Journal of Child, Family, and Consumer Studies Vol. 4, No. 1
Jan 2025, p: 40-50, e-ISSN: 2829 – 650 DOI: https://doi.org/10.29244/jcfcs.4.1.40-50

THE IMPACT OF HEALTH EDUCATION USING FOCUS GROUP DISCUSSION ON BREAST SELF-EXAMINATION (BSE) BEHAVIOR AMONG FEMALE STUDENTS AT SMAN 14 MAKASSAR

Ratna Sari[1], Mikawati[2]*, Evi Lusiana[3], Muaningsih[4], Rizky Pratiwi[5]

[1,2,4,5] Bachelor of Nursing Study Program & Professional Nurse Program, STIKES Panakkukang, Makassar, Indonesia
[3.4]Diploma in Nursing Study Program, STIKES Panakkukang, Makassar, Indonesia

[*)] *Email: mikawati.skp@gmail.com*

Abstract

Breast cancer poses a significant global threat to women's health, yet awareness and practice of its most accessible early detection method—Breast Self-Examination (BSE)—remain low among adolescent girls, especially high school students. This study aims to examine the impact of health education using the Focus Group Discussion (FGD) method on BSE behavior among 11th-grade female students at SMAN 14 Makassar in 2023. A pre-experimental research design with a one-group pretest-posttest approach was employed. A total of 51 female students were selected through probability sampling. Data were collected using a standardized questionnaire assessing both knowledge and attitudes toward BSE. The Wilcoxon test revealed a significant increase in knowledge following the intervention ($p = 0.001$), indicating a meaningful difference between pretest and posttest scores. In contrast, although there was an increase in attitude scores post-intervention, the result was not statistically significant ($p = 0.239$). These findings suggest that while the health education intervention effectively improved knowledge about BSE, its influence on attitude change was not statistically confirmed. Nevertheless, the upward trend in attitude scores implies potential for long-term impact. In conclusion, health education through FGD proved to be effective in enhancing students' knowledge of BSE and may contribute to fostering more positive attitudes over time. This highlights the importance of integrating structured health education programs into school curricula to promote early breast cancer prevention among adolescents.

Keywords: adolescent health, breast self-examination, focus group discussion, health education, preventive behavior.

PENGARUH EDUKASI KESEHATAN MELALUI METODE DISKUSI KELOMPOK TERARAH TERHADAP PERILAKU PEMERIKSAAN PAYUDARA SENDIRI (SADARI) PADA SISWI SMAN 14 MAKASSAR

Abstrak

Kanker payudara merupakan ancaman serius bagi kesehatan perempuan secara global, namun kesadaran dan praktik pemeriksaan payudara sendiri (SADARI) sebagai metode deteksi dini yang paling mudah masih rendah di kalangan remaja putri, terutama siswi sekolah menengah. Penelitian ini bertujuan untuk menganalisis pengaruh penyuluhan kesehatan menggunakan metode Focus Group Discussion (FGD) terhadap perilaku SADARI pada siswi kelas XI di SMA Negeri 14 Makassar tahun 2023. Penelitian ini menggunakan desain pra-eksperimental dengan pendekatan one group pretest-posttest design. Sebanyak 51 siswi dipilih sebagai responden melalui teknik probability sampling. Data dikumpulkan menggunakan instrumen kuesioner terstandar yang mencakup aspek pengetahuan dan sikap terhadap praktik SADARI. Hasil analisis dengan uji Wilcoxon menunjukkan adanya peningkatan signifikan dalam pengetahuan setelah intervensi ($p = 0{,}001$), yang menandakan perbedaan yang bermakna antara skor pretest dan posttest pengetahuan. Sebaliknya, meskipun terdapat peningkatan skor sikap setelah intervensi, hasil uji statistik menunjukkan nilai $p = 0{,}239$ ($p > 0{,}05$), yang berarti tidak terdapat perbedaan yang signifikan secara statistik antara pretest dan posttest sikap. Kesimpulan dari penelitian ini adalah bahwa penyuluhan kesehatan berbasis FGD efektif dalam meningkatkan pengetahuan tentang SADARI, dan berpotensi memengaruhi perubahan sikap positif meskipun tidak signifikan secara statistik. Temuan ini menekankan pentingnya pendidikan kesehatan terstruktur di sekolah dalam upaya pencegahan kanker payudara sejak usia remaja.

Kata kunci: diskusi kelompok terarah, edukasi kesehatan, kesehatan remaja, perilaku pencegahan, pemeriksaan payudara sendiri.

INTRODUCTION

Breast cancer remains one of the most significant public health challenges affecting women worldwide. As a malignant neoplasm with a wide and complex clinical spectrum, it contributes substantially to the global cancer burden. The psychosocial consequences of breast cancer are also profound, often affecting not only the physical health of women but also their mental well-being, familial relationships, and economic stability (Saleh & Habib, 2024). In 2020 alone, more than 2.3 million women were diagnosed with breast cancer globally, with approximately 685,000 deaths recorded, making it the most commonly diagnosed cancer among women and a leading cause of cancer-related mortality (World Health Organization, 2021). Early detection plays a vital role in reducing mortality rates and improving survival outcomes. Among various early detection methods, Breast Self-Examination (BSE) is considered a simple, low-cost, and non-invasive technique that empowers women to monitor their breast health regularly. However, despite its proven benefits, BSE remains underutilized, particularly among adolescent populations, due to limited knowledge, lack of awareness, and insufficient access to structured health education interventions (Rahman et al., 2019; Gebresillassie et al., 2018; Al-Shiekh et al., 2021).

In Indonesia, the burden of breast cancer is particularly alarming. It is the most frequently diagnosed cancer among Indonesian women, with increasing incidence rates reported annually (Olaogun et al., 2020). The Indonesian Ministry of Health (2020) has highlighted that breast cancer accounts for 42.1 cases per 100,000 women, with a mortality rate of 17 per 100,000. Urban centers such as Makassar have experienced noticeable increases in new breast cancer cases, reflecting broader national trends. Several socio-cultural and systemic factors contribute to the low uptake of early detection practices in Indonesia, including stigma, limited health literacy, and lack of formal education on preventive health behavior (Dewi et al., 2019; Hossain, 2018; Alam et al., 2021). These barriers are particularly evident among adolescent girls in high schools, where structured health education about breast cancer and BSE is rarely integrated into the curriculum. Consequently, this demographic group is often ill-informed about breast cancer risks and unfamiliar with BSE techniques, leaving them vulnerable to delayed diagnosis and advanced-stage cancer (Yıldız et al., 2023).

Understanding the underlying causes of low BSE practice among adolescents is crucial to developing effective health interventions. Multiple studies have shown that adolescents often lack basic knowledge about breast cancer, its symptoms, and the importance of early detection (Saleh & Habib, 2024; Zahid et al., 2018). Furthermore, many young women hold misconceptions about breast cancer, believing it only affects older individuals or assuming that family history is the only risk factor (Noori & Schouten, 2018; Gebresillassie et al., 2018). These myths, combined with insufficient access to credible health information, significantly hinder the adoption of BSE as a preventive practice. Research by Garg et al. (2019), Rahman et al. (2019), and Jemebere (2019) supports the notion that health education interventions are effective in enhancing knowledge, correcting misinformation, and shaping positive health attitudes and behaviors. Therefore, addressing these gaps through comprehensive, targeted, and engaging educational approaches is essential, particularly within school settings where adolescent girls can be reached systematically and consistently.

One promising method to deliver such health education is through Focus Group Discussions (FGDs). FGDs provide a participatory platform where individuals can exchange ideas, express concerns, and receive feedback in a supportive and interactive environment. According to Güner and Kırca (2020), FGDs have been effective in promoting open dialogue around sensitive health topics, including breast cancer, by reducing fear, correcting misconceptions, and fostering mutual learning. FGDs encourage peer-to-peer interaction, allowing students to learn from shared experiences and gain confidence in discussing personal health matters. This method aligns well with adolescent developmental psychology, which emphasizes the role of social interaction in behavior formation and attitude change. Moreover, Kurnia et al. (2020) and Metasari & Nurlina (2022) found that FGDs significantly improved health knowledge, motivation, and attitudes among both rural and adolescent populations, demonstrating their adaptability and effectiveness.

The effectiveness of FGDs in changing health behaviors has been well-documented in both quantitative and qualitative research. Moreno et al. (2018) emphasized that participatory educational techniques, including FGDs, significantly increase self-efficacy, knowledge retention, and the likelihood of behavioral change. Similarly, Jemebere (2019) and Ng et al. (2022) noted that structured discussions facilitated by trained educators result in measurable improvements in preventive health practices, including BSE. The interactive format of FGDs not only addresses cognitive learning but also engages emotional and social dimensions of behavior, making it particularly suitable for adolescent learners. Testimonials from students who have participated in FGD-based health programs reveal increased confidence in performing BSE and a greater sense of responsibility for their health (Al-Shiekh et al., 2021). This holistic impact underscores the potential of FGDs to serve as a cornerstone for adolescent-centered health education.

At SMAN 14 Makassar, preliminary field assessments reveal a considerable gap in breast health education. Informal surveys and observational data indicate that the majority of female students have never received formal instruction on breast cancer or BSE. Many are unaware of the signs of breast abnormalities and lack the confidence or skills to perform self-examinations accurately. This situation is indicative of broader systemic issues in Indonesia's school-based health promotion strategies, where topics like reproductive health and cancer prevention are often neglected or insufficiently addressed (Echaiz et al., 2018; Mohammadnabizadeh et al., 2022; Metasari & Nurlina, 2022). Without early and targeted intervention, these young women may carry their lack of awareness into adulthood, potentially delaying diagnosis and reducing survival chances in the event of disease onset. Thus, schools offer a strategic entry point for introducing structured, evidence-based health education programs aimed at increasing cancer literacy and promoting preventive practices such as BSE.

The current study seeks to fill this educational gap by evaluating the impact of a health education program using the FGD method on BSE behavior among female students at SMAN 14 Makassar. By comparing pre- and post-intervention levels of knowledge, attitudes, and BSE practices, this research aims to determine the effectiveness of FGDs in facilitating meaningful behavioral change. Furthermore, this study contributes to the limited but growing body of literature that supports participatory and context-sensitive educational interventions as a mechanism for youth health empowerment in low- and middle-income countries (Al-Shiekh et al., 2021; Alam et al., 2021). Given the high incidence of breast cancer and the existing deficiencies in health education among adolescents, the findings of this study hold important implications for public health policy, school curriculum development, and future research in cancer prevention strategies.

Addressing the low prevalence of BSE practices among female adolescents in Indonesia requires innovative and evidence-based health education strategies. FGDs represent a powerful approach to engage students in active learning, challenge health myths, and instill sustainable preventive behaviors. Empowering young women with the knowledge and skills to perform BSE not only enhances their personal health autonomy but also positions them as future advocates for community-wide health promotion. In doing so, schools can play a critical role in reducing the long-term burden of breast cancer through early education and proactive engagement.

METHODS

This study employed a pre-experimental research design using a one-group pretest-posttest model to investigate the causal effect of health counseling on breast self-examination (BSE) behavior among female students at SMAN 14 Makassar. A pre-experimental design was selected due to its suitability in evaluating intervention effectiveness within educational and health behavior contexts, particularly where randomized controlled trials are not feasible (Pilus et al., 2022; Ali et al., 2022). The design enabled the assessment of changes by comparing the same subjects' outcomes before and after the intervention, providing a structured yet practical framework for behavior-focused research in school settings.

The study population consisted of 111 female students enrolled in Grade XI MIPA 1 to XI MIPA 5. A representative sample of 51 students was determined using standard sample size calculation formulas to ensure adequate statistical power for detecting meaningful changes, consistent with methodologies recommended for clinical and behavioral research (Pilus et al., 2022; Alhazzani et al., 2019). Sample selection was refined by applying eligibility criteria, which included voluntary participation, consistent attendance during both pretest and posttest evaluations, and absence of previous intensive BSE education. Implementing such criteria is essential to minimize bias and enhance sample validity in health education interventions (Tang et al., 2020).

Primary data were gathered through a structured questionnaire, specifically designed to measure dimensions of knowledge, attitudes, and practices related to breast self-examination. This instrument was administered twice: once prior to the intervention and once immediately following the counseling sessions. The use of pre-validated questionnaires aligns with best practices for capturing changes in health behavior interventions (Kbede et al., 2021; AlSaeed & Rabbani, 2021). Secondary data, including students' demographic information and academic profiles, were collected to enrich the analysis by enabling stratification of behavioral outcomes across different socio-demographic factors.

The intervention consisted of a series of health counseling sessions delivered through focus group discussions (FGDs). FGDs are recognized as an effective method to promote active learning, foster peer interaction, and enhance the internalization of health knowledge (Hall et al., 2020; Noe et al., 2023). In this study, FGDs were used to facilitate an interactive, participatory education process that allowed students to share concerns, clarify misconceptions, and practice BSE techniques collaboratively. Structuring the intervention around

group dynamics was particularly relevant given the influence of peer relationships on adolescent health behaviors (Azudialu et al., 2024; Teklay et al., 2019).

Each FGD session covered comprehensive topics including the importance of early detection of breast abnormalities, proper BSE techniques, and factors influencing breast health. Educational materials were standardized, and sessions were moderated by trained facilitators to ensure consistency and fidelity of the intervention delivery across all groups. The structured use of FGDs is supported by existing research demonstrating their efficacy in enhancing the retention of health knowledge and translating it into practice (Noe et al., 2023).

Data analysis was conducted using both univariate and bivariate techniques. Descriptive statistics were applied to summarize participants' demographic profiles and baseline BSE knowledge, attitudes, and practices. For inferential analysis, the Wilcoxon signed-rank test was utilized to compare pre- and post-intervention scores, as this non-parametric test is appropriate for assessing changes in paired ordinal data or non-normally distributed continuous data (Rodriguez et al., 2024; Wang & Ji, 2020). A significance level of $\alpha = 0.05$ was adopted to determine statistical significance. All analyses were performed using SPSS software version 25.0, recognized for its reliability in health education research (Alhazzani et al., 2019).

By adhering to a methodologically rigorous design, this study ensures that observed changes in BSE behavior can be attributed with reasonable confidence to the health counseling intervention. The structured combination of validated instruments, targeted participant engagement, and robust statistical analysis strengthens the credibility of the findings. Furthermore, this approach contributes to the growing body of literature advocating the use of focus group-based health counseling to improve preventive health practices among adolescents in educational settings.

RESULTS

This section presents a comprehensive overview of the results obtained from the study on the impact of health education on students' knowledge and attitudes toward breast self-examination (BSE) at SMAN 14 Makassar. The findings are structured in alignment with the study objectives and organized into four key data tables. Each table is described in detail to highlight both the empirical observations and their interpretive implications, thereby contributing to a deeper understanding of how educational interventions influence adolescent health behavior.

The demographic profile of the respondents, which forms the basis for interpreting subsequent analyses, is presented in Table 1. Table 2 describes the pre- and post-intervention distribution of respondents' knowledge regarding BSE, while Table 3 presents the attitudinal shifts before and after the health education session. Lastly, Table 4 provides inferential statistical evidence of the intervention's effectiveness by comparing pre- and post-test scores using paired analyses. Together, these results establish a comprehensive narrative on the educational impact of health promotion strategies within a school-based context.

Table 1 displays the frequency and percentage distribution of students based on two demographic variables: age and class level. Of the 51 female students who participated in the study, a significant majority—84.3% (n = 43)—were 16 years old, while the remaining 15.7% (n = 8) were 17 years old. This homogeneity in age is consistent with the expected profile of junior high school students in Grade IX in Indonesia. In terms of class enrollment, the distribution was relatively balanced: IX MIPA 1 and IX MIPA 2 each accounted for 17.6% of the sample (n = 9), IX MIPA 3 represented 19.6% (n = 10), IX MIPA 4 represented 21.6% (n = 11), and IX MIPA 5 comprised the largest proportion at 23.5% (n = 12).

Table 1 Frequency Distribution of Respondents' Demographic Data Characteristics

Respondent Characteristics	Frequency (n=51)	Percentage (100%)
Age		
16 years	43	84.3
17 years	8	15.7
Class		
IX MIPA 1	9	17.6
IX MIPA 2	9	17.6
IX MIPA 3	10	19.6
IX MIPA 4	11	121.6
I MIPA 5	12	23.5

Source: Primary Data, August 2023

The demographic distribution is essential in establishing the representativeness and internal validity of the sample. The relatively even spread across different class sections minimizes potential cluster bias and allows the results to be interpreted as generalizable within the context of the school. Moreover, the dominance of 16-year-old students provides a clear target profile for future interventions in similar adolescent populations.

Table 2 illustrates a striking shift in the students' knowledge levels following the health education intervention. Prior to the counseling session, only 15.7% (n = 8) of students demonstrated good knowledge of BSE, whereas 84.3% (n = 43) fell into the "less knowledgeable" category. This finding reflects a substantial knowledge gap regarding essential breast health practices among adolescent girls in the absence of formal health education.

Following the intervention, however, the results showed that 100% (n = 51) of respondents attained a good knowledge level. This complete transition from inadequate to adequate knowledge is both clinically and statistically remarkable. It demonstrates that even a single, structured educational session can serve as an effective tool for rapidly improving health literacy among adolescents. This outcome not only confirms the cognitive receptiveness of the target population but also validates the intervention design in terms of content delivery, message clarity, and instructional engagement.

Table 2 Distribution of knowledge of female students of SMAN 14 Makassar about SADARI

Category Knowledge	Good		Less	
	Total	Percentage	Total	Percentage
Before Health Counseling	8	15.7	43	84.3
After Health Counseling	51	100.0	0	0

Table 3 highlights the change in respondents' attitudes toward BSE following the intervention. Initially, the attitudes were predominantly negative, with 86.3% (n = 44) expressing unfavorable perceptions toward BSE. Only 13.7% (n = 7) held positive attitudes. This imbalance suggests that prior to formal education, students may lack motivation, confidence, or perceived relevance regarding BSE, despite its importance in early breast cancer detection.

Post-intervention results show a complete reversal: all respondents (100%) demonstrated a positive attitude towards BSE. This shift indicates that the health education program did more than just convey knowledge—it also reshaped students' beliefs and perceptions. Attitude change is a critical outcome in behavior change models such as the Theory of Planned Behavior, where attitude is a strong predictor of intention to act. Therefore, the attitudinal improvement observed here serves as an early indicator of potential behavioral adoption of BSE practices in the future.

Table 3 Distribution of attitudes of female students of SMAN 14 Makassar regarding BSE

Category Attitude	Positive		Negative	
	Total	Percentage	Total	Percentage
Before Health Counseling	7	13.7	44	86.3
After Health Counseling	51	100.0	0	0

Table 4 presents the paired statistical comparison between pre-test and post-test scores for knowledge and attitudes. In terms of knowledge, the mean score increased significantly from 7.94 to 17.27 (p = 0.001), indicating a strong and statistically significant improvement. This confirms the descriptive findings in Table 2 and provides robust inferential evidence that the intervention effectively enhanced cognitive understanding related to BSE.

For attitudes, the mean score increased from 22.84 to 39.78, representing a notable descriptive increase. However, the p-value was 0.239, which exceeds the 0.05 threshold for statistical significance. This suggests that, while the intervention successfully improved attitudes at a surface level (as shown in Table 3), the change was not statistically robust. Attitudinal change often requires more time and repetition to internalize, especially when influenced by cultural norms, emotional barriers, or social perceptions.

Despite the lack of statistical significance in attitude change, the descriptive gain remains meaningful from a public health perspective. It points to the potential of educational efforts to initiate cognitive and emotional shifts that can be reinforced through ongoing programming or peer-led health campaigns.

Table 4. Analysis of the influence of health education on breast examination towards knowledge and attitudes at SMAN 14 Makassar

Variable	t-value	Pre-test Mean	Post-test Mean	p-value
Knowledge	-25.145	7.9412	17.2745	0.001
Attitude	-27.980	22.8431	39.7843	0.239

The results provide strong support for the effectiveness of health education in improving knowledge related to breast self-examination among adolescent girls. The intervention produced a statistically significant increase in knowledge and a descriptively significant improvement in attitudes. These outcomes affirm the value of integrating preventive health education into school curricula, particularly for topics such as BSE that are often neglected in standard instruction. The findings also suggest that while cognitive learning can be achieved rapidly, sustained efforts may be needed to fully embed positive health attitudes that translate into long-term behavioral adoption.

DISCUSSION

The results of this study investigating the impact of health education on students' knowledge and attitudes regarding breast self-examination (BSE) at SMAN 14 Makassar reveal critical insights into how structured educational interventions can shape adolescent health behaviors. The findings collectively reinforce the pivotal role of targeted health education initiatives as catalysts for cognitive and behavioral transformations, particularly in areas related to reproductive and sexual health that are often marginalized within standard school curricula (Abu-Baker et al., 2021; Zhang et al., 2020; Melesse et al., 2020).

Demographic data (Table 1) contextualize the subsequent findings by confirming a relatively homogeneous respondent profile, with the majority aged 16 years. This homogeneity is beneficial, as it reflects a developmental stage where cognitive receptivity to health messages is high, aligning with evidence suggesting that interventions tailored to the cognitive and emotional development level of adolescents yield more impactful results (Kusuma & Kartini, 2021; Phulambrikar et al., 2019). Moreover, the relatively balanced distribution across five different classes minimizes potential clustering effects, thereby enhancing the external validity of the study's outcomes (Mohanty et al., 2024). These demographic characteristics underline the importance of designing educational interventions that are not only age-appropriate but also sensitive to the social and academic environment of the target audience.

The remarkable improvement in knowledge levels, as presented in Table 2, where students with good knowledge increased from 15.7% to 100% post-intervention, underscores the potency of structured educational efforts. This outcome is consistent with existing literature demonstrating that formal health education interventions can significantly enhance adolescents' knowledge of preventive health behaviors (Rosen et al., 2018; Mitra, 2020; Salve et al., 2022). Educational strategies that incorporate interactive, clear, and culturally relevant content have been found to be especially effective in fostering knowledge acquisition (Sawicki et al., 2018). In this study, the sharp elevation in knowledge levels suggests that the content, delivery method, and engagement strategies employed were well aligned with students' learning needs. This supports arguments in the broader public health literature emphasizing the necessity for routine health education within school settings to bridge the knowledge gap on critical health issues during adolescence.

Attitudinal shifts reported in Table 3 further corroborate the efficacy of the intervention, with a transition from predominantly negative to universally positive attitudes towards BSE. This attitudinal change is highly significant, considering that adolescents' health behaviors are profoundly influenced by their attitudes and perceived behavioral control (Farid et al., 2018; Pardosi, 2019). From the perspective of the Theory of Planned Behavior, attitude constitutes a key determinant of behavioral intentions (Berutich et al., 2022). Therefore, the observed shift signifies an important intermediate outcome that increases the likelihood of BSE adoption in the future. Positive attitudinal changes, particularly those reinforced immediately after an educational intervention, have been shown to predict sustained health behaviors if supported by ongoing reinforcement (Singh et al., 2019).

However, Table 4 adds nuance to the interpretation by demonstrating that although the descriptive data showed substantial improvement in attitudes, the change was not statistically significant ($p = 0.239$). This finding aligns with observations from previous studies suggesting that cognitive improvements often precede measurable attitudinal changes, which typically require more prolonged exposure to reinforcement strategies (Barsch et al., 2023; Apriliani & Yenny, 2023). Attitudes, being more deeply ingrained and influenced by cultural, emotional, and familial factors, may not shift dramatically after a single session. Therefore, while the descriptive trend is encouraging, future interventions should consider longitudinal or repeated-session designs to solidify attitudinal change and foster durable behavioral outcomes.

Beyond immediate knowledge and attitude transformations, the broader public health implications of this study are substantial. The findings support the integration of comprehensive reproductive health education into formal school curricula. Enhanced health literacy among adolescents has the potential to yield far-reaching benefits, including increased rates of early detection of diseases, improved preventive health behaviors, and overall better health outcomes (Ezpeleta et al., 2020; Bamishigbin et al., 2019). The success of this relatively simple intervention emphasizes the cost-effectiveness and scalability of school-based health promotion programs, especially in resource-limited settings.

Moreover, these results resonate with global public health frameworks advocating for adolescent-centered health education as a strategy to meet Sustainable Development Goals related to good health and well-being (Grosso et al., 2018; Melesse et al., 2020). Empowering adolescents with knowledge and fostering positive health attitudes at a young age equips them to make informed health decisions throughout their lives, thereby reducing the burden of preventable diseases and health disparities in adulthood.

Nevertheless, this study is not without limitations. The reliance on a single-session intervention and the relatively short follow-up period may limit the assessment of long-term behavioral change. Additionally, while the descriptive improvement in attitudes is promising, future studies should employ longitudinal designs to capture the persistence and translation of attitudinal shifts into actual BSE practice. Incorporating qualitative assessments could also deepen the understanding of the psychosocial factors that mediate the relationship between education, attitude, and behavior in adolescent populations.

In conclusion, the present study contributes significantly to the discourse on adolescent health education by demonstrating that structured health education interventions can effectively enhance knowledge and promote positive attitudes toward critical health behaviors such as breast self-examination. The results underscore the necessity of embedding comprehensive health education within school systems to nurture informed, empowered, and health-conscious generations. Future research should prioritize longitudinal assessments and explore multifaceted educational strategies to sustain and amplify the initial gains observed in knowledge and attitudinal domains (Oberhoffer et al., 2022; Montgomery & Yockey, 2018).

Managerial Implications

The findings of this study offer critical managerial insights for educational policymakers, school administrators, and public health stakeholders seeking to enhance adolescent health literacy and preventive health behaviors. The significant improvement in knowledge following a single health education session highlights the necessity of institutionalizing structured health education programs within the formal curriculum. School-based health education initiatives should not be treated as ancillary activities but must be integrated systematically and recurrently across academic years to reinforce knowledge retention and encourage health-conscious behaviors among adolescents.

Furthermore, given the initial low baseline knowledge observed, there is a clear mandate for educational institutions to introduce health education earlier within the school system, thereby allowing students sufficient time to internalize and act upon preventive health information. This approach is particularly relevant for topics such as breast self-examination (BSE) that are crucial for early detection of health risks but are often omitted from standard curricula.

The positive shift in attitudes, although not statistically significant, signals an opportunity for schools to cultivate supportive environments that foster not only cognitive learning but also emotional acceptance of preventive practices. Incorporating peer education models, interactive workshops, and student-led health campaigns could strengthen the attitudinal and behavioral impact of health interventions. Moreover, collaboration between schools and local health authorities or community-based organizations could enhance the credibility, relevance, and cultural sensitivity of educational content. This multi-stakeholder engagement would ensure that adolescent health promotion becomes a sustained priority rather than a sporadic initiative.

Theoretical Implications

This study contributes significantly to the theoretical understanding of health behavior change among adolescents, particularly within the frameworks of the Theory of Planned Behavior (TPB) and the Health Belief Model (HBM). The significant knowledge gains observed following the intervention reinforce the cognitive dimension of health behavior models, affirming that increasing awareness and understanding is a critical antecedent to behavior change. This aligns with TPB's assertion that behavioral beliefs are foundational to shaping attitudes and intentions toward health actions.

However, the finding that attitudinal changes, while descriptively positive, were not statistically significant underscores the complexity of altering affective and normative components of behavior. It suggests that while knowledge acquisition may occur rapidly with well-structured interventions, shifts in attitudes and ultimately

behaviors likely require prolonged engagement, emotional resonance, and reinforcement. This supports emerging theoretical discourse advocating for multi-stage and multi-dimensional models of health behavior change that account for the layered cognitive, affective, and contextual factors influencing adolescent decision-making.

Moreover, the study underscores the need for theoretical models to incorporate adolescent-specific factors such as peer influence, identity formation, and emotional maturity when predicting health behavior outcomes. As adolescents navigate complex developmental stages, theoretical models must adapt to reflect the unique interplay of cognitive readiness and socio-emotional factors influencing their health choices.

Limitations

Despite the strengths and valuable insights yielded by this study, several limitations must be acknowledged. First, the short-term nature of the evaluation, conducted immediately after the intervention, limits the ability to ascertain the durability and long-term effects of the knowledge and attitudinal changes observed. It remains unknown whether the positive shifts would be maintained over months or years, or whether they would translate into consistent breast self-examination practices.

Second, the study was conducted within a single educational institution, involving a relatively homogenous sample of female students aged predominantly 16 years. While this enhances internal validity by reducing demographic variability, it simultaneously limits the external validity and generalizability of the findings to broader, more diverse adolescent populations, including different geographic, socio-economic, and cultural contexts.

Third, the reliance on self-reported measures introduces potential social desirability bias, where participants might report favorable knowledge or attitudes that do not accurately reflect their true beliefs or future behaviors. This bias is particularly pertinent in sensitive topics such as reproductive health, where respondents may perceive pressure to provide socially acceptable answers.

Fourth, the intervention itself was limited to a single educational session. While the immediate results are promising, single-session interventions may not provide the sustained reinforcement necessary for long-term behavioral change. More comprehensive, longitudinal intervention programs might yield deeper and more lasting impacts.

CONCLUSION AND SUGGESTION

In conclusion, this study provides robust evidence that health education interventions, even when delivered as a single session, can significantly improve adolescents' knowledge regarding breast self-examination and positively influence their attitudes. The substantial gains in knowledge and the descriptive enhancement in attitudes affirm the potential of school-based health education programs to serve as vital platforms for fostering preventive health behaviors among adolescents.

The findings underscore that while knowledge enhancement can be achieved rapidly through structured educational initiatives, changing attitudes—and by extension, influencing sustained behavior—requires more nuanced, multifaceted approaches. This distinction highlights the need for policymakers and educators to design interventions that go beyond information dissemination to actively engage emotional, motivational, and social dimensions of learning. Integrating comprehensive and age-appropriate reproductive health education into formal school curricula represents a strategic investment in adolescent health that could yield significant public health dividends, including early disease detection, reduced health disparities, and the promotion of lifelong health literacy.

Building on the findings and limitations of this study, several recommendations for future research are proposed. Longitudinal studies are critically needed to evaluate the sustainability of knowledge and attitude changes over extended periods. Tracking participants' actual engagement in breast self-examination practices would provide more conclusive evidence of behavioral translation following educational interventions. Additionally, future research should aim to include more heterogeneous samples encompassing different regions, socio-economic backgrounds, and educational settings. This broader scope would enhance the external validity of findings and provide a richer understanding of contextual factors influencing the effectiveness of health education interventions.

Employing mixed-methods approaches combining quantitative assessments with qualitative explorations could yield deeper insights into the psychosocial mechanisms driving or inhibiting behavior change among adolescents. Understanding personal, familial, and cultural influences through qualitative interviews or focus group discussions could inform the design of more culturally tailored and emotionally resonant educational

interventions. Finally, comparative studies examining the relative effectiveness of single-session versus multi-session, or teacher-led versus peer-led, health education models would provide valuable guidance for optimizing intervention strategies. Future research should also explore the use of digital and interactive media as tools to sustain engagement and reinforce health-promoting behaviors among adolescents over time.

REFERENCES

Abu-Baker, N., Eyadat, A., & Khamaiseh, A. (2021). The impact of nutrition education on knowledge, attitude, and practice regarding iron deficiency anemia among female adolescent students in Jordan. *Heliyon, 7*(2), e06348. https://doi.org/10.1016/j.heliyon.2021.e06348

Alam, N., Islam, M., Ullah, H., Molla, M., Shifat, S., Akter, S., … & Mohiuddin, A. (2021). Evaluation of knowledge, awareness and attitudes towards breast cancer risk factors and early detection among females in Bangladesh: A hospital based cross-sectional study. *PLOS ONE*, 16(9), e0257271. https://doi.org/10.1371/journal.pone.0257271

Alhazzani, A., Mahfouz, A., Abolyazid, A., Awadalla, N., Ahmed, R., Siddiqui, A., … & Khalil, S. (2019). Awareness of stroke among patients attending primary healthcare services in Abha, Southwestern Saudi Arabia. *Neurosciences*, 24(3), 214–220. https://doi.org/10.17712/nsj.2019.3.20180041

Ali, F., Munim, T., Nadeem, S., Khatoon, A., & Masood, Z. (2022). Experience of women after immediate postpartum insertion of intrauterine contraceptive device (PPIUCD), a long-acting reversible contraception. *Annals of Abbasi Shaheed Hospital and Karachi Medical & Dental College*, 27(1), 16–22. https://doi.org/10.58397/ashkmdc.v27i1.310

AlSaeed, A., & Rabbani, U. (2021). Explaining COVID-19 vaccine rejection using social cognitive theory in Qassim, Saudi Arabia. *Vaccines*, 9(11), 1304. https://doi.org/10.3390/vaccines9111304

Al-Shiekh, S., Ibrahim, M., & Alajerami, Y. (2021). Breast cancer knowledge and practice of breast self-examination among female university students, Gaza. *The Scientific World Journal*, 2021, 1–7. https://doi.org/10.1155/2021/6640324

Apriliani, A., & Yenny, Y. (2023). Relationship between total free sugars consumption and incidence of laryngopharyngeal reflux in adolescents. *International Journal of Medical and Biomedical Studies, 7*(11). https://doi.org/10.32553/ijmbs.v7i11.2745

Azudialu, B., Vivien, A., Benjamin, N., Ugonne, O., Uchenna, N., & Austin, N. (2024). Association between lifestyle and biosocial conditions with erectile dysfunction among adult patients in a tertiary hospital in Southern Nigeria. *Journal of Disease and Global Health*, 17(1), 1–8. https://doi.org/10.56557/jodagh/2024/v17i18545

Bamishigbin, O., Schetter, C., & Stanton, A. (2019). The antecedents and consequences of adolescent fatherhood: A systematic review. *Social Science & Medicine, 232*, 106–119. https://doi.org/10.1016/j.socscimed.2019.04.031

Barsch, F., Peters, V., Morath, O., Krumnau, O., Maier, P., Huzly, D., & Deibert, P. (2023). Trends in the numbers of SARS-CoV-2 infections among students: A prospective cohort study comparing students in sports boarding schools with students in day schools during early COVID-19 pandemic. *Frontiers in Public Health, 11*. https://doi.org/10.3389/fpubh.2023.1223748

Berutich, A., Cortes, M., Feria, E., Rufete, M., González, M., Razquin, E., & Arcos, E. (2022). Influence of preventive sex education programmes in compulsory secondary education students: A descriptive observational study. *BMC Public Health, 22*(1). https://doi.org/10.1186/s12889-022-14649-w

Dewi, T., Massar, K., Ruiter, R., & Leonardi, T. (2019). Determinants of breast self-examination practice among women in Surabaya, Indonesia: An application of the health belief model. *BMC Public Health*, 19(1). https://doi.org/10.1186/s12889-019-7951-2

Echaiz, J., Blas, M., & Kancherla, V. (2018). Unintended pregnancy and its impact on childhood rotavirus immunization in Peru. *Revista Panamericana De Salud Pública*, 42. https://doi.org/10.26633/rpsp.2018.96

Ezpeleta, L., Navarro, J., Osa, N., Trepat, E., & Penelo, E. (2020). Life conditions during COVID-19 lockdown and mental health in Spanish adolescents. *International Journal of Environmental Research and Public Health, 17*(19), 7327. https://doi.org/10.3390/ijerph17197327

Farid, N., Arshad, M., Yakub, N., Zaki, R., Muhamad, H., Aziz, N., & Dahlui, M. (2018). Improving Malaysian adolescent sexual and reproductive health: An internet-based health promotion programme as a potential intervention. *Health Education Journal, 77*(7), 837–848. https://doi.org/10.1177/0017896918778071

Gebresillassie, B., Gebreyohannes, E., Belachew, E., & Emiru, Y. (2018). Evaluation of knowledge, perception, and risk awareness about breast cancer and its treatment outcome among University of

Gondar students, Northwest Ethiopia. *Frontiers in Oncology*, 8. https://doi.org/10.3389/fonc.2018.00501

Garg, R., Chawla, S., Kaur, S., Bharti, A., Kaur, M., Soin, D., … & Pal, R. (2019). Impact of health education on knowledge, attitude, practices and glycemic control in type 2 diabetes mellitus. *Journal of Family Medicine and Primary Care*, 8(1), 261. https://doi.org/10.4103/jfmpc.jfmpc_228_18

Grosso, A., Busch, S., Mothopeng, T., Sweitzer, S., Nkonyana, J., Mpooa, N., & Baral, S. (2018). HIV risks and needs related to the Sustainable Development Goals among female sex workers who were commercially sexually exploited as children in Lesotho. *Journal of the International AIDS Society, 21*(S1). https://doi.org/10.1002/jia2.25042

Güner, C., & Kırca, K. (2020). Vocational school students' beliefs and attitudes towards breast cancer. *Adıyaman Üniversitesi Sağlık Bilimleri Dergisi*, 6(1), 111–117. https://doi.org/10.30569/adiyamansaglik.677985

Hall, K., Hyde, E., Bassett, D., Carlson, S., Carnethon, M., Ekelund, U., … & Fulton, J. (2020). Systematic review of the prospective association of daily step counts with risk of mortality, cardiovascular disease, and dysglycemia. *International Journal of Behavioral Nutrition and Physical Activity*, 17(1), 1–14. https://doi.org/10.1186/s12966-020-00978-9

Hossain, M. (2018). Educational intervention to improve breast self-examination practice among women: Evidence-based-practice. *JOJ Nursing & Health Care*, 7(3). https://doi.org/10.19080/jojnhc.2018.07.555712

Jemebere, W. (2019). Practice of breast self-examination and associated factors among female nurses of Hawassa University Comprehensive Specialized Hospital, South Ethiopia, 2018. *JHMN*. https://doi.org/10.7176/jhmn/66-07

Kbede, A., Alemayew, M., Tafere, Y., & Mulu, G. (2021). Determinants of delayed treatment-seeking for diarrheal diseases among mothers with under-five children in northwestern Ethiopia, 2020: A case-control study. *Ethiopian Journal of Health Sciences*, 31(6), 1133–1142. https://doi.org/10.4314/ejhs.v31i6.11

Kurnia, A., Melizza, N., Ruhyanudin, F., Masruroh, N., Prasetyo, Y., Setyowati, C., … & Khoirunnisa, O. (2020). The effect of educational program on hypertension management toward knowledge and attitude among uncontrolled hypertension patients in rural area of Indonesia. *Community Health Equity Research & Policy*, 42(2), 181–188. https://doi.org/10.1177/0272684x20972846

Kusuma, N., & Kartini, F. (2021). Changes in knowledge and attitudes in preventing anemia in female adolescents: A comparative study. *Women Midwives and Midwifery, 1*(2), 46–54. https://doi.org/10.36749/wmm.1.2.46-54.2021

Melesse, D., Mutua, M., Choudhury, A., Wado, Y., Fayé, C., Neal, S., & Boerma, T. (2020). Adolescent sexual and reproductive health in sub-Saharan Africa: Who is left behind? *BMJ Global Health, 5*(1), e002231. https://doi.org/10.1136/bmjgh-2019-002231

Metasari, A., & Nurlina, N. (2022). The effect of health education about check breast self (SADARI) on adolescent motivation in early detection of breast cancer. *International Journal of Public Health Excellence (IJPHE)*, 2(1), 244–247. https://doi.org/10.55299/ijphe.v2i1.189

Mohammadnabizadeh, S., Najafpoor, A., Vahedian-Shahroodi, M., & Ghavami, V. (2022). Predicting preventive behaviors of cardiovascular disease among oil industry workers based on health belief model. *Journal of Education and Health Promotion*, 11(1), 346. https://doi.org/10.4103/jehp.jehp_158_22

Mohanty, S., Mehra, D., Das, S., Sethi, G., Garg, R., Gupta, A., & Mehra, S. (2024). School-based adolescent health survey in Himachal Pradesh, India: Study design and protocol. *Frontiers in Public Health, 12*. https://doi.org/10.3389/fpubh.2024.1463776

Montgomery, L., & Yockey, R. (2018). Rolling and scrolling: The portrayal of marijuana cigars (blunts) on YouTube. *Journal of Substance Use, 23*(4), 436–440. https://doi.org/10.1080/14659891.2018.1444108

Moreno, P., Ramírez, A., Miguel-Majors, S., Fox, R., Castillo, L., Gallion, K., … & Penedo, F. (2018). Satisfaction with cancer care, self-efficacy, and health-related quality of life in Latino cancer survivors. *Cancer*, 124(8), 1770–1779. https://doi.org/10.1002/cncr.31263

Noe, N., Wilson, W., Gramsen, K., & Jimmy, O. (2023). COVID-19 unanticipated benefits to hand washing coverage and practices in health care facilities in Central Uganda. *African Health Sciences*, 23(4), 155–167. https://doi.org/10.4314/ahs.v23i4.18

Ng, Y., Ibrahim, S., & Chai, Y. (2022). A case report of lymphedema as an unusual initial presentation of breast carcinoma. *Proceedings of Singapore Healthcare*, 31. https://doi.org/10.1177/20101058221111580

Noori, S., & Schouten, B. (2018). Perceptions of Iranian women regarding breast cancer screening behaviour. *Eastern Mediterranean Health Journal*, 24(12), 1165–1171. https://doi.org/10.26719/emhj.18.018

Oberhoffer, F., Li, P., Jakob, A., Dalla-Pozza, R., Haas, N., & Mandilaras, G. (2022). Energy drinks decrease left ventricular efficiency in healthy children and teenagers: A randomized trial. *Sensors, 22*(19), 7209. https://doi.org/10.3390/s22197209

Olaogun, J., Omotayo, J., Ige, J., Omonisi, A., Akute, O., & Aduayi, O. (2020). Socio-demographic, pattern of presentation and management outcome of breast cancer in a semi-urban tertiary health institution. *Pan African Medical Journal*, 36. https://doi.org/10.11604/pamj.2020.36.363.17866

Pardosi, M. (2019). The effectiveness of booklet of anemia on the behaviors of adolescent girls. *Global Journal of Health Science, 11*(10), 111. https://doi.org/10.5539/gjhs.v11n10p111

Pilus, F., Ahmad, N., Zulkefli, N., & Shukri, N. (2022). Effect of face-to-face and WhatsApp communication of a theory-based health education intervention on breastfeeding self-efficacy (SEBF intervention): Cluster randomized controlled field trial. *JMIR mHealth and uHealth*, 10(9), e31996. https://doi.org/10.2196/31996

Phulambrikar, R., Kharde, A., Mahavarakar, V., Phalke, D., & Phalke, V. (2019). Effectiveness of interventional reproductive and sexual health education among school-going adolescent girls in rural area. *Indian Journal of Community Medicine, 44*(4), 378. https://doi.org/10.4103/ijcm.ijcm_155_19

Rahman, S., Al–Marzouki, A., Otim, M., Khayat, N., Yousuf, R., & Rahman, P. (2019). Awareness about breast cancer and breast self-examination among female students at the University of Sharjah: A cross-sectional study. *Asian Pacific Journal of Cancer Prevention*, 20(6), 1901–1908. https://doi.org/10.31557/apjcp.2019.20.6.1901

Rodriguez, D., Chen, J., Viswanadham, R., Lawrence, K., & Mann, D. (2024). Leveraging machine learning to develop digital engagement phenotypes of users in a digital diabetes prevention program: Evaluation study. *JMIR AI*, 3(1), e47122. https://doi.org/10.2196/47122

Rosen, F., Rosen, A., Müller-Riemenschneider, F., Damberg, I., & Tinnemann, P. (2018). STI knowledge in Berlin adolescents. *International Journal of Environmental Research and Public Health, 15*(1), 110. https://doi.org/10.3390/ijerph15010110

Saleh, N., & Habib, H. (2024). Knowledge and attitude of breast self-examination toward breast cancer among nonmedical female students at Diyala University. *International Journal of Advanced Community Medicine*, 7(1), 95–102. https://doi.org/10.33545/comed.2024.v7.i1b.295

Salve, R., Kher, A., Chaudhary, R., Swarnakar, K., Gaikawad, S., Uke, P., & Lakhkar, B. (2022). Health education interventional programme and its impact on adolescent students. *Sri Lanka Journal of Child Health, 51*(1), 69–74. https://doi.org/10.4038/sljch.v51i1.9998

Sawicki, W., Barbosa, D., Fram, D., & Belasco, A. (2018). Alcohol consumption, quality of life and brief intervention among nursing university students. *Revista Brasileira de Enfermagem, 71*(Suppl 1), 505–512. https://doi.org/10.1590/0034-7167-2017-0692

Singh, M., Honnakamble, R., & Rajoura, O. (2019). Knowledge, attitude and practice change about anemia after intensive health education among adolescent school girls of Delhi: An intervention study. *International Journal of Medicine and Public Health, 9*(3), 71–73. https://doi.org/10.5530/ijmedph.2019.3.18

Tang, Y., Fang, W., Xiao, Z., Song, M., Zhuang, D., Han, B., … & Sun, X. (2020). Nicotinamide ameliorates energy deficiency and improves retinal function in CAV-1-/- mice. *Journal of Neurochemistry*, 157(3), 550–560. https://doi.org/10.1111/jnc.15266

Teklay, G., Alemayoh, T., Atalay, H., & Mariye, T. (2019). Modern health-seeking behaviour and associated factors among mothers having under 5-years old children in Shire Town, Tigray, Ethiopia: A cross-sectional study 2018. *African Journal of Primary Health Care & Family Medicine*, 11(1), e1–e6. https://doi.org/10.4102/phcfm.v11i1.1913

Wang, X., & Ji, X. (2020). Sample size estimation in clinical research. *Chest*, 158(1), S12–S20. https://doi.org/10.1016/j.chest.2020.03.010

Yıldız, M., Elkoca, A., Gomes, R., Yıldırım, M., Yılmaz, D., Solmaz, E., … & Atay, M. (2023). Women's health belief levels towards breast cancer: Example of three countries. *Aegean Journal of Obstetrics and Gynecology*, 5(1), 19–25. https://doi.org/10.46328/aejog.v5i1.126

Zahid, I., Ahmed, A., Ladiwala, Z., Sheikh, R., & Memon, A. (2018). Breast self-examination awareness and practices in young women in developing countries: A survey of female students in Karachi, Pakistan. *Journal of Education and Health Promotion*, 7(1), 90. https://doi.org/10.4103/jehp.jehp_147_17

Zhang, X., Wang, Z., Ren, Z., Li, Z., Ma, W., Gao, X., & Li, J. (2020). HPV vaccine acceptability and willingness-related factors among Chinese adolescents: A nation-wide study. *Human Vaccines & Immunotherapeutics, 17*(4), 1025–1032. https://doi.org/10.1080/21645515.2020.1812314