



The Effect Of Health Promotion On *Problem Based Learning* And Peer Education Methods On Clean And Healthy Living Behavior Of BKMFIKK UNM Students

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ABSTRACT

This study aimed to analyze the effect of health promotion using Problem Based Learning (PBL) and Peer Education methods on students' knowledge, attitudes, and practices of Clean and Healthy Living Behavior (CHLB), as well as to compare the effectiveness of both methods. A quasi-experimental pretest-posttest two-group design was used. The sample consisted of 100 respondents, with 50 respondents in the PBL group and 50 respondents in the Peer Education group. Five peer educators acted as facilitators and were not included as respondents. The intervention was conducted in six sessions covering handwashing, physical activity, smoking hazards, healthy food choices, environmental hygiene and dengue prevention, and healthy toilet use. The instruments consisted of 15 knowledge items, 10 attitude statements, and 10 practice questions. Data were analyzed using the Shapiro-Wilk test, Wilcoxon Signed Rank Test, and Mann-Whitney U Test at a significance level of 0.05. PBL significantly improved knowledge ($p=0.005$), attitudes ($p<0.001$), and practices ($p<0.001$). Peer Education also significantly improved knowledge ($p=0.003$), attitudes ($p<0.001$), and practices ($p<0.001$). A significant difference was found in knowledge improvement between the two methods ($p=0.021$; effect size=0.280), with Peer Education showing a higher increase, although the practical effect was small. No significant differences were found for attitude ($p=0.777$) or practice ($p=0.362$). Both methods were effective in improving CHLB, and their use should be adjusted to intervention objectives, target characteristics, and program implementation conditions.

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1. INTRODUCTION

Clean and Healthy Living Behavior (PHBS) is a set of health behaviors that are carried out on awareness so that individuals are able to maintain their own health, prevent disease, and create an environment that supports health. For students, PHBS includes hand hygiene, the use of healthy latrines, the selection of safe food and beverages, physical activity, smoking behavior control, and environmental hygiene management. Its application is influenced by knowledge, attitudes, social support, and environmental conditions (Notoatmodjo, 2007; Yusriani, 2023).

Students are in the transition phase towards independence and begin to organize their own diet, academic activities, organizational activities, break times, and social interactions. Habits formed during college have the potential



to continue into adulthood. Therefore, health promotion in higher education needs to be adjusted to the needs of students and directed at the formation of healthy behaviors that can be applied in daily activities (Asrina & Yusriani, 2023; Wismaningsih et al., 2024).

The need for PHBS promotion is becoming increasingly important for students who are active in sports organizations. Students of the Faculty Student Activity Bureau (BKMF) in the field of sports at the Faculty of Sports and Health Sciences, State University of Makassar (FIKK UNM) have a high intensity of group activities and the use of shared facilities. Initial observations on the Table Tennis, Cricket, and Volleyball BKMF show that the implementation of PHBS has not been optimal, especially in handwashing habits, healthy snack selection, environmental cleanliness, non-smoking behavior, mosquito larvae prevention, and healthy toilet use.

Health education that discusses PHBS indicators, especially for BKMF students, has not been carried out in a structured and sustainable manner. The information received by students is still general and has not been fully adjusted to the dynamics of sports organization activities. This condition shows the need for education that is contextual, participatory, and close to the student experience (Wismaningsih et al., 2024).

Problem Based Learning (PBL) is a problem-based learning method that places students as active subjects in identifying problems, analyzing causes, seeking information, discussing, and developing solutions. This method allows students to connect PHBS material with the real situation they face (Trianto, 2010; Suharia & Widiyaningrum, 2013). Meanwhile, Peer Education utilizes peers as facilitators so that communication takes place more equally, openly, and relevant to the participants' social environment (Negara et al., 2006; Imron, 2012; Sari, 2015).

This study aims to analyze the influence of health promotion through the PBL and Peer Education methods on the knowledge, attitudes, and actions of PHBS students of BKMF FIKK UNM members and compare the effectiveness of the two methods. The research outcomes were limited to six materials, namely hand washing, sports activities, the dangers of smoking, healthy snacks, environmental cleanliness and dengue prevention, and the use of healthy latrines.

2. METHODS

This research is a quasi-experimental research with a pretest-posttest two-group design. The study compared two active intervention groups, namely the PBL group and the Peer Education group, without a passive control group. Measurement of PHBS knowledge, attitudes, and actions was carried out before and after the intervention in both groups.

The research was carried out at FIKK State University of Makassar on July 2-27, 2026. The research population is 150 students who are active members of BKMF Table Tennis, BKMF Cricket, and BKMF Volleyball. The final sample consisted of 100 respondents who met the inclusion criteria and followed the entire research series, consisting of 50 respondents from the PBL group and 50 respondents from the Peer Education group. Five peer educators served as facilitators and were not included as respondents.

Data collection began with a pretest, followed by six intervention sessions on July 3-20, 2026, and ended with a posttest on July 27, 2026. Intervention materials include handwashing habits, benefits of sports activities, dangers of active and passive smoking, selection of healthy snacks, environmental cleanliness and dengue prevention, and the use of healthy latrines. The PBL group participated in problem-scenario-based learning, discussion, and solution development, while the Peer Education group participated in peer-facilitated education and discussion.

The research instrument was developed based on PHBS indicators in educational institutions and was aligned with six intervention materials. The instrument consisted of 15 knowledge questions with a score of 0-15, 10 attitude statements with a score of 10-40, and 10 action questions with a score of 0-10. Negative attitude statements in points 2, 4, and 5 were given an inverted score. Each prospective respondent is provided with an explanation of the objectives, procedures, benefits, risks, confidentiality, and the right to refuse or withdraw before giving written consent.

Data is checked, coded, entered, and cleaned before being analyzed. Univariate analysis was used to describe respondent characteristics and PHBS scores. The Shapiro-Wilk test is performed on the value of change (delta). Since all delta values are not normally distributed, pretest-posttest changes in each group are analyzed with the Wilcoxon Signed Rank Test, while the delta differences between groups are analyzed with the Mann-Whitney U Test. The level of significance was set at $p < 0.05$. The magnitude of the effect of changes in the group is expressed by r , while the comparison between groups uses Cliff's delta.

3. RESEARCH RESULTS

The results of the study with 100 respondents completed the pretest, six intervention sessions, and posttest so that all data was analyzed. The average age of the PBL group was 19.58 ± 1.39 years and the Peer Education group was 19.60 ± 1.55 years. The age and sex distributions between the two groups did not differ significantly, so the basic characteristics of the two groups were relatively comparable.

Table 1. Characteristics of PBL and Peer Education Group Respondents

Features	PBL (n=50)	Peer Education (n=50)	p-value
Age (years), mean $\pm$ elementary school	19.58 $\pm$ 1.39	19.60 $\pm$ 1.55	0.946a
Male, n (%)	25 (50,0)	23 (46,0)	0.827b
Female, n (%)	25 (50,0)	27 (54,0)	

Description: an independent sample t-test; b Fisher exact test; P value < 0.05 is declared significant

The results of the Shapiro-Wilk test showed that the entire delta values of knowledge, attitudes, and actions in both groups were not normally distributed. Therefore, the analysis of changes in the group uses the Wilcoxon Signed Rank Test and the analysis of differences between groups using the Mann-Whitney U Test.

In the PBL group, the average knowledge score increased from 14.84 $\pm$ 0.37 to 15.00 $\pm$ 0.00 ($p=0.005$; $r=0.400$). The average attitude score increased from 35.70 $\pm$ 2.74 to 38.80 $\pm$ 1.37 ($p<0.001$; $r=0.839$), while the average action score increased from 8.26 $\pm$ 1.45 to 9.56 $\pm$ 0.64 ($p<0.001$; $r=0.741$). These results show that PBL has a significant effect on the three domains of PHBS.

In the Peer Education group, the average knowledge score increased from 14.18 $\pm$ 0.69 to 14.84 $\pm$ 0.37 ($p=0.003$; $r=0.430$). The average attitude score increased from 35.92 $\pm$ 2.93 to 38.88 $\pm$ 1.33 ($p<0.001$; $r=0.823$), while the average action score increased from 8.44 $\pm$ 1.58 to 9.56 $\pm$ 0.50 ($p<0.001$; $r=0.687$). Thus, Peer Education also has a significant effect on PHBS's knowledge, attitudes, and actions.

Table 2. Changes in PHBS Knowledge, Attitude, and Action Scores in Both Groups

Method	Variabel	Pretest mean $\pm$ SD	Posttest mean $\pm$ SD	Delta mean $\pm$ SD	p-value	Effect size r
PBL	Knowledge	14,84 $\pm$ 0,37	15,00 $\pm$ 0,00	0,16 $\pm$ 0,37	0,005	0,400
PBL	Attitude	35,70 $\pm$ 2,74	38,80 $\pm$ 1,37	3,10 $\pm$ 1,69	<0.001	0,839
PBL	Actions	8,26 $\pm$ 1,45	9,56 $\pm$ 0,64	1,30 $\pm$ 1,16	<0.001	0,741
Peer Education	Knowledge	14,18 $\pm$ 0,69	14,84 $\pm$ 0,37	0,66 $\pm$ 0,74	0,003	0,430
Peer Education	Attitude	35,92 $\pm$ 2,93	38,88 $\pm$ 1,33	2,96 $\pm$ 1,77	<0.001	0,823
Peer Education	Actions	8,44 $\pm$ 1,58	9,56 $\pm$ 0,50	1,12 $\pm$ 1,21	<0.001	0,687

Comparison of delta values showed differences in knowledge improvement between the PBL and Peer Education groups ($p=0.021$; Cliff's delta = 0.280), with a higher increase in Peer Education and a large weaker category effect. There was no difference in the increase in attitude ($p=0.777$; effect size=0.033) and action ($p=0.362$; effect size=0.102); Both values of the securities are in the ignored category.

Table 3. Comparison of the Effectiveness of PBL and Peer Education

Variabel	Delta PBL	Delta Peer Education	p-value	Effect size	Interpretasi
Knowledge	0,16 $\pm$ 0,37	0,66 $\pm$ 0,74	0,021	0,280	Peer Education is higher; weak effects
Attitude	3,10 $\pm$ 1,69	2,96 $\pm$ 1,77	0,777	0,033	It is no different; Effects are negligible
Actions	1,30 $\pm$ 1,16	1,12 $\pm$ 1,21	0,362	0,102	It is no different; Effects are negligible

4. DISCUSSION

Research shows that PBL and Peer Education both improve students' PHBS knowledge, attitudes, and actions. These findings confirm that participatory health promotion is able to influence the cognitive, affective, and practical



realms when the material is adapted to the real situation of students and participants actively involved in the learning process.

PBL improves knowledge through problem identification, information search, discussion, and solution development. This process encourages cognitive elaboration because students not only remember information, but understand the cause-and-effect relationship and its application to daily life. This characteristic is in accordance with the concept of problem-based learning that places participants as the center of learning (Trianto, 2010; Suharia & Widiyaningrum, 2013).

The large influence of PBL on attitudes and actions shows that case analysis and reflection on the consequences of unhealthy behaviors can strengthen acceptance of PHBS. When students come up with solutions to environmental hygiene problems, the dangers of smoking, unhealthy snacks, or sanitation, they gain a sense of responsibility and the ability to implement the actions that have been formulated. However, sustainability of behavior still requires the support of facilities and environmental policies.

Peer Education improves knowledge through closer and informal communication. The similarity of age, organizational experience, and social environment allows participants to ask questions, share experiences, and clarify information without feeling judged. Peer education also functions as social support and strengthening group norms, so that health messages are easier to accept and maintain (Imron, 2012; Layzer et al., 2014).

The increase in attitudes and actions in the Peer Education group can be explained by social influence and peer example. Healthy behaviors are easier to implement when they are considered normal and supported by the group. These findings are in line with Dickie et al. (2017) who showed the importance of social norms in hand hygiene behavior, and Widyaningsih et al. (2023) who placed peers as agents of PHBS change. Behavior-based hygiene interventions and environmental reinforcement have also been reported to improve health practices (Biran et al., 2014; Galiani et al., 2015; Yang et al., 2017).

The difference in higher knowledge enhancement in Peer Education needs to be interpreted carefully. The initial knowledge scores of the two groups were already high, especially in the PBL group, so that the room for improvement was close to the maximum value and had the potential to cause a ceiling effect. Although the differences were significant, the magnitude of the effects between groups was only 0.280 and was weak, so the practical differences were limited.

The absence of differences in effectiveness on attitudes and actions suggests that both methods have relatively comparable benefits. PBL works primarily through strengthening critical thinking processes and problem-solving skills, while Peer Education works through interpersonal communication, social support, and group norms. The two methods can be seen as complementary: PBL is used to build understanding and solutions, while Peer Education helps maintain the motivation and culture of PHBS in the organization.

The results of the study are relevant to the PRECEDE-PROCEED Model which explains that behavior is influenced by predisposition, enable, and reinforcing factors (Green & Kreuter, 2005), as well as the Health Promotion Model which emphasizes benefits, barriers, self-confidence, and interpersonal influence (Pender et al., 2005). PBL strengthens cognitive factors and ability to overcome obstacles, while Peer Education strengthens interpersonal support and social norms.

Research has some limitations. The absence of a passive control group causes the influence of external factors to not be completely separated from the influence of the intervention. All respondents came from the same faculty environment so that information exchange between groups could occur. In addition, the ability of five peer educators to deliver material, lead discussions, and provide reinforcement may not be entirely uniform.

5. CONCLUSION

The Problem Based Learning and Peer Education methods are both effective in improving the knowledge, attitudes, and actions of PHBS students of BKMF FIKK UNM. Differences in effectiveness were only found in knowledge, with higher increases in Peer Education, but the effect was weak. There was no difference in the effectiveness of the two methods on attitudes and actions. PBL can be used to develop health analysis and problem-solving, while Peer Education can be used to strengthen communication, social support, and healthy group norms.

ADVICE

FIKK State University of Makassar and BKMF administrators are advised to integrate PBL and Peer Education in student health promotion programs. PBL can be used at the stage of problem identification and solution development, while Peer Education can be used for mentoring, reminders, and behavior reinforcement on an ongoing basis. Further research needs to use control groups, follow-up measurements, wider coverage of respondents, and direct action observation.



REFERENCES

- Asrina, A., & Yusriani, Y. (2023). Increasing knowledge about Clean and Healthy Living Behavior (PHBS) as a health promotion program in the school setting. *ABDIKAN: Journal of Community Service in the Field of Science and Technology*, 2(3), 440-454.
- Biran, A., Schmidt, W. P., Varadharajan, K. S., Rajaraman, D., Kumar, R., Greenland, K., Gopalan, B., Aunger, R., & Curtis, V. (2014). Effect of a behaviour-change intervention on handwashing with soap in India (SuperAmma): A cluster-randomised trial. *The Lancet Global Health*, 2(3), e145-e154. [https://doi.org/10.1016/S2214-109X\(13\)70160-8](https://doi.org/10.1016/S2214-109X(13)70160-8)
- Dickie, R., Rasmussen, S., Cain, R., Williams, L., & Mackay, W. (2017). The effects of perceived social norms on handwashing behaviour in students. *Psychology, Health & Medicine*. <https://doi.org/10.1080/13548506.2017.1338736>
- Galiani, S., Gertler, P., Ajzenman, N., & Vidal, A. O. (2015). Promoting handwashing behavior: The effects of large-scale community and school-level interventions. *Health Economics*, 18, S37-S54.
- Green, L. W., & Kreuter, M. W. (2005). *Health program planning: An educational and ecological approach* (4th ed.). McGraw-Hill.
- Imron, A. (2012). Adolescent reproductive health education: Peer educator & the effectiveness of the PIK-KRR program in schools. Ar-Ruzz Media.
- Ministry of Health of the Republic of Indonesia. (2011). *Guidelines for fostering Clean and Healthy Living Behaviors*. Ministry of Health of the Republic of Indonesia.
- Layzer, C., Rosapep, L., & Barr, S. (2014). A peer education program: Delivering highly reliable sexual health promotion messages in schools. *Journal of Adolescent Health*, 54(3 Suppl.), S70-S77. <https://doi.org/10.1016/j.jadohealth.2013.12.023>
- Negara, M., Pawelloi, E., Jelantik, I. G. N., & Arnawa, G. (2006). Training module for teachers who coach the AIDS and Drug Care Student Group (KSPAN). AIDS Control Commission.
- Notoatmodjo, S. (2007). *Health promotion and behavioral science*. Rineka Cipta.
- Pender, N. J., Murdaugh, C. L., & Parsons, M. A. (2005). *Health promotion in nursing practice* (5th ed.). Prentice Hall.
- Sari, N. P. (2015). A comparative study of audio-visual and peer group counseling on the level of adolescent reproductive health knowledge at SMP N 1 Ngaglik Sleman Yogyakarta. STIKES 'Aisyiyah Yogyakarta.
- Suharia, M., & Widiyaningrum, P. (2013). Development of learning tools for addictive and psychotropic substances with Problem Based Learning in junior high school. *Journal of Innovative Science Education*, 2(1).
- Trianto. (2010). *Integrated learning model*. The Earth of Scripts.
- Widyaningsih, Y. I., Setyaningsih, Y., & Musthofa, S. B. (2023). The effectiveness of safety talk and peer as change agent methods on clean and healthy living behaviour (PHBS) based on the health promotion model for workers in construction services. *Journal of Health Education*, 8(2), 158-165. <https://doi.org/10.15294/jhe.v8i2.64259>
- Wismaningsih, E. R., Ulfah, N. H., Yusriani, Y., Insani, A. A., & Siswati, S. (2024). *Health promotion in health services: A practical guide*. Strong Media Literasi Indonesia.
- Yang, C., Hu, J., Tao, M., Li, Y., Chai, Y., Ning, Y., & Xiao, Q. (2017). Effectiveness of a multifaceted intervention on improving the hand-washing skills and behaviors of migrant workers in Beijing. *Global Health Promotion*, 24(3), 32-39. <https://doi.org/10.1177/1757975915601833>
- Yusriani, Y. (2023). *Public health science: Theory and application*. Wiyata Bestari Samasta.



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