Research Square

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Intervention Nursing Student Mother Heart Connection (NSMHC) to Improve Student Mental Health

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Abstract

Background

This study examines the effectiveness of the Nursing Student-Mother Heart Connection (NSMHC) mobile application in enhancing the mental health of university students by improving communication between mothers and their children. Mental health is a critical determinant of academic success and overall well-being among university students, with parent-child relationships, particularly with mothers, playing a significant role.

Purpose

This study aims to find out the effectiveness of NSMHC applications to improve students' mental health

Methods

A quasi-experimental design with pretest-posttest control group was canducted with 60 first-year nursing students and their mothers. The intervention group received daily mindfulness-based emotion regulation training for mothers via the NSMHC app over a two-week period, while the control group received no intervention during the study period. Mental health outcomes were measured using the Mental Health Inventory-5 (MHI-5), and communication quality was assessed using the Parent-Adolescent Communication Scale (PACS).

Results

Sixty participants completed the study. The intervention group showed significant improvements in maternal communication, child communication, and student mental health after the two-week NSMHC program (all $p < 0.05$). Between-group analysis revealed significantly better mental health outcomes in the intervention group compared with the control group ($p = 0.041$).

Conclusion

These findings suggest that NSMHC can enhance mother-child communication and have a positive impact on student mental health. Further research is recommended to explore the long-term effects and mechanisms underlying these outcomes.

Trial Registration:

The study was registered in TCTR (**TCTR20260304010**; registration date: 04 March 2026; retrospectively registered)

Introduction

Mental health is currently an issue that is still being discussed in various fields because mental health is one of the main factors in determining the quality and satisfaction of life in individuals [21]. It becomes an integral part of health and well-being, as also defined by the World Health Organization, namely that mental health is a state of well-being in which individuals are aware of their abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can contribute to their communities [23]. In the university student population, mental health is crucial as it can impact academic achievement and other aspects of their academic life. Academic life is one parameter that can also be used to assess students' psychological well-being, as it is influenced by students' mental health and intrinsic motivation. An active academic life demonstrates the effort students put into their academic tasks, such as improving their knowledge and skills [12]. Several factors influence the mental health of students. Previous research suggests that factors influencing the mental health of students in higher education encompass psychological, academic, biological, lifestyle, social, and financial aspects [21]. A harmonious relationship with parents, especially mothers, can foster psychological well-being in college students [20]. However, recent decades have seen an increase in mental health disorder issues among children, adolescents, and young adults. Rates of impulse control disorders, such as ADHD and anxiety disorders, begin to increase as early as 4 years of age. The increase is most significant in adolescence and young adulthood, with the highest incidence of anxiety, mood, and substance use disorders [7]. College students are one of the populations with a high incidence of mental health disorders. A comprehensive research investigation conducted in the nation of Bangladesh revealed that the prevalence rates of psychological conditions, specifically depression, stress, and anxiety, among the population of university students exhibited a significant variation. Ranging from a notably low 46.92% to an alarmingly high 96.82%, thereby underscoring the urgent need for further exploration and intervention in the mental health landscape of this demographic [2]. Psychological factors contribute significantly to mental problems among college students. These include trauma, childhood maltreatment, and emotional maladjustment, which can increase the risk of anxiety and depression in college students [15].

The dynamics of mother-child interactions, as well as the dimensions of spiritual well-being, have the potential to impact the behavioral disorders observed in children through their effects on maternal mental health [22]. The establishment of a robust and profound connection between parents and their offspring has the potential to significantly enhance the cultivation of critical social skills, which are indispensable for the successful formation of profound and meaningful personal relationships that individuals will rely upon throughout their lives [4]. On the other hand, negative relationships between parents and children can elevate the likelihood of developing mental health issues. Individuals who experience high psychological distress are more likely to function negatively in daily life. Good emotion regulation strategies may act as a protective factor that moderates the relationship between childhood trauma and negative thinking in individuals [32]. A poor relationship between parents and children,

characterized by poor communication between the two, can exacerbate a student's mental health problems [20].

The quality of mother-child communication is mediated by maternal mental health. Thus, maternal mental health is crucial in determining the effectiveness of mother-student communication [17]. Research shows that mothers with good mental health tend to have more effective communication with their children. The presence of robust and favorable mental health among mothers can significantly contribute to the enhancement of their children's emotional and social development, in addition to markedly improving their academic performance in educational settings. Current technological developments encourage the integration of technology into various fields, one of which is to improve mother-child communication. However, there are still challenges in optimizing the use of these technologies to support quality interactions between mothers and children. Previous research shows that available applications only focus on disseminating information rather than encouraging direct mother-child communication and improving maternal mental health. [22]. Further research is needed to identify the app features that are most effective in facilitating positive communication and improving maternal mental health.

The Nursing Student-Mother Heart Connection (NSMHC) app provides mindfulness training and emotional support to help mothers manage their emotions, enabling them to enhance the quality of maternal communication with university students. Effective communication between mothers and students is expected to improve students' mental health. This study aims to provide interventions for mothers to foster good communication between mothers and students, thereby improving students' mental health.

Methods

Research design

This study employed a quasi-experimental design, utilizing a pretest and posttest with a control group. To assess the improvement in students' mental health, assessments were conducted before and after the intervention in both the experimental and control groups.

Setting and samples

This research was conducted between February 20 and June 3, 2025, at the Department of Nursing at one of the universities in Indonesia. The sample was taken from students of the Nursing Study Program at Diponegoro University. Sampling was conducted using a probability sampling technique, specifically simple random sampling. The sample size was calculated using the G-Power application version 3.1.9.7, with a significance level (α) = 0.05, power test strength (1-β) = 80% (0.80), and α-effect size (γ) of 0.80 [26]. Based on the calculation results, a minimum sample size of 27 respondents per group, totaling 54

respondents, was determined. To anticipate the possibility of dropout, an additional three participants were added to each group, bringing the total sample to 60 participants.

The inclusion criteria in this study were first-year students who still have mothers and have access to communicate with them, who can be given the intervention. The exclusion criteria set in this study are students who are diagnosed with severe and moderate mental disorders in the acute phase and do not follow the research process from pretest to posttest. The entire participant recruitment process from enrollment to follow-up and data analysis is systematically documented in the CONSORT flowchart (Hopewell et al., 2025; Fig. 1).

Intervention (applies to experimental studies)

The designer of the features in the NSMHC app is the initiator of a spiritual mindfulness intervention focused on emotions. The app features a series of emotion regulation exercises for mothers, utilizing an emotion-focused mindfulness approach. The student's mother was instructed to install the NSMHC application. The student mother was then invited to prepare themselves by being in a quiet place. After that, the student's mother was asked to follow the instructions on the NSMHC application. The intervention lasted about 20–40 minutes, depending on how the student's mother was able to find the emotions she felt. The intervention was carried out repeatedly, as many as once a day for two weeks. The posttest is administered after the mother has routinely conducted emotion regulation exercises using the NSMHC application. Participants in the control group received no interventions. However, they were given a handbook to learn emotional regulation exercises based on spiritual mindfulness, focusing on emotions, after completing a posttest by the intervention group. The control group was still asked to complete a pretest and posttest at the same time as the intervention group.

Measurement and Data Collection;

The instruments used in this study were a demographic data questionnaire, the Parent-Child Communication Scale (PACS), and the Mental Health Inventory-5 (MHI-5) instrument. Demographic data questionnaires were used to collect basic information from participants (mothers and students). The demographic data requested for mothers included their name, age, religion, occupation, education, and marital status. Meanwhile, for students, the questions asked were: name, mother's name, age, religion, and whether they lived with their parents.

The parent version and the child version of the PACS instrument were used to measure parent-child communication before and after the intervention [5]. Meanwhile, the MHI-5 questionnaire is used to assess the mental health level of students [27]. The intervention was conducted over a period of two weeks and was monitored daily. The intervention provided was in the form of mindfulness training focused on emotions for mothers through the NSMHC application. Data collection commenced with the selection of samples based on the specified inclusion criteria. The researcher explained the purpose and

objectives of the study to obtain the participants' consent. Demographic data, communication, and mental health measurements were completed independently by respondents.

Data Analysis

The collected data were statistically analyzed using the IBM Statistical Package for the Social Sciences (SPSS) software version 26. Demographic data is reported as a measure of frequency. The data obtained were tested for normality using the Shapiro-Wilk test. Bivariate analysis was conducted to compare pretest and posttest scores within a single group using the Wilcoxon test. To compare scores between groups, the Mann-Whitney test was used. The significance level targeted in this study is < 0.05.

Ethical considerations

This research has received ethical approval from the Health Research Ethics Committee of Diponegoro University, with the number 078/EC/KEPK/FK-UNDIP/IV/2025.

Results

A total of 60 participants joined this study after signing informed consent. Participants were divided into an intervention group and a control group with 30 participants in each group. The demographic characteristics of participants are presented in Table 1. Participants were in the age range of 34 to 51 years, which is the productive age in humans. The majority of student mothers (20%) work in various jobs, and most of them are high school graduates (50%).

Table 1
Demographic data of research participants *Note: Values are presented as n (%) or mean ± standard deviation (SD) as appropriate.*

Demographic Data	Category	Intervention		Control	
		n	%	n	%
Mother					
Age		46 ± 7.29	34 ± 59	51 ± 8.608	39 ± 62
Religion	Islam	26	86.7	25	83.3
	Christian	4	13.7	1	3.3
	Catholic	-	-	4	13.3
Education	Elementary school	-	-	1	3.3
	Junior high	2	6.7	3	10.0
	Senior High	15	50.0	15	50.0
	Bachelor	12	40.0	9	30.0
	Master	1	3.3	2	6.7
Work	Not working	10	33.3	13	43.3
	Civil Servant	4	13.3	5	16.7
	Private Employees	5	16.7	6	20
	Entrepreneurial	3	10.0	6	20
	Other	8	26.7	-	-
Marital Status	Marry	28	93.3	30	100
	Divorce of Life/Death	2	6.7	-	-
STUDENT					
Age		18.77 ± 0.971	17 ± 22	18.70 ± 0.702	17 ± 20
Gender	Man	4	13.3	2	6.7
	Woman	26	86.7	28	93.3
Religion	Islam	26	86.7	25	83.3
	Christian	4	13.3	1	3.3
	Catholic	-		4	13.3
Living with	Parents	3	10.0	6	20.0

Demographic Data	Category	Intervention		Control	
		n	%	n	%
Mother					
	Other families	2	6.7	-	-
	Boarding	25	83.3	24	80.0

The results of the Mann-Whitney test showed an improvement in students' mental health after the mother received the intervention, with a p-value of 0.041. Detailed comparisons of maternal communication, child communication, and student mental health scores between groups are presented in Table 2. This demonstrates that the NSMHC application can significantly enhance students' mental health by improving communication between mothers and students.

Table 2
The influence of NSMHC on improving students' mental health

Variabel	Time	Intervention (Mean ± SD)	Control (Mean ± SD)	P value (Wilcoxon)	P-value (Mann-Whitney)
Maternal Communication	Pretest	64.37 ± 6.173	68.43 ± 7.412	0.000	0.117
	Post-tests	78,43 ± 7,128	68,73 ± 7,896		0.000
Children's Communication	Pretest	58.23 ± 8.744	65.20 ± 10.829	0.000	0.158
	Post-tests	75.40 ± 8.756	68,47 ± 8,905		0.023
Student Mental Health	Pretest	17.60 ± 3.276	19.30 ± 3.789	0.001	0.615
	Post-tests	21.83 ± 3.696	19.57 ± 3.794		0.041

Note: Within-group comparisons were analyzed using the Wilcoxon test, and between-group comparisons were analyzed using the Mann–Whitney test. SD = standard deviation.

Discussion

Currently, students' mental health disorders have become very diverse. Previous research has reported that many students experience loneliness, depression, anxiety, and even suicidal ideation [6]. The results showed that on the student mental health variable, before the intervention, there were still many students who did not have good mental health (17.60 ± 3.276). Good mental health in students can

impact their understanding of learning styles. This learning style can affect students' academic performance and overall well-being [24]. The intricate and multifaceted dynamics of the maternal bond between a mother and her offspring significantly contribute to the overall psychological well-being and mental health of individuals pursuing higher education. It has been observed that when a mother exhibits robust mental health and emotional stability, her child is more likely to experience favorable mental health outcomes, ultimately fostering a more positive and resilient psychological state throughout their collegiate journey [11]. A good mother-child relationship can foster resilience and self-esteem, which significantly affects the mental health of college students. Mothers with good mental health tend to provide emotional support to their children, thereby improving their children's mental well-being [28].

Mother-child mental health has a complex and multifaceted relationship as it involves various mechanisms that affect the mental well-being of both parties. Mentally healthy mothers tend to reduce harsh parenting behaviors and improve their children's mental health. (F. Wang et al., 2021). Conversely, poor maternal mental health can increase the risk of family conflict and negatively impact the mental health of children. This can affect their future romantic relationships [1]. Children of depressed or anxious mothers show impairment and a higher risk of child mental health disorders [13].

The strength of maternal and child mental health is evident in the quality of communication between mothers and their children [18]. Effective communication serves as a safeguard against various mental health challenges, creating a nurturing environment that can alleviate stress and improve emotional well-being. In clinical samples of adolescent girls who have been referred to psychiatric services, there is a notable connection between how mothers and daughters communicate and the girls' externalizing and internalizing behaviors, with the former being significant and the latter moderate. Additionally, the quality of communication between mothers and daughters entirely mitigates the effects of maternal depressive symptoms on the adolescents' internalizing and externalizing behaviors [33]. Improved communication between mothers and daughters might lessen the adverse effects of maternal depressive symptoms on the mental health of adolescents. Specifically, it was found that urban African-American adolescent girls who had strong communication with their mothers showed fewer internalizing and externalizing symptoms, regardless of their mothers' depressive symptoms. This suggests that effective communication is critical to supporting adolescent mental health, and supportive family interactions can reduce the risks associated with maternal mental health problems [19]. Good mental health in mothers and adolescents is reflected through effective communication, which can reduce depressive symptoms in boys when they receive messages related to cultural awareness. Conversely, high levels of anger and alienation in relationships can exacerbate negative impacts. A higher intensity of positive affect and lower levels of negative affect in mothers and adolescents were associated with better relationship quality and fewer depressive symptoms. Effective communication, characterized by understanding and emotional support, is essential for fostering a healthy mental state in both parties [3].

Mindfulness is increasingly recognized as a beneficial practice for improving maternal mental health. Through mindfulness practices, maternal well-being can be enhanced by promoting self-awareness and emotion regulation. A study on new mothers with low income showed that mindfulness interventions

can improve maternal mental health, including reducing symptoms of depression and anxiety and increasing resilience [14]. Mindfulness promotes acceptance and awareness without judgment, which can help mothers deal with emotional challenges during motherhood [10]. Mindfulness practices can also assist mothers in managing stress and anxiety that often arise in the caregiving role (Pan et al., 2023; Zhang et al., 2024). With increased maternal awareness and calmness, interactions with students are likely to become more positive and constructive. This, in turn, can create a more supportive environment for adolescents' emotional development and strengthen the bond between mother and child. This study demonstrates that integrating mindfulness practices into a mobile application called NSMHC can improve the mental health of university students (p-value = 0.041), with mental health being closely aligned with the quality of communication between mothers and their children. These findings highlight the importance of developing technology-based interventions to support the psychological well-being of university students. Furthermore, the results of this study also highlight the crucial role of mother-child communication in shaping children's mental health. Further research is needed to investigate the specific mechanisms by which mindfulness applications can impact family communication dynamics and long-term mental health.

Implication and Limitations

Using technology for mindfulness can help university mental health programs. Mindfulness can improve mothers' mental health, which can also help students. Better communication between mothers and children can benefit students' well-being and grades over time. The study suggests several important points: 1) Mobile apps with mindfulness practices, like the NSMHC app, can help mothers and college students communicate better, improving students' mental health. 2) Adding technology-based mindfulness to university mental health programs can be helpful, especially for mother-child relationships. 3) Clinicians working with college students should consider looking at mother-child communication as part of treatment. 4) Mental health professionals might suggest mindfulness apps as a cheap and easy way to support mothers' mental health and improve mother-child relationships. 5) Universities and counseling centers could try using similar technology-based methods to help more students. 6) The study shows that improving mothers' mental health with mindfulness can positively affect students' mental health, highlighting the importance of family in mental health care for young adults. 7) Clinicians should know that better mother-child communication can have long-term benefits for students' mental health and grades. These points show that technology-assisted mindfulness can support both mothers' and students' mental health in universities. But more research is needed to confirm the long-term effectiveness of these methods.

Limitation in this study is external factors, such as social support, academic environment, and participants' conditions, may influence outcomes; however, these factors were not fully controlled in this study.

Conclusion

This study demonstrates the significant potential of integrating mindfulness practices through mobile applications, such as NSMHC, in improving the mental health of college students and the quality of mother-child communication. By utilizing smartphone technology, this approach offers a practical and accessible solution for mothers to incorporate mindfulness into their daily lives. The positive impact of this practice is not only limited to the mental well-being of mothers but also has the potential to strengthen the mother-child relationship in the long run.

Abbreviations

NSMHC
Nursing Student Mother Heart Connection
MHI-5
Mental Health Inventory 5
PACS
Parent Adolescent Communication Scale
SPSS
Statistical Package for the Social Sciences

Declarations

Ethics approval and consent to participate

This study was approved by the Health Research Ethics Committee of the Faculty of Medicine, Diponegoro University, Indonesia, with ethical approval number 078 EC KEPK FK UNDIP IV 2025. All participants provided written informed consent prior to participation. Participation was voluntary, and confidentiality and anonymity of participants were maintained throughout the study.

Consent for publication

Not applicable. No identifiable personal data are presented in this manuscript.

Competing Interests

The authors declare that they have no competing interests.

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Author Contribution

Agus Santoso, Meidiana Dwidiyanti: Conceptualization, Methodology, Writing – original draft; Meidiana Dwidiyanti: Funding Acquisition, Project Administration, Supervision; Badrul Munif: Collect Data, writing-review and editing. Project Administrator, Writing-original draft. Intervention, Investigation; Intervention, writing-original draft; Intervention; Writing-original draft

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Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

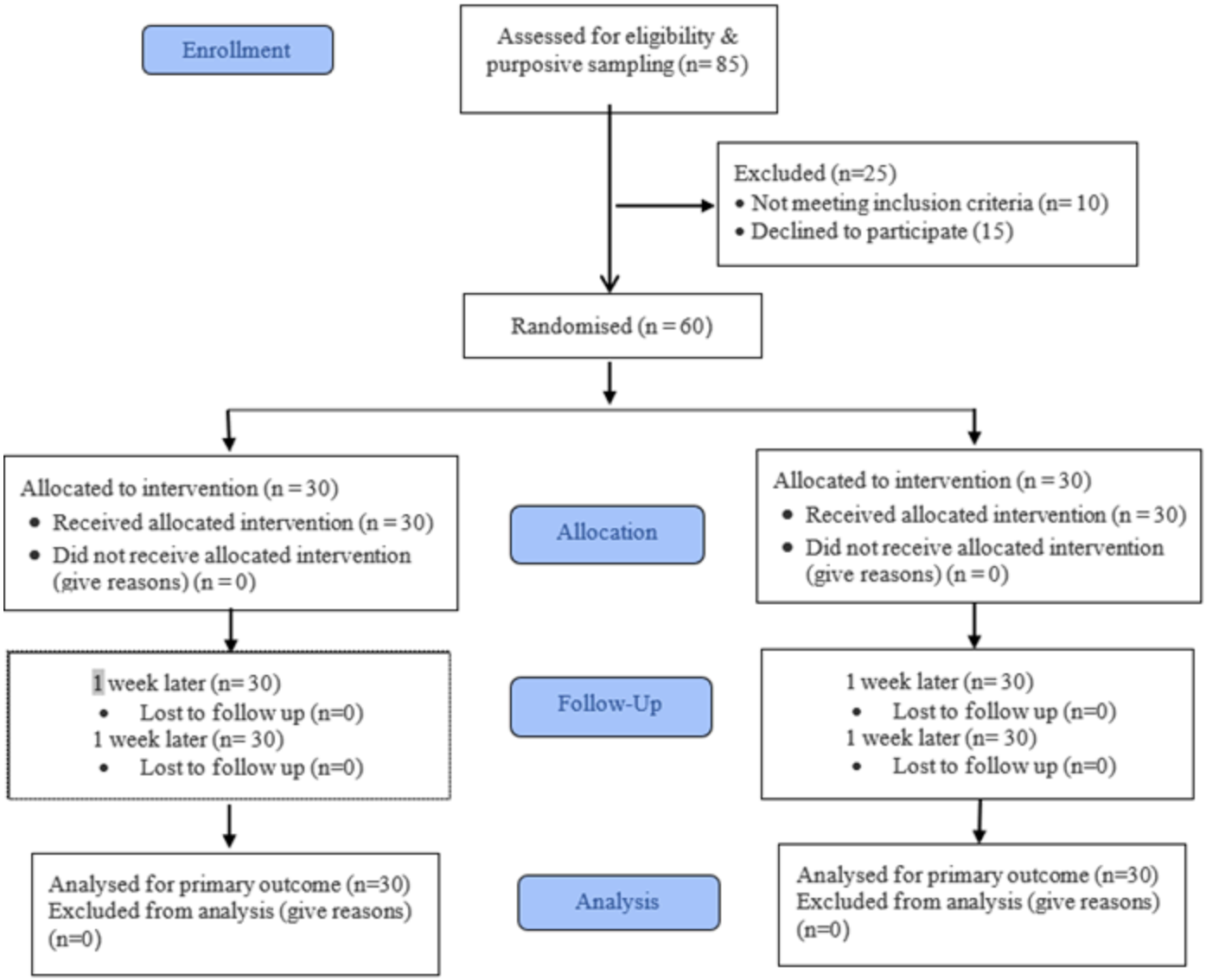


Figure 1

CONSORT flow diagram of participant recruitment and study process

Supplementary Files

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