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**Effectiveness of Mobile App-Based Intervention for Reducing Depressive Symptoms:  
Systematic Review of Randomized Controlled Trial**

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**ABSTRACT**

**Background:** Depression is still one of the mental health disorders with the highest prevalence in the world. Depression is the 4th highest disease in the world according to WHO. Less than 25% of people with depression receive further treatment, the majority of whom do not go to health care for fear of being stigmatized by others. This problem can be overcome by using technology as an intervention to reduce depressive symptoms. **Object:** This systematic review aims to describe the effectiveness of mobile App-based interventions in reducing depressive symptoms. **Method:** Searching articles used Medical Subject Heading (MeSH) with keywords of m-health OR mobile health OR mobile app health AND intervention OR program AND reduce OR reduction AND depression OR depressive symptoms. This research used academic databases including: Scopus, CINAHL, ScienceDirect and Pubmed with inclusion criteria include: articles published in 2018-2023 using RCT who testing the effectiveness of Mobile App-based intervention for reducing depressive symptoms and in English and using The Joanna Briggs Institute (JBI) Critical Appraisal method. A total of 802 articles are found and 10 articles were reviewed in this research. Participants in this study were adults. **Results:** All research related to various types of Mobile App-based interventions to reduce depressive symptoms such as Cognitive Behavioral Therapy, Mindfulness, Behavioural activation dan Psychotherapy. **Conclusion:** This research shows that some interventions or programs that have been analyzed effectively can reduce depressive symptoms. Further research is needed to conduct more clinical trials to determine which applications have greater influence and improvement.

**Keywords:** mHealth, Application, Intervention, Depression

**BACKGROUND**

Currently, mental health disorders are still a problem that is still difficult to solve both in Indonesia and in the world. depression is one of the disorders with a high prevalence in the world (Setyarini et al., 2022). Depression is a disorder in emotional conditions that occur prolonged that affects all mental processes of a person such as thinking, feeling and behaving. Someone who is depressed generally experiences disorders that include emotional states, motivation, behavior and

cognition that have excessive helplessness characteristics (Sulistiyorini & Sabarisman, 2017). A person with depression will experience a decline in health status, emotions and cognitive decline that makes a person with depression unable to function effectively causing loss of confidence, hopelessness, fear, dependence and decreased ability in communication resulting in social disorders that can worsen health conditions. Depression is a common

mental disorder suffered from children to the elderly (Sulistyorini & Sabarisman, 2017).

In 2018, Riset Kesehatan Dasar (Riskesdas) showed that more than 12 million people over the age of 15 years experienced depression (RISKESDAS, 2018). WHO also states depression is the 4th disease in the world and is predicted to continue to increase. In 2019, data obtained from the WHO showed that there were 264 million people experiencing depression (Chee et al., 2022). One of the reasons for the increasing number of people with depression in the world is because of the Covid-19 Pandemic which has a considerable impact on mental health. Research conducted by Huang & Zhao (2020) shows the existence of deteriorating mental health caused by the Covid-19 Pandemic. A survey conducted in China assessed that as many as 54% of respondents considered Covid-19 to have a moderate or severe negative psychological impact.

The psychological impact that is felt triggers fear so that an understanding of mental health and interventions is needed to overcome the problem (Wang et al., 2020). With a large number of people experiencing depression and depressive symptoms, very few of them go to health care facilities to get treatment. Less than 25% of people with depression get further treatment for not going to health facilities for fear of getting stigmatized from others. These problems can be overcome by using technology as an intervention to reduce depression and depressive symptoms (Karyotaki et al., 2019). The technology that can be used can be internet-based, web-based or Mobile App-based. With the emergence of innovations from the use of technology, sufferers can reduce depression and depressive symptoms more effectively, quickly and easily accessible at an affordable cost.

The selection of study design used is a Randomized Controlled Trial with the intention that RCT is a prospective study

that measures the effectiveness of a new intervention or treatment. This systematic review aims to describe the effectiveness of Mobile App-based interventions in reducing symptoms of depression.

## **RESEARCH METHODS**

### **Materials and Method**

This study employs a quantitative research design with an explanatory approach. This approach is used to examine and clarify the causal relationship between the independent variables—dividend policy, profitability, and firm growth—and the dependent variable, namely stock price. The research is conducted through the collection and analysis of secondary data obtained from the financial statements of the sampled companies. symptoms of depression.

### **Description of Materials or Research Subjects**

The assessment was carried out following on the Joanna Briggs Institute (JBI) Critical Appraisal on the inclusion and exclusion criteria of 10 articles used in this Systematic Review.

### **Research Design**

This study uses a Systematic Review Method. The literature search was conducted a systematic literature review following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) carried out using three stages, namely: planning, conducting and reporting.

### **Research Procedure**

The data used in this study is secondary data obtained from the results of research that has been done by previous researchers and not the results of direct observation. Secondary data sources are obtained from several articles of international reputation with predetermined topics. The literature used was obtained from the databases Scopus, CINAHL, ScienceDirect and Pubmed. Literature search conducted

using the term MeSH with the keyword m-health OR mobile health OR mobile app health AND intervention OR program AND reduce OR reduction AND depression OR depressive symptoms AND RCT OR Randomized Controlled Trial.

### **Instruments and Equipment**

The assessment was carried out following on the Joanna Briggs Institute (JBI) Critical Appraisal on the inclusion and exclusion criteria of 10 articles used in this Systematic Review.

### **Data Collection Methods**

Respondents in this literature are people with depression. Respondents who participated in each study that was reviewed were people with depression and depressive symptoms measured using the Patient Health Questionnaire-9 instrument with Moderate to severe depression without suicidal ideation. The total respondents on the article were 3692 respondents. Age characteristics vary from 19 years to as old as 65 years. The gender of respondents also varies, but in this study the majority of respondents were men.

### **Data Analysis**

This study uses a descriptive analysis to describe, demonstrate and show summarize data points.

### **Research Ethics**

The absence of a formal ethics review or approval in this study is because it is a Systematic Review, which analyzes existing published data and does not involve direct interaction with human subjects or the collection of new, primary data.

### **RESULT AND DISCUSSION**

Literature search results obtained 802 articles that match keywords with detailed articles from the databases Scopus (n = 276), CINAHL (n = 157), ScienceDirect (n = 276), and PubMed (n = 93). Of the total 802 articles found, then a duplicate article was checked and found 611 of the same articles so that they were excluded from the search results and the remaining 191 articles. Then the reviewer screened the article based on the title (n = 151), abstract (n = 31) and full text (n = 21) adjusted to the theme. Based on the feasibility screening carried out against the inclusion and exclusion criteria, 10 articles were found that can be used in this review. The assessment conducted based on The Joanna Briggs Institute (JBI) Critical Appraisal on the inclusion and exclusion criteria of 10 articles that can be used in this review.

Presentation of selection of study articles in the following PRISMA diagram:

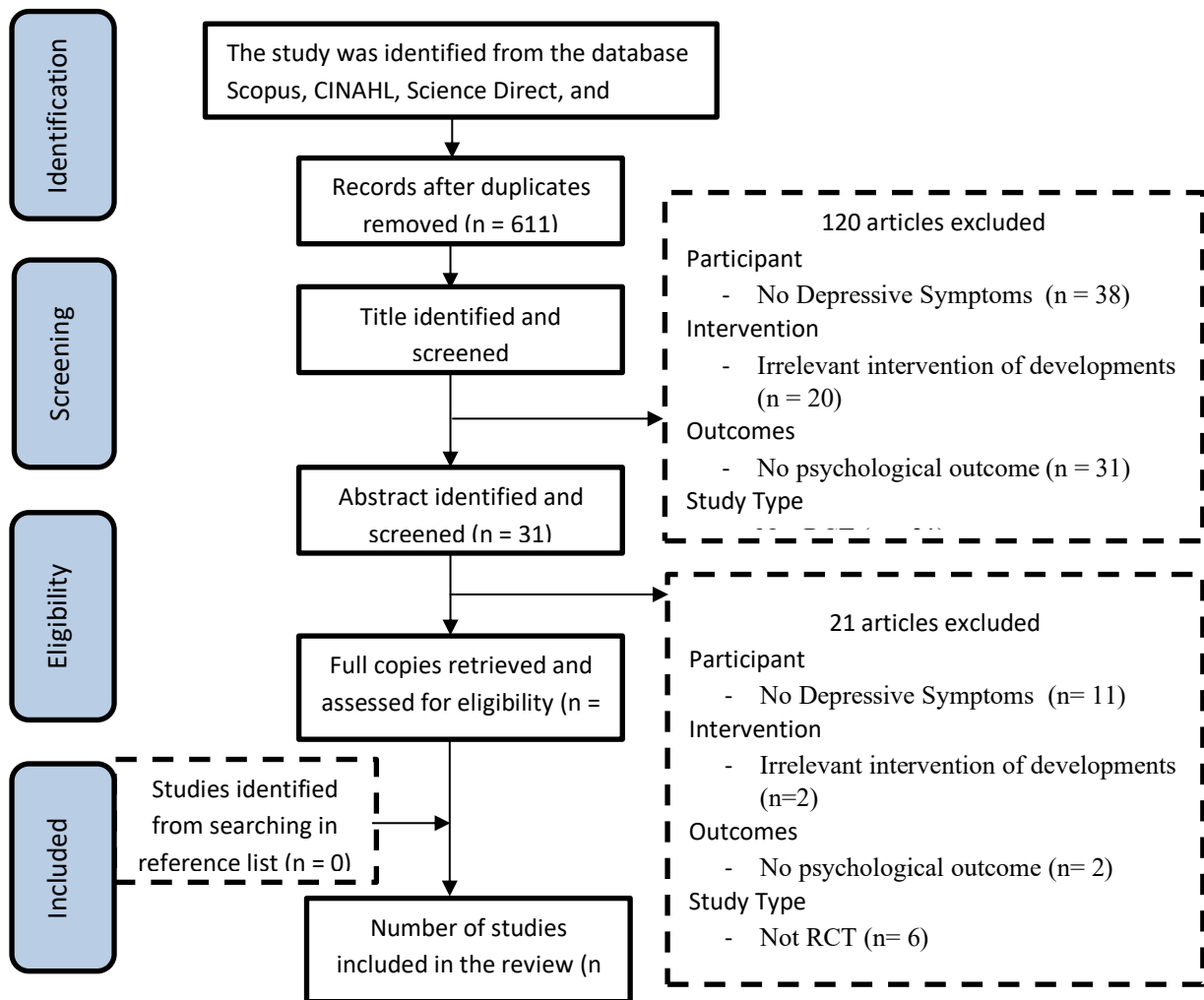


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA)

### Study Characteristic Data:

Based on the results of the review that has been done, it is known that all study designs used are Randomized Controlled Trial (n = 10) The article comes from Germany, USA, UK,

Singapore, Australia and Denmark. Based on the results of the review obtained from the article, the most widely used interventions to reduce depression and depressive symptoms are Cognitive Behavioral Therapy and Mindfulness.

Table 1.  
Study Characteristics

Category	N	%
<b>Publication Year</b>		
2018	2	20
2019	2	20
2020	1	10
2021	2	20
2022	3	30

Category	N	%
<b>Database</b>		
Scopus	3	30
CINAHL	1	10
<i>ScienceDirect</i>	3	30
Pubmed	3	30
<b>Country</b>		
German	3	30
USA	3	30
Singapore	1	10
Australia	1	10
Denmark	1	10
UK	1	10
<b>Instrument Used to Measure Depression</b>		
<i>Patient Health Questionnaire-9 (PHQ-9)</i>	4	40
<i>Patient Health Questionnaire -8 (PHQ-8)</i>	2	20
<i>Hospital Anxiety and Depression Scale (HADS)</i>	2	20
<i>Perceived Stress Scale-4 (PSS-4)</i>	1	10
<i>Major depression inventory (MDI)</i>	1	10
<b>Types of Intervention</b>		
<i>Cognitive Behavioral Therapy</i>	7	70
<i>Mindfulness</i>	3	30
<i>Behavioural activation</i>	1	10
<i>Psychotherapy</i>	1	10
<b>Setting</b>		
Komunitas	9	90
Rumah Sakit	1	10

## Discussion

After a review of 10 RCT articles with 3692 respondents from 6 countries with depressive symptoms, this study only used RCT with the aim of comparing the intervention group and the control group to measure an effectiveness that is a decrease in depressive symptoms. 7 out of 10 apps use CBT-based interventions. The intervention was carried out approximately 4-6 weeks with a follow-up of 4-6 months but some only took 2 weeks. Cognitive Behavioral Therapy (CBT) is one of the most widely used evidence-based psychological interventions for the treatment of several mental disorders such as depression, anxiety disorders and stress. The use of CBT has recently expanded to the treatment of

psychotic disorders, marital discord, stressful life situations and many other clinical conditions (Gautam et al., 2020). Research that uses CBT as the basis for intervention on the application has respondents with depression severity, namely mild to moderate with a PHQ-9 score of 5-14. The study was conducted by Ludtke et al. (2018) and Moberg et al. (2019) and showed a reduction in depressive symptoms after being given the intervention in the intervention group compared to the control group.

In addition to CBT, there are also studies that use mindfulness meditation as an intervention to reduce symptoms of depression. Mindfulness meditation is included in one type of mindfulness intervention, namely Mindfulness Based Stress

Reduction (MBSR), which is a type of therapy that focuses on practicing awareness through meditation techniques. By practicing observing bodily sensations, a person can achieve a mindful state in his daily life (Feruglio et al., 2021). Mindfulness meditation aims to change an individual's relationship with stressful situations and thoughts. This is achieved by decreasing emotional reactions and increasing positive cognitive appraisals (Flett et al., 2019). Research conducted by Huberty et al. (2021) using the popular application Calm based on mindfulness meditation intervention for 8 weeks showed a decrease in depression and anxiety symptoms. Participants in the Calm meditation intervention group had minimal depression.

Mindfulness-Based Cognitive Therapy (MBCT) is a mindfulness-based intervention that integrates aspects of CBT. It was originally used with patients with chronic major depression (Aolinario-Hagen et al., 2020). This intervention adds traditional elements such as psychoeducation and exercises to distinguish between thoughts and facts. However, MBCT is more focused on encouraging patients to take a decentered approach to internal experience rather than teaching clients to change their thoughts (Brotto et al., 2019). This intervention was conducted using the paficia application by Moberg et al. (2019) with Mild to moderate depression participants.

In contrast to others, (Deady et al., 2022) used an intervention that integrated Behavioural activation and Mindfulness. Behavioural activation (BA) is a psychological intervention involving physical activity that aims to increase an individual's activity and engagement in life (Zakiah et al.,

2019). Behavioural activation (BA) has been shown to be effective in reducing depressive symptoms as well as effective for reducing PTSD disorders (Nai ret al., 2018). This is in line with the results of research conducted by [10] with the HeadGear application which was given an intervention time of 5 weeks with participants with moderate to severe depression. In research O'Toole et al., (2018) with severe depression patients in a hospital setting given Problem-Solving Oriented Psychotherapy using the LifeApp application. The psychotherapy provided includes problem-solving, perspective change, distraction techniques, acceptance, mindfulness, decreased social isolation, activity planning and increased social competence (Menon et al., 2017). At the end of the treatment, participants showed a reduction in depression symptoms and suicide risk.

## CONCLUSION

Based on the results of the articles that have been reviewed, it can be concluded that Mobile-App based interventions to reduce symptoms of depression are effective in reducing symptoms of depression. Cognitive Behavioral Therapy-based applications are effective in people with mild to moderate depression, Mindfulness in people with minimal depression, interventions that integrate behavioral activation and mindfulness in moderate to severe depression and Problem-Solving Oriented Psychotherapy in moderate to severe depression. Further research is needed to conduct more clinical trials to determine which application has the greater effect and improvement.

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