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Enhancing Health Education Using Edutainment: A Quantitative Study in Malang Regency, Indonesia

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ABSTRACT

Introduction: Adolescent health education is essential for promoting long-term well-being, yet many students lack access to effective and engaging learning approaches. This study evaluates the impact of structured teacher training combined with edutainment-based interventions on improving adolescent health knowledge and behavioral intentions using the Theory of Planned Behavior (TPB) in Malang Regency, Indonesia.
Methods: A quantitative pre-experimental design was used with a pre-test–intervention–post-test structure. The study involved 22 teachers from five schools and 56 junior high school students from SMPN 1 Kepanjen, Malang. The intervention included comprehensive teacher training and interactive edutainment sessions for students, covering topics such as adolescent characteristics, physical activity, assertive communication, and time management. Knowledge changes were analyzed using the Wilcoxon signed-rank test.
Results: The intervention significantly increased knowledge in both groups. Students' average scores improved from 73.2 (pre-test) to 84.4 (post-test) ($p < 0.001$), while teachers' scores increased from 69 to 83.4 ($p < 0.001$). However, no significant changes were observed in students' subjective norms, behavioral control, or behavioral intentions.
Conclusion: Combining structured teacher training with edutainment is an effective strategy for enhancing adolescent health knowledge. This approach provides a scalable model for improving health literacy, though further efforts are needed to influence behavioral intentions and self-efficacy.

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INTRODUCTION

Promoting good health is essential for overall well-being, requiring not only individual behavior change but also addressing social, environmental, and economic determinants. Health education plays a vital role in achieving the Sustainable Development Goals (SDGs), particularly SDG 3: Good Health and Well-Being, by fostering disease prevention, improving health literacy, and ensuring equitable healthcare access (1). Effective health education interventions, especially those targeting attitudes and self-efficacy, are more likely to result in sustained behavioral changes (2,3). However, there is limited research on how these interventions can be optimized for adolescents, a group particularly vulnerable to unhealthy behaviors.

Adolescence is a critical developmental stage often marked by psychological immaturity and risky behaviors (4,5). In Indonesia, half of the 63 million adolescents aged 10–24 are at risk for unhealthy behaviors (5), with national data showing high rates of smoking (45.9%), alcohol consumption (20%), and drug use (2.6%) (6). Additionally, national statistics show that 45.9% of adolescents have smoked, 20% have consumed alcohol, and 2.6% have used illicit drugs (6). These risks are further exacerbated by limited access to accurate health information and the growing influence of digital media (7). Establishing healthy habits during adolescence is crucial, as it provides both immediate and long-term health benefits (8). However, effective interventions tailored to adolescent needs remain underexplored.

One major concern is the declining levels of physical activity among Indonesian adolescents. Research highlights that exercising at least three times per week significantly benefits health (9). However, UNICEF data indicate that 57% of children and adolescents in Indonesia do not meet recommended physical activity levels due to inadequate facilities and air pollution (10). This has contributed to rising obesity rates, with 14.8% of Indonesian adolescents—approximately 3.3 million individuals—classified as overweight or obese. In East Java, obesity prevalence exceeds the national average by 2%, with Malang identified as a high-risk area (11).

To address this issue, digital behavior change interventions (DBCIs) offer a promising solution by integrating goal-setting, self-monitoring, social support, and personalized feedback (12). Studies indicate that interactive, tailored digital tools enhance engagement and promote long-term behavior change (12,13). In Malang Regency, where overweight and obesity prevalence among individuals aged 15 and older stands at 39%, addressing adolescent behaviors through targeted health promotion is crucial (11). Previous research has linked physical activity and dietary patterns to adolescent obesity (14), and media-based health interventions have proven effective in enhancing knowledge and influencing behavior (15). Given the emphasis on adolescent health in Indonesia's Upaya Kesehatan Sekolah (UKS) program (16), a well-structured intervention is needed to support sustainable behavior change.

Globally, edutainment has proven effective in health education by enhancing engagement and behavior change. In the U.S., digital edutainment using gamification and storytelling has improved adolescent health literacy (17). African and South Asian studies highlight radio dramas and mobile apps as effective tools in areas with limited health education access (18,19). European research shows school-based edutainment enhances retention through interactive learning (20). However, in Indonesia, health education still relies on conventional methods with limited use of interactive approaches (21). This study bridges that gap by implementing an edutainment-based intervention grounded in the Theory of Planned Behavior (TPB). By integrating global insights, the study strengthens its theoretical foundation and demonstrates edutainment's adaptability across diverse cultural and educational settings.

This study employs the Theory of Planned Behavior (TPB) as its framework, which posits that behavior is driven by intention, shaped by attitudes, subjective norms, and perceived behavioral control (22,23). By using edutainment-based interventions, this study aims to empower adolescents with the knowledge and skills necessary for healthier decision-making. Additionally, as teachers play a crucial role in shaping student behaviors, teacher-focused training was incorporated to strengthen school-based health education efforts (24). This research seeks to assess changes in students' attitudes, subjective norms, perceived behavioral control, and behavioral intentions following a structured edutainment intervention at SMPN 1 Kepanjen Malang, ultimately contributing to more effective adolescent health promotion strategies.

METHOD

This study employs a clear and systematic approach to ensure the reliability and validity of the findings. Below are the components of the methodology:

Research Type

This study utilized a quantitative research design employing a pre-experimental method. Experimental research is used to assess the effects of interventions under controlled conditions through experiments. The community service activity consisted of two phases: the first phase involved meetings with stakeholders, and the second phase consisted of interventions targeted at teachers and students.

The participants in this study were teachers and students, selected through purposive sampling. A total of 22 teachers from SMPN 1 to SMPN 5 in Kepanjen, Malang, were selected by the Education Office of Malang Regency. The study included 56 students, who were members of the Organisasi Siswa Intra Sekolah (OSIS) and in grades 7 to 8 at SMPN 1 Kepanjen, Malang, based on predetermined inclusion criteria.

The sample size ensures diverse perspectives while maintaining feasibility. The selection of 22 teachers across multiple schools captures a broad range of experiences, while the inclusion of 56 OSIS students in grades 7–8 represents active school participants who can influence peer behavior. Although purposive sampling does not aim for statistical generalizability, it ensures the inclusion of key informants whose insights are crucial for understanding behavior change interventions in schools.

Research Location

This study was conducted in the working area of the Banyu Urip Health Center in Surabaya City, Indonesia, from November 2023 to April 2024.

Instrumentation or Tools

Materials

Two types of questionnaires were used in this study. The teacher questionnaire contained 10 questions, each with three response options. The student questionnaire, based on the Theory of Planned Behavior (TPB) framework, consisted of three questions per section. Response options for the student questionnaire included: "very important," "important," "somewhat important," and "not important." To ensure the accuracy and consistency of the questionnaire, both validity and reliability tests were conducted. Validity was assessed to confirm that the questionnaire accurately measures the intended constructs, while reliability testing ensured internal consistency and stability over time. The results indicated that the questionnaire meets acceptable standards for both validity and reliability, supporting its use for data collection in this study.

Procedure

This study consisted of two phases. The first phase involved a meeting between the researchers and relevant stakeholders to discuss the issues facing adolescents in Malang Regency. From this meeting, five key topics were identified: adolescent characteristics, healthy physical activities, refusal skills, time management for adolescents, and edutainment.

Following this, training sessions were conducted for 22 teachers and 56 students from SMPN 1 Kepanjen. The training was delivered in parallel: teachers received structured training, while students were taught using edutainment techniques. At the beginning of the activity, teachers completed a pre-test, followed by an intervention that included educational material covering the five identified topics. After the intervention, teachers completed a post-test to assess their knowledge.

Students also completed a pre-test to measure their baseline knowledge, followed by the intervention in the form of educational material. Afterward, students completed a post-test to evaluate their knowledge after the intervention. In addition to receiving edutainment interventions, students' attitudes, subjective norms, perceived behavioral control, and behavioral intentions were assessed using the Theory of Planned Behavior (TPB) framework to predict and explain their health-related behaviors and intentions.

Data Analysis

The knowledge data collected from the students' pre- and post-tests will undergo statistical analysis to determine whether there are statistically significant differences between the pre- and post-intervention scores.

Ethical Approval

This research has received a certificate of feasibility for the implementation of health research by the Health Research Ethics Commission, Faculty of Public Health, Universitas Airlangga with certificate number 97/EA/KEPK/2023.

RESULTS

Based on the results from the meeting with relevant stakeholders in Malang Regency, five key topics were identified for this community service activity: characteristics of adolescents, healthy physical activities for adolescents, the ability to say no, time management for adolescents, and edutainment.

Table 1. Characteristics of Respondents by Sex

Characteristics	n	%
Teachers		
Male	6	27
Female	16	73
Students		
Male	29	52
Female	27	48

According to **Table 1**, the study included a total of 56 students and 22 teachers from SMPN 1 Kepanjen, Malang. The gender distribution among students was relatively balanced, with 29 male students (52%) and 27 female students (48%). This distribution reflects a typical gender representation in the school, which helps in providing a diverse perspective on the impact of the interventions across genders.

Among the teacher respondents, there was a higher proportion of female teachers, with 16 (73%) female teachers and 6 (27%) male teachers. This disparity in the teacher gender distribution is in line with the general trends observed in many educational institutions, where female teachers often outnumber male teachers. The variation in gender representation between students and teachers offers an opportunity to explore potential gender-related differences in responses to the educational interventions provided in this study.

These demographic characteristics are important for understanding the context of the intervention, as they may influence the effectiveness of health education programs and interventions. Gender-related factors, such as attitudes toward health behaviors and the role of educators, could contribute to the overall outcomes observed in the study. Further analysis of these variables in relation to the effectiveness of the intervention could provide valuable insights into how gender impacts the adoption of healthy behaviors among adolescents.

Intervention for Students

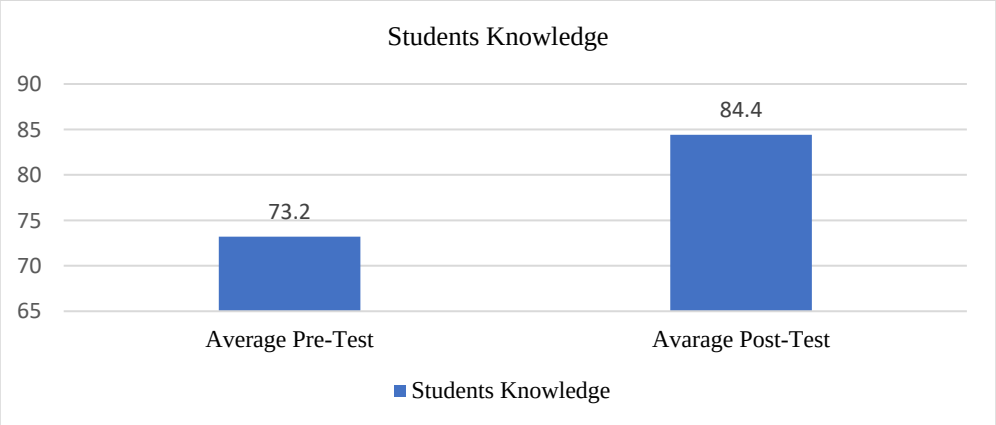

Figure 1. Increased Knowledge of Students

Figure 1 shows a significant increase in students' knowledge after the educational intervention. The average pre-test score was 73.2, while the average post-test score rose to 84.4. This 11.2-point increase indicates that the intervention, which covered topics like adolescent health, physical activities, and time management, effectively improved students' understanding. The results highlight the positive impact of structured educational programs on enhancing knowledge.

Table 2. Significance of Student's TPB Score Before and After Intervention

	Knowledge Pretest Post-test	Attitudes Pretest Post-test	Subjective Norms Pretest Post-test	Behavioral Control Pretest Post-test	Behavioral Intentions Pretest Post-test
Z	-3.738	-1.961	-1.307	-0.783	-1.753
Asymp. Sig (2-tailed)	0.000	0.050	0.191	0.434	0.080

The results presented in **Table 2** focus on the significance of the differences in students' scores across various constructs of the Theory of Planned Behavior (TPB) before and after the intervention. The TPB framework measures key variables that influence health behavior: knowledge, attitudes, subjective norms, behavioral control, and behavioral intentions.

The Wilcoxon signed-rank test was conducted to assess changes in these variables from pretest to posttest. The following findings were observed:

Knowledge: A significant increase was found in students' knowledge scores, with a p-value of 0.000 ($p < 0.001$). This suggests that the educational intervention had a substantial effect on enhancing students' understanding of the health-related topics covered, indicating that the intervention successfully improved their awareness and knowledge.

Attitudes: There was a significant change in students' attitudes towards health behaviors, with a p-value of 0.050. This suggests that the intervention had a meaningful impact on students' attitudes, helping them adopt more positive perceptions of health behaviors, particularly those related to physical activity and time management.

Subjective Norms: No significant change was found in subjective norms, with a p-value of 0.191. This indicates that while students' attitudes and knowledge improved, the social pressures or perceived norms regarding health behaviors were not significantly altered by the intervention. This could suggest that further interventions targeting peer influence or social support may be necessary.

Behavioral Control: Similarly, the perceived behavioral control of students did not show a significant change, with a p-value of 0.434. While students' knowledge and attitudes improved, their self-reported ability to control or manage their health behaviors did not change significantly. This suggests that more targeted strategies to build students' self-efficacy and confidence in their ability to perform health-promoting behaviors may be needed.

Behavioral Intentions: There was no significant change in students' behavioral intentions, with a p-value of 0.080. This suggests that while there was an increase in knowledge and attitudes, the students' intention to engage in health-promoting behaviors, such as regular physical activity or time management practices, did not show a statistically significant change.

The TPB questionnaire results show that the intervention significantly improved students' knowledge and attitudes ($p < 0.05$). However, it did not notably impact subjective norms, behavioral control, or behavioral intentions. While knowledge and attitude shifts are key to behavior change, additional strategies may be needed to enhance perceived control and intentions. This study highlights the intervention's effectiveness in promoting awareness but suggests further research to address other TPB components for lasting behavior change.

The lack of improvement in subjective norms, behavioral control, and behavioral intentions may stem from limited social reinforcement and environmental support. Without peer or community engagement, perceived norms remain unchanged. Additionally, behavioral control requires self-efficacy and resources, which the intervention may not have fully addressed. Lastly, the program's duration may have been too short for students to internalize behaviors, highlighting the need for follow-up support and real-world application.

Intervention for Teachers

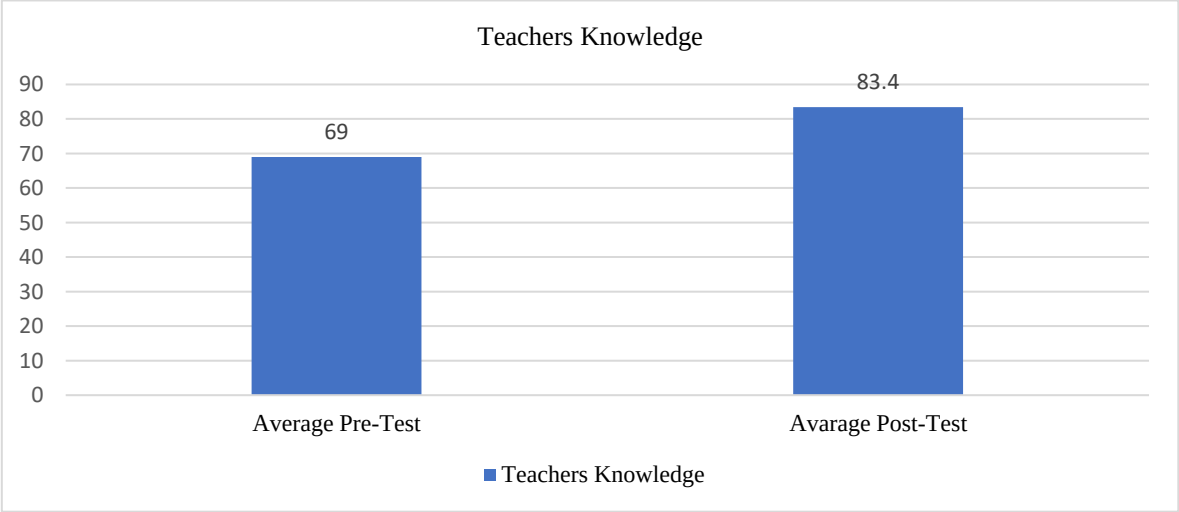

Figure 2. Increased Knowledge of Teachers

Figure 2 shows a significant improvement in teachers' knowledge following the educational intervention. The average pre-test score was 69, which increased to 83.4 after the training—a 14.4-point rise. This indicates that the intervention effectively enhanced teachers' understanding of key topics, including adolescent development, healthy activities, decision-making, and time management. The findings emphasize the value of teacher training in improving health education delivery and supporting better health outcomes for students.

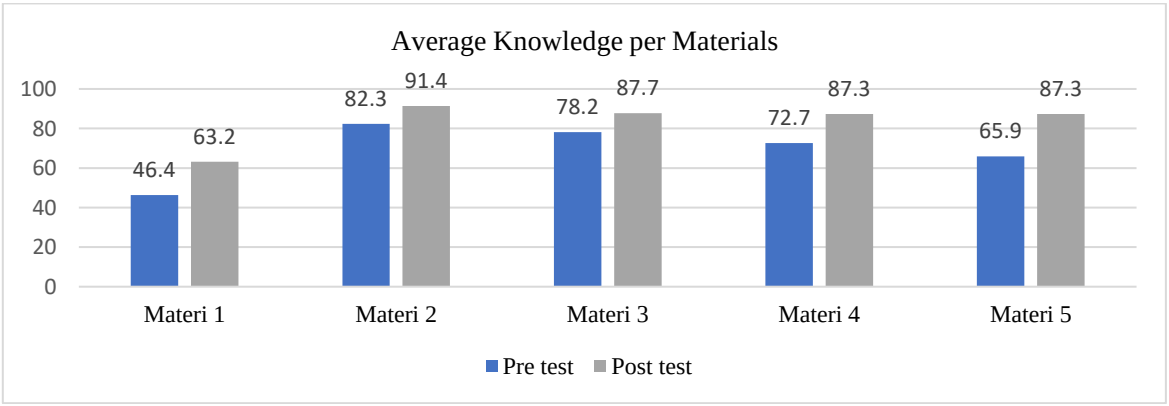

Figure 3. Average Knowledge of Teachers per Materials

Figure 3 shows a consistent increase in teachers' knowledge across all five educational materials, with varying degrees of improvement. The greatest gain was in edutainment (+21.4 points), highlighting its effectiveness in engaging teachers. Adolescent characteristics showed the lowest post-test score, suggesting a need for further training on this complex topic. Physical activity had the highest initial scores, indicating prior knowledge, though the intervention still reinforced key concepts. These findings emphasize the importance of tailored training approaches, particularly for adolescent development and interactive teaching methods, to enhance health education outcomes.

Figure 3 demonstrates the overall positive impact of the intervention on teachers' knowledge while identifying areas for further improvement. The consistent gains across all topics highlight the effectiveness of the training, while variations in knowledge growth suggest the need for more targeted content. The significant improvement in edutainment underscores the value of interactive learning methods in enhancing engagement and retention. Future interventions should integrate traditional education with innovative strategies like edutainment to create more engaging and effective health education, ultimately benefiting both teachers and students.

Table 3. Pre-test-Post test Knowledge Analysis

	Teachers Pre-test Post-test
Z	-4,072
Asymp. Sig (2-tailed)	0,000

Table 3 presents the Wilcoxon signed-rank test results, showing a significant increase in teachers' knowledge after the intervention ($Z = -4.072$, $p < 0.05$). The p-value of 0.000 confirms that the improvement was highly unlikely due to chance. This demonstrates the intervention's effectiveness in enhancing teachers' understanding of adolescent health topics. The strong statistical significance supports the reliability of the findings, highlighting the value of similar training programs in strengthening educators' knowledge and improving health education in schools.

DISCUSSION

This study highlights the effectiveness of structured teacher training and edutainment-based interventions in enhancing adolescent health knowledge. The intervention covered five key topics, with teachers receiving structured training while students engaged with interactive edutainment. Both groups completed pre- and post-tests, with knowledge improvements assessed using the Theory of Planned Behavior (TPB) framework.

Knowledge Gains and Learning EffectivenessThe results indicate a significant increase in knowledge among both teachers and students. The first topic, adolescent characteristics, emphasized the importance of physical, mental, and social development in shaping future behaviors. Adolescents with high health literacy are better equipped to evaluate and maintain their well-being (23). However, health awareness should not be limited to adolescents alone, as teachers and caregivers play a crucial role in reinforcing health behaviors (25,26).

The second topic addressed adolescent physical activity and lifestyle, a critical aspect of long-term health. Sedentary behavior linked to excessive screen time is a growing concern, negatively impacting both physical and mental health (27,28). The increase in student knowledge scores (Figure 1) aligns with prior research suggesting that structured health interventions can improve fitness levels and academic performance (29,30). While the intervention effectively improved knowledge, long-term strategies are needed to translate this into sustained physical activity habits.

The third and fourth topics focused on behavioral skills refusal skills and time management. Assertive communication enables adolescents to resist peer pressure and make informed decisions, a skill linked to improved self-esteem and reduced social anxiety (31–33). Similarly, effective time management supports academic achievement, reduces stress, and enhances overall well-being (34–37). The intervention helped students gain essential life skills, but further engagement, such as peer mentoring and real-life practice scenarios, could reinforce their application.

The fifth topic, edutainment, proved highly effective in engaging both teachers and students. Teachers exhibited the highest knowledge gain in this category (+21.4 points), emphasizing its potential in health education (38–40). Unlike traditional methods, edutainment combines entertainment with education, making learning more dynamic and accessible. Prior studies indicate that edutainment significantly improves knowledge retention and behavioral change, particularly among adolescents (41). Figure 3 illustrates how interactive learning fosters better comprehension and recall. However, while knowledge gains were evident, additional reinforcement strategies—such as digital platforms and gamified learning—could enhance long-term impact.

Despite the increase in knowledge and attitudes, the intervention had limited impact on subjective norms, behavioral control, and behavioral intentions (Table 2). This suggests that external influences, such as peer dynamics and parental support, play a critical role in shaping adolescent behaviors (42). The absence of significant improvements in these areas highlights the need for a more comprehensive approach that extends beyond school-based interventions. Social reinforcement, environmental support, and sustained behavioral engagement strategies should be integrated into future interventions.

Beyond teachers, parents and peer networks are essential in shaping adolescent health behaviors. The COPE Healthy Lifestyles TEEN Program found that when adolescents share health information with their parents, both groups benefit from healthier behaviors (43). Similarly, peer influence significantly impacts adolescent choices,

making peer-led health programs an effective supplement to teacher-driven education (44). Integrating these social components into interventions can enhance their long-term success and relevance.

The findings of this study have significant implications for health promotion policies and education systems. By demonstrating the effectiveness of edutainment in health literacy, this study presents a scalable model that can be adapted to various educational settings. Future interventions could expand digital edutainment platforms to reach a wider audience, particularly in underserved areas (45). School-based policies should also consider integrating interactive learning into national curricula to improve engagement and retention of health information (46). Research has shown that digital learning tools can significantly enhance accessibility and long-term knowledge retention, particularly for students in remote or resource-limited settings (45). Implementing such policies at a broader scale could ensure that adolescents across different socio-economic backgrounds benefit from innovative educational strategies.

In addition to directly benefiting students, the provision of health interventions for teachers has been demonstrated to be effective in promoting healthy lifestyle behaviors among students (47–49). When teachers receive training and resources to support health education, they can better guide students in adopting healthier habits and provide consistent reinforcement of the messages. Moreover, research underscores the influential role of teachers in shaping students' attitudes toward health and preventing health issues (50). Teachers not only act as role models but also as trusted figures who can significantly influence students' perceptions and behaviors. By targeting both groups, schools can create a more comprehensive and sustainable approach to improving adolescent health outcomes.

CONCLUSION

This study demonstrates the efficacy of educational interventions for enhancing adolescent health knowledge, with interactive methods like edutainment improving engagement and behavior change. The active involvement of teachers is crucial in sustaining a health focused school environment. However, a limitation of this research is the lack of long-term follow-up to assess sustained behavior change beyond the intervention period. Future studies should incorporate longitudinal assessments and involve parents and peer networks to enhance the effectiveness and lasting impact of school-based health programs.

AUTHOR'S CONTRIBUTION STATEMENT

Conceptualization, Methodology, Writing – original draft, Writing - review. LAS: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. IN: Methodology, Project Administration, Writing – review & editing. AN: Data collection, data curation, Writing – draft, Writing – editing. ACS: Writing – draft, Writing – review & editing

CONFLICTS OF INTEREST

There is no conflict Interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors affirm that no generative AI or AI-assisted technologies were used in the conception, writing, editing, or formatting of this manuscript. It is evident that all content was created exclusively by the authors listed herein, with no involvement of artificial intelligence tools.

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