



SCHOOL-BASED HEALTH PROMOTION MODEL FOR ADOLESCENT SLEEP HYGIENE AND NUTRITION

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ABSTRACT

Adolescence is a critical developmental stage during which poor sleep hygiene and low nutritional awareness may negatively affect health and academic performance. School-based health promotion is considered an effective strategy to improve healthy behaviors among adolescents. This study aimed to evaluate the effectiveness of a school-based health promotion program in improving sleep hygiene and nutritional awareness among senior high school students using the Health Promotion Model (HPM). A quasi-experimental study with a one-group pretest–posttest design was conducted among 50 students. The intervention consisted of digital-based health education delivered through videos, infographics, and interactive discussions focusing on healthy sleep habits and balanced nutrition. Data were collected using structured questionnaires measuring sleep hygiene knowledge, nutritional knowledge, and nutritional attitudes. The instruments were tested for validity using item–total correlation analysis and for reliability using Cronbach’s alpha coefficient ($\alpha \geq 0.70$), indicating acceptable internal consistency. The results showed a significant improvement in sleep hygiene knowledge, with the mean score increasing from 62.10 in the pre-test to 84.30 in the post-test ($p < 0.05$). Nutritional knowledge also increased significantly from 58.70 to 81.50, while nutritional attitude scores improved from 61.60 to 81.50 ($p < 0.05$). Therefore, the school-based health promotion program based on the Health Promotion Model was proven to be effective in improving sleep hygiene behaviors and nutritional awareness among adolescents, and it may support the development of sustainable healthy lifestyle behaviors within the school environment.

Keywords: adolescents; health promotion model; nutritional awareness; school-based health promotion; sleep hygiene

INTRODUCTION

Adolescence is a critical developmental period characterized by rapid physical, psychological, and behavioral changes that significantly influence long-term health outcomes. During this stage, adolescents often experience changes in sleep patterns and dietary behaviors due to academic demands, social activities, and increased exposure to digital media. Globally, insufficient sleep duration and poor sleep hygiene have become common problems among adolescents and are associated with adverse outcomes such as decreased academic performance, emotional instability, obesity, and increased risk of chronic diseases (Mindell et al., 2020; World Health Organization, 2021). Inadequate nutritional awareness further exacerbates these risks, as unhealthy eating habits established during adolescence tend to persist into adulthood.

At the national level, studies in Indonesia have shown that a large proportion of high school students do not meet recommended sleep duration and exhibit unhealthy dietary patterns, including low consumption of fruits and vegetables and high intake of fast food and sugar-

sweetened beverages (Fitriani & Widyaningsih, 2021). The increasing use of smartphones and digital devices, especially at night, has been identified as a major contributor to poor sleep hygiene among Indonesian adolescents. These conditions not only affect students' physical health but also impair cognitive function, concentration, and academic achievement, making adolescent sleep hygiene and nutritional awareness important public health concerns.

In the local context, observations in senior high schools indicate that students often have irregular sleep schedules, engage in prolonged screen time before bedtime, and demonstrate limited understanding of balanced nutrition. Many adolescents prioritize academic tasks and social media activities over adequate sleep, while food choices are frequently influenced by convenience and peer preferences rather than nutritional value. These patterns suggest that adolescents represent a vulnerable group at risk of developing unhealthy lifestyles, highlighting the need for targeted and context-specific health promotion interventions within the school setting.

School-based health promotion programs are widely recognized as effective strategies to improve adolescents' health behaviors because schools provide structured environments, consistent access to students, and opportunities for peer support. The Health Promotion Model (HPM) emphasizes the role of individual characteristics, perceived benefits, perceived barriers, self-efficacy, and social influences in shaping health behaviors (Pender et al., 2015). By addressing cognitive and motivational factors, HPM-based interventions can enhance adolescents' readiness to adopt healthy sleep habits and balanced dietary practices. The integration of digital media in health education further strengthens program effectiveness, as interactive and visual content aligns well with adolescents' learning preferences (Hernandez, 2020).

Based on these considerations, this study was conducted to evaluate the effectiveness of a school-based health promotion program using the Health Promotion Model in improving sleep hygiene and nutritional awareness among senior high school adolescents. The findings of this study are expected to contribute to evidence-based strategies for strengthening health promotion efforts in school settings and supporting the development of healthy behaviors among adolescents.

METHODS

This study employed a quasi-experimental design with a one-group pretest–posttest approach to evaluate the effectiveness of a school-based health promotion program based on the Health Promotion Model. The study was conducted at a senior high school in Sumbawa Regency, West Nusa Tenggara, Indonesia, in 2025. The study population consisted of students from grades X, XI, and XII, with a total sample of 50 students selected using purposive sampling based on predefined inclusion criteria. The intervention consisted of a school-based health promotion program focusing on sleep hygiene and nutritional awareness. Educational activities were delivered through digital media, including videos and infographics, combined with interactive discussions.

Data were collected using structured self-administered questionnaires that measured sleep hygiene knowledge, nutritional knowledge, and nutritional attitudes. The questionnaires were administered twice, before the intervention (pre-test) and after the intervention (post-test), to assess changes resulting from the program. Before data collection, the instruments were tested for validity and reliability. Content validity was evaluated by three experts in public health to ensure the relevance and clarity of each item. Construct validity was examined using item–total

correlation analysis, with items considered valid if the correlation coefficient exceeded the critical r-table value at a significance level of 0.05. Reliability was assessed using Cronbach's alpha coefficient, and a value of ≥ 0.70 was considered acceptable. The results indicated that all instruments met the validity and reliability criteria.

Data analysis was performed using statistical software. Descriptive statistics were used to summarize respondents' characteristics, while inferential analysis was conducted using paired t-tests to compare mean scores between pre-test and post-test measurements. Statistical significance was determined at a p-value of less than 0.05. The results were presented in tables and supported by narrative descriptions to clearly illustrate the effects of the intervention.

RESULTS

Characteristics of Respondents

Table 1.
Characteristics of Respondents (n = 50)

Characteristics	Category	f	%
Sex	Male	22	44
	Female	28	56
Age (years)	15	12	24
	16	14	28
	17	13	26
	18	11	22
Grade	X	14	28
	XI	18	36
	XII	18	36
Physical Activity	<30 minutes/day	20	40
	30–60 minutes/day	18	36
	>60 minutes/day	12	24

Table 1 shows that the majority of respondents were female (56%) and aged 16–17 years (54%). Most participants were in grades XI and XII (72%). Regarding physical activity, 76% of students reported engaging in less than 60 minutes of physical activity per day.

Effect of the Intervention on Sleep Hygiene Knowledge

Table 2.
Changes in Sleep Hygiene Knowledge Scores (n = 50)

Variable	N	Mean	SD	SE	t-value	df
Pre-test	50	62.10	11.52	1.15		
Post-test	50	84.30	10.15	1.01	-21.77	49

The mean sleep hygiene knowledge score increased from 62.10 (SD = 11.52) in the pre-test to 84.30 (SD = 10.15) in the post-test, representing a mean difference of 22.20 points. Paired t-test analysis showed a statistically significant difference between pre-test and post-test scores ($t = -21.77$, $df = 49$, $p < 0.05$)

Effect of the Intervention on Nutritional Knowledge and Attitudes

The mean nutritional knowledge score increased from 58.70 ± 11.30 to 81.50 ± 10.20 , with a mean difference of 22.80 points. Similarly, the mean nutritional attitude score increased from 61.60 ± 12.10 to 81.50 ± 11.00 , with a mean difference of 19.90 points. Statistical analysis indicated significant differences between pre-test and post-test scores for both variables ($p < 0.05$).

Table 3.
 Changes in Nutritional Knowledge and Attitudes (n= 50)

Variable	N	Mean	SD	SE	t-value	df
Pre-test	50	62.10	11.52	1.15		
Post-test	50	84.30	10.15	1.01	-21.77	49

DISCUSSION

Effect of the Intervention on Sleep Hygiene Knowledge

The findings of this study demonstrate a significant improvement in adolescents' sleep hygiene knowledge following the implementation of the school-based health promotion program. The substantial increase in mean scores indicates that digital-based educational strategies—such as videos, infographics, and interactive discussions—were effective in enhancing students' understanding of healthy sleep practices. Adolescents are highly exposed to digital technology, and educational approaches that incorporate visual and interactive elements are more likely to capture their attention and facilitate knowledge retention. These findings align with previous research indicating that digital health education improves sleep literacy and promotes awareness of healthy sleep behaviors among adolescents.

From the perspective of the Health Promotion Model (HPM), increased knowledge strengthens perceived benefits and enhances self-efficacy, both of which are central determinants of health-promoting behavior. As students develop a clearer understanding of the importance of adequate sleep and its relationship to academic performance and physical health, they may feel more confident in regulating behaviors such as limiting screen time before bedtime and maintaining consistent sleep schedules. In addition, the interactive group discussions likely contributed to knowledge reinforcement through social engagement. Within the HPM framework, interpersonal influences and social support play important roles in shaping behavioral intention. The collaborative learning environment may therefore have strengthened motivation and facilitated deeper cognitive processing of the educational material.

Effect of the Intervention on Nutritional Knowledge and Attitudes

The intervention also resulted in significant improvements in nutritional knowledge and attitudes, indicating that students not only gained cognitive understanding of balanced nutrition but also developed more favorable perceptions toward healthy eating behaviors. The observed increase in both domains suggests that the program addressed both informational and motivational components of dietary behavior. According to the Health Promotion Model, behavior change is influenced by perceived benefits, perceived barriers, and self-efficacy. The educational materials likely increased students' awareness of the long-term health benefits of balanced nutrition while helping them recognize manageable strategies for healthier food choices. By presenting relatable examples of daily meals and highlighting practical dietary modifications, the intervention may have reduced perceived barriers to adopting healthier eating patterns. The improvement in nutritional attitudes is particularly important, as attitudes serve as precursors to behavioral intention. When adolescents develop positive beliefs regarding the value of balanced nutrition, they are more likely to demonstrate readiness for behavioral modification. Furthermore, peer discussions during the sessions may have reinforced internal motivation, as students exchanged experiences and reflected on their own eating habits.

Early Indications of Health Behavior Change

Although this study did not include long-term follow-up assessments, the significant improvements in knowledge and attitudes suggest early indications of potential health behavior

change. Behavioral modification is typically a gradual process, beginning with increased awareness and followed by attitudinal shifts before consistent behavioral adoption occurs. Within the HPM framework, enhanced perceived benefits, strengthened self-efficacy, and supportive interpersonal influences can collectively increase behavioral intention. The positive cognitive and affective changes observed in this study indicate that the intervention successfully established foundational elements necessary for sustainable lifestyle modification. However, continued reinforcement and structured follow-up programs are recommended to ensure that improved knowledge and attitudes translate into long-term behavioral practice. Integrating regular health education sessions within the school curriculum may support the sustainability of these positive outcomes.

CONCLUSION

This study demonstrates that a school-based health promotion program grounded in the Health Promotion Model (HPM) is effective in improving sleep hygiene knowledge and nutritional awareness among senior high school adolescents. The digital-based educational intervention significantly enhanced students' cognitive understanding and positive attitudes toward healthy sleep practices and balanced nutrition. By strengthening key HPM constructs—particularly perceived benefits and self-efficacy—the intervention shows strong potential to facilitate early stages of sustainable health behavior change. Improvements observed in knowledge and attitudes indicate increased readiness among adolescents to adopt healthier sleep patterns and dietary practices. These findings highlight the importance of integrating theory-based and digitally supported health promotion strategies within school settings. Such interventions may serve as practical and scalable promotive–preventive approaches to address emerging adolescent health challenges in the modern digital era. Future research employing controlled designs and long-term follow-up assessments is recommended to evaluate sustained behavioral outcomes.

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