

Types of Digital-Based Nursing Interventions for Reducing Stress and Depression Symptoms on Adolescents During COVID-19 Pandemic: A Scoping Review

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Abstract: COVID-19 pandemic can cause problems in adolescent mental health such as anxiety, depression, and stress. This is because the distance barrier becomes an obstacle in handling mental health in adolescents. The use of technology has the potential to deal with mental health problems. The purpose of this study was to describe the types of digital-based nursing interventions to reduce symptoms of stress and depression on adolescents during the COVID-19 pandemic. This study used the Scoping Review method. Literature from CINAHL, PubMed, and ProQuest databases. The keywords were adolescent, depression, stress, digital, application, and nursing intervention in English. The criteria for articles in this study were full-text articles, the sample of adolescents, digital-based intervention, articles are original research, and time setting 2018–2022. We found 11 articles discussing digital-based nursing interventions to reduce symptoms of stress and depression in adolescents. There are 2 types of intervention, namely mobile-based intervention, and web-based intervention. The two interventions can be combined to become a method of providing digital nursing interventions that are effective and can reach the entire community. Digital-based nursing interventions are carried out by paying attention to physical, psychological, spiritual, and cultural aspects to improve the goals of nursing care so that they can be significant in reducing stress and depression in adolescents during the Covid-19 pandemic. Digital-based nursing interventions consisting of mobile-based intervention and web-based intervention can improve mental health among adolescents by reducing stress, anxiety, depression, and increasing resilience, well-being, and self-efficacy.

Keywords: adolescents, depression, digital intervention, stress

Introduction

Coronavirus Disease 2019 (COVID-19) has become a pandemic and a highly contagious disease in the world. According to the Ministry of Health of the Republic of Indonesia, Coronavirus Disease 2019 (COVID-19) is caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) which attacks the respiratory system. The prevalence of COVID-19 sufferers has increased every day since 2019. Based on data from the World Health Organization (WHO) on March 18, 2022, it was stated that the total confirmed cases of COVID-19 globally were 462,758,117 with 6,056,725 cases of death (Case Fatality Rate 5.1%) in 229 affected countries.¹ The COVID-19 pandemic can have an impact on people of all ages from children to teenagers.

Several studies in the general public also showed an increase in the prevalence of psychological problems, namely cases of depression (14.6–48.3%), stress (8.1–81.9%), and anxiety (6.33%–50.9%).^{2,3} The COVID-19 pandemic has also had an impact on teenagers. Research in Spain shows that teenagers can experience psychological distress during Covid-19.⁴ Research in China also shows that adolescents experience psychological problems, namely symptoms of Post-traumatic

Stress-Disorder (PTSD).^{3,5,6} COVID-19 can also cause mental health problems such as stress, anxiety, depressive symptoms, insomnia, rejection, anger, and fear in adolescents.^{7,8} The government and the public have taken several measures to reduce the impact of COVID-19.

The efforts made by the government in reducing the impact and spread of COVID-19 are by implementing policies, namely lockdown, physical distancing, restrictions on social activities, working from home, and online learning.⁹ Changes in learning methods from offline to online resulted in the emergence of psychological problems in students.¹⁰ These psychological problems are caused by limited communication and interaction, and the lack of socialization with lecturers, friends, and the environment.^{11,12}

Adolescence is a stage that is vulnerable to emotional and behavioral development because it is a period of transition from children to adults. The adolescent stage is a stage that undergoes many changes, both biological, psychological, and social.¹³ Teenagers prefer activities outside the home and interact with their peers. Peer groups have an important role in adolescent identity.¹⁴ This is certainly a challenge for adolescent growth and development in terms of psychosocial, emotional development, and also mental health. Youth mental health is the same importance of physical health.

Mental health is important for adolescents, especially related to lack of quality sleep, difficulty focusing, often forgetting and can make adolescents demotivated in learning so that learning is lacking.¹⁵⁻¹⁷ Disturbances in a child's mental health have a significant impact on other aspects of child and adolescent development such as poor school adjustment, reduced concentration, problems with achievement and social relationships.¹⁸⁻²²

Mental health problems need to be addressed because it will cause other serious effects such as suicide.²³ Nurses have a role in making nursing care to reduce mental health problems experienced by adolescents. So far, health workers have only focused on handling physical problems in adolescents during the COVID-19 pandemic.²⁴ So that interventions are needed that can be done to reduce the impact of mental health problems.

Previous studies on digital nursing interventions can be carried out using an application that provides information about mental health problems during the Covid-19 pandemic.²⁵⁻²⁷ In addition, the application also provides modules for relaxation to improve students' adaptive coping in dealing with stress. This application also provides a group as a means of support system and is accompanied by a facilitator, namely a nurse.²⁸ The support system in the application is an effort to reduce depressive symptoms in students. The development of the application collaborated with the school. Another study used chatbots for consultations between students and nurses.^{29,30} Chatbots provide information to reduce stress symptoms by providing information about self-therapy. However, other studies show that digital interventions cause students to become individualistic because they are carried out individually and there are no face-to-face meetings with other students.²⁹ Lack of concern for other students is also caused by students who focus on themselves in carrying out interventions. Although, other study also show that digital peer-support groups can be used to reduce depressive symptoms in students.²⁵ However, other study show that offline peer-support groups are more significant for increasing social support when done by offline.³¹ In addition, the website method with facilitators and nurse counselors can provide information and consulting services through the website to reduce symptoms of depression and stress in students.³² Websites and applications are accessed independently by students or facilitated by parents or teachers as a liaison between nurses and students.^{25,27,33} In addition, these data indicate that efforts to reduce symptoms of stress and depression can be carried out using digital nursing interventions.

A previous systematic reviews of digital-based interventions to reduce anxiety in adolescents when learning online showed a significant reduction in anxiety.^{25,34} However, the study did not analyze levels of stress and depression. Other studies also show that online nursing interventions can improve adaptive coping in adolescents during the Covid-19 pandemic.³⁴ The three studies recommend conducting studies on online nursing interventions to reduce symptoms of stress and depression in adolescents during the Covid-19 pandemic. So this study is the first scoping review to discuss online-based nursing interventions to reduce symptoms of stress and depression on adolescents during the covid-19 pandemic.

Internet psychological interventions can be used in dealing with mental health problems.³⁵ Considering that adolescents are affected by mental health during the COVID-19 pandemic and the barriers of distance in providing mental health interventions.³⁶ The application of digital/internet-based nursing interventions has a large reach, is easily accessible, and the online format allows adherence to maintain distance.³⁷ Therefore, the researcher intends to conduct

a literature review with a design scoping review to describe interventions that can be carried out in reducing mental health in adolescents due to the COVID-19 pandemic.

Materials and Methods

Design

This study used a scoping review design. Scoping review is a methodological technique that can explore new topics according to current conditions.³⁸ The broad conceptual range of this research framework can explain various studies that are relevant to the research objectives.³⁹ There were 5 core steps in this research framework, namely identification of research questions, identification of relevant study results, study selection, data mapping, compilations of results, and reporting of study results.⁴⁰ The study search method used the PRISMA Extension for Scoping Reviews (PRISMA-ScR) to identify various topics that discuss digital-based nursing interventions to reduce symptoms of stress and depression on adolescents during the COVID-19 pandemic.

Search Methods

The search for articles in this study used 3 databases, namely: CINAHL, Pubmed, and Proquest. The keywords used are: “adulthood OR adolescent OR young adult” AND “stress” AND “depressive OR depression” AND “e-health OR internet OR digital therapy OR application OR m-health” AND “nursing care OR nursing intervention”. The research questions were: what the types of digital-based nursing interventions to reduce symptoms of stress and depression on adolescents during the COVID-19 pandemic?

Inclusion and Exclusion Criteria

The way to measure the criteria in this study is using PICO namely:

Patient: adolescents

Intervention: online-based nursing interventions

Comparison: no comparison

Outcome: stress and depression.

This study used the PRISMA Extension for Scoping Review (PRISMA -ScR) which serves to identify various topics that discuss interventions to reduce the impact of mental health problems on adolescents during the COVID-19 pandemic (Figure 1). Articles were selected based on inclusion and exclusion criteria. The inclusion criteria for this study were that the patient were a full text article, a sample of teenagers, primary research, there was an intervention, the article was an original study, using English, and the time setting for the last 5 years (2018–2022).

Data Extraction

The authors used manual tables for data extraction. The aspects in the extraction table were authors, year, country, study design, sample, intervention, and results of the study. The authors have purpose of made a manual table was to make it easier for the writer to compare the study results from each article. Then the authors can classify based on similar data.

Quality Appraisal

The authors used The Joanna Briggs Institute (JBI) to assess the quality of articles. JBI is a method for determining the quality of articles by filling out statements about the contents of the articles being reviewed. There are 13 statements for articles with a randomized control trial design and 9 statements for articles with a quasi-experimental design. Each statement has answer options, namely yes, no, not applicable, and unclear. Yes answers were given a score of 1 and all other answers were given a score of 0. The articles were analyzed using the JBI critical assessment method with good article standards to be used if above 75% based on criteria and topic relevance.

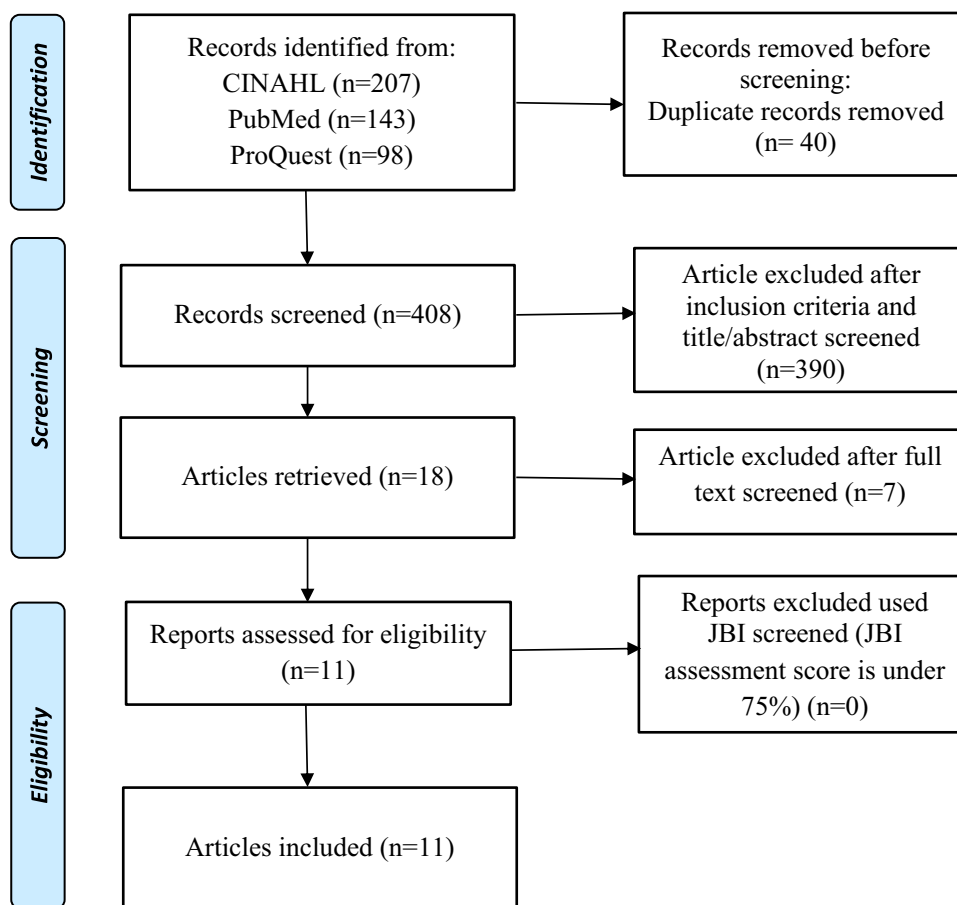


Figure 1 PRISMA flow diagram.

Notes: Adapted from Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi: 10.1136/bmj.n71. Creative Commons.⁶⁹

Data Analysis

Articles were obtained based on the selection results from the inclusion and exclusion criteria, then analyzed to be reported in the study results. The articles obtained were then read in full and analyzed by all authors. Data analysis was carried out used a descriptive approach to describe types of online-based nursing interventions to reduce symptoms of stress and depression in adolescents during the Covid-19 pandemic. After being analyzed, each intervention obtained from the study was classified based on similar interventions and then described and explained in a narrative manner.

Results

The number of articles obtained from the search is 448 articles. After duplicating the collected articles, 408 articles were obtained. Furthermore, after elimination based on the inclusion criteria, the remaining 28 articles. Then after checking the title and abstract, 18 articles were found. After analyzing the full text of the article, the remaining 11 articles. Articles were analyzed using the JBI Critical Appraisal Tool assessment method with good article standards above 75% based on criteria and topic relevance (Table 1).

There are 11 articles that explain digital-based nursing interventions to improve adolescent mental health during the COVID-19 pandemic. The research subjects of the articles analyzed were teenagers and students at schools and universities. Of the 11 articles analyzed, the method of providing digital intervention can be through web-based intervention or mobile-based intervention. The authors identified the two methods by providing an explanation of the

Table 1 JBI Critical Appraisal Tool

Reference Number	JBI Critical Appraisal Tool	Study Design
[41]	84.6% (11/13)	RCT
[46]	84.6% (11/13)	RCT
[68]	76.9% (10/13)	Pilot RCT
[49]	84.6% (11/13)	RCT
[47]	88.8% (8/9)	RCT
[42]	84.6% (11/13)	RCT
[43]	84.6% (11/13)	RCT
[50]	76.9% (10/13)	RCT
[44]	100% (13/13)	RCT
[45]	76.9% (10/13)	RCT
[51]	84.6% (11/13)	RCT

interventions and their impacts. The results of the analysis of the article are presented in tabular form as follows (Table 2):

This scoping review discusses digital nursing interventions to improve adolescent mental health during the COVID-19 pandemic. In general, this finding discusses the intervention and the impact of the intervention carried out. There are 2 methods of digital nursing intervention, namely mobile-based intervention and web-based intervention.

Table 2 Extraction Data

No	Reference Number	Outcome	Country	Design	Sample	Intervention	Result
1.	[41]	Reduced anxiety and/or depressive symptoms	China	RCT	114 students	Mindfulness-Based Mobile Health (mHealth) Intervention	The results showed that there was a significant reduction in anxiety and depression in students
2.	[46]	Reduced stress	US	RCT	585 students	Internet-Based Self Help	The results showed that there was a significant reduction in stress and an increase in resilience after being given an online self-help intervention
3.	[68]	Increased resilience	Ireland	Pilot RCT	55 students	Web-Based Intervention	There is a significant increase in resilience after being given a Web-Based intervention
4.	[49]	Social self efficacy and resilience	Iran	RCT	77 students	Virtual resilience training	There is a significant increase in self-efficacy and resilience after being given a virtual resilience training intervention
5.	[47]	Mental health and well-being	USA	RCT	679 students	Online Isha Upa Yoga	The results showed that there was a significant improvement in mental health and well-being and a decrease in stress
6.	[42]	Reduce depressive symptoms	India	RCT	1440 students	Resiliency Engagement and Care in Health(ReACH)	The results showed that there was a significant decrease in depression
7.	[43]	Reduce stress and depression, and increase quality of life	Netherlands	RCT	221 participants	Mindfulness-Based Mobile Application	There is a significant reduction in stress, depression, and an increase in quality of life after being given the Mindfulness-Based Mobile Application intervention
8.	[50]	Mental health, depression, anxiety, stress	Australia	RCT	605 participants	Web- and Mobile App-Based Mental Health Promotion Intervention	The results showed that there was a significant improvement in mental health marked by a decrease in symptoms of depression, anxiety, and stress

(Continued)

Table 2 (Continued).

No	Reference Number	Outcome	Country	Design	Sample	Intervention	Result
9.	[44]	Reduce depressive symptoms and enhancing resilience and quality of life (QoL)	China	RCT	103 participants	Mobile Device–Based Resilience Training Program	There was a significant decrease in depressive symptoms and a significant increase in patient resilience and quality of life after being given the Mobile Device–Based Resilience Training Program intervention
10.	[45]	Decrease perceived stress and improve well-being	Los Angeles	RCT	88 students	Mobile Mindfulness	There is a significant reduction in negative physician outcomes characterized by reduced symptoms of burnout, anxiety, and depression
11.	[51]	Reduce anxiety	United States	RCT	166 Students	Online mindfulness program	There is a significant increase in students resilience.

Mobile Application Intervention (m-Health)

The training provided through the mobile application consists of focused attention, body scanning, and loving-kindness meditation.⁴¹ Participants will be provided with video content to guide their activities, which include: (a) experiences of psychological stress such as excessive worrying about school and health, feelings of loneliness, and sadness; (b) mindfulness practice as a form of clarification of the benefits obtained; and (c) preference for short instructional videos (3 minutes) for intervention for 2–4 weeks), and delivery via social media WeChat. This intervention through m-health significantly reduces psychological stress during lockdown and reduces anxiety.

Interventions that can be done via mobile are to build structured friendships with communication on social media.⁴² These interventions can build positive and mutually supportive relationships, provide emotional support, and provide psychoeducation about COVID-19 such as preventive measures. The second step is to resolve the problem with supportive therapy and formulate the problem for decision making. The third step is to make an intervention plan by involving the local community; thereby increasing the process of social support within the circle of friendship. This intervention can reduce symptoms of anxiety and improve mental health because of getting social support through mobile phones.

This mobile application provides information about the application including settings. The intervention was carried out for 5 weeks.⁴³ Participants will be taught and monitored via email notifications regarding mindfulness therapy. Each week, participants were asked to practice therapy according to the instructions given. This intervention is proven to reduce psychological problems and improve aspects of the quality of psychological well-being marked by a decrease in stress levels.

This intervention serves to increase resilience through the medium of images or short videos.⁴⁴ The training was carried out for 15 minutes including reading the instructions and doing the exercises. Every week there will be feedback from psychologists via WeChat regarding the evaluation of participants' exercises. Participants are ensured to take part in training in the form of psychoeducation and resistance-building therapy. After the intervention, it was found that the endurance training program through mobile devices can effectively increase resilience and reduce stress symptoms so that it can shape mental health.

The m-health-based mindfulness training program was conducted for 10 minutes in the first 10 days, 15 minutes for the next 15 days, and 20 minutes for all subsequent sessions.⁴⁵ Each session will be guided via audio on the app. Instructions are exercises to pay attention to the body at rest, take deep breaths, feel emotions, and accept everything that has happened. M-health-based mindfulness exercises are included in the learning curriculum in order to get maximum results. After being given the intervention, students experienced a significant reduction in fatigue, anxiety, and depression.

Web-Based Intervention

This program is web-based which lasts 20–30 minutes.⁴⁶ This program contains modules for using psychological principles in dealing with stress. The “Space for Resilience” program contains seven web-based modules: Building

Resilience, Purpose, Self, Connection, Body, Mind, and progress. After each module is completed, participants are asked to express their feelings and do attention-focusing exercises. In addition, participants were also taught grief therapy through web instructions. Self-therapy via the web can increase resilience and reduce stress and depression.

Upa Yoga practice is done through instructional videos.⁴⁷ Each practice is guided by Yoga teacher Isha Hatha through videos embedded in redcap. Participants are ensured to watch the video, follow the guided practice, and are able to properly carry out the video instructions. This mobile-based exercise is carried out for 25 minutes. After doing the video exercise, participants will receive an email containing a link containing a 17-minute audio containing a practice guide for the three cycles of Yoga Namaskar and four minutes for Nadi Shuddhi. These interventions can effectively reduce the impact of mental health problems by reducing stress and improving well-being.

The SilverCloud Health program combines cognitive behavior which includes components of cognitive flexibility, optimism, self-reflection, behavioral activation, and active coping.⁴⁸ In addition, participants will also be provided with information via the web regarding social support, lifestyle factors, and values. The training modules include introductory videos, quizzes, psycho-educational content, personal stories from other users, interactive activities, mindfulness exercises, daily activity suggestions, and goal setting. This intervention was carried out for 8 weeks. After being given the intervention, there was a significant increase in resilience.

Web-based interventions can use video and audio clips, videos, animations, text messages, storytelling, and interactive discussions.⁴⁹ Education is given using a power point that is provided with audio. After being given the intervention, students experienced a significant increase in self-efficacy and resilience. So that students can prevent social and psychological dangers that may arise.

Web-based interventions can be provided in an audio-visual format. Interventions are carried out by providing education and challenges.⁵⁰ The intervention was carried out for 30 minutes using audio-visual media, and a daily performance book. The intervention emphasized the experiences by writing them in a diary and the challenges they had done. The intervention was carried out for 10 weeks. In addition, a web-based mental health promotion is provided. After being given the intervention, participants were able to improve mental health marked by reducing depression and increasing resilience.

The intervention is in the form of mindfulness therapy for eight weeks online via Zoom Meeting within 90 minutes.⁵¹ The practice is in the form of mindfulness meditation. Self-reflection, and interactive exercises are appropriate for cognitive therapy. Participants were asked to repeat the exercise independently for 20–30 minutes per day. Online mindfulness programs have been shown to be effective in reducing anxiety in students.

Discussion

From the scoping review conducted, digital-based nursing interventions utilize two-way communication and one-way communication. Two-way communication is carried out by utilizing social media such as WeChat and the zoom application. While the one-way communication is done by giving modules, directions in the form of video, and directions in the form of audio. The two methods can be combined for optimal mental health outcomes.

This study shows that digital-based nursing intervention can effectively reduce symptoms of stress and depression in adolescents during the Covid-19 pandemic. Online nursing interventions are carried out comprehensively by paying attention to the physical, psychological, spiritual and cultural aspects of adolescents. Parents are also involved to increase support during adolescent nursing interventions. Previous studies have shown that interventions that pay attention to the physical and psychological aspects of adolescents can effectively improve mental health.^{52,53} This is in line with other study which show that a cultural and psychological approach to youth can effectively reduce stress due to the co-19 pandemic.⁵⁴ So that the implementation of nursing must pay attention to all aspects of adolescents holistically to improve adolescent mental health.

Digital-based interventions are carried out for 5–32 weeks. The duration of the activity implementation was carried out to reduce symptoms of depression and stress in adolescents during the Covid-19 pandemic. Content on the website can be accessed forever for re-calls about the interventions carried out. This is in line with previous studies which showed that digital-based counseling interventions were carried out for 10 weeks to reduce stress symptoms in college students.^{14,36} The length of time the intervention aims to monitor the participants' progress in a complex manner in

reducing symptoms of stress and depression. Another study also showed that digital intervention was carried out for 16 weeks through the zoom application as a means of counseling to solve problems experienced by participants.^{55,56} Activities are carried out with education then meditation online so that it takes longer time than offline interventions.

Digital-based interventions have positive and negative impacts. The positive impacts of using technology in nursing interventions are staff effectiveness, increased productivity, optimization of staff time management, and utilization of resources. Through this positive impact, nursing care can be carried out effectively and efficiently.^{57,58} Not only that, the use of technology has a negative impact, namely affecting the quality of nursing care provided, including the quality of documentation, assessment, care planning, and evaluation which is still lacking.^{59,60}

The results of this study indicate that the negative impact of using technology in nursing interventions. Technology-based nursing interventions will also have an impact on communication and coordination of care in providing nursing care to patients who are less than optimal. Previous study have shown that the negative impact of digital-based nursing interventions is that participants are less focused on participating in online activities.²⁶ This is due to distraction from activities at home or constrained by the internet network. Other studies have shown that the negative impact of using technology in the implementation of counseling is that the counseling schedule does not match and there is internet interference, so that participants cannot fully participate in counseling activities.^{14,25}

If viewed from a health care perspective, technology-based nursing interventions will suit the ability of staff to use and mobilize their abilities to use technology. So nurses need to pay attention to the use of technology in providing nursing care by considering patient needs. Although in the provision of nursing care, namely assessment, treatment planning, and evaluation which are considered less than optimal if given through technology.^{61,62} However, the process of teaching patients and families and communication and coordination of care can still be optimized through the use of technology. Despite these results, the transformation of nursing care through technology will require the nurse's role in problem and symptom management, health promotion and disease prevention, and discharge planning. Because the main factor in the use of technology is not only in the equipment, but in the ability of nurses to operate technological tools in providing nursing care.^{60,63} This shows that technology-based nursing interventions still need to be adapted to the needs and readiness of resources in each health service.

Digital-based nursing intervention to improve mental health can be done through mobile-based training and web-based training. Various interventions that can be given are mindfulness, training, yoga, and resilience programs. Digital interventions have been shown to be effective in improving adolescent mental health by reducing stress, anxiety, depression, and increasing resilience, well-being, and self-efficacy. This is in line with previous research, namely cognitive processing therapy (CPT) and prolonged exposure (PE) based on m-health which can reduce the impact of post-traumatic syndrome disorder.⁶⁴

The use of digital-based nursing intervention brings many benefits to health care recipients without the need to go far to the hospital for treatment. Patients can be given therapy even though the patient is at home, this can reduce costs and also the patient's time to come to the hospital.⁶⁵ Previous research has revealed that the application of video telehealth to home (VTH) allows patients and service providers to overcome many barriers to care.^{33,66} In line with research on home based telehealth, his research revealed that home based telehealth is effective, safe and feasible.⁶⁷ The existence of technology can make it easier for patients to not have to go far (eg living in rural areas and far from transportation, who have physical disabilities making it difficult to move). Home based telehealth offers flexibility and convenience to maintain consistent attendance in therapy.

Limitations

This research is limited in the number of articles that discuss digital-based nursing interventions for reducing symptoms of stress and depression on adolescents during covid-19 pandemic. This is due to the lack of research that focuses on the treatment of mental health by nurses. So this study cannot comprehensively discuss digital-based nursing interventions in improving mental health. Even so, it describes the interventions and the impact of digital-based nursing interventions in improving mental health.

Conclusions

There are 11 articles that discuss digital-based nursing interventions to deal with mental health problems in adolescents. This study classifies it into 2 main interventions, namely mobile-based intervention and web-based intervention. Both interventions are effective in dealing with mental health problems such as increasing resilience, well-being, self-efficacy, and quality of life, and can reduce stress, depression, and anxiety. Online nursing care provided to adolescents is carried out by taking into account the physical and psychological conditions of adolescents to increase the safety and comfort of adolescents during the online nursing implementation process. The two interventions can be combined so that they can reach more people and are easily accessible so that they are effective in dealing with mental health problems in adolescents.

The implication in this study is that there is a foundation for nurses in providing nursing care online to reduce symptoms of stress and depression in adolescents to be more effective and efficient. In addition, the results of this study can also be a basis for the government in making policies for schools and health workers in providing online nursing interventions to reduce mental health problems such as stress and depression. A suggestion for future research is the need for a study with a systematic review design and meta-analysis to determine the effectiveness of online-based nursing interventions in reducing symptoms of stress and depression in adolescents.

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