Investigating ACT-based Active Intervention Elements in Smartphone-based Mental Health Applications to Reduce Anxiety Symptoms: A Meta-Analysis

Rosalia Mardjo (s2783525)

Department of Psychology, University of Twente

202200087 – MSc Thesis Positive Clinical Psychology and Technology

First Supervisor: Dr. Jannis Kraiss

Second Supervisor: Felix Fiß

June 30, 2025

Abstract

Background: Anxiety disorders are one of the most prevalent mental disorders, with limited access to treatment. Smartphone-based mental health applications could reduce the treatment gap, especially when based on evidence-based therapeutic frameworks such as Acceptance and Commitment Therapy (ACT). As more research is needed to determine which ACT-based active intervention elements contribute to anxiety symptom improvement, this study aimed to examine the association between the ACT-based active intervention elements cognitive defusion, values, acceptance, present-moment focus, and committed action and anxiety symptom improvement in smartphone-based mental health applications.

Method: This meta-analysis analysed RCT papers retrieved from PubMed, PsycINFO, and Web of Science that included a smartphone-based mental health application as the intervention, and a validated self-report instrument assessing anxiety, such as GAD-7. After systematic screening of papers, data extraction and contacting authors, univariable mixed-effect meta-regression models were conducted between each ACT-based active intervention element and anxiety outcomes. Sensitivity analyses were conducted to control for covariates time, age, gender, comorbidity, clinical level, adjunctivity, and guidance.

Results: 160 RCTs were included in the analysis (n = 35,504). The meta-analysis showed that the active intervention elements cognitive defusion (g = -0.22, p<.01), acceptance (g = -0.14, p<.05), and present-moment focus (g = -0.21, p<.001) were significantly associated with small reductions in anxiety symptoms, while values (g = -0.14, p>.05), and committed action (g = -0.14, p>.05) were not significantly related with improvements in anxiety. These effects were consistent after adjusting models for various covariates.

Conclusion: The results of this meta-analysis suggest that ACT-based active intervention elements targeting cognitive and emotional processes of anxiety, i.e. cognitive defusion, acceptance, present-moment focus, were the most effective in improving anxiety symptoms when delivered via smartphone-based mental health applications. In contrast, active intervention elements targeting anxiety-related behaviour, i.e. values and committed action, did not show significant effects on anxiety symptom improvement. These findings support the relevance of designing smartphone-based mental health applications that address cognitive and emotional mechanisms of anxiety.

Keywords: Anxiety symptoms, Acceptance and Commitment Therapy (ACT), smartphone-based mental health applications, active intervention elements, meta-analysis.

Introduction

Globally, one-eighth of the population suffers from mental disorders (WHO, 2022). One of the most prevalent disorders is anxiety disorder, accounting for 3895 per 100.000 individuals (Javai et al., 2023). Furthermore, subthreshold anxiety disorders are similarly prevalent, with a 12% lifetime prevalence for subthreshold generalised anxiety disorder (Haller et al., 2014). Although an anxiety response is a natural human threat response, this is considered to become problematic when this response is exaggerated or expressed without a threat being present, and when this becomes persistent (Kennerly et al., 2017). Physical consequences from anxiety could be heart palpitations, fatigue, excessive sweating, trouble concentrating, nausea, or derealisation (Kennerley et al., 2017; WHO, 2023). Anxiety also has negative societal consequences, such as increased work absence leading to negative economic consequences (Kasper, 2006). Moreover, merely 27.6% of people struggling with an anxiety disorder are being treated (WHO, 2023). Thus, the prevalence and consequences of anxiety symptoms combined with the limited accessibility of treatment stress the need for effective and easily accessible treatment.

Smartphone-based mental health applications offer a novel way to provide easily accessible mental health treatment, as 6.5 billion individuals worldwide possess a smartphone (Linardon et al., 2024). There are different types of applications designed to treat anxiety symptoms, which are based on several therapeutic frameworks, such as Cognitive Behavioural Therapy (CBT), Mindfulness, or Positive Psychology (Linardon et al., 2024). Moreover, various meta-analyses reviewing the effects of smartphone-based mental health applications conclude that they could effectively reduce anxiety symptoms (Firth et al., 2017a), and they could effectively be implemented as either a stand-alone treatment to self-manage anxiety, or as adjunctive treatment to usual mental health care (Lecomte et al., 2020). The meta-analysis by Linardon et al. (2019) examined the efficacy of smartphone-based mental health applications for mental health problems. They indicate that these applications were not significantly different in their effects compared to face-to-face psychological interventions, suggesting that smartphone-based mental health applications are easily accessible treatment options to tackle the limited access to anxiety symptom treatment.

As mentioned above, the content of smartphone-based mental health applications is grounded in specific therapeutic frameworks. The most implemented framework is CBT, which has the largest effect size in treating generalised anxiety with smartphone-based mental health

applications (Linardon et al., 2024). A third-wave CBT treatment framework, Acceptance and Commitment Therapy (ACT), is also implemented in several smartphone-based mental health applications to treat anxiety symptoms. While traditional CBT focuses on challenging unhelpful thoughts and behaviours, the goal of ACT is to foster psychological flexibility, which entails being fully conscious and welcoming about the present moment and adjusting or maintaining behaviours according to one's values, despite challenges one might experience (Harley, 2015). This paper included the following ACT elements: cognitive defusion, values, acceptance, present-moment focus, and committed action (Hayes et al., 2006; Kraiss, 2025). Their detailed descriptions are outlined in Table 1.

Table 1

Description of Active Intervention Elements based on ACT

Active Intervention Element	Element Description
Cognitive defusion	Learning to observe thoughts without attaching meaning or judgment to them.
Values	Identifying what matters to an individual and using those values as a guide for behaviour and decision-making.
Acceptance	Embracing uncomfortable emotions, thoughts, and sensations without attempting to avoid or suppress them.
Present-moment focus	Being present in the current moment, rather than getting caught up in past regrets or future worries.
Committed action	Fostering value-driven actions despite the presence of obstacles or discomfort.

Although the evidence base for ACT smartphone-based mental health applications is more limited compared to those based on traditional CBT, emerging evidence shows their significant efficacy in treating anxiety symptoms (Linardon et al., 2019). Initially, when comparing ACT with traditional CBT in a randomised controlled trial (RCT), improvement in anxiety symptoms was similar between both treatments (Arch et al., 2012). Additionally, smartphone-based mental health applications developed based on ACT showed promising results in increasing users' psychological flexibility and reducing anxiety-specific symptoms, such as PTSD symptoms (Lu et al., 2023; Zhao et al., 2023). Therefore, current evidence suggests that ACT is a promising therapeutic framework to include in smartphone-based mental health applications to treat anxiety symptoms.

The content of smartphone-based mental health applications consists of evidence-based psychological elements derived from therapeutic frameworks such as CBT or ACT to foster their users' mental health. In this thesis, these elements are defined as active intervention elements (Cohen et al., 2023). For instance, in the RCT by Zhao et al. (2023), the ACT smartphone-based mental health application was found to be more effective in anxiety symptom treatment compared to the mindfulness-based application and waitlist control. The ACT-based application included the active intervention elements cognitive defusion, values, acceptance, present-moment focus, and committed action (Hayes et al., 2006; Zhao et al., 2023). Therefore, identifying the active intervention elements embedded in smartphone-based mental health applications is essential for understanding which active intervention elements effectively treat anxiety symptoms.

Despite the recent systematic reviews that have investigated the overall effectiveness of smartphone-based mental health applications on anxiety symptom treatment, little research has been done on the association between specific active intervention elements and improvements in anxiety symptoms (Firth et al., 2017a; Linardon et al., 2024). For example, the recent meta-analysis by Linardon et al. (2024) assessed the overall effectiveness of CBT, mindfulness, and acceptance-based interventions, which limits the ability to draw fine-grained conclusions about the contributions of individual active intervention elements. This knowledge is important to determine, as in practice, many smartphone-based mental health applications consist of individual active intervention elements from several therapeutic frameworks. For instance, the application *Serene* included mindfulness techniques such as meditation and the traditional CBT active intervention element cognitive restructuring (Al-Refae et al., 2021), while *IntelliCare* included active intervention elements from both traditional CBT and Positive Psychology (Graham et al., 2020). These examples indicate that active intervention elements could occur individually rather than solely in combination with active intervention elements from their original therapeutic framework in smartphone-based mental health applications. Therefore, investigating the individual association between an active intervention element and anxiety symptoms would lead to more insights for researchers and application developers to design more effective smartphone-based mental health applications with an optimal combination of active intervention elements.

To understand how ACT-based active intervention elements relate to anxiety symptom treatment in smartphone-based mental health applications, as mentioned above, this thesis aimed to identify the individual associations between ACT-based active intervention elements

and anxiety symptoms in these applications. Accordingly, the research question of this meta-analysis was the following: What is the association between the ACT-based active intervention elements cognitive defusion, values, acceptance, present-moment focus, and committed action and improvements in anxiety symptoms in smartphone-based mental health applications?

Methods

This thesis was part of a larger systematic review project that focused on smartphone-based mental health applications for depression and anxiety, which was registered in PROSPERO on January 17th, 2025 (CRD42025630092). The research protocol of this project can be found on the OSF page (https://osf.io/vwgty). Furthermore, this research was prepared and conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (Page et al., 2021).

Search Strategy

The electronic databases PubMed, PsycINFO (EBSCO), and Web of Science were used to search for papers that met the inclusion criteria. Papers selected from PsycINFO and PubMed were ensured to be psychological or biomedical sciences papers, while using Web of Science ensured the inclusion of relevant papers from other disciplines as well. Moreover, five meta-analyses about smartphone-based mental health applications were cross-checked to retrieve additional eligible papers (Linardon et al., 2020; Linardon et al., 2024; Versluis et al., 2016; Firth et al., 2017a; Firth et al., 2017b). Grey literatures were not included in this systematic review.

The included search strings were based on the meta-analysis by Linardon et al. (2024), consisting of terms referring to smartphones and mobile technologies, study design (RCTs), and outcomes. The search strings were adjusted according to the format of each database, and the search was done in titles, abstracts, and keywords. If applicable, the search string was also complemented with MeSH terms in PubMed (Kraiss, 2025).

Eligibility Criteria

Studies were included in the systematic review project if they: 1) were an RCT; 2) included a smartphone-based mental health application as the intervention; and 3) included a validated self-report instrument assessing depression or anxiety, such as PHQ-9 for depression and GAD-7 for anxiety. Additionally, trials that conducted an information session, an intake meeting, or one session of psychoeducation were also included. If a study included a digital

intervention as an adjunctive treatment next to usual care, it was also included. Secondary analyses were included only if their findings included data relevant for the meta-analysis that were not reported in the primary RCT study. Studies were excluded if they: 1) were not specifically targeting mental health (e.g. diet, or weight loss); 2) included a text-message only intervention; 3) were not peer-reviewed (e.g. preprints, or white papers); 4) were qualitative or a review; and 5) were conference proceedings, abstracts, dissertations, or study protocols.

Study Selection

Psychology master's students have completed the screening of papers with the screening tool Covidence, to screen titles and abstracts, remove duplicates, review full-texts, and keep an overview of all decisions made during the screening process. Two screeners individually screened titles and abstracts after reaching a Cohen's kappa interrater reliability of 0.72 based on 750 records. Three other students reviewed the full-texts. To ensure consistent eligibility decision-making among all screeners, research supervisors reviewed and discussed discrepancies in the first 10% of full-texts to calibrate their screening decisions. Further uncertainties were discussed with the supervisors until decision-making related to screening reached consensus. Additionally, screeners of titles and abstracts were instructed to include the paper for full-text review in case of uncertainty. Subsequently, full-text reviewers were instructed to apply the eligibility criteria systematically as a standardised and hierarchical checklist, to exclude papers based on the same order of the eligibility criteria. The reviewers marked uncertain full-texts for further discussion and resolution with their supervisor.

Data Extraction

Data extraction was conducted by four psychology master's students. First, the students conducted a pilot data extraction with three papers, one individually and two collaboratively. Their supervisors also extracted the papers to address inconsistencies in data extraction. After reviewing all extraction sheets in a meeting, the research team established a consistent approach to data extraction. The four students proceeded with data extraction individually and asked for the supervisor's feedback if necessary. They used a data extraction template in Microsoft Excel to extract comparable data from each paper (Kraiss, 2025). Extractors continuously received feedback from their supervisors on uncertainties during data extraction.

The extracted data items were divided into study, sample, and intervention characteristics, followed by the active intervention elements. Study characteristics included the study design, such as population description, primary outcome of the trial, and the validated

depression or anxiety measures (Kraiss, 2025). Sample characteristics included mean age and percentage of female participants, number of participants in the trial per arm (intervention and control arms), the dropout rate, and the mean and standard deviation scores for each outcome measure at baseline and follow-up assessments. Lastly, intervention characteristics entailed the type of intervention and control groups, the length of interventions, and specific features of the interventions, such as personalisation, or gamification, and integration of other technologies such as a wearable (Kraiss, 2025).

Element Coding

Next to extracting data from papers, the extractors also sent a survey via Qualtrics to the corresponding authors, for them to indicate the presence of specific active intervention elements in their intervention or control group (see Appendix B). This approach was necessary, as the research team anticipated that many authors would not specify the active intervention elements in their paper, and requesting data directly from the authors in a structured manner ensured a systematic and consistent data collection. If other data were missing in the paper and its supplementary material, such as the mean and/or standard deviation of an outcome measure, this was also requested in the e-mail. However, some authors did not reply or comply with the email request. This resulted in an additional step of another student from the research team reviewing the papers to extract the active intervention elements manually if their descriptions were clearly mentioned in the papers. If neither via e-mail nor manual extraction provided any results, the active intervention elements were coded as "Not available."

The active intervention elements included in the survey were chosen based on validated treatment frameworks, trial protocols and reviews. The systematic review project that this thesis is part of included active intervention elements from several psychological frameworks, such as CBT, Mindfulness and Positive Psychology (Kraiss, 2025). Relevant for this thesis were the active intervention elements of ACT, namely cognitive defusion, values, acceptance, present-moment focus, and committed action (See Table 1).

Outcomes

The outcomes of the larger systematic review project were depression and anxiety, which were obtained through validated self-report instruments, such as Patient Health Questionnaire (PHQ-9) for depression and Generalised Anxiety Disorder Questionnaire (GAD-7) for anxiety. In this thesis, only the extracted outcome measures of anxiety were included.

Additionally, data on the outcomes were extracted from the papers at all follow-up assessments, even if they were not reported as the primary outcome in the study.

Statistical Analysis

All extracted data in separate extraction sheets and results from the survey were merged into one dataset. For the statistical analysis in this thesis, only data from papers were analysed that included anxiety as an outcome. Standardised mean differences were obtained by calculating the difference between baseline and follow-up mean scores, divided by the standard deviation at pre-test. This calculation was done for each outcome, timepoint, group, and trial, which resulted in time-varying within-group effect sizes that are nested within groups and trials. The standard error of the standardised mean differences was adjusted with an assumed pre-post correlation of $r = 0.5$. Additionally, the effect sizes were first calculated as Cohen's d and thereafter corrected to Hedge's g to reduce small sample bias (Harrer et al., 2021a; Lakens, 2013).

Subsequently, univariable mixed-effect meta-regression models were conducted using the metafor package in R, version 4.5.0, to investigate the association between active intervention elements of ACT and anxiety outcomes (The R Foundation, 2024; Viechtbauer, 2010). The models accounted for both fixed and random effects. Random effects were specified to account for variability in timepoints within groups, and in groups within trials (Harrer et al., 2021b). In each model, the active intervention elements functioned as the independent variables, while the self-reported anxiety outcome was the dependent variable. The active intervention elements were coded as "1" if present in the intervention or as "0" if absent. Separate univariable models were run for each active intervention element.

Lastly, sensitivity analyses were conducted to control for the following variables by adding them as covariates in the mixed-effect meta-regression models: time in weeks, age in years, gender in percentage of female participants, comorbidity, adjunctivity and guidance as dichotomous variables (0 = absent, 1 = present), and clinical level as a categorical variable with three categories (0 = non-clinical, 1 = sub-clinical, 2 = clinical). These analyses were necessary, as within-group effect sizes would be more highly at risk for confounding effects due to the non-reliance on randomised group effects (Harrer et al., 2021b). Three models were run for each active intervention element. The first model included only the active intervention element. The second model included time as a covariate, while in the third model, the variables age, gender, comorbidity, clinical level, adjunctivity, and guidance were added as covariates next to

time. Time was included as a separate covariate in the second model to control for the natural improvement of anxiety symptoms when receiving an intervention (Cuijpers et al., 2017). This would make observed associations between the active intervention element and anxiety symptoms more likely due to the active intervention element itself and not due to the passage of time.

Results

Study Selection

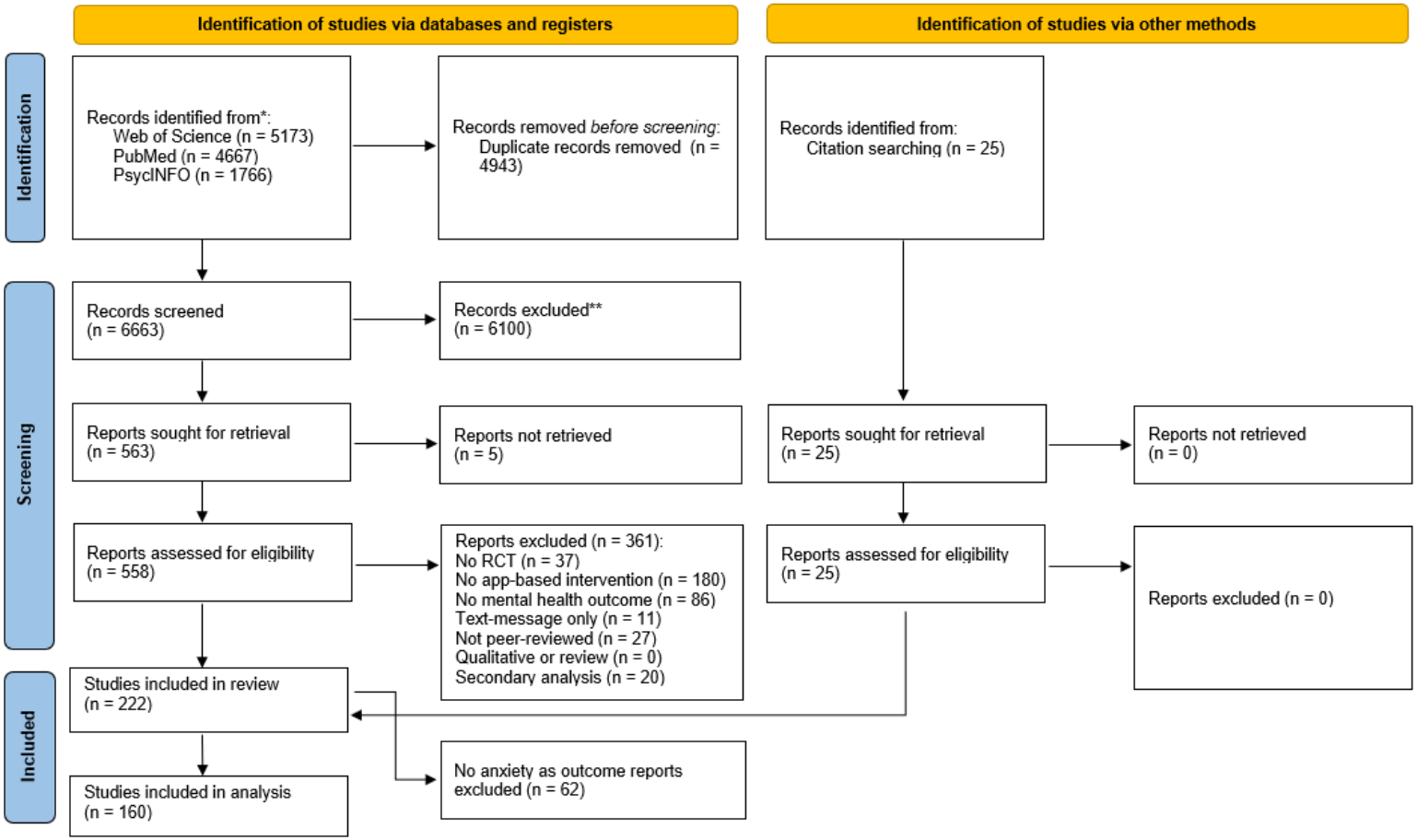
A total of 11,606 papers were identified in the three electronic database searches. After removing duplicates (n = 4,943), title-abstract screening (n = 6,663) and full-text screening (n = 563), 558 papers were assessed based on the eligibility criteria, out of which 197 papers were included in the review. Additionally, through citation searching, 25 papers were included, which resulted in a total of 222 papers being included in the data extraction process (See Figure 1). Specifically for this thesis, as it included only anxiety as an outcome measure and not all papers included anxiety, 160 papers were included in the analysis, with 160 intervention and 159 control groups, and 621 timepoints. Further characteristics of all studies are outlined in Appendix C.

Study Characteristics

The included studies in the analysis were conducted between 2011 and 2024 and were from 28 different countries. The majority of papers were published in the United States (n = 52), followed by China (n = 15), and Australia (n = 14). The most frequent study design was an RCT (n = 135), 19 of them were a delayed waitlist RCT, 4 a cluster RCT, and two a crossover RCT. The anxiety outcome was mostly measured by GAD-7 (n = 62), followed by DASS-A (n = 22), and HADS-A (n = 21). The mean length of follow-up in these studies was 8.52 weeks (SD= 8.20).

Figure 1

Flow Chart Systematic Review



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.
Source: Page MJ, et al. BMJ 2021;372: n71. doi: 10.1136/bmj. n71.

Population Characteristics

The population of the included studies in the analyses consisted of 35,504 participants, with 18,344 in the intervention group and 17,160 in the control group. Participants' mean age was 33.12 years at pre-test (*SD* = 11.64), and 74.0% of them were female. The majority of the participants consisted of non-clinical individuals (43.5%), hence not having an anxiety disorder diagnosis (clinical) nor having elevated anxiety symptoms (sub-clinical). The remaining participants consisted of sub-clinical (39.8%), and clinical (16.8%) individuals. Moreover, participants mostly did not have a comorbid mental disorder (93.1%), and the average drop-out rate was 23.0%.

Intervention and Element Characteristics

The response rate to the survey about the active intervention elements, which was sent to the corresponding authors, was 45%. The most frequent intervention types were CBT (*n* = 48), followed by Multidisciplinary (*n* = 42), which relates to interventions based on several therapeutic frameworks, and Mindfulness (*n* = 41). Merely six ACT-based smartphone-based mental health applications were present in the study. Additionally, the majority of anxiety-focused interventions were not given as adjunctive treatment (91.6%), most of them did not include guidance from a healthcare professional (78.8%), and the average duration of these interventions was 3.91 weeks (*SD* = 3.67). In Table 3, it is visible how frequently the ACT-based active intervention elements were present in studies and groups. The elements present-moment focus and acceptance were the most frequently present.

Table 3

Active Intervention Elements Frequency Distribution

Active Intervention Element	Number of Studies (%)	Number of Groups (%)
Cognitive defusion	25 (15.6)	27 (8.5)
Values	19 (11.9)	22 (6.9)
Acceptance	43 (26.9)	48 (15.0)
Present-moment focus	79 (49.4)	92 (28.8)
Committed action	6 (3.8)	7 (2.2)

Lastly, based on Pearson correlation analysis (Harrer et al., 2021a), all five active intervention elements showed positive significant correlations (See Table 4). The strongest

correlation was observed between acceptance and present-moment focus (r = 0.64, p <.001), while the weakest correlation was between present-moment focus and committed action (r = 0.26, p <.001).

Table 4

Correlation Matrix Active Intervention Elements (Pearson Correlation)

Active Intervention Element	*M*	*SD*	1	2	3	4	5
1. Cognitive defusion	0.08	0.27	–				
2. Values	0.07	0.25	0.61***	–			
3. Acceptance	0.15	0.36	0.49***	0.53***	–		
4. Present-moment focus	0.27	0.44	0.41***	0.44***	0.64***	–	
5. Committed action	0.02	0.15	0.55***	0.54***	0.35***	0.26***	–

Note. ***p< .001

Results of Syntheses

Table 5 shows the results of the univariable mixed-effect meta-regression models, investigating the association between all five ACT-based active intervention elements and anxiety symptoms. The analyses were conducted in three models: unadjusted (Model 1), adjusted for time as a covariate (Model 2), and adjusted for the covariates age, gender, comorbidity, clinical level, adjunctivity, guidance, and time (Model 3). In the unadjusted model, cognitive defusion (g = -0.22, p<.01), acceptance (g = -0.14, p<.05), and present-moment focus (g = -0.21, p<.001) had a small significant negative association with anxiety symptoms, while values (g = -0.14, p>.05), and committed action (g = -0.14, p>.05), had a non-significant small negative association. These associations did not substantially differ in strength or direction when adjusting Models 2 and 3 for the covariates (See Table 5).

Table 5

Results of Univariable Mixed-Effect Models

Active Intervention Element	Studies (*n*)	Groups (*n*)	Timepoints (*n*)	Hedges' g (*SE*)	95% CI
Cognitive defusion					
Model 1	138	304	621	-0.22 (0.08) **	[-0.37, -0.06]
Model 2	138	304	621	-0.21 (0.08) **	[-0.36, -0.05]
Model 3	128	282	582	-0.18 (0.07) *	[-0.33, -0.04]
Values					
Model 1	138	304	621	-0.14 (0.10)	[-0.33,0.05]
Model 2	138	304	621	-0.12 (0.09)	[-0.30,0.07]
Model 3	128	282	582	-0.14 (0.09)	[-0.32,0.03]
Acceptance					
Model 1	138	304	621	-0.14 (0.06) *	[-0.25, -0.03]
Model 2	138	304	621	-0.14 (0.06) *	[-0.25, -0.03]
Model 3	128	282	582	-0.13 (0.05) *	[-0.23, -0.02]
Present-moment focus					
Model 1	138	303	620	-0.21 (0.05) ***	[-0.30, -0.13]
Model 2	138	303	620	-0.21 (0.05) ***	[-0.30, -0.12]
Model 3	128	282	582	-0.21 (0.05) ***	[-0.29, -0.12]
Committed action					
Model 1	138	304	621	-0.14 (0.16)	[-0.46,0.19]
Model 2	138	304	621	-0.13 (0.16)	[-0.44,0.19]
Model 3	128	282	582	-0.08 (0.15)	[-0.37,0.22]

Note. *$p<.05$, **$p<.01$, ***$p<.001$. Model 1 is the unadjusted model, Model 2 includes only time as a covariate, and Model 3 includes age, gender, comorbidity, clinical level, adjunctivity, and guidance next to time as covariates.

Discussion

Interpretation and Review of Results

This meta-analysis investigated the association of five ACT-based active intervention elements with anxiety symptom improvement in smartphone-based mental health applications. Based on 160 studies and 35,504 participants, the results indicated that cognitive defusion, acceptance, and present-moment focus have a small, significant effect on anxiety symptom improvement, while values and committed action showed a non-significant, small effect. These results were also consistent when adjusting for various covariates.

The finding that cognitive defusion, acceptance and present-moment focus had significant effects on anxiety symptoms could be clarified by the theoretical perspective of ACT. To treat anxiety symptoms and achieve behavioural adaptation, ACT primarily targets reducing cognitive fusion and experiential avoidance by developing cognitive defusion, acceptance, and mindfulness (present-moment focus) strategies. These developments target individual's cognitions and emotions, while elements such as values and committed action focus more on the behavioural domain of ACT, encouraging value-based actions (Arch & Graske, 2008; Hayes, 2016). This prior emphasis on cognitive defusion, acceptance, and present-moment focus aligns with anxiety symptom treatment, as the nature of anxiety is rooted in negative thinking patterns and heightened emotional responses (Kennerly et al., 2017). Therefore, these findings suggest the importance of ACT-based active intervention elements that address internal experiences in anxiety symptom treatment, which is consistent with the cognitive and emotional nature of anxiety (Twohig & Levin, 2017).

Building on these explanations, it is possible that implementing cognitive and emotional active intervention elements cognitive defusion, acceptance, and present-moment focus, serves as a prerequisite to effectively engage in value-based action, hence to implement the behavioural active intervention elements values and committed actions. This would further highlight the significance of these cognitive and emotional active intervention elements in treating anxiety symptoms, aligning with the results of the current meta-analysis. Therefore, to encourage a more user-centred design based on these findings, it could be most effective to first include cognitive and emotional ACT active intervention elements, followed by the behavioural elements such as values and committed action in designing smartphone-based mental health applications for anxiety symptoms (Mohr et al., 2017).

Although limited research is available to compare the current findings, in the RCT conducted by Lu et al. (2023), they conclude that anxiety symptoms could be improved by enhancing the ACT-elements cognitive defusion and values, and the overarching element psychological flexibility. Additionally, cognitive defusion and values functioned as mediators for treating anxiety symptoms in their study (Lu et al., 2023). On the one hand, these findings align with the significance of cognitive defusion in treating anxiety symptoms in the present study. On the other hand, it contradicts the insignificant effect of values on anxiety symptoms in the current study. A possible explanation is that value-based exercises were delivered in a guided way in the intervention of Lu et al. (2023), while the interventions included in the present meta-analysis were mostly unguided (78.8%). This guided delivery might have contributed to

the active intervention element values having a larger effect on anxiety symptom treatment than in other studies. Nevertheless, it is crucial to highlight that the findings of the present meta-analysis were based on a large number of studies, resulting in more robust evidence for its current findings.

Additionally, although the current study's findings indicate the importance of cognitive defusion, acceptance, and present-moment focus, it is crucial to acknowledge that they were primarily included in interventions based on frameworks that overlap with the concept of ACT, namely traditional CBT and Mindfulness. Since ACT is considered a third-wave CBT, and the ACT element present-moment focus is closely similar to Mindfulness principles (Hayes et al., 2006; Twohig & Levin, 2017), including ACT-based active intervention elements in traditional CBT- or Mindfulness-based interventions might make it challenging to establish whether the observed effects on anxiety symptoms are specifically related to ACT-based active intervention elements. To discover the specific effects of ACT-based active intervention elements, future research could investigate whether these elements function as mediators for anxiety symptom treatment. Mediation analyses would help establish whether improvements in anxiety symptoms are caused by changes in the ACT-based active intervention elements, which would provide stronger evidence for their effectiveness and inform their application in the design of smartphone-based mental health applications (Macri & Rogge, 2024).

Furthermore, the fact that all included ACT-based active intervention elements had similar small effects on anxiety symptom improvement could be partly explained by their significant moderate intercorrelations (see Table 4). These intercorrelations indicate the moderate co-occurrence of these elements in smartphone-based mental health applications. Consequently, the univariable mixed-effect models conducted in this meta-analysis may not have assessed the individual effects of the active intervention elements on anxiety symptoms, but possibly their collective effect. This suggests the measurement of an underlying latent factor of ACT, possibly psychological flexibility (Hayes et al., 2006; Kashdan & Rottenberg, 2010). This possibility reflects the interrelated structure of ACT's core elements, which was further outlined in the meta-analysis by Macri and Rogge (2024). Their findings suggest that the interrelated ACT-elements function as mediators for anxiety treatment, further confirming the collective mechanism of ACT-elements. However, as the intercorrelations were merely moderate, it would indicate that these elements did not always co-occur, highlighting the need for further research on the individual contribution of the ACT-based active intervention elements on anxiety symptom improvement.

To disentangle the individual effects of these ACT-based active intervention elements on anxiety symptoms, future research could examine these with micro-randomised trials that include ecological momentary assessments (Pham et al., 2016; Smith & Juarascio, 2019; Thomas et al., 2023). This method would help in determining the real-time effects of specific active intervention elements on anxiety symptoms. For instance, the ACT-specific modules in the smartphone-based mental health application of Lu et al. (2023) could be tested separately, resulting in more precise data on how and in what context the ACT-based active intervention elements contribute to anxiety symptom improvement. Ultimately, insights from micro-randomised trials would support the development of personalised and context-specific smartphone-based mental health applications.

Strengths and Limitations

One of the strengths of this study is the systematic data extraction process, which consisted of contacting authors and receiving the information about active intervention elements and possible missing data from them. This increased the accuracy and completeness of the data used in the meta-analysis, as oftentimes the active intervention elements are not described in great detail in the studies (De Bruin et al., 2020). Moreover, to the researcher's knowledge, this study was the first meta-analysis that investigated the association of smartphone-based mental health applications at the level of active intervention elements, providing new insights into the specific associations of ACT-based active intervention elements to treat anxiety symptoms within smartphone-based mental health applications.

Despite the abovementioned strengths of this study, the limitations should also be considered. First, a common assumption of pre-post correlation $r = 0.50$ was made when calculating standardised mean differences. On the one hand, this assumption was supported by literature, but on the other hand, it could also result in estimation bias in the analysed models (Hamman et al., 2018). Second, the probability of having publication bias should also be considered, as unpublished studies with non-significant results would be underrepresented in the databases from which the articles were retrieved, possibly resulting in an overestimation of effect sizes (Walker et al., 2008). Third, because the response rate of corresponding authors was merely 45%, a member of the research team extracted active intervention elements manually from the rest of the papers. This might have increased the subjectivity in extracting the active intervention elements and possibly underrepresented them, particularly because most papers did not include clear descriptions of active intervention elements.

Implications and Conclusion

This meta-analysis ensured a more thorough understanding of how individual ACT-based active intervention elements cognitive defusion, values, acceptance, present-moment focus, and committed actions are associated with anxiety symptoms in smartphone-based mental health applications. The findings revealed that cognitive defusion, acceptance, and present-moment focus had a small but significant effect on anxiety symptom improvement, while values and committed action did not show significant effects. These findings set the first steps in underlining the relevance of ACT-based active intervention elements that target cognitive and emotional experiences related to anxiety symptoms in the design of smartphone-based mental health applications, aligning with the cognitive and affective nature of anxiety. Proceeding research on digital interventions at the level of active intervention elements could further enable the development of more effective smartphone-based mental health applications by identifying and incorporating active intervention elements that target the needs of its users. Eventually, the availability of effective smartphone-based mental health applications would increase access to mental health care for individuals experiencing anxiety symptoms and potentially reduce the overall prevalence of anxiety.

References

Arch, J. J., & Craske, M. G. (2008). Acceptance and commitment therapy and cognitive behavioral therapy for anxiety disorders: Different treatments, similar mechanisms? *Clinical Psychology Science and Practice*, *15*(4), 263–279. https://doi.org/10.1111/j.1468-2850.2008.00137.x

Arch, J. J., Eifert, G. H., Davies, C., Vilardaga, J. C. P., Rose, R. D., & Craske, M. G. (2012). Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of Consulting and Clinical Psychology*, *80*(5), 750–765. https://doi.org/10.1037/a0028310

Al-Refae, M., Al-Refae, A., Munroe, M., Sardella, N. A., & Ferrari, M. (2021). A Self-Compassion and Mindfulness-Based Cognitive Mobile Intervention (SERENE) for depression, anxiety, and stress: promoting adaptive emotional regulation and wisdom. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.648087

Cohen, Z. D., Barnes-Horowitz, N. M., Forbes, C. N., & Craske, M. G. (2023). Measuring the active elements of cognitive-behavioral therapies. *Behaviour Research and Therapy*, *167*, 104364. https://doi.org/10.1016/j.brat.2023.104364

Cuijpers, P., & Kleiboer, A. M. (2017). 40 Self-directed approaches to the treatment of depression. In D. J. Stein, D. J. Kupfer, & A. F. Schatzberg (Eds.), *The Oxford Handbook of Mood Disorders* (pp. 469–484). Oxford University Press.

Cuijpers, P., Weitz, E., Cristea, I. A., & Twisk, J. (2017). Pre-post effect sizes should be avoided in meta-analyses. *Epidemiology and Psychiatric Sciences*, *26*(4), 364–368. https://doi.org/10.1017/s2045796016000809

De Bruin, M., Black, N., Javornik, N., Viechtbauer, W., Eisma, M. C., Hartman-Boyce, J., Williams, A. J., West, R., Michie, S., & Johnston, M. (2020). Underreporting of the active content of behavioural interventions: a systematic review and meta-analysis of randomised trials of smoking cessation interventions. *Health Psychology Review*, *15*(2), 195–213. https://doi.org/10.1080/17437199.2019.1709098

Firth, J., Torous, J., Nicholas, J., Carney, R., Rosenbaum, S., & Sarris, J. (2017a). Can smartphone mental health interventions reduce symptoms of anxiety? A meta-analysis ofrandomized controlled trials. *Journal of Affective Disorders*, *218*, 15–22. https://doi.org/10.1016/j.jad.2017.04.046

Firth, J., Torous, J., Nicholas, J., Carney, R., Pratap, A., Rosenbaum, S., & Sarris, J. (2017b). The efficacy of smartphone-based mental health interventions for depressive symptoms: A meta-analysis of randomized controlled trials. *World Psychiatry, 16*(3), 287–298. https://doi.org/10.1002/wps.20472

Graham, A. K., Greene, C. J., Kwasny, M. J., Kaiser, S. M., Lieponis, P., Powell, T., & Mohr, D. C. (2020). Coached mobile app platform for the treatment of depression and anxiety among primary care patients. *JAMA Psychiatry*, *77*(9), 906. https://doi.org/10.1001/jamapsychiatry.2020.1011

Haller, H., Cramer, H., Lauche, R., Gass, F., & Dobos, G. J. (2014). The prevalence and burden of subthreshold generalized anxiety disorder: a systematic review. *BMC Psychiatry*,*14*(1). https://doi.org/10.1186/1471-244x-14-128

Hamman, E. A., Pappalardo, P., Bence, J. R., Peacor, S. D., & Osenberg, C. W. (2018). Bias in meta-analyses using Hedges' d. *Ecosphere, 9*(9). https://doi.org/10.1002/ecs2.2419

Harley, J. (2015). Bridging the Gap between Cognitive Therapy and Acceptance and Commitment Therapy (ACT). *Procedia - Social and Behavioral Sciences*, *193*, 131–140. https://doi.org/10.1016/j.sbspro.2015.03.252

Harrer, M., Cuijpers, P., Furukawa, T. A., & Ebert, D. D. (2021-a). *Chapter 3 Effect Sizes | Doing Meta-Analysis in R*. https://bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/effects.html#cors

Harrer, M., Cuijpers, P., Furukawa, T. A., & Ebert, D. D. (2021-b). *Chapter 8 Meta-Regression | Doing Meta-Analysis in R*. https://bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/metareg.html

Hayes S. C. (2016). Acceptance and Commitment Therapy, Relational Frame Theory, and the Third Wave of Behavioral and Cognitive Therapies - Republished Article. *Behavior therapy*, *47*(6), 869–885. https://doi.org/10.1016/j.beth.2016.11.006

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour research and therapy*,*44*(1), 1-25.

Ivanova, E., Lindner, P., Ly, K. H., Dahlin, M., Vernmark, K., Andersson, G., & Carlbring, P. (2016). Guided and unguided Acceptance and Commitment Therapy for social anxiety disorder and/or panic disorder provided via the Internet and a smartphone application: A randomized controlled trial. *Journal of Anxiety Disorders*, *44*, 27–35. https://doi.org/10.1016/j.janxdis.2016.09.012

Kasper, S. (2006). Anxiety disorders: under-diagnosed and insufficiently treated. *International Journal of Psychiatry in Clinical Practice*, *10*(sup1), 3–9. https://doi.org/10.1080/13651500600552297

Kennerley, H., Kirk, J., & Westbrook, D. (2017). *An introduction to cognitive behaviour Therapy: Skills and Applications*. SAGE Publications Limited.

Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review*, *30*(7), 865–878. https://doi.org/10.1016/j.cpr.2010.03.001

Kraiss, J. (2025, February 5). Identifying effective cognitive behavioral therapy elements in app-based mental health interventions for anxiety and depression: A systematic review and meta-regression analysis of randomized controlled trials. Retrieved from https://www.osf.io/wc59a

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, *4*. https://doi.org/10.3389/fpsyg.2013.00863

Lecomte, T., Potvin, S., Corbière, M., Guay, S., Samson, C., Cloutier, B., Francoeur, A., Pennou, A., & Khazaal, Y. (2020). Mobile apps for Mental health Issues: Meta-Review of Meta-Analyses. *JMIR Mhealth and Uhealth*, *8*(5), e17458. https://doi.org/10.2196/17458

Linardon, J. (2020). Can acceptance, mindfulness, and self-compassion be learned by smartphone apps? A systematic and meta-analytic review of randomized controlled trials. *Behavior Therapy, 51*(4), 646–658. https://doi.org/10.1016/j.beth.2019.10.002

Linardon, J., Cuijpers, P., Carlbring, P., Messer, M., & Fuller-Tyszkiewicz, M. (2019). The efficacy of app-supported smartphone interventions for mental health problems: a meta-analysis of randomized controlled trials. *World Psychiatry*, *18*(3), 325–336. https://doi.org/10.1002/wps.20673

Linardon, J., Torous, J., Firth, J., Cuijpers, P., Messer, M., & Fuller-Tyszkiewicz, M. (2024). Current evidence on the efficacy of mental health smartphone apps for symptoms of depression and anxiety. A meta-analysis of 176 randomized controlled trials. *World Psychiatry*, *23*(1), 139–149. https://doi.org/10.1002/wps.21183

Lu, Y., Li, Y., Huang, Y., Zhang, X., Wang, J., Wu, L., & Cao, F. (2023). Effects and Mechanisms of a Web- and Mobile-Based Acceptance and Commitment Therapy intervention for anxiety and depression symptoms in nurses: Fully decentralized randomized Controlled trial. *Journal of Medical Internet Research*, *25*, e51549. https://doi.org/10.2196/51549

Mohr, D. C., Weingardt, K. R., Reddy, M., & Schueller, S. M. (2017). Three Problems With Current Digital Mental Health Research and Three Things We Can Do About Them. *Psychiatric Services*, *68*(5), 427–429. https://doi.org/10.1176/appi.ps.201600541

Newman, M. G., Zainal, N. H., & Hoyer, J. (2020). Cognitive-behavioral therapy (CBT) for generalized anxiety disorder (GAD). In M. G. Newman & N. H. Zainal (Eds.), *Generalized Anxiety Disorder and Worrying: A Comprehensive Handbook for Clinicians and Researchers* (pp. 203–230). Wiley.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw,J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, n71. https://doi.org/10.1136/bmj.n71

Pham, Q., Wiljer, D., & Cafazzo, J. A. (2016). Beyond the randomized Controlled Trial: A review of alternatives in MHealth clinical trial methods. *JMIR Mhealth and Uhealth*, *4*(3), e107. https://doi.org/10.2196/mhealth.5720

Smith, K. E., & Juarascio, A. (2019). From Ecological Momentary Assessment (EMA) to Ecological Momentary Intervention (EMI): past and future directions for ambulatory assessment and interventions in eating disorders. *Current Psychiatry Reports*, *21*(7). https://doi.org/10.1007/s11920-019-1046-8

The R Foundation (2024). *The R Project for Statistical Computing (Version 4.5.0).* https://www.r-project.org/

Thomas, E. B. K., Gruichich, T. S., Maronge, J. M., Hoel, S., Victory, A., Stowe, Z. N., & Cochran, A. (2023). Mobile Acceptance and Commitment therapy with Distressed First-Generation College Students: microrandomized trial. *JMIR Mental Health*, *10*, e43065. https://doi.org/10.2196/43065

Twohig, M. P., & Levin, M. E. (2017). Acceptance and Commitment Therapy as a treatment for anxiety and depression. *Psychiatric Clinics of North America*, *40*(4), 751–770. https://doi.org/10.1016/j.psc.2017.08.009

Versluis, A., Verkuil, B., Spinhoven, P., van der Ploeg, M. M., & Brosschot, J. F. (2016). Changing mental health and positive psychological well-being using ecological momentary interventions: A systematic review and meta-analysis. *Journal of Medical Internet Research, 18*(6), e5642. https://doi.org/10.2196/jmir.5642

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*(3), 1–48. https://doi.org/10.18637/jss.v036.i03

Walker, E., Hernandez, A. V., & Kattan, M. W. (2008). Meta-analysis: Its strengths and limitations. *Cleveland Clinic Journal of Medicine*, *75*(6), 431–439. https://doi.org/10.3949/ccjm.75.6.431

World Health Organization: WHO. (2023, September 27). *Anxiety disorders*. https://www.who.int/news-room/fact-sheets/detail/anxiety-disorders

World Health Organization: WHO. (2022, June 8). *Mental disorders*. https://www.who.int/news-room/fact-sheets/detail/mental-disorders

Zhao, C., Zhao, Z., Levin, M. E., Lai, L., Shi, C., Hu, J., Chen, W., & Ren, Z. (2023). Efficacy and acceptability of mobile application-delivered acceptance and commitment therapy for posttraumatic stress disorder in China: A randomized controlled trial. *Behaviour Research and Therapy*, *171*, 104440. https://doi.org/10.1016/j.brat.2023.104440

Appendix A

AI-Statement

During the preparation of this work the author used ChatGPT in order to brainstorm, and receive feedback on the structure or formulation of the text. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

Appendix B
Survey Active Intervention Elements
Meta-analysis clinician questions V2

Information and Consent Dear researcher, thank you for taking the time to complete this survey. As part of a systematic review project, we are currently collecting information on intervention elements in mobile mental health interventions. In this survey, you will be asked about which intervention elements were used in each arm of your trial. This questionnaire will take you between 5 to 10 minutes to complete. We appreciate your effort and contribution. If you would like to take part in this survey, please indicate so via the button below. You can withdraw from this survey at any time. For further information, you can contact the researchers: Jannis Kraiss (j.t.kraiss@utwente.nl), Jorge Piano Simoes (j.pianosimoes@utwente.nl), and Felix Fiß (f.m.fis@utwente.nl)

Consent, please indicate whether you would like to participate in this survey.

- ○ Yes, I would like to participate. (1)
- ○ No, I do not want to participate. (2)

Skip To: End of Survey If Please indicate whether you would like to participate in this survey. = No, I do not want to participate.

What is your personal identifier code? You can find this information in the invitation email we sent to you.

_____

How many arms did your trial have? *Note*: The term "arm" refers to the number of groups or conditions in your trial. *Example*: A trial in which participants were randomized to receive either a mobile mental health CBT intervention or be placed on a waiting list has 2 arms.

- ○ 2 (1)
- ○ 3 (2)
- ○ 4 (3)
- ○ 5 (4)
- ○ 6 (5)

Could you please label the **first** arm of your study? This can be the specific name of the smartphone app evaluated in this trial or a general label (e.g., CBT, mindfulness, resilience app, waitlist control, TAU,). Please ensure that the label you provide clearly distinguishes this arm from other arms within the trial.

_____

Could you please label the **second** arm of your study? This can be the specific name of the smartphone app evaluated in this trial or a general label (e.g., CBT, mindfulness, resilience app, waitlist control, TAU,). Please ensure that the label you provide clearly distinguishes this arm from other arms within the trial.

_____

Could you please label the **third** arm of your study? This can be the specific name of the smartphone app evaluated in this trial or a general label (e.g., CBT, mindfulness, resilience app, waitlist control, TAU...). Please ensure that the label you provide clearly distinguishes this arm from other arms within the trial.

_____

Could you please label the **fourth** arm of your study? This can be the specific name of the smartphone app evaluated in this trial or a general label (e.g., CBT, mindfulness, resilience app, waitlist control, TAU,...). Please ensure that the label you provide clearly distinguishes this arm from other arms within the trial.

_____

Could you please label the **fifth** arm of your study? This can be the specific name of the smartphone app evaluated in this trial or a general label (e.g., CBT, mindfulness, resilience app, waitlist control, TAU,...). Please ensure that the label you provide clearly distinguishes this arm from other arms within the trial.

_____

Could you please label the **sixth** arm of your study? This can be the specific name of the smartphone app evaluated in this trial or a general label (e.g., CBT, mindfulness, resilience app, waitlist control, TAU,...). Please ensure that the label you provide clearly distinguishes this arm from other arms within the trial.

_____

Indicating intervention elements ***(The following questions were asked for each arm in the study).***

The following questions concern the arm "${arm1/ChoiceTextEntryValue}". Please indicate for each intervention element in the table whether it was included in the arm "${arm1/ChoiceTextEntryValue}" by selecting "yes". If the arm "${arm1/ChoiceTextEntryValue}" did not include any intervention elements because it was, for example, a waitlist condition, then you can leave the default response "no" for all elements and proceed.

	Yes	**No**
Functional analysis A technique in which antecedents (triggers, causes) and consequences of	○	○

behavior are examined to identify the factors that maintain a problematic behavior. (1)		
Exposure in vivo Confronting stimuli that are feared without showing avoidance behavior. (2)	○	○
Imagery-based exposure Repeatedly visualizing feared or distressing situations to reduce emotional reactivity and maladaptive avoidance behaviors. (3)	○	○
Interoceptive exposure Intentionally eliciting and confronting physical sensations associated with anxiety to decrease fear of those sensations. (4)	○	○
Desensitization A gradual process of exposing individuals to feared stimuli or situations, often combined with relaxation techniques. (5)	○	○
Problem solving A structured approach to defining a problem, finding potential solutions, evaluating options, and implementing the best solution. (6)	○	○
Goal-setting Defining specific, measurable, achievable, relevant, and time-bound (SMART) objectives to guide behavior and track progress. (7)	○	○
Self-monitoring Systematically recording and tracking one's behaviors, thoughts, or emotions, for example through daily diaries or mood charts. (8)	○	○

Journaling Writing down thoughts, emotions, and experiences to identify. May happen in a reflective or informal way. (34)	○	○
Cognitive restructuring Identifying and challenging irrational or maladaptive thoughts and replacing them with more constructive ones. (9)	○	○
Thought record A cognitive-behavioral tool that helps individuals identify, evaluate, and reframe negative or distorted thoughts. (10)	○	○
Self-reinforcement Rewarding oneself for achieving specific goals or exhibiting desired behaviors. (11)	○	○
Social skills Teaching and practicing strategies to improve interpersonal interactions, relationships, and communication. Assertiveness is a central part of this element. (12)	○	○
Activity scheduling Planning and scheduling activities that are likely to be enjoyable, meaningful or provide a sense of accomplishment. (13)	○	○
Behavior experiment Testing out new behaviors or challenging beliefs in real-world situations. (14)	○	○
Self-compassion Fostering self-kindness in the face of difficulties or personal shortcomings. (15)	○	○

Mental imagery Visualization techniques to create mental pictures of positive outcomes, desired behaviors, relaxing scenes, or safe spaces. (16)	○	○
Worry exposure A specific variant of imaginal exposure, in which cognitive avoidance is addressed by being imaginally exposed to the most feared outcome for a longer period. (17)	○	○
Relaxation A method to decrease physiological and psychological tension through techniques like deep breathing or progressive muscle relaxation. (18)	○	○
Behavioral activation Encouraging individuals to engage in meaningful and enjoyable activities. (19)	○	○
Psychoeducation The provision of information and resources to help individuals understand their mental health condition, its symptoms, and effective coping strategies. (20)	○	○
Graded tasks A strategy to break down complex or overwhelming goals into smaller, manageable steps. (21)	○	○
Stimulus control A behavioral intervention that strengthens associations between specific cues and desired behaviors while weakening associations with interfering behaviors or emotions. (22)	○	○
Externally-focused attention	○	○

Direct attention to external stimuli in an adaptive way, allowing individuals to effectively engage with their environment and manage anxiety. (23)		
Cognitive defusion Learning to observe thoughts without attaching meaning or judgment to them. (24)	○	○
Values Identifying what matters to an individual and using those values as a guide for behavior and decision-making. (25)	○	○
Acceptance Embracing uncomfortable emotions, thoughts, and sensations without attempting to avoid or suppress them. (26)	○	○
Present-moment focus Being present in the current moment, rather than getting caught up in past regrets or future worries. (27)	○	○
Committed action Fostering value-driven actions despite the presence of obstacles or discomfort. (28)	○	○
Mindfulness Paying non-judgmental attention to the present moment, observing thoughts, feelings, and bodily sensations with openness and acceptance. (29)	○	○
Gratitude Recognizing and appreciating the positive aspects of life. (30)	○	○
Savoring Fully enjoying and	○	○

prolonging positive experiences. (31)		
Optimism Fostering a positive and hopeful outlook towards life and the future. (32)	○	○
Personal strengths Identifying and using one's talents and abilities. (33)	○	○

You have reached the end of this questionnaire. Thank you for providing additional information about your trial! If you are interested in receiving the results of our review, feel free to send an email to: meta-analysis-mmh@utwente.nl.

Appendix C

Full Overview of Study Characteristics

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Abbasalizadeh (2024)	Iran	ICU nurses with at least 6 months experience working in an ICU	29.58 (4.68)	28.33	Resilience	Psychoeducation	General mental health	mHealth (30)	Control Group (30)	20	-	DASS-21
Abbott (2023)	United States	Adults with elevated anxiety symptoms	24 (9)	80.4	Headspace	Mindfulness	Anxiety and worry	Headspace (97)	Waitlist (66)	4, 8	-	BAI
Aboody (2020)	Israel	Female college students who speak Hebrew and have an active social media account	23.51 (1.45)	100	GGBI	CBT	General mental health	GGBI (48)	Waitlist (42)	2, 4	DASS-D	-
Abramovitch (2024)	United States	Undergraduate adult students at a large public university in the southeastern United States	18.78 (0.97)	85.70	GG-OCD app	CBT	Perfectionism	GG-OCD app (35)	Waitlist (35)	2, 4	DASS-D	DASS-A
Ahorsu (2020)	Iran	Individuals diagnosed with epilepsy and having moderate to severe insomnia	38.18	58.44	CBT-I APP	CBT	Insomnia	CBT-I APP (160)	Information resources (160)	4, 12, 24	HADS-D	HADS-A

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Akechi (2023)	United States	Breast cancer patients between 20-49 years	43.95 (4.53)	100.0	PST and BA app	CBT	Concern about recurrence disease	PST and BA app (223)	Usual care (224)	8, 24	HADS-D	HADS-A
Akin-Sari_a (2022)	Turkey	Adults with high COVID-19 distress	23.48 (7.8)	79.6	iApp	Cognitive training	COVID-19 distress	iApp (25)	dApp(22)	1.71, 3.43	PHQ9	-
Akin-Sari_b (2022)	Turkey	Adults (aged between 18 and 65) speaking Turkish as their first language with a subclinical level of OCD	25.27 (9.67)	67	iApp (immediate-app use)	Approach avoidance modification training	OCD	iApp (28)	Waitlist (27)	2, 3.5	DASS-D	DASS-A
Al-Refae (2021)	Canada	Residents of Canada aged 18 and above	25.24 (8.74)	79	Serene app	Multidisciplinary	General mental health	Serene app (127)	Waitlist (118)	4	DASS-D	DASS-A
Anastasiadou (2020)	Spain	Patients older than 12 years, diagnosed with an eating disorder	18.06 (6.04)	91.4	TCApp	CBT	General mental health	F2F therapy and TCApp (53)	F2F therapy (53)	12	BDI-2	STAI
Araya (2021)	United Kingdom/Peru	Adults from Brazil with clinically significant depressive symptoms who were being treated for hypertension and/or diabetes	56	86.5	Digital intervention (CONEMO)	Behavioral activation	Depression	Digital intervention (CONEMO) (440)	(Enhanced) usual care (440)	12, 24	PHQ9	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Araya (2021)	United Kingdom/Peru	Adults from Peru with clinically significant depressive symptoms who were being treated for hypertension and/or diabetes	59.7	81.5	Digital intervention (CONEMO)	Behavioral activation	Depression	Digital intervention (CONEMO) (217)	(Enhanced) usual care (215)	12, 24	PHQ9	-
Arean (2016)	United States	Adults with mild to moderate depression	33.9 (11.84)	79.9	Cognitive control app (Project: EVO)	Cognitive training	Depression	Cognitive control app (Project: EVO) (209)	Information resources (206)	4, 8, 12	PHQ9	GAD7
					Problem-solving therapy app (iPST)	Problem-solving therapy		Problem-solving therapy app (iPST) (211)				
Bakker (2018)	Australia	NR	34.20 (12.10)	80	MoodKit, MoodPrism, MoodMission	CBT	General mental health	MoodKit (56), MoodPrism (56), MoodMission (50)	Waitlist (64)	4	PHQ9	GAD7
Barroso (2020)	United States	Adults with H and chronic fatigue	51.2 (9.9)	63.3	CBSM	CBT	Fatigue	CBSM (15)	Placebo App (15)	5, 10, 22	BDI-2	STAI-S STAI-T
Bear (2022)	New Zealand	Mothers of children betweem 0-1 months	31.16 (4.83)	100.0	Smiling Mind	Mindfulness	Postnatal distress	Smiling Mind (49)	Placebo app (50)	8, 12	DASS-D	DASS-A
Bell (2023)	Australia	Young people (aged between 16 and 25) from the general population who were experiencin	20.60 (2.7)	62	Mello app	Multidisciplinary	General mental health	Mello app (29)	No intervention (26)	3, 6	PHQ8	GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		g clinical levels of depression and anxiety and elevated RNT levels										
Ben-Zeev (2018)	United States	Adults with schizophrenia, schizoaffective disorder, bipolar disorder or major depressive disorder	49 (9.95)	39	FOCUS	Multidisciplinary	General mental health	FOCUS (82)	Group treatment WRAP (81)	12, 24	BDI-2	-
Ben-Zeev (2021)	United States	Adults with bipolar disorder, MDD, schizophrenia or schizoaffective disorder	37.92 (11.61)	83.8	CORE App	Nonspecific	General mental health	CORE App (154)	Waitlist and delayed CORE App (161)	4, 8	BDI-2	GAD7
Bhayee (2016)	Canada	People with "healthy" levels of stress	32.65 (9.2)	46.2	N-tsMT	Mindfulness	General mental health	N-tsMT (20)	Math training (23)	6	BSI-D	BSI-A
Birney (2016)	United States	Working adults with mild-to-moderate depression	40.65 (11.39)	76.7	MoodHacker	Multidisciplinary	Depression	MoodHacker (150)	Bibliotherapy (150)	6, 10	PHQ9	-
Birrell (2023)	Australia	Year 9 students visiting Australian secondary schools	15.2 (0.4)	43.4	Mind your Mate Intervention	Nonspecific	General mental health	Mind your Mate Intervention (88)	Education program (78)	24, 48	PHQ9	GAD7
Boettcher (2018)	Sweden	Patients diagnosed with SAD	35.40 (12.25)	77.00	Challenger App	CBT Self-Help and Exposure	Social Anxiety	Bibliotherapy + Challenger App (70) and Bibilotherp	Waitlist (69)	3, 7, 10, 14, 16, 52	PHQ9	GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
								y + delayed App (70)				
Borjalilu (2019)	Iran	University students with elevated levels of stress	24.29 (3.21)	71.00	Aramgar	Minfulness	Stress	Aramgar (20); Face-to-face therapy + Aramgar (28)	Usual care (20)	6	DASS-D	DASS-A
Bostock (2016)	United Kingdom	Employees from a Fortune 500 company	33.6 (6.01)	33.30	Sleepio	CBT	Insomnia	Sleepio (135)	Waitlist (135)	8, 22	PHQ2	GAD2
Bostock (2019)	United Kingdom	Employees at two UK companies	35.50 (7.70)	60	Headspace	Mindfulness	General mental health	Headspace (128)	Waitlist (110)	8	HADS-D	HADS-A
Brouwer (2019)	The Netherlands	Adults with recurrent MDD	46.0 (10.8)	74.6	mCT	Cognitive training	Depression	mCT (132)	Usual care (132)	12, 96	HRSD-17	-
Bruehlman-Senecal(2020)	United States	Incoming first-year students (aged 18-25 years) at a large public university in the US not living with their parents	18.68 (0.35)	59.30	NodApp	Multidisciplinary	Loneliness	NodApp (100)	Waitlist (121)	4, 8	PHQ9	GAD7
Bruhns (2021)	Germany	Adult students at a German university	22.98 (3.36)	89	MCT & More	Multidisciplinary	General mental health	MCT & More (208)	Waitlist (215)	4	PHQ9	-
Bruhns (2023)	Germany	Individuals with a diagnosis of depression (ICD-10 and DSM-5)	39.04 (12.90)	55.40	MCT & More	Multidisciplinary	General mental health	MCT & More + info video (47) and MCT & More + no info video (32)	Waitlist (80)	4	PHQ9	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Bröcker (2024)	South Africa	Trauma-exposed adults with PTSD, scoring ≥23 on the CAPS-5	37.40 (11.35)	88.71	PTSD Couch app (counsellor-supported)	Multidisciplinary	General mental health	PTSD-Couch – CS (32)	Usual care (30)	4, 8, 12	DASS-21	DASS-21
Børøsund (2020)	Norway	Cancer patients	52 (11.2)	72.00	StressProffen	CBT	Stress	Stressproffen (87)	Usual care (88)	12	HADS-D	HADS-A
Børøsund (2022)	Norway	Adult Cancer survivors 1 year or less after their treatment	52 (11.3)	82	Stressproffen	Multidisciplinary	Stress	Stressproffen (87)	Usual Care (88)	24, 48	HADS-D	HADS-A
Cardi (2022)	Italy	Adults with episodes of binge eating	-	95.7	Food ICT Group	Nonspecific	Eating disorder	Food ICT Group (44)	Waitlist (50)	2, 3	DASS-D	DASS-A
Carl (2020)	United Kingdom	Individuals diagnosed with GAD, aged ≥18	30.90 (10.70)	68.36	Daylight	CBT	General mental health	Daylight (128)	Waitlist group (128)	3, 6, 10	PHQ9	GAD7
Carli (2022)	Italy and Portugal	Cancer patients	59.40 (10.68)	44.24	NEVERMIND	Multidisciplinary	Depression	NEVERMIND (213)	Usual care (212)	12, 24	BDI-2	-
Catuara-Solarz (2022)	Spain	Adults working in the United Kingdom	40 (6.10)	54	Foundations app	Multidisciplinary	General mental health	Foundations app (95)	Waitlist (95)	2, 4	-	GAD7
Cerea (2020)	Italy	University students scoring above the clinical threshold on ROCD symptoms, aged 20-24 years	22.00 (1.32)	76.00	GGRO	Multidisciplinary	General mental health	immediate-use App/iApp group (25)	delayed-use App/dApp group (25)	2, 4	DASS-21	DASS-21, SIAS
Cerea (2022)	Italy	Italian women at high-risk of developing Body Image	22.82 (2.11)	100.00	GGBI	CBT	General mental health	immediate-use App/iApp group (47)	delayed-use App/dApp group (48)	2, 4	-	SIAS

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		Disorders (BIDs), aged 20–30 years										
Chan (2021)	China	Individuals with comorbid depression and insomnia, who scored ≥ 10 on the PHQ and ≥ 8 on the ISI	27.30 (7.20)	73.00	CBT-I Intervention	CBT	General mental health	CBT-I Intervention (167)	Waitlist Group (153)	6, 12	CESD	HADS-A
Comtois (2022)	United States	People who were unemployed because of COVID-19 or were COVID-19–designated essential workers	31.1 (9.5)	56.1	COVID Coach Calm 7 Cups of Tea	Nonspecific Mindfulness Positive Psychology	General mental health	COVID Coach (212) Calm (204) 7 Cups of Tea (209)	Mood monitoring (Beautiful mood) (213)	4	PHQ9	GAD7
Cox (2019)	United States	Intensive Care Unit patients	49.50 (15.10)	44.00	mMT, tMT	Mindfulness	General mental health	mMT (31), tMT (31)	Education program (18)	4, 12	PHQ9	GAD7
Cox (2023)	United States	Patients with a cardiopulmonary diagnosis	49.30 (13.20)	60.00	Blueprint with therapist, Blueprint without therapist	CBT	General mental health	Blueprint with therapist (16), Blueprint without therapist (14)	Usual Care Control (15)	4, 12	HADS-D	HADS-A
Dahne (2019)	United States	Latinx adults with limited English proficiency	36.05 (sd)	66.7	Aptivate	CBT	Depression	Aptivate (22)	iCouch (9) Usual Care (11)	1, 2, 3, 4, 5, 6, 7, 8	BDI-2	-
Dahne (2019)	United States	Adults with depressive symptoms	43.79 (sd)	84.60	Moodivate	CBT	Depression	Moodivate (24)	MoodKit (19) Usual Care (9)	1, 2, 3, 4, 5, 6, 7, 8	BDI-2	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Danieli (2022)	Italy	Active workers aged over 55 years experiencing stress symptoms and mild-to-moderate anxiety	55.58 (5.08)	78	SMT-CBT, SMT-CBT + PHA, PHA only	CBT, CBT, Chatbot	General mental health	SMT-CBT (16), SMT-CBT + PHA (16), PHA only (14)	Waitlist (14)	4, 8, 20	SCL-D, PHQ8	SCL-A, GAD7
De Kock (2022)	United Kingdom	Health and social care staff working in NHS	-	88.2	My Possible Self (MPS)	Multidisciplinary	Psychological well-being	NHS Highland Staff Wellbeing Project (NHSWBP) (51) My Possible Self (MPS) (60)	Waitlist (58)	2, 4	PHQ9	GAD7
Deady (2022)	Australia	Working Australians in male-dominated industries	40.26 (10.63)	25.8	HeadGear	Multidisciplinary	Depression	HeadGear (1128)	Mood monitoring (1143)	5, 12, 52	PHQ9	-
Deady (2023)	Australia	Adult australian residents who are employed and feel stressed	42.96 (10.07)	71	Anchored	Multidisciplinary	Depression	Anchored (1056)	Psychoeducation (1056)	4, 12, 24	PHQ9	GAD7
Dennis-Tiwary (2018)	United States	Women in their 19th–29th week of pregnancy	32.97 (5.52)	100	ABMT	Attentional bias modification training	General mental health	ABMT (15)	Placebo app (14)	4	DASS-D	DASS-A, HAM-A
Depp (2015)	United States	Outpatients diagnosed with either Bipolar Disorder 1 or 2	47.50 (12.80)	58.50	PRISM	Psychoeducation	Mood symptoms	PRISM (41)	Mood monitoring (41)	6, 12, 24	MADRS	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
DiNardo (2022)	United States	Veterans with type 1 or 2 diabetes	60.7 (10.6)	8.3	Mind-STRIDE	Mindfulness	General mental health	Mind-STRIDE and diabetes self-management education and support (65)	Diabetes self-management education and support (67)	12, 24	PHQ8	-
Dingwall (2021)	Australia	Indigenous Australians undergoing hemo dialysis	55 (9.4)	71.8	ALMhi Stay Strong App	Nonspecific	General mental health	ALMhi Stay Strong App (62)	Hep B Story App and delayed ALMhi Stay Strong App (61)	12, 24	PHQ9	-
Ditton (2023)	Australia	Medical students	24 (5.48)	61.5	ACT app	ACT	General mental health	ACT app (individualised) (37)	Usual care and delayed ALMhi Stay Strong App (33) ACT app (nonindividualised) (36)	5	DASS-D	DASS-A
Domar (2023)	United States	Men who were each part of a couple experiencing infertility	33.70 (4.5)	0	FertiStrong	Multidisciplinary	General mental health	FertiStrong (20)	Waitlist (35) No intervention (19)	4	HADS-D	HADS-A
Donker (2019)	Netherlands	Dutch adults from the general population with acrophobia symptoms	41.33	66.84	OPhobia VR	CBT	Acrophobia	OPhobia (96)	Waitlist (97)	3, 12	PHQ9	BAI
Donker (2022)	Netherlands	People from Dutch general population with	42 (12.15)	83	VR-CBT-App	CBT	General mental health	VR-CBT-App (77)	Waitlist (77)	6 (12, 24)	PHQ9	BAI

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		aviophobia symptoms										
Economides (2022)	United Kingdom	Working adults in the United Kingdom with an active account on Prolific	44.60 (14.3)	52	Unmind CBT and ACT-based intervention for stress; Unmind CBT-based intervention for worry and anxiety; Unmind CBT and ACT-based intervention for resilience	Multidisciplinary	General mental health	Unmind CBT and ACT-based intervention for stress (94); Unmind CBT-based intervention for worry and anxiety (97); Unmind CBT and ACT-based intervention for resilience (98)	Waitlist (94)	2, 6	PHQ8	GAD7
El-Jawahri (2023)	United States	Patients with acute myeloid leukemia (AML)	60.12	36.7	DreamLand	Nonspecific	General mental health	DreamLand (29)	Usual care (31)	3,6	HADS-D, PHQ9	HADS-A
Enock (2014)	United States	Individuals aged between from 18 and 68	34.8 (11.4)	52.2	CBM-A	CBM	Social anxiety	CBM-A (206)	Control training (CON) (187) Waitlist (36)	4, 8, 16	DASS-D	-
Everitt (2021)	Australia	General population, aged 18-69	32.97 (10.92)	85.50	MoodTracker, ImproveYourMood, ImproveYourMood+	Mood monitoring, Mindfulness	General mental health	MoodTracker (58), ImproveYourMood (62), ImproveYourMood+ (60)	Waitlist group (55)	3, 7	PHQ9	GAD7
Faurholt-Jepsen (2021)	Denmark	Patients with bipolar disorder discharged	42.69 (13.48)	49.9	Monseo System	CBT	General mental health	Monseo System (47)	Usual care (51)	12, 24	HDRS-17, BDI, HDRS-6	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Compariso n Group (n)	Follow-up (weeks)	Depression	Anxiety
		from hospitalizati on										
Fiol-De Roque (2021)	Spain	Adult health care workers who provided health care to patients with COVID-19	41.37 (10.4)	83.20	PsyCovid App	Multidiscip linary	General mental health	PsyCovid App (248)	Information resources (234)	2	DASS-D	DASS-A
Fish (2019)	United States	University students	21.00	96.00	Headspace Mindfulnes s	Mindfulnes s	General mental health	Headspace Mindfulnes s (47)	Usual care (44)	2	PHQ9	-
Fitzpatrick (2017)	United States	Students who self-identify as having symptoms of anxiety and depression	22.20 (2.33)	67.00	Woebot	CBT	General mental health	Woebot (34)	Information resources (36)	2	PHQ9	GAD7
Flett (2019)	New Zealand	Undergradu ate university students	20.08 (2.8)	70	Headspace, Smiling Mind	Mindfulnes s	General mental health	Headspace (72), Smiling Mind (63)	Placebo app (75)	1.5, 4	CESD	HADS-A
Forman Hoffman (2024)	United States	Adults living in Colorado	37 (12.79)	95	Meru Health Program	Multidiscip linary	Depression	Meru Health Program (54)	Waitlist (46)	6, 12	PHQ9	GAD7
Fuller-Tyszkiewic z (2020)	Australia	Australians (adult) supporting a friend or relative with a physical or mental condition	39.64 (6.13)	95	StressLess	Multidiscip linaryy	General mental health	StressLess (73)	Active control: self-monitoring (110)	5, 12	DASS-D	DASS-A
Gao (2022)	United States	Individuals with elevated worry (PSWQ > 40) and	41.41	80.28	MT + TAU	Mindfulnes s	General mental health	MT + TAU (40)	Usual care (40)	8, 16	-	GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Gao (2024)	China	insomnia symptoms University student athtletes	19.4 (1.5)	62.8	WeChat	Mindfulness	Anxiety	WeChat (150)	Education program (138)	6	-	Dispositional Anxiety
Ghaemi (2022)	United States	Participants with moderate acute psychotic exacerbation in schizophrenia	44.7 (11.29)	34.5	PEAR-004	Nonspecific	General mental health	PEAR-004 (56)	Placebo app (56)	4, 8, 12, 16	BDI-2	-
Ghanbari (2021)	Iran	Women with breast cancer	46.45 (9.29)	100	BCSzone	Nonspecific	General mental health	BCSzone (41)	Waitlist (41)	5	-	STAI
Gnanapragasam (2023)	England	NHS-affiliated members of staff	44.3	84.3	Foundations App	Multidisciplinary	Psychiatric morbidity	Foundations App (502)	Usual care (500)	4, 8	PHQ9	GAD7
Goldberg (2020)	United States	Adults with little meditation retreat experience	41.74 (12.52)	84.5	HMP	Multidisciplinary	General mental health	Awareness & Connection from HMP (121); Awareness & Insight from HMP (107)	Waitlist (115)	4, 8	PROMIS-D	PROMIS-A
Graham (2020)	United States	Adults with elevated depression or anxiety levels	42.3 (13.8)	82	IntelliCare	Nonspecific	General mental health	IntelliCare (74)	Usual care (72)	4, 8, 12, 16	PHQ9	GAD7
Greer (2019)	United States	Incurable cancer patients with clinically significant anxiety symptoms	56.45 (11.30)	73.8	CBT mobile app	CBT	Anxiety	CBTmobile app (72)	Education program (73)	12	HADS-D, PHQ9	HAM-A, HADS-A

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Grubbs (2022)	United States	Veterans with anxiety or depression diagnosis	46	74.6	Moving Forward	Problem solving therapy (PST)	General mental health	PST+ Moving Forward (33)	PST + Workbook (33)	6, 12	DASS-D	DASS-A
Guo (2020)	China	Adults in China with HIV from an outpatient clinic	28.30 (5.8)	7.70	Run4Love	Multidisciplinary	Depression	Run4Love (150)	Usual care (150)	12, 24, 39	CESD, PHQ9	-
Ha (2020)	South Korea	Individuals with elevated worry (PSWQ > 40) and insomnia symptoms	21.44	70.21	Spring	CBT	General mental health	Spring (34)	Waitlist group (34)	2	BDI-2	STAI-T
Ham (2019)	South Korea	Cancer patients who scored ≥ 16 on the BDI-2 and/or ≥ 39 on the STAI	44.17	85.71	HARU Today	CBT	General mental health	HARU Today (21), Attention Group (21)	Waitlist Group(21)	10	BDI-2	STAI-S, STAI-T
Hanssen (2020)	Netherlands	Individuals with a schizophrenia spectrum disorders (SZ) diagnosis	39.00	36.00	Smart App: Personalized Feedback	Nonspecific	General mental health	Smart App: Personalized Feedback (27)	Smart App: No Feedback (23)	3	CAPE	-
He (2022)	China	College students with depressive symptoms	18.78 (0.88)	37.2	Chatbot XiaoE	CBT	Depression	Chatbot XiaoE (49)	Bibliotherapy (49)	1, 4	PHQ-9	-
Heim (2021)	Switzerland	Lebanese and displaced people living in Lebanon affected by adversity	27.3 (7.9)	67.4	Step-By-Step Intervention	CBT	General mental health	Step-By-Step Intervention (67)	Placebo App (50) Information resources (71)	8, 20	PHQ9	GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Compariso n Group (n)	Follow-up (weeks)	Depression	Anxiety
Hensler (2022)	Sweden	Adults with exposure to potentially traumatic event in the past 2 years, and mild to severe posttraumati c stress symptoms (PTSD Checklist for DSM-5 total score ≥10)	42.78 (10.90)	91.60	PTSD Coach	Multidiscip linary	General mental health	PTSD Coach (89)	Waitlist Group (90)	12	PHQ9	-
Hilt (2023)	United States	Adolescents in the United States reporting moderate-to-high levels of rumination	13.78 (0.89)	59	Mindfulnes s + Mood monitoring	Mindfulnes s	Rumination	Mindfulnes s + Modd monitoring (72)	Placebo app: Mood monitoring (80)	3, 6, 12, 26	CDI	MASC
Hirshberg (2022)	United Stated	School system employees	42.58 (10.67)	88	Healthy Minds Program (HMP)	Mindfulnes s	General mental health	HMP (346)	Waitlist (320)	1, 2, 3, 4, 16	PROMIS-D	PROMIS-A
Horsch (2017)	Netherlands	Adults with relatively mild insomnia disorder	39.66 (13.44)	62.30	SleepCare	CBT	Insomnia	SleepCare (74)	Waitlist Group (77)	6, 12	CESD	HADS-A
Howells (2016)	United Kingdom	Adult authentic happiness seekers	40.70 (10.6)	88	Headspace Mindfulnes s	Mindfulnes s	General mental health	Headspace Mindfulnes s (97)	Catch Notes: Placebo app (97)	2	CESD	-
Huberty (2021)	United States	Adults with elevated insomnia symptoms	44.5 (14.6)	74.6	Calm App	Mindfulnes s	Insomnia	Calm App (113)	No intervention (127)	4, 8	HADS-D	HADS-A
Huberty (2022)	United States	Employees of a large consumer	-	50.3	Calm App	Mindfulnes s	General mental health	Calm App (585)	Waitlist (444)	2, 4, 6, 8	DASS-D	DASS-A

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		electronics retailer										
Hunt (2021)	United States	Adults with IBS	32 (10.2)	75.2	Zemedy	CBT	IBS	Zemedy (62)	Waitlist (59)	8	DASS-D, PHQ9	DASS-A
Hur (2018)	South Korea	Individuals diagnosed with Other Specified Depressive Disorder	23.71 (3.26)	88.24	Todac App	CBT	General mental health	Todac App (17)	Mood monitoring (17)	3	BDI-2	STAI-X2
Hwang (2019)	Korea	Nurses employed at college hospitals in Seoul	/	95	Test group	Nonspecific	Stress	Test group (30)	No intervention (30)	4	PHQ9	GAD7
Hwang (2022)	Korea	Individuals experiencing work-related stress	37.94 (9.31)	80.2	BetterLife program	Multidisciplinary	Perceived stress	BetterLife program (63)	Waitlist (63)	10	BDI-2	BAI
Imamura (2021)	Vietnam	Full time nurses in a large general hospital	33.10 (6.78)	85	Program	CBT	Not specified	Program A (a free-choice, multimodule stress management) (317); Program B (a fixed-order, internet cognitive behavioral therapy, iCBT)(316)	Treatment as usual (316)	12, 28	DASS21-D	DASS-21 A
Jannati (2020)	Iran	Mothers with Postpartum depression (PPD) aged ≥18	27.52	100.00	Happy Mom	CBT	Postpartum depression	Happy Mom (38)	No intervention (37)	8	EPDS	-
Järvelä-Reijonen (2020)	Finland	Working-age adults with psychological distress	49.57 (7.24)	83.8	Oiva	ACT	General mental health	Oiva (85); Face-to-face ACT (84)	No intervention (85)	10, 36	BDI-2	-

First Author	Country	Population	Mean age (SD)	Female (%)	Mental health app						Outcome measures	
					Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		and overweight/ obesity										
Kageyama (2021)	Japan	Adult university students with subthreshold depression	20.06 (1.24)	34.40	SPSRS	Cognitive Bias Modification	Depression	SPSRS (16)	Waitlist (16)	5	CESD	GAD7
Kauer (2012)	Australia	Young adults between 14-24 years with emotional mental health issues	18.04 (3.2)	72.9	Mobietype	Nonspecific	Depression	Mobietype (69)	Placebo app (49)	3, 6	DASS-D	-
Keng (2022)	Singapore	Health care workers in Singapore during the COVID-19 pandemic	30.18 (6.19)	90	Headspace	Mindfulness	General mental health	Headspace (40)	Placebo app: Lumosity (40)	3, 7	DASS-D	DASS-A
Kenny (2020)	Ireland	Students aged 15-18 years	16.05 (0.76)	62	CopeSmart	Multidisciplinary	General mental health	CopeSmart (385)	No intervention (175)	4, 8	DASS-D	DASS-A
Kerber (2023)	Germany	Adults with clinically relevant symptoms of internalising disorders	38.3 (11.19)	73.6	MindDoc	Multidisciplinary	General mental health	MindDoc (523)	Usual care (522)	8, 24	PHQ9	GAD7
Kim (2024)	Korea	Individuals with a history of panic attacks	34.95 (12)	73.9	Digital app for panic disorder	Multidisciplinary	Panic disorder	Digital app for panic disorder (25)	Information resources (25)	4	-	HAM-A, GAD7
Kirykowicz (2023)	South Africa	Adults working in a	33.4 (3.8)	58.8	COVID Coach	Nonspecific	General mental health	COVID Coach (16)	No intervention (18)	4	CES-D	STAI-S

First Author	Country	Population	Mean age (SD)	Female (%)	Mental health app						Outcome measures	
					Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		government healthcare facility in the Western Cape										
Kloos (2022)	Netherlands	Dutch and Flemish adults in the general population who felt they suffered from reduced well-being due to the corona crisis	52.90 (15)	80	ZENN-Gratitude app	Gratitude	General mental health	ZENN-Gratitude app (424)	Waitlist (425)	6, 12	PHQ9	GAD7
Kollei (2017)	Germany	Students with elevated body image problems (FKB-20 >17 for men, FKB-20 >18 for women)	21.64	92.45	MT-BD app	Multidisciplinary	General mental health	MT-BD app (26)	Waitlist group (27)	2, 6	ADS	-
Kosasih (2023)	Singapore	Adults aged ≥18	22.05 (4.06)	74.58	Intellect App "Anxiety and Worry"	Multidisciplinary	General mental health	Intellect App "Anxiety and Worry" (160)	Intellect "Procrastination" (163)	2, 4	PHQ9	GAD7
Krafft (2019)	United Sates	Adults interested in phone-based self-help	21.79	70.4	Simple matrix app and Complex matrix app	ACT	General mental health	Simple matrix app (33); Complex matrix app (34)	No intervention (31)	2, 4	DASS-D	DASS-A
Kubo (2019)	United States	Cancer patients receiving chemotherapy	58.3 (14.34)	68	Headspace	Mindfulness	General mental health	Headspace (54)	Usual care (43)	8	HADS-D	HADS-A

First Author	Country	Population	Mean age (SD)	Female (%)	Mental health app						Outcome measures	
					Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		Informal caregivers of cancer patients	57.6 (17.65)	58	Headspace	Mindfulness	General mental health	Headspace (17)	Usual care (14)	8	HADS-D	HADS-A
Kubo (2024)	United States	Patients with metastatic solid malignancies or hematological cancers.	66.44 (9.59)	69.9	Headspace	Mindfulness	General mental health	Headspace (52)	Usual care (51)	6, 12	HADS-D	HADS-A
Kuhn (2017)	United States	Adults having been exposed to a traumatic event more than 1 month ago who do not receive treatment	39	69	PTSD Coach App	Multidisciplinary	PTSD symptoms	PTSD Coach App (62)	Waitlist (58)	12, 24	PHQ8	-
Kuhn (2022)	United States	U.S. military veterans (aged 18-55 years) with a subclinical level of insomnia	44.48 (7.9)	42	Coach	CBT	Insomnia	Coach (25)	Waitlist (25)	6, 12	PHQ8	GAD7
Kulikov (2023)	United States	Adolescents with self-reported symptoms of depression, aged 13-21	17.51	78.00	Spark	CBT	General mental health	Spark (35)	Active Control Group (25)	5	PHQ8, MFQ-Ps	GAD7
Kusumadewi (2023)	Indonesia	Students with elevated anxiety symptoms	20.45 (0.71)	78.79	GAMA-AIMS	CBT	Anxiety	GAMA-AIMS (43)	Usual care (43)	1,2,3,4,5,6,7	-	TMAS

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Lacey (2023)	New Zealand	Adults with specific phobia	42.2 (13.2)	80.0	oVRcome	CBT	Specific phobia	oVRcome (63)	Waitlist (63)	6, 12	PHQ9	-
LaFreniere (2023)	United States	Students aged 18 to 24 with symptoms of GAD	18.66 (1.14)	90.6	SkillJoy Ecological Momentary Intervention	Positive Psychology	Generalized anxiety disorder	SkillJoy Ecological Momentary Intervention (41)	Placebo App (45)	1, 4	BDI-2	-
Lahtinen (2023)	Finland	University faculty, staff, and students	34.68 (10.77)	83.24	Mindfulness Intervention	Mindfulness	General mental health	Mindfulness Intervention (282)	Psychoeducation (279)	4, 12	BDI	GAD7
Laird (2022)	United States	Middle-aged adults (40-65 years) with elevated stress levels	51.45 (6.8)	65.5	Calm App	Mindfulness	Perceived stress	Calm App (39)	Placebo App (POD) (35)	4	HADS-D	HADS-A
Lee (2018)	Canada	Undergraduate students	20.62	63.19	DeStressify	Mindfulness	General mental health	DeStressify (102)	No intervention (104)	4	QIDS-SR	STAI-S, STAI-T
Lee (2023)	Korea	Office workers with elevated levels of perceived stress	35.2 (8.49)	78	Mobile app-based stress management intervention mSMI	Multidisciplinary	Perceived stress	mSMI (39)	No intervention (43)	6	HADS-D	HADS-A
Levin (2018)	United States	Adults high in self-criticism	22.76 (7.02)	68.90	Cog. Defusion, Cof. Restructuring	Multidisciplinary	General mental health	Cog. Defusion (30), Cof. Restructuring (29)	Waitlist group (28)	2	DASS-21	DASS-21
Levin_a (2019)	United States	University students 18+	21.9 (5.47)	68.1	ACT app	ACT	General mental health	Tailored ACT app (23); Random app (22)	No intervention (24)	4	DASS-D	DASS-A
Levin_b (2019)	United States	University students on the waitlist for the Counseling and Psychologic	20.43 (2,46)	100.00	SBT App	Mindfulness	General mental health	SBT App (10)	No intervention (13)	2, 4	CCAPS-Depression	CCAPS-General Anx, CCAPS-Social Anx

First Author	Country	Population	Mean age (SD)	Female (%)	Mental health app						Outcome measures	
					Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		al Services center (CAPS), aged ≥18										
Lewis (2020)	United Kingdom	Individuals with severe mental illness	34.5	33.3	ClinTouch	Symptom monitoring	Psychotic symptoms	ClinTouch (40)	Usual care (41)	6. 12	CDS	-
Li (2019)	China	HIV or AIDS patients	27.5	7.7	Run4Love	CBT	Depression	Run4Love (15)	Education program (150)	12, 24	CES-D	-
Li (2022)	Hong Kong	Individuals with distress related to pain	41.35 (14.56)	83.8	WhatsApp-based MBi	Mindfulness	Pain	WhatsApp-based MBI (118)	Waitlist (117)	3, 7, 15	PHQ9	GAD7
Li (2022)	Hong Kong	Individuals with distress related to dysregulated eating	36.03 (11.59)	89.7	WhatsApp-based MBI	Mindfulness	Dysregulated eating	WhatsApp-based MBI (177)	Waitlist (174)	3, 7, 15	PHQ9	GAD7
Li (2022)	Hong Kong	Individuals with distress related to insomnia	42.13 (13.33)	79.6	WhatsApp-based MBI	Mindfulness	Insomnia	WhatsApp-based MBI (167)	Waitlist (166)	3, 7, 15	PHQ9	GAD7
Li (2024)	United States	Chinese immigrant women residing in the United States who are in a relationship and had experienced intimate partner violence (IPV) in the past year	36.16 (9.89)	100	SHE Intervention	Multidisciplinary	General mental health	SHE Intervention (25)	Information resources (26)	7, 15	PHQ9	GAD7
Lim (2023)	Malaysia	Medical practitioners (faculty staff,	NA	64.20	ThoughtFulChat App	Nonspecific	Reducing the symptoms of self-	ThoughtFulChat App (167)	No intervention (167)	12	DASS-21	DASS-21

First Author	Country	Population	Mean age (SD)	Female (%)	Mental health app						Outcome measures	
					Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		students, or corporate staff) aged >18					reported Depression, Anxiety, and Stress					
Linardon (2022)	Australia	Individuals who self-reported the presence of binge eating	28.95 (8.17)	93.00	Break Binge Eating	CBT	General mental health	Break Binge Eating (197)	Waitlist group(195)	4, 8	PHQ4	PHQ4
Linardon (2023)	Australia	Adults who are binge eating	33.85 (9.83)	93.8	Break Binge Eating and Break the Diet Cycle	`CBT	Binge eating	Break Binge Eating (199); Break the Diet Cycle (199)	Waitlist (202)	4, 8	PHQ4	PHQ4
Litvin (2020)	Germany	Bosch UK employees	/	37.70	eQuoo	Multidisciplinary	General mental health	eQuoo (222)	Control group: Multidisciplinary (269), Waitlist (218)	2, 5	-	One-item Anxiety Scale
Litvin (2023)	United Kingdom	Adult college/university students	-	76.5	eQuoo	Multidisciplinary; CBT	General mental health	eQuoo (389); Sanvello Mental Health App (384)	No intervention (392)	5	PHQ8	GAD7
Liu (2022)	Taiwan	Women aged 25 to 40 in the postpartum period	31.81 (5.36)	100	We'll App	Nonspecific	Postpartum depressive symptoms	We'll App (65)	Waitlist (65)	8	EPDS	-
Liu (2022)	China	University students above the age 18 with elevated depressive symptoms	23.08 (1.76)	55.4	XiaoNan	CBT	General mental health	XiaoNan (41)	Bibliotherapy (42)	16	PHQ9	GAD7
Liu (2023)	China	Individuals with spinal cord injury	41.71 (12.14)	17.35	Together	Multidisciplinary	General mental health	Together (49)	Usual care (49)	12, 24	BDI-2	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
LooGee (2021)	Australia	Adults with elevated social anxiety symptoms	28.7 (12.4)	81	EMI App	CBT	Social anxiety	EMI App (28)	No intervention (27)	4	PHQ2	GAD2
Lu (2023)	China	Nurses with anxiety or depression symptoms	35.36 (7.22)	97.20	Rain Classroom	ACT	General mental health	Rain Classroom (72)	Waiting control group (73)	2, 3, 4, 5, 17	PHQ9	GAD7
Luangapichart (2022)	Thailand	Medical personnel suffering from burnout and stress	33.4 (7.92)	84.4	Mindful Senses Program	Mindfulness	General mental health	Mindful Senses Program and psychological self-help articles (45)	Psychological self-help articles (week 1-4) and delayed Mindful Senses Program (week 9-12) (45)	4, 8, (12, 16)	Thai HADS-D	Thai HADS-A
Lukas_a (2021)	Germany	Individuals with heightened depression, scoring ≥ 10 on the Patient Health Questionnaire-9 (PHQ-9)	24.69 (4.47)	81.00	MT-Phoenix + Psychoedu	Approach avoidance modification training	Depression	MT-Phoenix + Psychoedu (5)	Waitlist Group (11)	2, 4	PHQ9	-
Lukas_b (2021)	Germany	Adults with elevated depression levels	29.93 (11.61)	82.00	MT-Phoenix	AAMT	Depression	MT-Phoenix (40)	Waitlist (37)	2, 12	PHQ9 CES-D	-
Luo (2021)	China	Parents of children diagnosed with cancer	33.60 (5.2)	69.90	device–based resilience	Nonspecific	General mental health	device–based resilience (52)	Information resources (51)	8, 24	SDS	-
Lüdtke (2018)	Germany	Adults with a subjective need for an intervention to reduce depressive symptoms	42.89 (11.19)	78.40	Be Good to Yourself	Multidisciplinary	Depression	Be Good to Yourself (45)	Waitlist (45)	4	PHQ9	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
MacKinnon (2022)	Canada	Mothers of preschool children (aged 18–36 months old) with moderate to severe depression	33.84 (5.34)	100	BEAM	Nonspecific	General mental health	BEAM (33)	Usual care (32)	10	PHQ9	GAD7
Mak (2018)	China	Adults in the general population	33.64 (12.08)	72.88	MBP, SCP, CBP	Mindfulness, Self-compassion, CBT	General mental health	MBP (739), SCP (748), CBP (795)	NA	4, 12	ACS	ACS
Mantani (2017)	Japan	Adults (aged 25-59 years) with a primary diagnosis of major depressive disorder without psychotic features who are antidepressant-resistant after taking one or more antidepressants at an adequate dosage for 4 weeks or more	40.90 (8.7)	53.40	Kokoro App	CBT	Depression	Kokoro App (81)	Usual care (83)	9, 17	PHQ9; BDI-2	-
Mao (2023)	China	High social anxiety adolescents (≥ 40 on SAS-A, age 14-17)	15.13	64.29	CBM-I App	Cognitive bias modification training	Social anxiety in adolescents	CBM-I App (14)	Waitlist group (14)	4	-	SAS-A
Marciniak (2023)	Switzerland	University students with lowered reward	21.50 (2.3)	80.00	Imager App Group	Nonspecific	General mental health	Imager App Group (51)	No intervention (44)	1	BDI-2	STAI

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Compariso n Group (n)	Follow-up (weeks)	Depression	Anxiety
		sensitivity scores										
McCloud (2020)	United Kingdom	University students	24.3 (6.76)	85.1	Feel Stress Free App	CBT	General mental health	Feel Stress Free App (84)	Waitlist (84)	2, 4, 6	HADS-D	HADS-A
McGillivra y (2023)	Australia	Adults between 18-25 years with suicidal thoughts the past year	21.5	84.6	LifeBuoy	Multidiscip linary	Suicidal ideation	LifeBuoy (228)	Education program (227)	6.14, 18.86	PHQ9	GAD7
Miklowitz (2023)	United States	Youth with bipolar and depressive disorders	15.8 (1.6)	72.3	My Coach-connect	Nonspecific	General mental health	My Coach-connect (32)	Placebo App (33)	9, 18, 27	-	SCARED
Min (2023)	South Korea	Hospital employees with elevated stress levels	38.64 (10.87)	90.22	Neuro-feedback assessed mindfulnes s; mindfulnes s only	Mindfulnes s	Stress	Neuro-feedback assessed mindfulnes s (30); mindfulnes s only (33)	Education program (31)	4, 8	PHQ9	-
Min-Hung (2019)	Taiwan	Patients diagnosed with GAD	21.49 (1.78)	74.4	HD-ABM	Attentional bias modificatio n training	Generalized anxiety disorder	HD-ABM (31)	Placebo App (31) Waitlist (31)	2, 3, 4, 8	BDI	BAI, STAI
Mistretta (2018)	United States	Health care workers working at Mayo Clinic in Arizona	46 (12.6)	87	MBRT Int. (Mindfulne ss-based)	Mindfulnes s; Nonspecific	General mental health	MBRT Int. (Mindfulne ss-based) (22); Smartphone resilience int. (23)	Control group: self-monitoring (15)	6, 18	DASS-D	DASS-A
Moberg (2019)	United States	Adults scoring between 5-14 on the PHQ-8 or between 5-14 on the GAD7	30.20	54.80	Pacifica	Multidiscip linary	General mental health	Pacifica (253)	Waitlist (247)	4, 12	DASS-21, PHQ8	DASS-21, GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Moritz (2024)	Germany	Adults aged between 18 and 85 years	30.45 (10.09)	84.5	COGITO App	Nonspecific	General mental health	COGITO App (108)	Waitlist (105)	6	PHQ9	GAD7
Mutter (2023)	Germany	University students struggling with procrastination	26.21 (5.3)	60.0	StudiCare Procrastination	CBT	Procrastination	StudiCare Procrastination (116)	E-coach CBT (117)	4, 8, 12	PHQ8	GAD7
Newman (2021)	United States	Undergraduate students with self-reported GAD	21.40	77.00	self-help mobile program	CBT	General mental health	self-help mobile program (50)	No intervention (50)	12, 26	-	STAI-T
Nicol (2022)	United States	Adolescents aged 13 to 17 years with moderate depressive symptoms	14.7 (1.7)	88.2	WGenZ (Woebot-based application)	Multidisciplinary	General mental health	WGenZ (10)	Waitlist (8)	Depression: 2, 4, 6, 8. 12 Anxiety: 4, 8, 12	PHQ9	GAD7
Niles (2020)	United States	Participants with elevated PTSD symptoms	32.1 (9.9)	80	ABM Training	Attentional bias modification training	PTSD	Personalized ABM (336) Non-personalized ABM (323)	Placebo app (342)	3, 5	DASS-D	STAI
Nishi (2022)	Japan	Pregnant women at 16–20 weeks' gestation, aged ≥ 20	30.44 (4.6)	100	Luna Baby app	CBT	General mental health	iCBT - Luna Baby app (2509)	No intervention (2508)	16, 22, 33	EPDS	-
Oh (2018)	South Korea	Adults in their 50s and 60s with subclinical memory problems	59.30 (5.09)	52.8	SMART	Cognitive training	Memory improvement	SMART (18); Fit Brains (19)	Waitlist (16)	8	CESD	STAI-S
Oh (2020)	Korea	Adult patients with mild-	41 (11.55)	51.2	*Todaki* Chatbot	CBT	Panic disorder	*Todaki* Chatbot (23)	Information resources (22)	4	HADS-D	HADS-A

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Compariso n Group (n)	Follow-up (weeks)	Depression	Anxiety
		to-severe panic symptoms										
Orosa-Duarte (2021)	Spain	University students	23.00 (4.16)	84.52	REM Volver a casa, IMBP group	Mindfulnes s		REM Volver a casa (54), IMBP group (51)	No intervention (49)	8	-	STAI-T
O'dea (2020)	Australia	Adolescents aged 12-16	14.82 (0.93)	86.53	WeClick	CBT	General mental health	WeClick (98)	Waitlist (95)	4, 12	PHQ-A	SCAS
O'Toole (2019)	Denmark	Individuals referred to out-patient suicide prevention treatment	28.75 (9.47)	41.9	LifeApp'tit e	Nonspecific	Suicide risk	Usual care and LifeApp'tit e (60)	Usual care (69)	8, 16	MDI	-
Peake (2024)	United States	Adolescents aged 13 to 21 years with self-identified depression symptoms	16.84 (2.55)	63.1	Spark app	CBT	Depression	Spark app (74)	Placebo app (79)	Depression: 1, 2, 3, 4, 5 Anxiety: 5	PHQ8	GAD7
Pham (2016)	United Kingdom	Adults with at least moderate anxiety symptoms	-	49.1	Flowy App	Mindfulnes s	Anxiety	Flowy App (31)	Waitlist (32)	2, 4	-	GAD7
Ponzo (2020)	United Kingdom	University students	19.96	65.85	Biobase app	Multidiscip linary	General mental health	Biobase app (59)	Waitlist Group (64)	4, 6	PHQ9, DASS-21	STAI
Possemato (2016)	United States	VA primary care veterans with PTSD symptoms	42 (12)	80	PTSD Coach	CBT	PTSD symptoms	PTSD Coach (Clinician support) (10)	PTSD Coach (Self-managing) (10)	8	PHQ9	-
Possemato (2023)	United States	Veterans enrolled in primary care within VA healthcare systems in New York and California	50.92 (15.43)	9.80	Clinician supported PTSD Coach	Nonspecific	PTSD	Clinician supported PTSD Coach (115)	Usual care (119)	8, 16, 24	PHQ9	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		with PTSD symptoms who do not receive PTSD treatment										
Pratap (2018)	United States	Hispanic/Latino and non-Hispanic/Latino adults with depressive symptoms	34.90 (10.91)	77.1	EVO(1) and iPST(2)	Cognitive training(1) and Problem Solving Therapy(2)	Depression	EVO (83); iPST (112)	Education program (79)	4, 12	PHQ9	-
Qin (2022)	China	Chinese-speaking women who recently (0-3 days postpartum) gave birth at a public hospital in Shanghai	31.90 (3.62)	100	CareMom + Usual Care	CBT	Depression	CareMom + Usual Care (57)	Waitlist (55)	1, 2, 3, 4	EPDS	GAD7
Raevuori (2021)	Finland	Patients with clinical depression in a Finnish university student health service	25.10 (4.5)	73	MeruHealth	Multidisciplinary	Depression	MeruHealth + TAU (63)	TAU (61)	4, 8, 20, 32	PHQ9	GAD7
Rajabi Majd (2020)	Iran	Adults having an insomnia disorder who speak Persian	35.75 (5.79)	55.80	CBT-I App	Multidisciplinary	Insomnia	CBT-I App (156)	Information resources (156)	10, 18, 30	HADS-D	HADS-A
Reid (2011)	Australia	Patients aged 14 to 24 years from rural and metropolitan general practices	18.10 (3.2)	72	Mobiletype	Multidisciplinary	General mental health	Mobiletype (69)	Placebo app (49)	3, 9	DASS-D	DASS-A

First Author	Country	Population	Mean age (SD)	Female (%)	Mental health app						Outcome measures	
					Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		with mild or severe mental health issues										
Riordan (2024)	United States	Undergraduate student with elevated anxiety and/or depression symptoms	20.17 (1.58)	77.8	Healthy Minds App	Multidisciplinary	General mental health	Healthy Minds App (massed) (176)	Healthy Minds App (spaced) (175)	2	PROMIS-D	PROMIS-A
Rocamora González (2022)	Spain	Patients newly diagnosed with colorectal cancer	35.4	Mindfulness	General mental health	Calm App (52)	Usual care (50)	-	HADS-D	HADS-A		
Roepke (2015)	United States	Individuals with clinically significant depression (CES-D ≥ 16)	40.15 (12.40)	69.60	CBT/PPT SuperBetter, General SuperBetter	Multidisciplinary	General mental health	CBT/PPT SuperBetter (93), General SuperBetter (97)	Waitlist Group (93)	2, 4, 6	CESD	GAD7
Roncero (2019)	Spain	Psychology students	21.56 (6.15)	81.4	GGRO	CBT	OCD	Immediate use (iApp) (51)	Waitlist (dApp) (46)	2, 4	DASS-D	-
Roy (2021)	United States	Individuals with GAD	41.95	90.48	TAU + unwinding anxiety app	Mindfulness	Anxiety	TAU + unwinding anxiety app (28)	TAU (33)	4, 8	-	GAD7
Röhr (2021)	Germany	Syrian refugee adults with elevated posttraumatic stress symptoms	33.33 (11.20)	38.3	Sanadak	CBT	Posttraumatic stress	Sanadak (65)	Education program (68)	4, 16	PHQ9	GAD7
Sawyer (2019)	Australia	New mothers	31.66	100.00	eMums Plus	CBT	Depression	eMums Plus (54)	Usual care (57)	32, 48	EPDS	-
Schwob (2023)	United States	Adults with social anxiety	19.40 (0.64)	53.66	Imaginal Exposure	Exposure	General mental health	Imaginal Exposure (39)	Self-monitoring (43)	1, 4	-	SPDQ, SIAS

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		disorder (SAD)										
Seo (2022)	South Korea	New mothers with elevated depression symptoms (EPDS ≥ 9)	NA	100.00	Happy Mother App	CBT	General mental health	Happy Mother App (50)	Information resources (50)	8, 20	EPDS	-
Sharma (2022)	Canada	Psychiatric inpatients between 18-65 years	31.83 (8.0)	24.75	Mindshift CBT	CBT	Anxiety	Mindshift CBT (9)	Usual care (11)	4	PHQ9	GAD7
Smith (2020)	United States	Employees from a large technology corporation	33.2 (7.8)	55	Wearable-based treatment	Mindfulness	General mental health	Wearable-based treatment (107)	Waitlist (108)	4	MASQ-D	MASQ-A
Smith (2021)	United States	Obstetrics and gynecology patients during the COVID-19 pandemic	36.21 (11.3)	100	Meditation App (CALM)	Mindfulness	General mental health	Mediation App (CALM) (50)	Usual Care (51)	2, 4	HADS-D	HADS-A
Smith_b (2021)	United States	Students enrolled in their third semester of physician assistant (PA) school	NA	78.57	10% Happier	Mindfulness	General mental health	10% Happier(8)	Waitlist Group (8)	8	DASS-D	DASS-A
Soltani (2024)	Iran	Iranian patients with MDD	NA	76.56	Yara App	Nonspecific	General mental health	Yara App (32)	Usual Care (32)	12	-	STAI
Stiles-Shields (2019)	United States	Adults with moderate depressive symptoms	NA	NA	Boost Me; Thought Challanger	CBT	Depression	Boost Me (10); Thought Challanger (10)	Waitlist (10)	3, 6, 10	PHQ9	-
Stolz (2018)	Switzerland	Adults who speak German and are diagnosed with Social	34.76	63	PC-based treatment; Mobile treatment	CBT	Social Anxiety	PC-based treatment (60); Mobile treatment (60)	Waitlist (30)	12, 24	BDI2	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		anxiety disorder										
Sun (2019)	China	Chinese undergraduates with high level of social anxiety	21.26 (2.18)	81.58	CBM-I (cognitive bias modification for interpretation)	Cognitive bias modification	Social anxiety	CBM-I (22)	Placebo app (19)	4, 8	-	STAI-T
Sun (2021)	China	Pregnant adult women from an obstetrics clinic	29.91 (4.02)	100	Spirits Healing App	Mindfulness	Depression	Spirits Healing App (84)	Attention control group (84)	4, 8, 18	EPDS	GAD7
Sun (2022)	China	Chinese university students in quarantine	22.21 (2.67)	74	Mindfulness based mHealth	Mindfulness	General mental health	Mindfulness based mHealth (57)	Placebo app: Social support based mHealth (57)	4, 8	PHQ9	GAD7
Taylor (2022)	United Kingdom	Health care workers	40.53	83.18	HeadSpace	Mindfulness	General mental health	HeadSpace (1095)	MoodZone: Psychoeducation (1087)	6, 18	DASS-21	DASS-21
Taylor (2023)	United Kingdom	UK-based working adults experiencing mild to moderate depressive symptoms	36.90 (9.5)	54.80	Activate your mood; Mind your mood; Finding happiness	Behavioural activation; CBT; ACT	Depression	Activate your mood (102); Mind your mood (101); Finding happiness (100)	Waitlist (102)	3, 7	PHQ8	GAD7
Thabrew (2022)	New Zealand	New Zealand residents aged between 16 and 30 years	23.68 (3.81)	87.80	Whitu	Multidisciplinary	General mental health	Whitu (45)	Waitlist (45)	4, 12	CESD	GAD7
Tighe (2017)	Australia	Indigenous Australians aged 18–35 years	26.25 (8.13)	63.9	ibobbly App	ACT	General mental health	ibobbly App (31)	Waitlist and delayed ibobbly App (30)	6	PHQ9	-

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Toh (2022)	Singapore	Undergraduate university students	22.50 (5.41)	71	Stress-coping	CBT	Psychological stress	Stress-coping (135)	Cooperation: Placebo app (129)	1, 4	PHQ9	GAD7
Torok (2022)	Australia	Young adults from Australia experiencing recent suicidal ideation, aged 18-25 years	21.50 (2.18)	85	LifeBuoy	DBT	Change in suicidal ideation	LifeBuoy (228)	LifeBuoy-C Control: Placebo app (227)	6, 18	PHQ9	GAD7
Tønning (2021)	Denmark	Adult patients with a diagnosis of unipolar depressive disorder	43.94	52.50	Smartphone-based CBT	Multidisciplinary	General mental health	Smartphone-based CBT (59)	Usual care (61)	12, 26	HDRS-17, HDRS-6, BADS, BDI, HAM-D6	-
van Aubel (2020)	Netherlands	Individuals aged 16 to 25 with subthreshold depressive and/or psychotic complaints	21.01	72.73	ACT-DL Con.	ACT	General mental health	ACT-DL Con. (27)	FILM Cond. : Group treatment (28)	6, 26, 52	MADRS, IDS-SR, SCL-D	STAI-T, SCL-A
van Stolk-Cooke (2023)	United States	Adult family members of veterans with PTSD	39 (8.44)	97	PTSD Family Coach	Mutlidisciplinary	General mental health	PTSD Family Coach (104)	Psychoeducation-only app (96)	4	PHQ9	GAD7
Vereschagin (2024)	Canada	University students	20	70.3	Minder App	Multidisciplinary	General mental health	Minder App (743)	Waitlist (746)	4	PHQ9	GAD7
Versluis (2018)	Netherlands	Individuals reporting work stress	43.23 (11.39)	71	MovisensXS, VGZ mindfulness coach application	Multidisciplinary	General mental health	MovisensXS, worry-reduction training, VGZ mindfulness coach application (46)	Moodmonitoring (MovisensXS) (48) Waitlist (42)	2, 4	PHQ9	GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
Vollert (2023)	Germany	individuals who wish to improve their sleep, age ≥18	37.30 (14.24)	62.80	Refresh	CBT	General mental health	Refresh (186)	Waitlist Group (185)	8, 24	PHQ9	-
Vàsquez (2023)	Spain	Caregivers with elevated depressive symptoms	50.0 (9.8)	92.6	CBIA	CBT	Depression	CBIA (58)	CBIA + conference call (54); Attention control group (63)	5	CES-D	-
Wang (2022)	China	Undergraduate nursing students	22.50 (1.50)	85.10	Intervention Group	Nonspecific	General mental health	Intervention Group (57)	Usual care (57)	8, 32	-	STAI
Watson-Singleton (2023)	United States	African Americans	36.06 (12.29)	54.10	BlackFULLness	Mindfulness	General mental health	BlackFULLness (84)	Waitlist (86)	12	DASS-21	DASS-21
Watts (2013)	Australia	Adults self identifying as suffering from mild to moderate depression	41 (12.38)	80	Get Happy	CBT	Depression	Get Happy-Mobile (22)	Get Happy-Computer (30)	8, 12	PHQ9; BDI2	-
WernerSeidler (2023)	Australia	Adolescents (ages 12–16) experiencing insomnia symptoms	14.71 (1.21)	71.30	SleepNinja	CBT	Insomnia	SleepNinja (131)	Active Control: Text message tips (133)	6, 14	PHQ-A	GAD7
Wilhelm (2022)	United States	Adults living in the United States with a primary DSM-5 body dysmorphic disorder (BDD) diagnosis	27 (9.6)	83.75	App-based CBT	CBT	Body Dysmorphic Disorder	App-based CBT (40)	Waitlist (40)	6, 12	QIDS-SR	-
Winslow (2022)	United States	Active duty military personnel with diagnosis or complaint	37.4 (7.7)	20	mHealth App	CBT	General mental health	mHealth App (10)	CBT alone (10); Asymptomatic group (10)	12	DASS-D	DASS-A

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Comparison Group (n)	Follow-up (weeks)	Depression	Anxiety
		of stress and anger										
Wong (2021)	China	Hong Kong residents aged 18 years or older	35.69 (12)	77.36	Lifestyle Hub	Multidisciplinary	General mental health	Lifestyle Hub (53)	Waitlist (53)	8, 12	DASS-D	DASS-A
Yang (2023)	South Korea	Individuals with ASD aged 15–35 and had a total score of ≥39 on the STAI	20.97 (5.06)	10.00	HARU ASD	CBT	Anxiety symptoms	HARU ASD (15)	Waitlist Group (15)	9.43	-	STAI
Yoon (2022)	South Korea	Stressed employees	37.04 (9.25)	48.9	InMind App	Mindfulness	Stress	InMind App (22)	Waitlist (23)	4, 8	MBI	MBI
Zainal (2023)	United States	Clients with GAD and no treatment	20.80 (5.41)	85.5	Mindfulness EMI	Mindfulness	GAD	Mindfulness EMI (68)	Placebo app (42)	2, 4	-	GAD-Q-4-Dimensional
Zainal (2024)	Singapore	Adults with elevated levels of social anxiety symptoms	21.84 (3.37)	78	Mindfulness ecological momentary interventio (MEMI)	Mindfulness	Social anxiety disorder	MEMI (96)	Mood monitoring (95)	2, 6	BDI-2	GAD-Q-4
Zhang a (2023)	China	Women who were 12-20 weeks pregnant with psychological distress	30.29 (4,29)	100	Digital mindfulness-based intervention (Digital MBI)	Mindfulness	Maternal psychological distress	Digital mindfulness-based intervention (Digital MBI) (80)	No intervention (80)	8, 24, 30, 36, 48	EPDS	GAD7
Zhang b (2023)	China	Adults from China with insomnia	49.67 (14.49)	74	DCBT-I - Resleep	CBT	Insomnia	DCBT-I – Resleep (41)	Control group: information resources (41)	6, 10, 18, 30	PHQ9	GAD7
Zhao (2023)	China	Chinese individuals with elevated	25.12 (6.4)	75.6	ACT program	ACT	PTSD	ACT program (78)	Mindfulness (76) Waitlist (67)	4	PHQ9	GAD7

					Mental health app						Outcome measures	
First Author	Country	Population	Mean age (SD)	Female (%)	Name	Technique	Primary Target	Intervention Group (n)	Compariso n Group (n)	Follow-up (weeks)	Depression	Anxiety
Zhou (2023)	China	PTSD symptoms High school students in grades 10 and 11	16.80	43.52	Coping Camp	CBT	General mental health	Coping Camp (275)	No intervention (265)	11, 19	DASS-21	DASS-21

Note. Primary target: Primary target of the intervention. This can be different from the primary outcome if the intervention is primarily targeted to improve a different outcome than depression or anxiety (e.g., PTSD, insmonia, well-being). It was coded as "General mental health" if the primary target was not described. Technique: Primary therapeutic framework the intervention or control group is based on.

Outcome measure questionnaire abbreviations: ACS = Affective Control Scale; ADS = General Depression Scale; BADS = Behavioral Activation for Depression Scale; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BDI-2 = Beck Depression Inventory-2; BDI-FS = Beck Depression Inventory Fast Screen; BSI-A = Brief Symptom Inventory - Anxiety subscale; BSI-D = Brief Symptom Inventory - Depression subscale; CALS = Child and Adolescent Life Satisfaction Scale; CAPE = Community Assessment of Psychic Experiences; CCAPS-Depression = Counseling Center Assessment of Psychological Symptoms 34-item version - Depression subscale; CCAPS-General Anxiety = Counseling Center Assessment of Psychological Symptoms 34-item version - General Anxiety subscale; CCAPS-Social Anxiety = Counseling Center Assessment of Psychological Symptoms 34-item version - Social Anxiety subscale; CDI = Children's Depression Inventory; CDRS-R = Child Depression Rating Scale-Revised; CDS = Calgary Depression Scale; CES-D = Center for Epidemiological Studies Depression Scale; CGAS = Children's Global Assessment Scale; DASS-21 = The Depression Anxiety Stress Scales – 21; DASS-A = Depression, Anxiety, Stress Scale - Anxiety subscale; DASS-D = Depression, Anxiety, Stress Scale - Depression subscale; EPDS = Edinburgh Postnatal Depression Scale; GAD2 = Generalized Anxiety Disorder-2; GAD7 = Generalized Anxiety Disorder-7; GAD-Q-4-Dimensional = Generalised Anxiety Dimensional; GADQ-4 = Generalized Anxiety Disorder Questionnaire – fourth edition; HAM-A = Hamilton Anxiety Rating Scale; HAM-D6 = Hamilton Depression Self-rating Scale 6-item; HADS-A = Hospital Anxiety and Depression Scale - Anxiety subscale; HADS-D = Hospital Anxiety and Depression Scale - Depression subscale; HRSD-17 = Hamilton Rating Scale for Depression-17; IDS-SR = Inventory of Depressive Symptomatology, Self-Report; LSAS-SR = Liebowitz Social Anxiety Scale; MADRS = Montgomery Asberg Depression Rating Scale; MASQ-A = Mood and Anxiety Symptoms Questionnaire; MBI = Mibeong Index; MFQ-Ps = Mood and Feelings Questionnaire - Short Parent Version; MASC = Multidimensional Anxiety Scale for Children; Mini-SPIN = Social Phobia Inventory; PHQ2 = Patient Health Questionnaire-2; PHQ4 = Patient Health Questionnaire–4; PHQ8 = Patient Health Questionnaire-8; PHQ9 = Patient Health

Questionnaire-9; PHQ-A = The Patient Health Questionnaire for Adolescents; PROMIS-A = Patient-Reported Outcomes Measurement Information System Anxiety; PROMIS-D = Patient-Reported Outcomes Measurement Information System Depression; PSRs = Psychiatric Status Ratings; QIDS-C = Quick Inventory of Depressive Symptomatology; QIDS-SR = Quick Inventory of Depressive Symptomatology - Self Report; RADS2 = Reynold's Adolescent Depression Rating Scale - 2nd Edition; SAS-A = Social Anxiety Scale; SCARED = Screen for Child Anxiety and Related Emotional Disorders (subscale generalised anxiety only); SCAS = Spence Children's Anxiety Scale; SCL-A = Symptom Checklist-90-R - Anxiety subscale; SCL-D = Symptom Checklist-90-R - Depression subscale; SIAS = Social Interaction Anxiety Scale; SDS = The Self-Rating Depression Scale; SOPHS = Social Phobia Screener Scale; SPDQ = Social Phobia Diagnostic Questionnaire; STAI = State-Trait Anxiety Inventory; STAI-S = The State–Trait Anxiety Inventory - State anxiety subscale; STAI-T = The State–Trait Anxiety Inventory - Trait anxiety subscale; STAI-X2 = The situation-dependent trait version of State-Trait Anxiety Inventory; TMAS = Taylor Manifest Anxiety Scale.

References (Appendix C)

Abbasalizadeh, M., Farsi, Z., Sajadi, S. A., Atashi, A., & Fournier, A. (2024). The effect of resilience training with mHealth application based on micro-learning method on the stress and anxiety of nurses working in intensive care units: a randomized controlled trial. *BMC Medical Education*, *24*(1). https://doi.org/10.1186/s12909-024-05427-w

Abbott, D., Lack, C. W., & Anderson, P. (2023). Does using a mindfulness app reduce anxiety and worry? A randomized-controlled trial. *Journal of Cognitive Psychotherapy*, *37*(1), 26-42.

Aboody, D., Siev, J., & Doron, G. (2020). Building resilience to body image triggers using brief cognitive training on a mobile application: A randomized controlled trial. *Behaviour Research and Therapy*, *134*, 103723. https://doi.org/10.1016/j.brat.2020.10372

Abramovitch, A., Uwadiale, A., & Robinson, A. (2024). A randomized clinical trial of a gamified app for the treatment of perfectionism. *British Journal of Clinical Psychology*, *63*(1), 73–91. https://doi.org/10.1111/bjc.12444

Ahorsu, D. K., Lin, C., Imani, V., Carlbring, P., Nygårdh, A., Broström, A., Hamilton, K., & Pakpour, A. H. (2020). Testing an app-based intervention to improve insomnia in patients with epilepsy: A randomized controlled trial. *Epilepsy & Behavior*, *112*, 107371. https://doi.org/10.1016/j.yebeh.2020.107371

Akechi, T., Yamaguchi, T., Uchida, M., Imai, F., Momino, K., Katsuki, F., Sakurai, N., Miyaji, T., Mashiko, T., Horikoshi, M., Furukawa, T. A., Yoshimura, A., Ohno, S., Uehiro, N., Higaki, K., Hasegawa, Y., Akahane, K., Uchitomi, Y., & Iwata, H. (2023). Smartphone psychotherapy reduces fear of cancer recurrence among breast cancer survivors: a fully decentralized randomized controlled clinical trial (J-SUPPORT 1703

study). *Journal of Clinical Oncology*, *41*(5), 1069–1078. https://doi.org/10.1200/jco.22.00699

Akin-Sari, B., Inozu, M., Haciomeroglu, A. B., Cekci, B. C., Uzumcu, E., & Doron, G. (2022). Cognitive training via a mobile application to reduce Obsessive-Compulsive-Related Distress and cognitions during the COVID-19 outbreaks: a randomized controlled trial using a subclinical cohort. *Behavior Therapy*, *53*(5), 776–792. https://doi.org/10.1016/j.beth.2021.12.008

Akin-Sari, B., Inozu, M., Haciomeroglu, A. B., Trak, E., Tufan, D., & Doron, G. (2022). Cognitive training using a mobile app as a coping tool against COVID-19 distress: A crossover randomized controlled trial. *Journal Of Affective Disorders*, *311*, 604–613. https://doi.org/10.1016/j.jad.2022.05.118

Al-Refae, M., Al-Refae, A., Munroe, M., Sardella, N. A., & Ferrari, M. (2021). A Self-Compassion and Mindfulness-Based Cognitive Mobile Intervention (SERENE) for depression, anxiety, and stress: promoting adaptive emotional regulation and wisdom. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.648087

Anastasiadou, D., Folkvord, F., Brugnera, A., Vinader, L. C., SerranoTroncoso, E., Jardí, C. C., Bertolin, R. L., Rodríguez, R. M., Nuñez, B. M., Berna, M. G., Torralbas-Ortega, J., Torrent-Solà, L., Puntí-Vidal, J., Ferrer, M. C., Domenjó, A. M., Marsa, M. D., Gunnard, K., Cusido, J., Cunillera, J. A., & Lupiañez-Villanueva, F. (2020). An mHealth intervention for the treatment of patients with an eating disorder: A multicenter randomized controlled trial. *International Journal of Eating Disorders*, *53*(7), 1120–1131. https://doi.org/10.1002/eat.23286

Araya, R., Menezes, P. R., Claro, H. G., Brandt, L. R., Daley, K. L., Quayle, J., Diez-Canseco, F., Peters, T. J., Cruz, D. V., Toyama, M., Aschar, S., Hidalgo-Padilla, L., Martins, H., Cavero, V., Rocha, T., Scotton, G., De Almeida Lopes, I. F., Begale, M.,

Mohr, D. C., & Miranda, J. J. (2021). Effect of a digital intervention on depressive symptoms in patients with comorbid hypertension or diabetes in Brazil and Peru. *JAMA*, *325*(18), 1852. https://doi.org/10.1001/jama.2021.4348

Arean, P. A., Hallgren, K. A., Jordan, J. T., Gazzaley, A., Atkins, D. C., Heagerty, P. J., & Anguera, J. A. (2016). The use and effectiveness of mobile apps for depression: results from a fully remote clinical trial. *Journal of Medical Internet Research*, *18*(12). https://doi.org/10.2196/jmir.6482

Bakker, D., Kazantzis, N., Rickwood, D., & Rickard, N. (2018). A randomized controlled trial of three smartphone apps for enhancing public mental health. *Behaviour Research and Therapy*, *109*, 75–83. https://doi.org/10.1016/j.brat.2018.08.003

Barroso, J., Madisetti, M., & Mueller, M. (2019). A feasibility study to develop and test a Cognitive Behavioral Stress Management mobile Health application for HIV-Related Fatigue. *Journal of Pain and Symptom Management*, *59*(2), 242–253. https://doi.org/10.1016/j.jpainsymman.2019.09.009

Bear, K. A., Barber, C. C., & Medvedev, O. N. (2022). The impact of a mindfulness app on postnatal distress. *Mindfulness*, *13*(11), 2765–2776. https://doi.org/10.1007/s12671-022-01992-7

Bell, I., Arnold, C., Gilbertson, T., D'Alfonso, S., Castagnini, E., Chen, N., Nicholas, J., O'Sullivan, S., Valentine, L., & Alvarez-Jimenez, M. (2023). A personalized, transdiagnostic smartphone intervention (MELLO) targeting repetitive negative thinking in young people with depression and anxiety: pilot randomized controlled trial. *Journal of Medical Internet Research*, *25*, e47860. https://doi.org/10.2196/47860

Ben-Zeev, D., Brian, R. M., Jonathan, G., Razzano, L., Pashka, N., Carpenter-Song, E., Drake, R. E., & Scherer, E. A. (2018). Mobile Health (MHealth) versus Clinic-Based

Group Intervention for People with Serious Mental Illness: a randomized controlled trial. *Psychiatric Services*, *69*(9), 978–985. https://doi.org/10.1176/appi.ps.201800063

Ben-Zeev, D., Chander, A., Tauscher, J., Buck, B., Nepal, S., Campbell, A., & Doron, G. (2021). A smartphone intervention for people with serious mental illness: fully remote randomized controlled trial of CORE. *Journal of Medical Internet Research*, *23*(11). https://doi.org/10.2196/29201

Bhayee, S., Tomaszewski, P., Lee, D. H., Moffat, G., Pino, L., Moreno, S., & Farb, N. a. S. (2016). Attentional and affective consequences of technology supported mindfulness training: a randomised, active control, efficacy trial. *BMC Psychology*, *4*(1). https://doi.org/10.1186/s40359-016-0168-6

Birney, A. J., Gunn, R., Russell, J. K., & Ary, D. V. (2016). MoodHacker Mobile web app with email for adults to Self-Manage Mild-to-Moderate Depression: Randomized Controlled trial. *JMIR Mhealth and Uhealth*, *4*(1). https://doi.org/10.2196/mhealth.4231

Birrell, L., Debenham, J., Furneaux-Bate, A., Prior, K., Spallek, S., Thornton, L., Chapman, C., & Newton, N. (2023). Evaluating a Peer-Support mobile app for mental health and substance use among adolescents over 12 months during the COVID-19 pandemic: randomized controlled trial. *Journal of Medical Internet Research*, *25.* https://doi.org/10.2196/45216

Boettcher, J., Magnusson, K., Marklund, A., Berglund, E., Blomdahl, R., Braun, U., Delin, L., Lundén, C., Sjöblom, K., Sommer, D., Von Weber, K., Andersson, G., & Carlbring, P. (2018). Adding a smartphone app to internet-based self-help for social anxiety: A randomized controlled trial. *Computers in Human Behavior*, *87*, 98–108. https://doi.org/10.1016/j.chb.2018.04.052

Borjalilu, S., Mazaheri, M. A., & Talebpour, A. (2019). Effectiveness of Mindfulness-Based stress management in the mental health of Iranian university students: a comparison of blended therapy, Face-to-Face sessions, and mHealth App (Aramgar). *Iranian Journal of Psychiatry and Behavioral Sciences*, *13*(2). https://doi.org/10.5812/ijpbs.84726

Børøsund, E., Ehlers, S. L., Clark, M. M., Andrykowski, M. A., Småstuen, M. C., & Nes, L. S. (2021). Digital stress management in cancer: Testing StressProffen in a 12-month randomized controlled trial. *Cancer*, *128*(7), 1503–1512. https://doi.org/10.1002/cncr.34046

Børøsund, E., Ehlers, S. L., Varsi, C., Clark, M. M., Andrykowski, M. A., Cvancarova, M., & Nes, L. S. (2020). Results from a randomized controlled trial testing StressProffen; an application-based stress-management intervention for cancer survivors. *Cancer Medicine*, *9*(11), 3775–3785. https://doi.org/10.1002/cam4.3000

Bostock, S., Crosswell, A. D., Prather, A. A., & Steptoe, A. (2019). Mindfulness on-the-go: Effects of a mindfulness meditation app on work stress and well-being. *Journal of Occupational Health Psychology*, *24*(1), 127–138. https://doi.org/10.1037/ocp0000118

Bostock, S., Luik, A. I., & Espie, C. A. (2016). Sleep and Productivity Benefits of Digital Cognitive Behavioral therapy for insomnia. *Journal of Occupational and Environmental Medicine*, *58*(7), 683–689. https://doi.org/10.1097/jom.0000000000000778

Bröcker, E., Olff, M., Suliman, S., Kidd, M., Greyvenstein, L., & Seedat, S. (2024). A counsellor-supported 'PTSD Coach' intervention versus enhanced treatment as usual in a resource-constrained setting: A randomised controlled trial. *Cambridge Prisms Global Mental Health*, 1–25. https://doi.org/10.1017/gmh.2023.92

Brouwer, M. E., Williams, A. D., Forand, N. R., DeRubeis, R. J., & Bockting, C. L. (2018). Dysfunctional attitudes or extreme response style as predictors of depressive relapse and recurrence after mobile cognitive therapy for recurrent depression. *Journal Of Affective Disorders*, *243*, 48–54. https://doi.org/10.1016/j.jad.2018.09.002

Bruehlman-Senecal, E., Hook, C. J., Pfeifer, J. H., FitzGerald, C., Davis, B., Delucchi, K. L., Haritatos, J., & Ramo, D. E. (2020). Smartphone app to address loneliness among college students: pilot randomized controlled trial. *JMIR Mental Health*, *7*(10), e21496. https://doi.org/10.2196/21496

Bruhns, A., Baumeister, A., Demeroutis, G., Jahn, H., Willenborg, B., Shaffy, A., Moritz, S., & Bücker, L. (2023a). A mobile-based aftercare intervention to increase self-esteem in inpatients diagnosed with depression: A randomized controlled trial. *Psychotherapy Research*, *33*(6), 783–802. https://doi.org/10.1080/10503307.2022.2157226

Bruhns, A., Baumeister, A., Demeroutis, G., Jahn, H., Willenborg, B., Shaffy, A., Moritz, S., & Bücker, L. (2023b). A mobile-based aftercare intervention to increase self-esteem in inpatients diagnosed with depression: A randomized controlled trial. *Psychotherapy Research*, *33*(6), 783–802. https://doi.org/10.1080/10503307.2022.2157226

Bruhns, A., Lüdtke, T., Moritz, S., & Bücker, L. (2021). A Mobile-Based intervention to increase self-esteem in students with depressive symptoms: randomized controlled trial. *JMIR Mhealth and Uhealth*, *9*(7), e26498. https://doi.org/10.2196/26498

Cardi, V., Meregalli, V., Di Rosa, E., Derrigo, R., Faustini, C., Keeler, J. L., Favaro, A., Treasure, J., & Lawrence, N. (2022). A community-based feasibility randomized controlled study to test food-specific inhibitory control training in people with disinhibited eating during COVID-19 in Italy. *Eating and Weight Disorders - Studies on Anorexia Bulimia and Obesity*, *27*(7), 2745–2757. https://doi.org/10.1007/s40519-022-01411-9

Carli, V., Petros, N. G., Hadlaczky, G., Vitcheva, T., Berchialla, P., Bianchi, S., Carletto, S., Christinaki, E., Citi, L., Ottaviano, M., Ouakinin, S., Papastylianou, T., . . . Valenza, G. (2022). The NEVERMIND e-health system in the treatment of depressive symptoms among patients with severe somatic conditions: A multicentre, pragmatic randomised controlled trial. *EClinicalMedicine*, *48*, 101423. https://doi.org/10.1016/j.eclinm.2022.101423

Catuara-Solarz, S., Skorulski, B., Estella-Aguerri, I., Avella-Garcia, C. B., Shepherd, S., Stott, E., Hemmings, N. R., De Villa, A. R., Schulze, L., & Dix, S. (2021). The efficacy of "Foundations," a digital mental health app to improve mental well-being during COVID-19: Proof-of-Principle randomized controlled trial. *JMIR Mhealth and Uhealth*, *10*(7), e30976. https://doi.org/10.2196/30976

Cerea, S., Doron, G., Manoli, T., Patania, F., Bottesi, G., & Ghisi, M. (2022). Cognitive training via a mobile application to reduce some forms of body dissatisfaction in young females at high-risk for body image disorders: A randomized controlled trial. *Body Image*, *42*, 297–306. https://doi.org/10.1016/j.bodyim.2022.07.010

Cerea, S., Ghisi, M., Bottesi, G., Carraro, E., Broggio, D., & Doron, G. (2020). Reaching reliable change using short, daily, cognitive training exercises delivered on a mobile application: The case of Relationship Obsessive Compulsive Disorder (ROCD) symptoms and cognitions in a subclinical cohort. *Journal Of Affective Disorders*, *276*, 775–787. https://doi.org/10.1016/j.jad.2020.07.043

Chan, C. S., Wong, C. Y. F., Yu, B. Y. M., Hui, V. K. Y., Ho, F. Y. Y., & Cuijpers, P. (2021). Treating depression with a smartphone-delivered self-help cognitive behavioral therapy for insomnia: a parallel-group randomized controlled trial. *Psychological Medicine*, *53*(5), 1799–1813. https://doi.org/10.1017/s0033291721003421

Comtois, K. A., Mata-Greve, F., Johnson, M., Pullmann, M. D., Mosser, B., & Arean, P. (2022). Effectiveness of mental health apps for distress during COVID-19 in US Unemployed and Essential Workers: Remote Pragmatic Randomized clinical trial. *JMIR Mhealth and Uhealth*, *10*(11). https://doi.org/10.2196/41689

Cox, C. E., Hough, C. L., Jones, D. M., Ungar, A., Reagan, W., Key, M. D., Gremore, T., Olsen, M. K., Sanders, L., Greeson, J. M., & Porter, L. S. (2018). Effects of mindfulness training programmes delivered by a self-directed mobile app and by telephone compared with an education programme for survivors of critical illness: a pilot randomised clinical trial. *Thorax*, *74*(1), 33–42. https://doi.org/10.1136/thoraxjnl-2017-211264

Cox, C. E., Kelleher, S. A., Parish, A., Olsen, M. K., Bermejo, S., Dempsey, K., Jaggers, J., Hough, C. L., Moss, M., & Porter, L. S. (2023). Feasibility of Mobile App-based Coping Skills Training for Cardiorespiratory Failure Survivors: The Blueprint Pilot Randomized Controlled Trial. *Annals Of The American Thoracic Society*, *20*(6), 861–871. https://doi.org/10.1513/annalsats.202210-890oc

Dahne, J., Collado, A., Lejuez, C., Risco, C. M., Diaz, V. A., Coles, L., Kustanowitz, J., Zvolensky, M. J., & Carpenter, M. J. (2019). Pilot randomized controlled trial of a Spanish-language Behavioral Activation mobile app (¡Aptívate!) for the treatment of depressive symptoms among united states Latinx adults with limited English proficiency. *Journal of Affective Disorders*, *250*, 210–217. https://doi.org/10.1016/j.jad.2019.03.009

Dahne, J., Lejuez, C., Diaz, V. A., Player, M. S., Kustanowitz, J., Felton, J. W., & Carpenter, M. J. (2019). Pilot randomized trial of a Self-Help Behavioral Activation Mobile App for utilization in primary care. *Behavior Therapy*, *50*(4), 817–827. https://doi.org/10.1016/j.beth.2018.12.003

Danieli, M., Ciulli, T., Mousavi, S. M., Silvestri, G., Barbato, S., Di Natale, L., & Riccardi, G. (2022). Assessing the impact of conversational artificial intelligence in the treatment of stress and anxiety in aging Adults: randomized controlled trial. *JMIR Mental Health*, *9*(9), e38067. https://doi.org/10.2196/38067

De Kock, J. H., Latham, H. A., Cowden, R. G., Cullen, B., Narzisi, K., Jerdan, S., Munoz, S., Leslie, S. J., Stamatis, A., & Eze, J. (2022). Brief digital interventions to support the psychological well-being of NHS staff during the COVID-19 pandemic: 3-ARM Pilot randomized controlled trial. *JMIR Mental Health*, *9*(4). https://doi.org/10.2196/34002

Deady, M., Collins, D. a. J., Lavender, I., Mackinnon, A., Glozier, N., Bryant, R., Christensen, H., & Harvey, S. B. (2023). Selective prevention of depression in workers using a smartphone app: randomized controlled trial. *Journal of Medical Internet Research*, *25*, e45963. https://doi.org/10.2196/45963

Deady, M., Glozier, N., Calvo, R., Johnston, D., Mackinnon, A., Milne, D., Choi, I., Gayed, A., Peters, D., Bryant, R., Christensen, H., & Harvey, S. B. (2022). Preventing depression using a smartphone app: a randomized controlled trial. *Psychological Medicine*, *52*(3), 457–466. https://doi.org/10.1017/s0033291720002081

Dennis-Tiwary, T. A., Denefrio, S., & Gelber, S. (2018). Salutary effects of an attention bias modification mobile application on biobehavioral measures of stress and anxiety during pregnancy. *Biological Psychology*, *127*, 148–156. https://doi.org/10.1016/j.biopsycho.2017.05.003

Depp, C. A., Ceglowski, J., Wang, V. C., Yaghouti, F., Mausbach, B. T., Thompson, W. K., & Granholm, E. L. (2014). Augmenting psychoeducation with a mobile intervention for bipolar disorder: A randomized controlled trial. *Journal Of Affective Disorders*, *174*, 23–30. https://doi.org/10.1016/j.jad.2014.10.053

DiNardo, M. M., Greco, C., Phares, A. D., Beyer, N. M., Youk, A. O., Obrosky, D. S., Morone, N. E., Owen, J. E., Saba, S. K., Suss, S. J., & Siminerio, L. (2022). Effects of an integrated mindfulness intervention for veterans with diabetes distress: a randomized controlled trial. *BMJ Open Diabetes Research & Care*, *10*(2). https://doi.org/10.1136/bmjdrc-2021-002631

Dingwall, K. M., Sweet, M., Cass, A., Hughes, J. T., Kavanagh, D., Howard, K., Barzi, F., Brown, S., Sajiv, C., Majoni, S. W., & Nagel, T. (2021). Effectiveness of Wellbeing Intervention for Chronic Kidney Disease (WICKD): results of a randomised controlled trial. *BMC Nephrology*, *22*(1). https://doi.org/10.1186/s12882-021-02344-8

Ditton, E., Knott, B., Hodyl, N., Horton, G., Oldmeadow, C., Walker, F. R., & Nilsson, M. (2023). Evaluation of an APP-Delivered Psychological Flexibility Skill Training Intervention for medical student burnout and Well-being: randomized controlled trial. *JMIR Mental Health*, *10*. https://doi.org/10.2196/42566

Domar, A. D., Jasulaitis, L., Matevossian, K., Jasulaitis, S., Grill, E. A., & Meike, L. U. (2023). The impact of the FertiStrong mobile application on anxiety and depression in Men: a randomised control pilot study. *Journal of Human Reproductive Sciences*, *16*(3), 195–203. https://doi.org/10.4103/jhrs.jhrs_75_23

Donker, T., Fehribach, J., Van Klaveren, C., Cornelisz, I., Toffolo, M. B. J., Van Straten, A., & Van Gelder, J. (2022). Automated mobile virtual reality cognitive behavior therapy for aviophobia in a natural setting: a randomized controlled trial. *Psychological Medicine*, *53*(13), 6232–6241. https://doi.org/10.1017/s0033291722003531

Donker, T., Van Esveld, S., Fischer, N., & Van Straten, A. (2018). 0Phobia – towards a virtual cure for acrophobia: study protocol for a randomized controlled trial. *Trials*, *19*(1). https://doi.org/10.1186/s13063-018-2704-6

Economides, M., Bolton, H., Male, R., & Cavanagh, K. (2021). Feasibility and preliminary efficacy of Web-Based and mobile interventions for common mental health problems in working adults: Multi-Arm randomized pilot trial. *JMIR Formative Research*, *6*(3), e34032. https://doi.org/10.2196/34032

El-Jawahri, A., Luskin, M. R., Greer, J. A., Traeger, L., Lavoie, M., Vaughn, D. M., Andrews, S., Yang, D., Boateng, K. Y., Newcomb, R. A., Ufere, N. N., Fathi, A. T., Hobbs, G., Brunner, A., Abel, G. A., Stone, R. M., DeAngelo, D. J., Wadleigh, M., & Temel, J. S. (2023). Psychological mobile app for patients with acute myeloid leukemia: A pilot randomized clinical trial. *Cancer*, *129*(7), 1075–1084. https://doi.org/10.1002/cncr.34645

Enock, P. M., Hofmann, S. G., & McNally, R. J. (2014). Attention Bias Modification training via smartphone to reduce social anxiety: a Randomized, Controlled Multi-Session experiment. *Cognitive Therapy and Research*, *38*(2), 200–216. https://doi.org/10.1007/s10608-014-9606-z

Faurholt-Jepsen, M., Tønning, M. L., Fros, M., Martiny, K., Tuxen, N., Rosenberg, N., Busk, J., Winther, O., Thaysen-Petersen, D., Aamund, K. A., Tolderlund, L., Bardram, J. E., & Kessing, L. V. (2021). Reducing the rate of psychiatric re-admissions in bipolar disorder using smartphones—The RADMIS trial. *Acta Psychiatrica Scandinavica*, *143*(5), 453–465. https://doi.org/10.1111/acps.13274

Fiol-DeRoque, M. A., Serrano-Ripoll, M. J., Jiménez, R., Zamanillo-Campos, R., Yáñez-Juan, A. M., Bennasar-Veny, M., Leiva, A., Gervilla, E., García-Buades, M. E., García-Toro, M., Alonso-Coello, P., Pastor-Moreno, G., Ruiz-Pérez, I., Sitges, C., García-Campayo, J., Llobera-Cánaves, J., & Ricci-Cabello, I. (2021). A Mobile Phone–Based Intervention to reduce mental health problems in health care workers

during the COVID-19 pandemic (PsyCOvidApp): randomized controlled trial. *JMIR Mhealth and Uhealth*, *9*(5), e27039. https://doi.org/10.2196/27039

Fish, M. T., & Saul, A. D. (2019). The Gamification of Meditation: A Randomized-Controlled Study of a Prescribed Mobile Mindfulness Meditation Application in Reducing College Students' Depression. *Simulation & Gaming*, *50*(4), 419–435. https://doi.org/10.1177/1046878119851821

Fitzpatrick, K. K., Darcy, A., & Vierhile, M. (2017). Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial. *JMIR Mental Health*, *4*(2), e19. https://doi.org/10.2196/mental.7785

Flett, J. a. M., Hayne, H., Riordan, B. C., Thompson, L. M., & Conner, T. S. (2018). Mobile Mindfulness Meditation: a Randomised Controlled Trial of the Effect of Two Popular Apps on Mental Health. *Mindfulness*, *10*(5), 863–876. https://doi.org/10.1007/s12671-018-1050-9

Forman-Hoffman, V. L., Sihvonen, S., Wielgosz, J., Kuhn, E., Nelson, B. W., Peiper, N. C., & Gould, C. E. (2024). Therapist-supported digital mental health intervention for depressive symptoms: A randomized clinical trial. *Journal of Affective Disorders*, *349*, 494–501. https://doi.org/10.1016/j.jad.2024.01.057

Fuller-Tyszkiewicz, M., Richardson, B., Little, K., Teague, S., Hartley-Clark, L., Capic, T., Khor, S., Cummins, R. A., Olsson, C. A., & Hutchinson, D. (2020). Efficacy of a smartphone app intervention for reducing caregiver stress: randomized controlled trial. *JMIR Mental Health*, *7*(7), e17541. https://doi.org/10.2196/17541

Gao, M., Roy, A., Deluty, A., Sharkey, K. M., Hoge, E. A., Liu, T., & Brewer, J. A. (2022). Targeting Anxiety to Improve Sleep Disturbance: A Randomized Clinical Trial of

App-Based Mindfulness Training. *Psychosomatic Medicine*, *84*(5), 632–642. https://doi.org/10.1097/psy.0000000000001083

Gao, Y., Shi, L., Fu, N., Yang, N., Weeks-Gariepy, T., & Mao, Y. (2024). Mobile-delivered mindfulness intervention on Anxiety Level among College Athletes: A Randomized Controlled Trial (Preprint). *Journal Of Medical Internet Research*, *26*, e40406. https://doi.org/10.2196/40406

Gee, B. L., Batterham, P. J., Gulliver, A., Reynolds, J., & Griffiths, K. M. (2021). An Ecological Momentary Intervention for people with social anxiety: A descriptive case study. *Informatics For Health And Social Care*, *46*(4), 370–398. https://doi.org/10.1080/17538157.2021.1896525

Ghaemi, S. N., Sverdlov, O., Van Dam, J., Campellone, T., & Gerwien, R. (2022). A Smartphone-Based Intervention as an adjunct to Standard-of-Care Treatment for schizophrenia: randomized controlled trial. *JMIR Formative Research*, *6*(3). https://doi.org/10.2196/29154

Ghanbari, E., Yektatalab, S., & Mehrabi, M. (2021). Effects of psychoeducational interventions using mobile apps and Mobile-Based Online group Discussions on Anxiety and Self-Esteem in Women with Breast Cancer: randomized controlled trial. *JMIR Mhealth and Uhealth*, *9*(5). https://doi.org/10.2196/19262

Gnanapragasam, S. N., Tinch-Taylor, R., Scott, H. R., Hegarty, S., Souliou, E., Bhundia, R., Lamb, D., Weston, D., Greenberg, N., Madan, I., Stevelink, S., Raine, R., Carter, B., & Wessely, S. (2023). Multicentre, England-wide randomised controlled trial of the 'Foundations' smartphone application in improving mental health and well-being in a healthcare worker population. *The British Journal of Psychiatry*, *222*(2), 58–66. https://doi.org/10.1192/bjp.2022.10

Goldberg, S. B., Imhoff-Smith, T., Bolt, D. M., Wilson-Mendenhall, C. D., Dahl, C. J., Davidson, R. J., & Rosenkranz, M. A. (2020). Testing the Efficacy of a Multicomponent, Self-Guided, Smartphone-Based Meditation App: Three-Armed Randomized Controlled Trial. *JMIR Mental Health*, *7*(11), e23825. https://doi.org/10.2196/23825

Graham, A. K., Greene, C. J., Kwasny, M. J., Kaiser, S. M., Lieponis, P., Powell, T., & Mohr, D. C. (2020). Coached mobile app platform for the treatment of depression and anxiety among primary care patients. *JAMA Psychiatry*, *77*(9), 906. https://doi.org/10.1001/jamapsychiatry.2020.1011

Greer, J. A., Jacobs, J., Pensak, N., MacDonald, J. J., Fuh, C., Perez, G. K., Ward, A., Tallen, C., Muzikansky, A., Traeger, L., Penedo, F. J., El-Jawahri, A., Safren, S. A., Pirl, W. F., & Temel, J. S. (2019). Randomized Trial of a Tailored Cognitive-Behavioral Therapy Mobile Application for Anxiety in Patients with Incurable Cancer. *The Oncologist*, *24*(8), 1111–1120. https://doi.org/10.1634/theoncologist.2018-0536

Grubbs, K. M., Abraham, T. H., Pyne, J. M., Greene, C. J., Teng, E. J., & Fortney, J. C. (2022). Enhancing Problem-Solving therapy with smartphone Technology: a pilot randomized controlled trial. *Psychiatric Services*, *73*(7), 805–808. https://doi.org/10.1176/appi.ps.201900254

Guo, Y., Hong, Y. A., Cai, W., Li, L., Hao, Y., Qiao, J., Xu, Z., Zhang, H., Zeng, C., Liu, C., Li, Y., Zhu, M., Zeng, Y., & Penedo, F. J. (2020). Effect of a WeChat-Based intervention (Run4Love) on depressive symptoms among people living with HIV in China: a randomized controlled trial. *Journal of Medical Internet Research*, *22*(2), e16715. https://doi.org/10.2196/16715

Ha, S. W., & Kim, J. (2020). Designing a Scalable, Accessible, and Effective Mobile App Based Solution for Common Mental Health Problems. *International Journal Of*

Human-Computer Interaction, *36*(14), 1354–1367. https://doi.org/10.1080/10447318.2020.1750792

Ham, K., Chin, S., Suh, Y. J., Rhee, M., Yu, E., Lee, H. J., Kim, J., Kim, S. W., Koh, S., & Chung, K. (2019). Preliminary Results From a Randomized Controlled Study for an App-Based Cognitive Behavioral Therapy Program for Depression and Anxiety in Cancer Patients. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01592

Hanssen, E., Balvert, S., Oorschot, M., Borkelmans, K., Van Os, J., Delespaul, P., & Fett, A. (2019). An ecological momentary intervention incorporating personalised feedback to improve symptoms and social functioning in schizophrenia spectrum disorders. *Psychiatry Research*, *284*, 112695. https://doi.org/10.1016/j.psychres.2019.112695

He, Y., Yang, L., Zhu, X., Wu, B., Zhang, S., Qian, C., & Tian, T. (2022). Mental health chatbot for young adults with depressive symptoms during the COVID-19 pandemic: Single-Blind, Three-Arm randomized controlled trial. *Journal of Medical Internet Research*, *24*(11), e40719. https://doi.org/10.2196/40719

Heim, E., Ramia, J. A., Hana, R. A., Burchert, S., Carswell, K., Cornelisz, I., Cuijpers, P., Chammay, R. E., Noun, P., Van Klaveren, C., Van Ommeren, M., Zoghbi, E., & Hof, E. V. (2021). Step-by-step: Feasibility randomised controlled trial of a mobile-based intervention for depression among populations affected by adversity in Lebanon. *Internet Interventions*, *24*, 100380. https://doi.org/10.1016/j.invent.2021.100380

Hensler, I., Sveen, J., Cernvall, M., & Arnberg, F. K. (2022). Efficacy, Benefits, and Harms of a Self-management App in a Swedish Trauma-Exposed Community Sample (PTSD Coach): Randomized Controlled Trial. *Journal Of Medical Internet Research*, *24*(3), e31419. https://doi.org/10.2196/31419

Hilt, L. M., Swords, C. M., & Webb, C. A. (2023). Randomized controlled trial of a mindfulness mobile application for ruminative adolescents. *Journal of Clinical Child & Adolescent Psychology*, 1–14. https://doi.org/10.1080/15374416.2022.2158840

Hirshberg, M. J., Frye, C., Dahl, C. J., Riordan, K. M., Vack, N. J., Sachs, J., Goldman, R., Davidson, R. J., & Goldberg, S. B. (2022). A randomized controlled trial of a smartphone-based well-being training in public school system employees during the COVID-19 pandemic. *Journal of Educational Psychology*, *114*(8), 1895–1911. https://doi.org/10.1037/edu0000739

Horsch, C. H., Lancee, J., Griffioen-Both, F., Spruit, S., Fitrianie, S., Neerincx, M. A., Beun, R. J., & Brinkman, W. (2017). Mobile Phone-Delivered Cognitive Behavioral Therapy for Insomnia: A Randomized Waitlist Controlled Trial. *Journal Of Medical Internet Research*, *19*(4), e70. https://doi.org/10.2196/jmir.6524

Howells, A., Ivtzan, I., & Eiroa-Orosa, F. J. (2016). Putting the 'app' in Happiness: A Randomised Controlled Trial of a Smartphone-Based Mindfulness Intervention to Enhance Wellbeing. *Journal of Happiness Studies*, *17*(1), 163–185. https://doi.org/10.1007/s10902-014-9589-1

Huberty, J. L., Espel-Huynh, H. M., Neher, T. L., & Puzia, M. E. (2022). Testing the Pragmatic Effectiveness of a Consumer-Based Mindfulness Mobile App in the Workplace: Randomized controlled trial. *JMIR Mhealth and Uhealth*, *10*(9). https://doi.org/10.2196/38903

Huberty, J., Puzia, M. E., Green, J., Vlisides-Henry, R. D., Larkey, L., Irwin, M. R., & Vranceanu, A. (2021). A mindfulness meditation mobile app improves depression and anxiety in adults with sleep disturbance: Analysis from a randomized controlled trial. *General Hospital Psychiatry*, *73*, 30–37. https://doi.org/10.1016/j.genhosppsych.2021.09.004

Hunt, M., Miguez, S., Dukas, B., Onwude, O., & White, S. (2021). Efficacy of Zemedy, a Mobile Digital Therapeutic for the Self-management of Irritable Bowel Syndrome: Crossover Randomized Controlled Trial. *JMIR Mhealth And Uhealth*, *9*(5), e26152. https://doi.org/10.2196/26152

Hur, J., Kim, B., Park, D., & Choi, S. (2018). A Scenario-Based Cognitive Behavioral Therapy Mobile App to Reduce Dysfunctional Beliefs in Individuals with Depression: A Randomized Controlled Trial. *Telemedicine Journal And e-Health*, *24*(9), 710–716. https://doi.org/10.1089/tmj.2017.0214

Hwang, H., Kim, S. M., Netterstrøm, B., & Han, D. H. (2022). The Efficacy of a Smartphone-Based App on Stress Reduction: Randomized Controlled trial. *Journal of Medical Internet Research*, *24*(2). https://doi.org/10.2196/28703

Hwang, W. J., & Jo, H. H. (2019). Evaluation of the effectiveness of Mobile App-Based Stress-Management Program: a randomized controlled trial. *International Journal of Environmental Research and Public Health*, *16*(21), 4270. https://doi.org/10.3390/ijerph16214270

Imamura, K., Tran, T. T. T., Nguyen, H. T., Sasaki, N., Kuribayashi, K., Sakuraya, A., Bui, T. M., Nguyen, A. Q., Nguyen, Q. T., Nguyen, N. T., Nguyen, K. T., Nguyen, G. T. H., Tran, X. T. N., Truong, T. Q., Zhang, M. W., Minas, H., Sekiya, Y., Watanabe, K., Tsutsumi, A., & Kawakami, N. (2021). Effect of smartphone-based stress management programs on depression and anxiety of hospital nurses in Vietnam: a three-arm randomized controlled trial. *Scientific Reports*, *11*(1). https://doi.org/10.1038/s41598-021-90320-5

Jannati, N., Mazhari, S., Ahmadian, L., & Mirzaee, M. (2020). Effectiveness of an app-based cognitive behavioral therapy program for postpartum depression in primary care: A

randomized controlled trial. *International Journal Of Medical Informatics*, *141*, 104145. https://doi.org/10.1016/j.ijmedinf.2020.104145

Järvelä-Reijonen, E., Puttonen, S., Karhunen, L., Sairanen, E., Laitinen, J., Kolehmainen, M., Pihlajamäki, J., Kujala, U. M., Korpela, R., Ermes, M., Lappalainen, R., & Kolehmainen, M. (2020). The Effects of Acceptance and Commitment Therapy (ACT) Intervention on Inflammation and Stress Biomarkers: a Randomized Controlled Trial. *International Journal of Behavioral Medicine*, *27*(5), 539–555. https://doi.org/10.1007/s12529-020-09891-8

Kageyama, K., Kato, Y., Mesaki, T., Uchida, H., Takahashi, K., Marume, R., Sejima, Y., & Hirao, K. (2021). Effects of video viewing smartphone application intervention involving positive word stimulation in people with subthreshold depression: A pilot randomized controlled trial. *Journal of Affective Disorders*, *282*, 74–81. https://doi.org/10.1016/j.jad.2020.12.104

Kauer, S. D., Reid, S. C., Crooke, A. H. D., Khor, A., Hearps, S. J. C., Jorm, A. F., Sanci, L., & Patton, G. (2012). Self-monitoring Using Mobile Phones in the Early Stages of Adolescent Depression: Randomized Controlled Trial. *Journal Of Medical Internet Research*, *14*(3), e67. https://doi.org/10.2196/jmir.1858

Keng, S., Chin, J. W. E., Mammadova, M., & Teo, I. (2022). Effects of Mobile App-Based Mindfulness Practice on Healthcare Workers: a Randomized Active Controlled Trial. *Mindfulness*, *13*(11), 2691–2704. https://doi.org/10.1007/s12671-022-01975-8

Kenny, R., Fitzgerald, A., Segurado, R., & Dooley, B. (2019). Is there an app for that? A cluster randomised controlled trial of a mobile app–based mental health intervention. *Health Informatics Journal*, *26*(3), 1538–1559. https://doi.org/10.1177/1460458219884195

Kerber, A., Beintner, I., Burchert, S., & Knaevelsrud, C. (2023). Effects of a Self-Guided Transdiagnostic Smartphone App on Patient Empowerment and Mental Health: Randomized Controlled Trial. *JMIR Mental Health*, *10*, e45068. https://doi.org/10.2196/45068

Kim, K., Hwang, H., Bae, S., Kim, S. M., & Han, D. H. (2024). The effectiveness of digital app for reduction of clinical symptoms in individuals with panic disorder: a randomized controlled trial (Preprint). *Journal of Medical Internet Research*, *26*. https://doi.org/10.2196/51428

Kirykowicz, K., Jaworski, B., Owen, J., Kirschbaum, C., Seedat, S., & Van Den Heuvel, L. L. (2023). Feasibility, acceptability and preliminary efficacy of a mental health self-management app in clinicians working during the COVID-19 pandemic: A pilot randomised controlled trial. *Psychiatry Research*, *329*, 115493. https://doi.org/10.1016/j.psychres.2023.115493

Kloos, N., Austin, J., Van 'T Klooster, J., Drossaert, C., & Bohlmeijer, E. (2022). Appreciating the good things in life during the COVID-19 pandemic: a randomized controlled trial and evaluation of a gratitude app. *Journal of Happiness Studies*, *23*(8), 4001–4025. https://doi.org/10.1007/s10902-022-00586-3

Kollei, I., Lukas, C. A., Loeber, S., & Berking, M. (2017). An app-based blended intervention to reduce body dissatisfaction: A randomized controlled pilot study. *Journal Of Consulting And Clinical Psychology*, *85*(11), 1104–1108. https://doi.org/10.1037/ccp0000246

Kosasih, F. R., Yee, V. T. S., Toh, S. H. Y., & Sündermann, O. (2023). Efficacy of Intellect's self-guided anxiety and worry mobile health programme: A randomized controlled trial with an active control and a 2-week follow-up. *PLOS Digital Health*, *2*(5), e0000095. https://doi.org/10.1371/journal.pdig.0000095

Krafft, J., Potts, S., Schoendorff, B., & , M. E. (2019). A Randomized Controlled Trial of Multiple Versions of an Acceptance and Commitment Therapy Matrix App for Well-Being. *Behavior Modification*, *43*(2), 246–272. https://doi.org/10.1177/0145445517748561

Kubo, A., Kurtovich, E., McGinnis, M., Aghaee, S., Altschuler, A., Quesenberry, C., Kolevska, T., & Avins, A. L. (2019). A randomized controlled trial of MHealth mindfulness intervention for cancer patients and informal cancer caregivers: a feasibility study within an integrated health care delivery system. *Integrative Cancer Therapies*, *18*. https://doi.org/10.1177/1534735419850634

Kubo, A., Kurtovich, E., McGinnis, M., Aghaee, S., Altschuler, A., Quesenberry, C., Kolevska, T., Liu, R., Greyz-Yusupov, N., & Avins, A. (2024). Pilot pragmatic randomized trial of mHealth mindfulness-based intervention for advanced cancer patients and their informal caregivers. *Psycho-Oncology*, *33*(2). https://doi.org/10.1002/pon.5557

Kuhn, E., Kanuri, N., Hoffman, J. E., Garvert, D. W., Ruzek, J. I., & Taylor, C. B. (2017). A randomized controlled trial of a smartphone app for posttraumatic stress disorder symptoms. *Journal of Consulting and Clinical Psychology*, *85*(3), 267–273. https://doi.org/10.1037/ccp0000163

Kuhn, E., Miller, K. E., Puran, D., Wielgosz, J., YorkWilliams, S. L., Owen, J. E., Jaworski, B. K., Hallenbeck, H. W., McCaslin, S. E., & Taylor, K. L. (2022). A pilot randomized controlled trial of the Insomnia Coach Mobile app to assess its feasibility, acceptability, and potential efficacy. *Behavior Therapy*, *53*(3), 440–457. https://doi.org/10.1016/j.beth.2021.11.003

Kulikov, V. N., Crosthwaite, P. C., Hall, S. A., Flannery, J. E., Strauss, G. S., Vierra, E. M., Koepsell, X. L., Lake, J. I., & Padmanabhan, A. (2023). A CBT-based mobile

intervention as an adjunct treatment for adolescents with symptoms of depression: a virtual randomized controlled feasibility trial. *Frontiers in Digital Health*, *5*. https://doi.org/10.3389/fdgth.2023.1062471

Kusumadewi, A. F., Marchira, C. R., Widyandana, D., & Wirasto, R. T. (2023). Randomized Clinical Trial on the Comparison of Effect of Asynchronous Mobile Application and Guided Brief Cognitive Behavioral Therapy in Managing Anxiety among Medical Students. *Trends in Psychiatry and Psychotherapy*. https://doi.org/10.47626/2237-6089-2023-0713

Lacey, C., Frampton, C., & Beaglehole, B. (2023). oVRcome – Self-guided virtual reality for specific phobias: A randomised controlled trial. *Australian & New Zealand Journal Of Psychiatry*, *57*(5), 736–744. https://doi.org/10.1177/00048674221110779

LaFreniere, L. S., & Newman, M. G. (2023). Upregulating positive emotion in generalized anxiety disorder: A randomized controlled trial of the SkillJoy ecological momentary intervention. *Journal of Consulting and Clinical Psychology*, *91*(6), 381–387. https://doi.org/10.1037/ccp0000794

Lahtinen, O., Aaltonen, J., Kaakinen, J., Franklin, L., & Hyönä, J. (2021). The effects of app-based mindfulness practice on the well-being of university students and staff. *Current Psychology*, *42*(6), 4412–4421. https://doi.org/10.1007/s12144-021-01762-z

Laird, B., Puzia, M., Larkey, L., Ehlers, D., & Huberty, J. (2022). Feasibility of using a mobile app for stress in Middle-Aged men and Women. (Preprint). *JMIR Formative Research*, *6*(5). https://doi.org/10.2196/30294

Lee, R. A., & Jung, M. E. (2018). Evaluation of an mHealth App (DeStressify) on University Students' Mental Health: Pilot Trial. *JMIR Mental Health*, *5*(1), e2. https://doi.org/10.2196/mental.8324

Lee, Y. J. (2023). Effects of a mobile health intervention on activities of stress self-management for workers. *Work*, *75*(1), 233–241. https://doi.org/10.3233/wor-211406

Levin, M. E., Haeger, J., & Cruz, R. A. (2019). Tailoring Acceptance and Commitment Therapy Skill Coaching in the Moment Through Smartphones: Results from a Randomized Controlled Trial. *Mindfulness*, *10*(4), 689–699. https://doi.org/10.1007/s12671-018-1004-2

Levin, M. E., Haeger, J., An, W., & Twohig, M. P. (2018). Comparing Cognitive Defusion and Cognitive Restructuring Delivered Through a Mobile App for Individuals High in Self-Criticism. *Cognitive Therapy And Research*, *42*(6), 844–855. https://doi.org/10.1007/s10608-018-9944-3

Levin, M. E., Hicks, E. T., & Krafft, J. (2020). Pilot evaluation of the stop, breathe & think mindfulness app for student clients on a college counseling center waitlist. *Journal Of American College Health*, *70*(1), 165–173. https://doi.org/10.1080/07448481.2020.1728281

Lewis, S., Ainsworth, J., Sanders, C., Stockton-Powdrell, C., Machin, M., Whelan, P., Hopkins, R., He, Z., Applegate, E., Drake, R., Bamford, C., Roberts, C., & Wykes, T. (2020). Smartphone-Enhanced Symptom Management in Psychosis: open, randomized controlled trial. *Journal of Medical Internet Research*, *22*(8). https://doi.org/10.2196/17019

Li, A. C., Wong, K. K., Chio, F. H., Mak, W. W., & Poon, L. W. (2022). Delivering Mindfulness-Based interventions for insomnia, pain, and dysfunctional eating through a text messaging app: Three randomized controlled trials investigating the effectiveness and mediating mechanisms. *Journal of Medical Internet Research*, *24*(5). https://doi.org/10.2196/30073

Li, Y., Guo, Y., Hong, Y. A., Zhu, M., Zeng, C., Qiao, J., Xu, Z., Zhang, H., Zeng, Y., Cai, W., Li, L., & Liu, C. (2019). Mechanisms and Effects of a WeChat-Based Intervention on Suicide Among People Living With HIV and Depression: Path Model Analysis of a Randomized Controlled Trial. *Journal Of Medical Internet Research*, *21*(11), e14729. https://doi.org/10.2196/14729

Li, Y., Rhee, H., Bullock, L. F. C., McCaw, B., & Bloom, T. (2024). Self-Compassion, Health, and Empowerment: A pilot randomized controlled trial for Chinese immigrant women experiencing intimate partner violence. *Journal of Interpersonal Violence*, *39*(7–8), 1571–1595. https://doi.org/10.1177/08862605231207624

Lim, Y. S., Quek, J. H., Ching, X. W., Lim, D. T. R., Lim, K. G., Thuraisingham, C., & George, P. P. (2023). Efficacy of a Text-Based Mental Health Coaching App in Improving the Symptoms of Stress, Anxiety, and Depression: Randomized Controlled Trial. *JMIR Formative Research*, *7*, e46458. https://doi.org/10.2196/46458

Linardon, J., Shatte, A., McClure, Z., & Fuller-Tyszkiewicz, M. (2023). A broad v. focused digital intervention for recurrent binge eating: a randomized controlled non-inferiority trial. *Psychological Medicine*, *53*(10), 4580–4591. https://doi.org/10.1017/s0033291722001477

Linardon, J., Shatte, A., Rosato, J., & Fuller-Tyszkiewicz, M. (2020). Efficacy of a transdiagnostic cognitive-behavioral intervention for eating disorder psychopathology delivered through a smartphone app: a randomized controlled trial. *Psychological Medicine*, *52*(9), 1679–1690. https://doi.org/10.1017/s0033291720003426

Litvin, S., Saunders, R., Jefferies, P., Seely, H., Pössel, P., & Lüttke, S. (2023). The Impact of a Gamified Mobile Mental Health App (eQuoo) on Resilience and Mental Health in a Student Population: Large-Scale Randomized Controlled Trial. *JMIR Mental Health*, *10*, e47285. https://doi.org/10.2196/47285

Litvin, S., Saunders, R., Maier, M. A., & Lüttke, S. (2020). Gamification as an approach to improve resilience and reduce attrition in mobile mental health interventions: A randomized controlled trial. *PLoS ONE*, *15*(9), e0237220. https://doi.org/10.1371/journal.pone.0237220

Liu, C., Chen, H., Zhou, F., Long, Q., Wu, K., Lo, L., Hung, T., Liu, C., & Chiou, W. (2022). Positive intervention effect of mobile health application based on mindfulness and social support theory on postpartum depression symptoms of puerperae. *BMC Women S Health*, *22*(1). https://doi.org/10.1186/s12905-022-01996-4

Liu, H., Peng, H., Song, X., Xu, C., & Zhang, M. (2022). Using AI chatbots to provide self-help depression interventions for university students: A randomized trial of effectiveness. *Internet Interventions*, *27*, 100495. https://doi.org/10.1016/j.invent.2022.100495

Liu, Y., Hasimu, M., Jia, M., Tang, J., Wang, Y., He, X., Yan, T., Xie, S., & Li, K. (2022). The Effects of APP-Based Intervention for Depression Among Community-Dwelling Individuals With Spinal Cord Injury: A Randomized Controlled Trial. *Archives Of Physical Medicine And Rehabilitation*, *104*(2), 195–202. https://doi.org/10.1016/j.apmr.2022.10.005

Lu, Y., Li, Y., Huang, Y., Zhang, X., Wang, J., Wu, L., & Cao, F. (2023). Effects and Mechanisms of a Web- and Mobile-Based Acceptance and Commitment Therapy Intervention for Anxiety and Depression Symptoms in Nurses: Fully Decentralized Randomized Controlled Trial. *Journal Of Medical Internet Research*, *25*, e51549. https://doi.org/10.2196/51549

Luangapichart, P., Saisavoey, N., & Viravan, N. (2022). Efficacy and Feasibility of the Minimal Therapist-Guided Four-Week Online Audio-Based mindfulness Program 'Mindful Senses' for Burnout and Stress Reduction in Medical Personnel: a

randomized controlled trial. *Healthcare*, *10*(12), 2532. https://doi.org/10.3390/healthcare10122532

Lüdtke, T., Pult, L. K., Schröder, J., Moritz, S., & Bücker, L. (2018). A randomized controlled trial on a smartphone self-help application (Be Good to Yourself) to reduce depressive symptoms. *Psychiatry Research*, *269*, 753–762. https://doi.org/10.1016/j.psychres.2018.08.113

Lukas, C. A., & Berking, M. (2021). Blending group-based psychoeducation with a smartphone intervention for the reduction of depressive symptoms: results of a randomized controlled pilot study. *Pilot And Feasibility Studies*, *7*(1). https://doi.org/10.1186/s40814-021-00799-y

Lukas, C. A., Eskofier, B., & Berking, M. (2021). A Gamified Smartphone-Based Intervention for Depression: Randomized Controlled Pilot trial. *JMIR Mental Health*, *8*(7), e16643. https://doi.org/10.2196/16643

Luo, Y., Xia, W., Cheung, A. T., Ho, L. L. K., Zhang, J., Xie, J., Xiao, P., & Li, H. C. W. (2021). Effectiveness of a Mobile Device–Based Resilience Training Program in Reducing Depressive Symptoms and Enhancing Resilience and Quality of Life in Parents of Children With Cancer: Randomized Controlled Trial. *Journal Of Medical Internet Research*, *23*(11), e27639. https://doi.org/10.2196/27639

MacKinnon, A. L., Simpson, K. M., Salisbury, M. R., Bobula, J., Penner-Goeke, L., Berard, L., Rioux, C., Giesbrecht, G. F., Giuliano, R., Lebel, C., Protudjer, J. L. P., Reynolds, K., Sauer-Zavala, S., Soderstrom, M., Tomfohr-Madsen, L. M., & Roos, L. E. (2022). Building Emotional Awareness and Mental Health (BEAM): a pilot randomized controlled trial of an App-Based program for mothers of toddlers. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.880972

Mak, W. W., Tong, A. C., Yip, S. Y., Lui, W. W., Chio, F. H., Chan, A. T., & Wong, C. C. (2018). Efficacy and Moderation of Mobile App–Based Programs for Mindfulness-Based Training, Self-Compassion Training, and Cognitive Behavioral Psychoeducation on Mental Health: Randomized Controlled Noninferiority Trial. *JMIR Mental Health*, *5*(4), e60. https://doi.org/10.2196/mental.8597

Mantani, A., Kato, T., Furukawa, T. A., Horikoshi, M., Imai, H., Hiroe, T., Chino, B., Funayama, T., Yonemoto, N., Zhou, Q., & Kawanishi, N. (2017). Smartphone Cognitive Behavioral Therapy as an adjunct to pharmacotherapy for refractory Depression: Randomized Controlled trial. *Journal of Medical Internet Research*, *19*(11), e373. https://doi.org/10.2196/jmir.8602

Mao, N., Li, T., Li, C., Ding, R., Zhang, Q., & Cui, L. (2023). Smartphone-Based Training of Cognitive Bias Modification: Efficacy for Reducing Social Anxiety in Chinese Adolescents. *Journal Of Child And Family Studies*, *32*(8), 2394–2405. https://doi.org/10.1007/s10826-023-02619-8

Marciniak, M. A., Shanahan, L., Myin-Germeys, I., Veer, I. M., Yuen, K. S. L., Binder, H., Walter, H., Hermans, E. J., Kalisch, R., & Kleim, B. (2023). Imager—A mobile health mental imagery-based ecological momentary intervention targeting reward sensitivity: A randomized controlled trial. *Applied Psychology Health And Well-Being*, *16*(2), 576–596. https://doi.org/10.1111/aphw.12505

McCloud, T., Jones, R., Lewis, G., Bell, V., & Tsakanikos, E. (2020). Effectiveness of a mobile app intervention for anxiety and depression symptoms in university students: randomized controlled trial. *JMIR Mhealth and Uhealth*, *8*(7). https://doi.org/10.2196/15418

McGillivray, L., Hui, N. K., Wong, Q. J. J., Han, J., Qian, J., & Torok, M. (2023). The Effectiveness of a Smartphone Intervention Targeting Suicidal Ideation in Young

Adults: Randomized Controlled Trial Examining the Influence of Loneliness. *JMIR Mental Health*, *10*, e44862. https://doi.org/10.2196/44862

Miklowitz, D. J., Weintraub, M. J., Ichinose, M. C., Denenny, D. M., Walshaw, P. D., Wilkerson, C. A., Frey, S. J., Morgan-Fleming, G. M., Brown, R. D., Merranko, J. A., & Arevian, A. C. (2023). A randomized clinical trial of Technology-Enhanced Family-Focused therapy for youth in the early stages of mood disorders. *JAACAP Open*, *1*(2), 93–104. https://doi.org/10.1016/j.jaacop.2023.04.002

Min-Hung, T., Yuh-Ming, H., Sue-Hwang, C., & Hsiao-Ju, C. (2019). Home-delivered attention bias modification training via smartphone to improve attention control in sub-clinical generalized anxiety disorder: A randomized, controlled multi-session experiment. *Journal of Affective Disorders*, *246*, 444–451. https://doi.org/10.1016/j.jad.2018.12.118

Min, B., Park, H., Kim, J. I., Lee, S., Back, S., Lee, E., Oh, S., Yun, J., Kim, B., Kim, Y., Hwang, J., Lee, S., & Kim, J. (2023). The effectiveness of a Neurofeedback-Assisted mindfulness training program using a mobile app on stress reduction in employees: randomized controlled trial. *JMIR Mhealth and Uhealth*, *11*, e42851. https://doi.org/10.2196/42851

Mistretta, E. G., Davis, M. C., Temkit, M., Lorenz, C., Darby, B., & Stonnington, C. M. (2018). Resilience Training for Work-Related Stress among Health care Workers. *Journal of Occupational and Environmental Medicine*, *60*(6), 559–568. https://doi.org/10.1097/jom.0000000000001285

Moberg, C., Niles, A., & Beermann, D. (2019). Guided Self-Help Works: Randomized Waitlist Controlled Trial of Pacifica, a Mobile App Integrating Cognitive Behavioral Therapy and Mindfulness for Stress, Anxiety, and Depression. *Journal Of Medical Internet Research*, *21*(6), e12556. https://doi.org/10.2196/12556

Moritz, S., Grudzień, D. P., Gawęda, Ł., Aleksandrowicz, A., Balzan, R., Shaffy, A., Bruhns, A., Borsutzky, S. M., & Rolvien, L. (2024). A randomized controlled trial on COGITO, a free self-help smartphone app to enhance mental well-being. *Journal of Psychiatric Research*, *174*, 254–257. https://doi.org/10.1016/j.jpsychires.2024.04.021

Mutter, A., Küchler, A., Idrees, A. R., Kählke, F., Terhorst, Y., & Baumeister, H. (2023). StudiCare procrastination - Randomized controlled non-inferiority trial of a persuasive design-optimized internet- and mobile-based intervention with digital coach targeting procrastination in college students. *BMC Psychology*, *11*(1). https://doi.org/10.1186/s40359-023-01312-1

Newman, M. G., Jacobson, N. C., Rackoff, G. N., Bell, M. J., & Taylor, C. B. (2020). A randomized controlled trial of a smartphone-based application for the treatment of anxiety. *Psychotherapy Research*, *31*(4), 443–454. https://doi.org/10.1080/10503307.2020.1790688

Nicol, G., Wang, R., Graham, S., Dodd, S., & Garbutt, J. (2022). Chatbot-Delivered Cognitive Behavioral therapy in adolescents with depression and Anxiety during the COVID-19 Pandemic: Feasibility and Acceptability study. *JMIR Formative Research*, *6*(11).https://doi.org/10.2196/40242

Niles, A. N., Woolley, J. D., Tripp, P., Pesquita, A., Vinogradov, S., Neylan, T. C., & O'Donovan, A. (2020). Randomized controlled trial testing Mobile-Based Attention-Bias modification for posttraumatic stress using personalized word stimuli. *Clinical Psychological Science*, *8*(4), 756–772. https://doi.org/10.1177/2167702620902119

Nishi, D., Imamura, K., Watanabe, K., Obikane, E., Sasaki, N., Yasuma, N., Sekiya, Y., Matsuyama, Y., & Kawakami, N. (2022). The preventive effect of internet-based cognitive behavioral therapy for prevention of depression during pregnancy and in the

postpartum period (iPDP): a large scale randomized controlled trial. *Psychiatry And Clinical Neurosciences, 76*(11), 570–578. https://doi.org/10.1111/pcn.13458

Nishi, D., Imamura, K., Watanabe, K., Obikane, E., Sasaki, N., Yasuma, N., Sekiya, Y., Matsuyama, Y., & Kawakami, N. (2022). The preventive effect of internet-based cognitive behavioral therapy for prevention of depression during pregnancy and in the postpartum period (iPDP): a large scale randomized controlled trial. *Psychiatry And Clinical Neurosciences*, *76*(11), 570–578. https://doi.org/10.1111/pcn.13458

O'Dea, B., Han, J., Batterham, P. J., Achilles, M. R., Calear, A. L., Werner-Seidler, A., Parker, B., Shand, F., & Christensen, H. (2020). A randomised controlled trial of a relationship-focussed mobile phone application for improving adolescents' mental health. *Journal of Child Psychology and Psychiatry*, *61*(8), 899–913. https://doi.org/10.1111/jcpp.13294

O'Toole, M. S., Arendt, M. B., & Pedersen, C. M. (2019). Testing an App-Assisted Treatment for Suicide Prevention in a randomized controlled Trial: Effects on suicide risk and Depression. *Behavior Therapy*, *50*(2), 421–429. https://doi.org/10.1016/j.beth.2018.07.007

Oh, J., Jang, S., Kim, H., & Kim, J. (2020). Efficacy of mobile app-based interactive cognitive behavioral therapy using a chatbot for panic disorder. *International Journal of Medical Informatics*, *140*, 104171. https://doi.org/10.1016/j.ijmedinf.2020.104171

Oh, S. J., Seo, S., Lee, J. H., Song, M. J., & Shin, M. (2018). Effects of smartphone-based memory training for older adults with subjective memory complaints: a randomized controlled trial. *Aging & Mental Health*, *22*(4), 526–534. https://doi.org/10.1080/13607863.2016.1274373

Orosa-Duarte, Á., Mediavilla, R., Muñoz-Sanjose, A., Palao, Á., Garde, J., López-Herrero, V., Bravo-Ortiz, M., Bayón, C., & Rodríguez-Vega, B. (2021). Mindfulness-based

mobile app reduces anxiety and increases self-compassion in healthcare students: A randomised controlled trial. *Medical Teacher*, 1–21. https://doi.org/10.1080/0142159x.2021.1887835

Peake, E., Miller, I., Flannery, J., Chen, L., Lake, J., & Padmanabhan, A. (2024). Preliminary efficacy of a digital intervention for adolescent Depression: randomized controlled trial. *Journal of Medical Internet Research*, *26*. https://doi.org/10.2196/48467

Pham, Q., Khatib, Y., Stansfeld, S., Fox, S., & Green, T. (2016). Feasibility and Efficacy of an MHealth Game for Managing Anxiety: "Flowy" Randomized Controlled pilot trial and design evaluation. *Games for Health Journal*, *5*(1), 50–67. https://doi.org/10.1089/g4h.2015.0033

Ponzo, S., Morelli, D., Kawadler, J. M., Hemmings, N. R., Bird, G., & Plans, D. (2020). Efficacy of the Digital Therapeutic Mobile App BioBase to Reduce Stress and Improve Mental Well-Being Among University Students: Randomized Controlled Trial. *JMIR Mhealth And Uhealth*, *8*(4), e17767. https://doi.org/10.2196/17767

Possemato, K., Johnson, E., Barrie, K., Ghaus, S., Noronha, D., Wade, M., Greenbaum, M. A., Rosen, C., Cloitre, M., Owen, J., Jain, S., Beehler, G., Prins, A., Seal, K., & Kuhn, E. (2023). A randomized clinical trial of Clinician-Supported PTSD coach in VA primary care patients. *Journal of General Internal Medicine*, *38*(S3), 905–912. https://doi.org/10.1007/s11606-023-08130-6

Possemato, K., Kuhn, E., Johnson, E., Hoffman, J. E., Owen, J. E., Kanuri, N., De Stefano, L., & Brooks, E. (2016). Using PTSD Coach in primary care with and without clinician support: a pilot randomized controlled trial. *General Hospital Psychiatry*, *38*, 94–98. https://doi.org/10.1016/j.genhosppsych.2015.09.005

Pratap, A., Renn, B. N., Volponi, J., Mooney, S. D., Gazzaley, A., Arean, P. A., & Anguera, J. A. (2018). Using Mobile Apps to Assess and Treat Depression in Hispanic and

Latino Populations: Fully Remote Randomized Clinical Trial. *Journal Of Medical Internet Research*, *20*(8), e10130. https://doi.org/10.2196/10130

Qin, X., Liu, C., Zhu, W., Chen, Y., & Wang, Y. (2022). Preventing postpartum depression in the early postpartum period using an APP-Based Cognitive Behavioral Therapy Program: a pilot randomized controlled study. *International Journal of Environmental Research and Public Health*, *19*(24), 16824. https://doi.org/10.3390/ijerph192416824

Raevuori, A., Vahlberg, T., Korhonen, T., Hilgert, O., Aittakumpu-Hyden, R., & Forman-Hoffman, V. (2021). A therapist-guided smartphone app for major depression in young adults: A randomized clinical trial. *Journal of Affective Disorders*, *286*, 228–238. https://doi.org/10.1016/j.jad.2021.02.007

Rajabi Majd, N., Broström, A., Ulander, M., Lin, C., Griffiths, M. D., Imani, V., Ahorsu, D. K., Ohayon, M. M., & Pakpour, A. H. (2020). Efficacy of a Theory-Based Cognitive Behavioral Technique App-Based Intervention for patients with insomnia: Randomized Controlled trial. *Journal of Medical Internet Research*, *22*(4), e15841. https://doi.org/10.2196/15841

Reid, S. C., Kauer, S. D., Hearps, S. J., Crooke, A. H., Khor, A. S., Sanci, L. A., & Patton, G. C. (2011). A mobile phone application for the assessment and management of youth mental health problems in primary care: a randomised controlled trial. *BMC Family Practice*, *12*(1). https://doi.org/10.1186/1471-2296-12-131

Riordan, K. M., Simonsson, O., Frye, C., Vack, N. J., Sachs, J., Fitch, D., Goldman, R. I., Chiang, E. S., Dahl, C. J., Davidson, R. J., & Goldberg, S. B. (2024). How often should I meditate? A randomized trial examining the role of meditation frequency when total amount of meditation is held constant. *Journal of Counseling Psychology, 71*, 104-114.

Rocamora González, C., Rodríguez Vega, B., Torrijos Zarcero, M., Mediavilla, R., Bouzó Molina, N., Plaza Fernández, R., Pascual Migueláñez, I., & Palao Tarrero, Á. (2022). Mindfulness based intervention through mobile app for colorectal cancer people awaiting surgery: a randomized clinical trial. *Cirugía Española (English Edition)*, *100*(12), 747–754. https://doi.org/10.1016/j.cireng.2022.08.008

Roepke, A. M., Jaffee, S. R., Riffle, O. M., McGonigal, J., Broome, R., & Maxwell, B. (2015). Randomized Controlled Trial of SuperBetter, a Smartphone-Based/Internet-Based Self-Help Tool to Reduce Depressive Symptoms. *Games For Health Journal*, *4*(3), 235–246. https://doi.org/10.1089/g4h.2014.0046

Röhr, S., Jung, F. U., Pabst, A., Grochtdreis, T., Dams, J., Nagl, M., Renner, A., Hoffmann, R., König, H., Kersting, A., & Riedel-Heller, S. G. (2021). A Self-Help App for Syrian Refugees With Posttraumatic Stress (Sanadak): Randomized Controlled Trial. *JMIR Mhealth And Uhealth*, *9*(1), e24807. https://doi.org/10.2196/24807

Roncero, M., Belloch, A., & Doron, G. (2019). Can Brief, Daily Training Using a Mobile App Help Change Maladaptive Beliefs? Crossover Randomized Controlled Trial. *JMIR Mhealth And Uhealth*, *7*(2), e11443. https://doi.org/10.2196/11443

Roy, A., Hoge, E. A., Abrante, P., Druker, S., Liu, T., & Brewer, J. A. (2021). Clinical Efficacy and Psychological Mechanisms of an App-Based Digital Therapeutic for Generalized Anxiety Disorder: Randomized Controlled Trial. *Journal Of Medical Internet Research*, *23*(12), e26987. https://doi.org/10.2196/26987

Sawyer, A., Kaim, A., Le, H., McDonald, D., Mittinty, M., Lynch, J., & Sawyer, M. (2019). The Effectiveness of an App-Based Nurse-Moderated Program for New Mothers With Depression and Parenting Problems (eMums Plus): Pragmatic Randomized Controlled Trial. *Journal Of Medical Internet Research*, *21*(6), e13689. https://doi.org/10.2196/13689

Schwob, J. T., & Newman, M. G. (2023). Brief imaginal exposure exercises for social anxiety disorder: A randomized controlled trial of a self-help momentary intervention app. *Journal Of Anxiety Disorders*, *98*, 102749. https://doi.org/10.1016/j.janxdis.2023.102749

Seo, J., Kim, S., Na, H., Kim, J., & Lee, H. (2022). Effectiveness of a Mobile Application for Postpartum Depression Self-Management: Evidence from a Randomised Controlled Trial in South Korea. *Healthcare*, *10*(11), 2185. https://doi.org/10.3390/healthcare10112185

Sharma, G., Schlosser, L., Jones, B. D. M., Blumberger, D. M., Gratzer, D., Husain, M. O., Mulsant, B. H., Rappaport, L., Stergiopoulos, V., & Husain, M. I. (2022). Brief App-Based Cognitive Behavioral Therapy for Anxiety Symptoms in Psychiatric Inpatients: Feasibility Randomized Controlled Trial. *JMIR Formative Research*, *6*(11), e38460. https://doi.org/10.2196/38460

Smith, E. N., Santoro, E., Moraveji, N., Susi, M., & Crum, A. J. (2020). Integrating wearables in stress management interventions: Promising evidence from a randomized trial. *International Journal of Stress Management*, *27*(2), 172–182. https://doi.org/10.1037/str0000137

Smith, J. L., Allen, J. W., Haack, C. I., Wehrmeyer, K. L., Alden, K. G., Lund, M. B., & Mascaro, J. S. (2021). Impact of App-Delivered Mindfulness Meditation on Functional Connectivity, Mental Health, and Sleep Disturbances Among Physician Assistant Students: Randomized, Wait-list Controlled Pilot Study. *JMIR Formative Research*, *5*(10), e24208. https://doi.org/10.2196/24208

Smith, R. B., Mahnert, N. D., Foote, J., Saunders, K. T., Mourad, J., & Huberty, J. (2021). Mindfulness effects in obstetric and gynecology patients during the Coronavirus

Disease 2019 (COVID-19) pandemic. *Obstetrics and Gynecology*, *137*(6), 1032–1040. https://doi.org/10.1097/aog.0000000000004316

Soltani, Z., Parizad, N., Radfar, M., Alinejad, V., Arzanlo, M., & Haghighi, M. (2024). The effect of the Yara smartphone application on anxiety, sleep quality, and suicidal thoughts in patients with major depressive disorder in Iran: a randomized controlled trial. *BMC Psychiatry*, *24*(1). https://doi.org/10.1186/s12888-024-05688-1

Stiles-Shields, C., Montague, E., Kwasny, M. J., & Mohr, D. C. (2019). Behavioral and cognitive intervention strategies delivered via coached apps for depression: Pilot trial. *Psychological Services*, *16*(2), 233–238. https://doi.org/10.1037/ser0000261

Stolz, T., Schulz, A., Krieger, T., Vincent, A., Urech, A., Moser, C., Westermann, S., & Berger, T. (2018). A mobile app for social anxiety disorder: A three-arm randomized controlled trial comparing mobile and PC-based guided self-help interventions. *Journal of Consulting and Clinical Psychology*, *86*(6), 493–504. https://doi.org/10.1037/ccp0000301

Sun, S., Lin, D., Goldberg, S., Shen, Z., Chen, P., Qiao, S., Brewer, J., Loucks, E., & Operario, D. (2022). A mindfulness-based mobile health (mHealth) intervention among psychologically distressed university students in quarantine during the COVID-19 pandemic: A randomized controlled trial. *Journal of Counseling Psychology*, *69*(2), 157–171. https://doi.org/10.1037/cou0000568

Sun, X., Yang, R., Zhang, Q., Xiao, J., Li, C., & Cui, L. (2019). Cognitive bias modification for interpretation training via smartphones for social anxiety in Chinese undergraduates. *Journal of Experimental Psychopathology*, *10*(3). https://doi.org/10.1177/2043808719875274

Sun, Y., Li, Y., Wang, J., Chen, Q., Bazzano, A. N., & Cao, F. (2021). Effectiveness of Smartphone-Based Mindfulness Training on Maternal Perinatal Depression:

Randomized controlled trial. *Journal of Medical Internet Research*, *23*(1), e23410. https://doi.org/10.2196/23410

Taylor, H., Cavanagh, K., Field, A. P., & Strauss, C. (2022). Health Care Workers' Need for Headspace: Findings From a Multisite Definitive Randomized Controlled Trial of an Unguided Digital Mindfulness-Based Self-help App to Reduce Healthcare Worker Stress. *JMIR Mhealth And Uhealth*, *10*(8), e31744. https://doi.org/10.2196/31744

Taylor, R. W., Male, R., Economides, M., Bolton, H., & Cavanagh, K. (2023). Feasibility and preliminary efficacy of digital interventions for depressive symptoms in working adults: multiarm randomized controlled trial. *JMIR Formative Research*, *7*, e41590. https://doi.org/10.2196/41590

Thabrew, H., Boggiss, A. L., Lim, D., Schache, K., Morunga, E., Cao, N., Cavadino, A., & Serlachius, A. S. (2022). Well-being app to support young people during the COVID-19 pandemic: randomised controlled trial. *BMJ Open*, *12*(5), e058144. https://doi.org/10.1136/bmjopen-2021-058144

Tighe, J., Shand, F., Ridani, R., Mackinnon, A., De La Mata, N., & Christensen, H. (2017). Ibobbly mobile health intervention for suicide prevention in Australian Indigenous youth: a pilot randomised controlled trial. *BMJ Open*, *7*(1). https://doi.org/10.1136/bmjopen-2016-013518

Toh, S. H. Y., Tan, J. H. Y., Kosasih, F. R., & Sündermann, O. (2022). Efficacy of the mental health app Intellect to Reduce Stress: randomized controlled trial with a 1-Month follow-up. *JMIR Formative Research*, *6*(12), e40723. https://doi.org/10.2196/40723

Tønning, M. L., Faurholt-Jepsen, M., Frost, M., Martiny, K., Tuxen, N., Rosenberg, N., Busk, J., Winther, O., Melbye, S. A., Thaysen-Petersen, D., Aamund, K. A., Tolderlund, L., Bardram, J. E., & Kessing, L. V. (2020). The effect of smartphone-based monitoring and treatment on the rate and duration of psychiatric readmission in patients with

unipolar depressive disorder: The RADMIS randomized controlled trial. *Journal Of Affective Disorders*, *282*, 354–363. https://doi.org/10.1016/j.jad.2020.12.141

Torok, M., Han, J., McGillivray, L., Wong, Q., Werner-Seidler, A., O'Dea, B., Calear, A., & Christensen, H. (2022). The effect of a therapeutic smartphone application on suicidal ideation in young adults: Findings from a randomized controlled trial in Australia. *PLoS Medicine*, *19*(5), e1003978. https://doi.org/10.1371/journal.pmed.1003978

Van Aubel, E., Bakker, J. M., Batink, T., Michielse, S., Goossens, L., Lange, I., Schruers, K., Lieverse, R., Marcelis, M., Van Amelsvoort, T., Van Os, J., Wichers, M., Vaessen, T., Reininghaus, U., & Myin-Germeys, I. (2020). Blended care in the treatment of subthreshold symptoms of depression and psychosis in emerging adults: A randomised controlled trial of Acceptance and Commitment Therapy in Daily-Life (ACT-DL). *Behaviour Research And Therapy*, *128*, 103592. https://doi.org/10.1016/j.brat.2020.103592

Van Stolk-Cooke, K., Wielgosz, J., Hallenbeck, H. W., Chang, A., Rosen, C., Owen, J., & Kuhn, E. (2022). The PTSD Family Coach App in Veteran Family Members: Pilot Randomized controlled trial. *JMIR Formative Research*, *7*, e42053. https://doi.org/10.2196/42053

Vázquez, F. L., Blanco, V., Hita, I., Torres, Á. J., Otero, P., Páramo, M., & Salmerón, M. (2023). Efficacy of a Cognitive Behavioral Intervention for the Prevention of Depression in Nonprofessional Caregivers Administered through a Smartphone App: A Randomized Controlled Trial. *Journal Of Clinical Medicine*, *12*(18), 5872. https://doi.org/10.3390/jcm12185872

Vereschagin, M., Wang, A. Y., Richardson, C. G., Xie, H., Munthali, R. J., Hudec, K. L., Leung, C., Wojcik, K. D., Munro, L., Halli, P., Kessler, R. C., & Vigo, D. V. (2024). Effectiveness of the minder mobile Mental Health and Substance use intervention for

university students: randomized controlled trial. *Journal of Medical Internet Research*, *26*. https://doi.org/10.2196/54287

Versluis, A., Verkuil, B., Spinhoven, P., & Brosschot, J. F. (2018). Effectiveness of a smartphone-based worry-reduction training for stress reduction: A randomized-controlled trial. *Psychology and Health*, *33*(9), 1079–1099. https://doi.org/10.1080/08870446.2018.1456660

Vollert, B., Müller, L., Jacobi, C., Trockel, M., & Beintner, I. (2022). Effectiveness of an App-Based Short Intervention to Improve Sleep: Randomized Controlled Trial. *JMIR Mental Health*, *10*, e39052. https://doi.org/10.2196/39052

Wang, L., Guo, Y., Liu, Y., Yan, X., & Ding, R. (2022). The effects of a mobile phone-based psychological intervention program on stress, anxiety and self-efficacy among undergraduate nursing students during clinical practice: A randomized controlled trial. *Journal Of Professional Nursing*, *42*, 219–224. https://doi.org/10.1016/j.profnurs.2022.07.016

Watson-Singleton, N. N., & Pennefather, J. (2023). Using a Randomized Clinical Trial to Test the Efficacy of a Culturally Responsive Mobile Health Application in African Americans. *Behavior Therapy*, *55*(4), 813–824. https://doi.org/10.1016/j.beth.2023.12.002

Watts, S., Mackenzie, A., Thomas, C., Griskaitis, A., Mewton, L., Williams, A., & Andrews, G. (2013). CBT for depression: a pilot RCT comparing mobile phone vs. computer. *BMC Psychiatry*, *13*(1). https://doi.org/10.1186/1471-244x-13-49

Werner-Seidler, A., Li, S. H., Spanos, S., Johnston, L., O'Dea, B., Torok, M., Ritterband, L., Newby, J. M., Mackinnon, A. J., & Christensen, H. (2023). The effects of a sleep-focused smartphone application on insomnia and depressive symptoms: a randomised

controlled trial and mediation analysis. *Journal Of Child Psychology And Psychiatry*, *64*(9), 1324–1335. https://doi.org/10.1111/jcpp.13795

Wilhelm, S., Weingarden, H., Greenberg, J. L., Hoeppner, S. S., Snorrason, I., Bernstein, E. E., McCoy, T. H., & Harrison, O. T. (2022). Efficacy of App-Based Cognitive Behavioral Therapy for Body Dysmorphic Disorder with Coach Support: Initial Randomized Controlled Clinical Trial. *Psychotherapy and Psychosomatics*, *91*(4), 277–285. https://doi.org/10.1159/000524628

Winslow, B. D., Kwasinski, R., Hullfish, J., Ruble, M., Lynch, A., Rogers, T., Nofziger, D., Brim, W., & Woodworth, C. (2022). Automated stress detection using mobile application and wearable sensors improves symptoms of mental health disorders in military personnel. *Frontiers in Digital Health*, *4*. https://doi.org/10.3389/fdgth.2022.919626

Wong, V. W., Tong, J. T., Shi, N., Ng, C. H., Sarris, J., & Ho, F. Y. (2024). Smartphone-delivered multicomponent lifestyle medicine intervention for improving mental health in a nonclinical population: a randomized controlled trial. *Frontiers in Public Health*, *11*.https://doi.org/10.3389/fpubh.2023.1231981

Yang, Y. J., & Chung, K. (2022). Pilot Randomized Control Trial of an App-Based CBT Program for Reducing Anxiety in Individuals with ASD without Intellectual Disability. *Journal Of Autism And Developmental Disorders*, *53*(4), 1331–1346. https://doi.org/10.1007/s10803-022-05617-9

Yoon, S., Lee, S., Suh, H., Chung, S., & Kim, J. W. (2022). Effects of mobile mindfulness training on mental health of employees: A CONSORT-compliant pilot randomized controlled trial. *Medicine*, *101*(35), e30260. https://doi.org/10.1097/md.0000000000030260

Zainal, N. H., & Newman, M. G. (2023). A randomized controlled trial of a 14-day mindfulness ecological momentary intervention (MEMI) for generalized anxiety disorder. *European Psychiatry*, *66*(1). https://doi.org/10.1192/j.eurpsy.2023.2

Zainal, N. H., Tan, H. H., Hong, R. Y. S., & Newman, M. G. (2024). Testing the efficacy of a Brief, Self-Guided Mindfulness Ecological Momentary Intervention on Emotion Regulation and Self-Compassion in Social Anxiety Disorder: randomized Controlled trial. *JMIR Mental Health*, *11*. https://doi.org/10.2196/53712

Zhang, C., Liu, Y., Guo, X., Liu, Y., Shen, Y., & Ma, J. (2023). Digital Cognitive Behavioral Therapy for Insomnia Using a Smartphone Application in China. *JAMA Network Open*, *6*(3), e234866. https://doi.org/10.1001/jamanetworkopen.2023.4866

Zhang, X., Li, Y., Wang, J., Mao, F., Wu, L., Huang, Y., Sun, J., & Cao, F. (2023). Effectiveness of Digital Guided Self-help Mindfulness Training During Pregnancy on Maternal Psychological Distress and Infant Neuropsychological Development: Randomized Controlled Trial. *Journal Of Medical Internet Research*, *25*, e41298. https://doi.org/10.2196/41298

Zhao, C., Zhao, Z., Levin, M. E., Lai, L., Shi, C., Hu, J., Chen, W., & Ren, Z. (2023). Efficacy and acceptability of mobile application-delivered acceptance and commitment therapy for posttraumatic stress disorder in China: A randomized controlled trial. *Behaviour Research And Therapy*, *171*, 104440. https://doi.org/10.1016/j.brat.2023.104440

Zhou, X., Edirippulige, S., Jones, A., Bai, X., Smith, A. C., & Bambling, M. (2023). The feasibility, acceptability and efficacy of an app-based intervention (the Coping Camp) in reducing stress among Chinese school adolescents: A cluster randomised controlled trial. *PLoS ONE*, *18*(11), e0294119. https://doi.org/10.1371/journal.pone.0294119