks of self-directed, established online cognitive behavioural intervention for worry-related problems plus additional modules adapted specifically for dysfunctional COVID-19 worry. (N=1): Daily app-based 15-min mindfulness sessions for 2 weeks using publicly available app including mind training (e.g., attention, memory) sessions for 2 weeks using publicly available app. (N=1): 5 online 20-min expressive writing sessions over 2 weeks (3 days between sessions), during which participants were instructed to write anything that came to mind regarding COVID-19.

First author & year	Types of interventions	Comparators (number of studies)	Digital	In-person	Details of interventions
Boydstun 2021	Simulated disaster VR simulation for vulnerability to threat, emotional engagement with the simulation, reduction of panic and fear	Non-interactive simulation (1), No VR (1), VR without panic control treatment (1), VR with photo-realistic faces of peers (1)	21	4	Virtual Reality: -an emotion-eliciting intervention for both clinical and nontreatment-seeking community samples. -a tool for disaster-related psychological resilience training, psychological first aid, or counseling.
Breslin 2023	Physical activity during school time. 15-minute run, walk or cycle of approximately one mile	no control (4) care as usual (9)	-	26	1. The studies were based off of the Daily Mile initiative the core principles of which were: - 15 mins/approx 1 mile of walking running or wheeling -all weather - no change of clothes - teacher decided when it took place - 3x times per week. - inclusive for every child 2. Not all studies followed these core methods of delivery - 2 studies reported 20 mins of activity - 3 studies had daily participation - 4 studies excluded children with intellectual and physical disabilities from analysis
Buttazzoni 2021	Cognitive behaviour therapy (CBT), Psychoeducation, relaxation, Positive psychology, emotional self-awareness therapy, attention bias modification, social interaction	Active control (5), No comparator (5) Treatment as usual (1)	26	-	Majority of the studies used a form of mobile app that included gamified symptoms tracking, educational, task completion and relaxation
deOliveira 2023	Cognitive behaviour therapy (CBT), Behavioural activation, Problem Solving Therapy, interpersonal psychotherapy	Non telemedicine intervention (19), Active control (14), Waitlist (4), Usual care (9)	31	6	Telephone or online consultations with mental health professionals.
Dewa 2021	Cognitive behaviour therapy (CBT), digital social networking, gaming	No comparator-uncontrolled (37), RCT (5) –passive control	42		Digital mental health–related intervention types included: mental health social networking tools, smartphone apps, self-help cognitive behavioral therapy, telepsychiatry, one-to-one peer mentor support, video gaming, avatars, and internet use for mental health support. Nonspecific informal digital interventions included general social networking and social media (eg, Facebook, Twitter, Tumblr, Snapchat, and Reddit) and general internet use and web browsing.

First author & year	Types of interventions	Comparators (number of studies)	Digital	In-person	Details of interventions
					Intervention duration was reported in 48% (20/42) of the studies and ranged from 8 weeks to 1 year
Diaz-Garcia 2021	Emotion regulation, Impulse control, Optimism, Causal analysis, Empathy, Self-efficacy, Reaching out Cognitive behavioral skills, Relaxation, Emotional centering, mindfulness, Instructional modules, informational briefs, video interviews, self-tests, and practice exercises, problem-solving, attention & cognitive training, emotional resilience, stress management,	waitlist (3), Placebo/passive control (3), Active control (4) treatment as usual (1)	11		Internet-based program (video, slides, Virtual Partners, graphical feedback, emails and a conference call); Web-based program (Interactive exercises, graphs, a printable workbook and fillable copies of exercises); online (via webinar, the Internet or cell phone; Audio exercises, pre-programmed e-mail coaching and feedback specific, and text messaging system); Visual search attention training, Dot-probe attention training, Text-based scenario training, Picture- word imagery training; Self-guided, online (interactive didactic video presentations, video feedback, stress briefing, feelings, thoughts and action activities, homework Intervention durations varied from 2 to 12 weeks
Dippel 2022	Cognitive behaviour therapy (CBT), Psychoeducation, Problem Solving Therapy, Adolescent Coping with Depression Course (CWD-A), "Stress Busters", Positive Thoughts and Action (PTA), Systemic-Behaviour-Family-Therapy (SBFT), Attachment-Based Family Therapy, Family-Based Interpersonal Psychotherapy (FB-IPT), Family focused Treatment for Childhood Depression (FFT-CD), Parent-Child Interaction Therapy Emotional Development (PCIT-ED)	Wait list (5), Treatment as usual (8) Active control (9)		19	50% and 25% of the conducted sessions took place together with caregivers or the families Most of the studies implemented sessions with the children/adolescents, and meet afterwards or separately with either the caregivers or family. A total of eight studies incorporated, when indicated, the entire family (caregiver, patients, and siblings) in family sessions The general proportion of caregiver/family involvement was the highest in eight studies; however, no individual session was extended to children/adolescents or caregiver Seven studies that explicitly integrated the caregivers in all sessions, but no siblings or other family members The studies that conducted individual therapy with the children/adolescents did not have an overall proportion of caregiver integration above 50% Intervention duration varied from 5 to 48 weeks
Domhardt 2021	Cognitive behaviour therapy (CBT), relaxation strategies, such as progressive muscle relaxation and autogenic training and elements of social learning theory, Systemic family therapy, problem solving and communication training, cognitive restructuring, and alternative family roles	none (1), waiting list (4), face2face (3), control group (1), mixed (1), health promotion (5), digital (10)	25		Most interventions took place without parental involvement and were directed at the youth themselves (20/25, 80%). In 20% (5/25) of the studies, interventions for children as well as interventions for both children and adolescents and for adolescents only were evaluated with the involvement of parents (including intervention components for parents or parent training All interventions were internet-based Intervention duration varied from 1 to 60 weeks

First author & year	Types of interventions	Comparators (number of studies)	Digital	In-person	Details of interventions
Fulambarkar 2023	Learn to BREATHE (L2B), Dot Be, MBSR, MBCT	Active control (4), non-active control (4), mixed (1)		9	All interventions were administered in school settings. Half of the non-active control groups were regular curriculum or a waitlist control. The active control groups were varied, including hatha yoga, relaxation program, health curriculum, and substance abuse prevention. The majority of studies reported the use of a manualized procedure, either Learning to BREATHE (L2B) or Dot Be The other studies also reported using manualized procedures based on MBSR or MBCT Intervention duration varied from 4 to 11 weeks
Gaynor 2023	Cognitive behaviour therapy (CBT), Problem Solving Therapy, IPT-A-IN (Program of Intensive Interpersonal Psychotherapy), Dialectical Behaviour Therapy for Adolescents, mentalization-based treatment for adolescents, Youth-Nominated Support Team—Version 1, Group Therapy for Repeated Deliberate Self-Harm in Adolescents, Home-Based Family Intervention, Attachment-Based Family Therapy), Emergency Department (ED) intervention using FISP (Family Intervention for Suicide Prevention), The Program of Intensive Interpersonal Psychotherapy for depressed adolescents with suicidal risk, Suicidal Teens Accessing Treatment After an ED Visit, using Motivational Interviewing	Control group (17) Care as usual (16)		17	7/17 studies included structured telephone calls as a measure of motivation or support 13 studies have delivery mode to Individual, parent/family, two studies individual, 1 study group, and 1 study individual and group
Hale 2021	Running, Aerobic, STAR programme, Yoga, PYD programme, Heath promotion PE, Water/Land-based exercise, NMP programme, CrossFit, EIP programme, NEAT	No control (5), physical exercise as usual (14), sedentary activities (4), wait list (3)	-	28	Interventions were mainly delivered in schools either in replacement of regular physical exercise (15) as an additional sessions (1) or as a before or after-school programme (3), in the community (6) and in clinics (3).

First author & year	Types of interventions	Comparators (number of studies)	Digital	In-person	Details of interventions
	girls, PALs, ATLAS programme, Taekwondo, Exercise Intervention Programme (EIP), HIIT				Interventions often delivered more than type of activity. Frequently used activities included cardiovascular/aerobic (21), yoga (12) and resistance training (10) A large proportion were multicomponent (19) with most interventions including education sessions focused on health (e.g. portion control) or behavioural skills (e.g. goal setting, team behaviour, one study included additional components focused on journaling and storytelling. A small number (5) addressed psychological topics including self-esteem, body image or stress. No identified multicomponent interventions addressed mental health literacy (e.g. developing understanding of mental health, reducing stigma and help-seeking). Key messages advocated by additional components were reinforced using workshops, information booklets, parental letters and mobile applications/websites.
Meza 2023	Cognitive behaviour therapy (CBT), Counselling, Psychoeducation, Mindfulness, SAFETY, Diaectical Behavior Therapy, MBT-A, Multisystemic Therapy (MST), ASAP & BRITE app, YST-I / YST-II, Developmental group psychotherapy, SHIFT	Care as usual (14), Individual & Group (1), Supportive (2), Group & Care as usual (1), Psychiatric inpatients (1)		18	Eight different format elements that were present across the intervention manuals reviewed. Across the 18 intervention manuals, the most common format element was the inclusion of at least one family session (present in 94% of interventions), followed by parent/caregiver sessions (present in 89% of interventions), and individual youth therapy sessions (present in 83% of interventions). 91% of the 'Supported Trials' included both individual therapy with the youth and family treatment (defined as therapy sessions that included the youth and at least one parent/caregiver), only 71% of 'Unsupported Trials' included these elements. Second, 24/7 phone coaching to provide emergency support was included in 36% of supported intervention trials and none of the unsupported interventions The most common element across 18 trials was psychoeducation (present in 94% of trials), followed by eliciting and addressing patient concerns (present in 83% of interventions), homework assignments (present in 78% of interventions), flexible manual delivery (present in 78% of interventions), self-harm monitoring (present in 72% of interventions), relationship building/alliance with therapist (present in 72% of interventions), individualized case formulation (present in 61% of interventions), and commitment to safety (present in 61% of interventions). Ten content elements were identified in the 18 coded trials. Distress tolerance/emotion regulation skills emerged as the most common content element (present in 89% of all interventions), followed by social/interpersonal skills (present in 83% of interventions), safety planning (present in 83% of interventions), problem-solving skills (present in 83% of interventions), communication skills (present in 78% of interventions), cognitive restructuring skills (present in 78% of interventions), behavioral skills (present in 72% of interventions), means safety/ lethal means counseling (LMC, present in 61% of interventions), mindfulness (present in 56% of interventions), and impulse control skills (present in 50% of interventions).

First author & year	Types of interventions	Comparators (number of studies)	Digital	In-person	Details of interventions
Walsh 2022	Universal (11/22 trials, including Headstrong, SPARX-R, Strengthening Evidence base on school-based interventions for promoting adolescent health [SEHER], and Youth Aware of Mental Health [YAM]), (b) selective (3/22 trials, including Profscreen), (c) selective/indicated (4/22 trials, including Question, Persuade and Refer [QPR], Op Volle Kracht [OVK], and OVK/SPARX), and (d) universal/selective (4/22 trials including Signs of Suicide [SOS] and Sources of Strength).	Passive Control (2), waiting list (7), Active control (4)		12	SPARX-R=gamified, CBT-based. LifeSTYLE=No mental health content (Both 5-7 wks) Teacher supervised intervention, Indicated OVK & SPARX: depression prevention & CBT-based programmes. Psychologist supervised OVK (8 wks) SPARX: home based game. School psychologists & counsellors & health teachers delivered SOS (2 days). SOS. School counselling & social work staff presented the programme (2 days). Counsellor (SM)/teacher (TSM) delivered multicomponent universal health and school climate promotion intervention (SEHER). AEP (all arms) (104 wks). A teacher-delivered curriculum-based suicide prevention intervention (1.5 hrs) focusing on support, stress, peers & community resources. YAM: Workshops targeting risk & protective factors. delivered by instructors. QPR: Gatekeeper training of teachers & school personnel. Profscreen: Screening & referral by health professionals (all 4 wks). Peer leaders lead prevention messaging & encouraged youth to seek trusted adults (4 mnts).