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Comparative Effects of Safe Steps and Life Cycle Games on Adolescent Reproductive Literacy and Mental Health

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ABSTRACT

Background: Adolescents often experience low reproductive literacy and poor mental health, which can lead to risky behaviors, early sexual debut, unintended pregnancy, and psychological problems such as anxiety and depression. Innovative approaches are needed to provide engaging and effective health education.

Purpose: This study aimed to compare the effects of two educational games, SafeSteps (mobile) and LifeCycle (board game), on adolescents' reproductive health literacy and mental health.

Methods: A quasi-experimental design was applied with 266 participants divided into the two intervention groups (n=133 per group). Data on reproductive literacy and mental health (SDQ) were collected using validated questionnaires before and after the intervention. Paired t-tests and Analysis of Covariance (ANCOVA) were conducted to measure within- and between-group differences.

Results: Both SafeSteps and LifeCycle significantly improved adolescents' reproductive literacy, attitudes toward sexual violence, and mental health ($p < .001$). The SafeSteps group showed a significantly greater increase in reproductive literacy (mean $\Delta=17.3$) compared to the LifeCycle group (mean $\Delta=13.4$; $F=13.84$, $p < .001$). SafeSteps also yielded stronger gains in attitudes toward sexual violence ($p < .001$). Crucially, improvements in mental health were comparable between the two groups ($F=1.46$, $p=0.228$).

Conclusion: SafeSteps (mobile) yielded stronger gains in cognitive and attitudinal outcomes, while both game modalities equally improved mental health. These findings recommend that policymakers and educators should integrate a hybrid approach combining scalable digital games with collaborative board-based sessions into school-based programs to ensure comprehensive and effective adolescent health promotion.

Keywords: adolescent health, digital games, gamification, mental health, reproductive literacy

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BACKGROUND

Adolescents face complex challenges that significantly impact their development and well-being, particularly concerning reproductive health literacy and mental health problems. Data from the 2022 Indonesia National Adolescent Mental Health Survey (I-NAMHS) indicate that approximately 34.9% of adolescents aged 10–17 years experience mental health problems, with 5.1% suffering from depression and 9.8% experiencing emotional and mental disorders (Ma et al., 2023; Nurhidayah et al., 2024). Simultaneously, the issue of reproductive health literacy is alarming; current literature consistently reports that the majority of Indonesian adolescents possess inadequate knowledge on the subject, with one study reporting that only 18.4% of adolescents had adequate literacy (Mancone et al., 2024; Oktaria & Martha, 2023; Wahyudi & Raharjo, 2023).

These two issues often co-occur and can severely hinder adolescents' overall well-being and decision-making capacity. Low reproductive health literacy is established as a key risk factor for risky sexual behaviors, unintended pregnancies, and vulnerability to sexually transmitted infections (Huang et al., 2022; Oktaria & Martha, 2023; Wahyudi & Raharjo, 2023). Conversely, poor mental health contributes to anxiety, depression, social withdrawal, academic difficulties, and increased engagement in various risky behaviors (Jorm & Kitchener, 2021; Lehtimaki et al., 2021; Rahmawaty et al., 2022). Therefore, interventions are necessary that can simultaneously address both dimensions.

Traditional educational approaches in schools are frequently passive and fail to effectively engage adolescents, thus limiting their impact on sustained knowledge and behavioral change. To overcome these limitations, game-based educational interventions, or serious games, offer an interactive and enjoyable alternative. Digital games (such as mobile applications) can provide realistic simulations that facilitate cognitive learning, whereas physical games (like board games) tend to encourage greater social interaction and collaborative problem-solving. Prior research demonstrates that game-based interventions can successfully improve both reproductive health literacy and mental health awareness among adolescents (Andrew et al., 2023; Marsiami, 2021; Rubio & Besoain, 2025).

Despite the acknowledged benefits of game-based interventions, current literature lacks a comprehensive comparison of the relative effectiveness between digital and non-digital modalities in simultaneously improving both reproductive health literacy and mental health outcomes in adolescents. Previous studies have generally focused on a single modality or a single outcome, leaving a critical gap regarding which modality is optimally suited for different outcome dimensions. This study aims to bridge this gap by directly comparing the effects of SafeSteps (a mobile/digital game) and LifeCycle (a board/non-digital game) against traditional education on adolescents' reproductive health literacy and mental health.

OBJECTIVE

This study aims to compare the effects of Safe Steps and Life Cycle games on adolescents' reproductive health literacy and mental health, providing evidence to inform the development of effective and engaging educational media for adolescents.

METHODS

This study employed a quantitative, quasi-experimental pretest–posttest control group design to evaluate and compare the effectiveness of two game-based educational media: SafeSteps (mobile game) and LifeCycle (board game), in improving adolescents' reproductive health literacy and mental health. The use of a quasi-experimental design was necessitated by the logistical constraints of randomizing groups within the school setting.

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The total study population (N) consisted of 800 students from a vocational high school in Kediri Regency. The required minimum sample size was determined using the Slovin formula with a 5\% margin of error (e = 0.05), yielding a required sample size of n = 265.67. A final sample size (n) of 266 students was recruited using stratified random sampling based on grade levels to ensure proportional representation. These students were then equally allocated into two intervention groups: Group 1, receiving the SafeSteps mobile game intervention (n=133); and Group 2, receiving the LifeCycle board game intervention (n=133). The final sample size was sufficient to meet the minimum requirement calculated by the Slovin formula.

Both interventions were delivered in three sessions over three weeks (each session lasting 60 minutes). Trained facilitators, standardized manuals, and scripts were used to guide the sessions and ensure consistency. SafeSteps (Mobile Game): A digital simulation game accessible on Android devices, presenting interactive scenarios and decision-making choices related to reproductive health and mental well-being. LifeCycle (Board Game): A physical board game designed with life-path narratives, challenge cards, and structured group discussions. Each group underwent structured sessions comprising: Session 1: Introduction to key concepts through gameplay; Session 2: Reflection and guided discussion; Session 3: Consolidation and reinforcement of knowledge and coping skills. The intervention duration of three sessions over three weeks was chosen based on prior evidence in game-based health literacy promotion demonstrates that short, intensive interventions (2–4 sessions) are sufficient to induce measurable cognitive and behavioral changes (cite relevant reference).

The study utilized two standardized questionnaires to measure the primary variables: the Adolescent Reproductive Health Literacy Questionnaire (ARHLQ) to assess reproductive health literacy, and the Strengths and Difficulties Questionnaire (SDQ) (self-report version) to assess adolescent mental health conditions. Prior to the main data collection, both instruments were adapted and tested for psychometric properties within the local context. The ARHLQ demonstrated acceptable reliability with a Cronbach's alpha (α) of 0.84, and its construct validity was supported by Confirmatory Factor Analysis (CFA). Similarly, the Indonesian version of the SDQ showed good internal consistency with a Cronbach's alpha (α) of 0.78, which is consistent with prior validation studies in Indonesian adolescents. The established psychometric properties of these instruments ensure minimized measurement error and promote the validity of the study findings.

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) software, version 26.0, with a significance level set at $p < 0.05$. Missing data were handled using pairwise deletion. Initially, descriptive statistics (univariate analysis) were used to summarize demographic characteristics and the mean scores of reproductive health literacy and mental health at pretest and posttest. For bivariate analysis, Paired t-tests were performed to evaluate within-group differences between pretest and posttest scores. The primary comparison of effectiveness between the SafeSteps and LifeCycle groups was conducted using Analysis of Covariance (ANCOVA) on the posttest scores, controlling for the corresponding pretest scores to adjust for potential baseline differences inherent in the quasi-experimental design.

RESULTS

Respondent Characteristics

A total of 266 respondents participated in the study, equally divided between the SafeSteps group (n=133) and the LifeCycle group (n=133). The distribution of respondents by age, gender, and class is shown in Table 1.

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Table 1. Distribution Characteristics of Respondents (n=266)

Variable	Category	SafeSteps (n=133)	LifeCycle (n=133)	Total (n=266)	%
Age (years)	15	28	25	53	19.9
	16	52	50	102	38.3
	17	39	44	83	31.2
	18	14	14	28	10.6
Gender	Male	62	64	126	47.4
	Female	71	69	140	52.6
School Grade	X	45	47	92	34.6
	XI	44	42	86	32.3
	XII	44	44	88	33.1

The majority of respondents were aged 16–17 years (69.5%), with a balanced gender distribution (47.4% male and 52.6% female). Respondents were also relatively evenly distributed across grade levels.

Pretest–Posttest Results within Groups

The paired t-test results, presented in Table 2, show that both interventions led to highly significant improvements ($p < 0.001$) across all domains (Reproductive Health Literacy, Attitude toward Sexual Violence, and Mental Health). The calculated Cohen's d indicates large effect sizes for all measured changes.

Table 2. Paired Sample t-Test Results (Pretest vs Posttest per Group)

Domain	Group	Pretest Mean ± SD	Posttest Mean ± SD	Mean Difference [95% CI]	t	p	Cohen's d
Reproductive Health Literacy	SafeSteps	62.1 ± 8.7	79.4 ± 7.9	17.30[15.89,18.71]	23.95	<.001	2.09
	LifeCycle	61.8 ± 9.0	75.2 ± 8.5	13.40[12.06,14.74]	17.64	<.001	1.53
Attitude toward Sexual Violence	SafeSteps	58.7 ± 7.5	74.5 ± 7.1	15.80[14.54,17.06]	24.93	<.001	2.17
	LifeCycle	59.2 ± 7.8	71.6 ± 7.3	12.40[11.16,13.64]	18.91	<.001	1.64
Mental Health (SDQ, lower = better)	SafeSteps	19.6 ± 4.3	15.8 ± 3.9	−3.80[−4.40,−3.20]	-10.65	<.001	-0.92
	LifeCycle	19.9 ± 4.1	16.7 ± 3.8	−3.20[−3.78,−2.62]	-9.32	<.001	-0.81

Note: For Mental Health (SDQ), a negative mean difference indicates an improvement (lower score).

Comparison between SafeSteps and LifeCycle

Analysis of Covariance (ANCOVA) was performed to compare the posttest mean scores between the SafeSteps and LifeCycle groups, controlling for their respective pretest scores. The results are presented in Table 3.

Table 3. ANCOVA (Comparison of Δ SafeSteps vs LifeCycle)

Domain	Group	Adjusted Posttest Mean [95% CI]	F	p	η_p^2
Reproductive Health Literacy	SafeSteps	78.91[78.10,79.72]	13.84	<.001	0.05
	LifeCycle	75.69[74.88,76.50]			
Attitude toward Sexual Violence	SafeSteps	74.25[73.54,74.96]	13.91	<.001	0.05
	LifeCycle	71.85[71.14,72.56]			
Mental Health (SDQ, lower = better)	SafeSteps	16.03[15.68,16.38]	1.46	0.228	0.005
	LifeCycle	16.47[16.12,16.82]			

Note:n^2_p(Partial Eta-Squared) indicates the proportion of variance in the posttest score explained by the intervention group after controlling for the pretest score.

The quantitative results demonstrate that while both game-based interventions were highly effective in enhancing adolescents' reproductive health literacy and improving attitudes toward sexual violence, the **SafeSteps** digital game yielded significantly greater improvements than the **LifeCycle** board game in both the **Reproductive Health Literacy** domain (F = 13.84, p < .001, n^2_p = 0.050$) and **Attitude toward Sexual Violence** domain (F = 13.91, p < .001, n^2_p=0.050). However, the difference between the two interventions for the **Mental Health** outcome (SDQ Total Score) was **not statistically significant** (F = 1.46, p = 0.228, n^2_p=0.005). These findings provide empirical insight into the differential strengths of digital versus non-digital serious games in achieving cognitive and emotional health outcomes among adolescents.

DISCUSSION

This study demonstrated that while both game-based interventions Safe Steps (mobile) and Life Cycle (board game) were effective in significantly improving adolescent reproductive health literacy, attitudes toward sexual violence, and mental health, Safe Steps showed superior effects in enhancing literacy and attitudes. Crucially, both games produced comparable improvements in mental health. This aligns with previous findings underscoring the importance of youth-friendly interactive media in health education (Mancone et al., 2024; McHugh et al., 2023; Nobre et al., 2021; Sutiawati et al., 2024).

This differential efficacy is best explained by Bandura's Social Cognitive Theory (SCT). The digital format of SafeSteps uniquely leverages the mechanisms of mastery experiences and immediate feedback within an immersive environment, thereby accelerating knowledge retention and attitude formation more effectively than the board game (Idhayanti et al., 2023; Marsiami, 2021; Nurhidayah et al., 2024; Rubio & Besoain, 2025). This capacity for personalized, rapid iteration maximizes individual cognitive gains and motivation, which is consistent with the higher effect sizes observed for the digital group in literacy and attitude scores. Conversely, LifeCycle, while effective, relied more heavily on social interaction (Andrew et al., 2023; Piolanti & Foran, 2022; Rubio & Besoain, 2025).

The comparable improvements in mental health (SDQ) suggest that emotional regulation and coping skills are primarily driven by the underlying reflective and problem-solving content a component shared by both games rather than the specific medium itself (Chan et al., 2021; Gkintoni et al., 2024; Mancone et al., 2024). Consequently, while mobile games offer a pathway for maximizing knowledge and scalability, board games remain valuable for peer support, leading to the practical implication that a hybrid intervention model combining

both modalities may offer the most comprehensive solution.

Despite these insights, the study faces several limitations. First, the use of a single-site sample restricts the generalizability of the findings across diverse settings. Second, the short intervention duration prevents the assessment of long-term retention or sustained behavioral changes. Third, the proximity of the groups introduced the potential for contamination between groups, which may have diluted the true comparative effects. Finally, reliance on self-reported outcomes carries the inherent risk of response bias.

Future research should focus on addressing these limitations. Specifically, studies should implement longer-term follow-up periods (e.g., 6 and 12 months) and utilize cluster-randomized trials across multiple sites to enhance external validity. Furthermore, researchers should experimentally test the efficacy of a comprehensive digital-plus-board hybrid intervention model.

CONCLUSION

This study provides strong evidence that game-based serious play is an effective strategy for promoting adolescent reproductive and psychological well-being. The finding that the digital format (SafeSteps) significantly outperformed the non-digital format (LifeCycle) in enhancing reproductive health literacy and attitudes offers a clear directive for resource allocation: mobile games should be the priority medium when the goal is to achieve rapid, measurable, and scalable knowledge transfer to individuals. Conversely, the shared success of both games in improving mental health affirms the continued relevance of non-digital, collaborative tools for fostering essential psychosocial skills and group support in educational settings. Given these distinct strengths, policymakers and health workers should integrate a hybrid model combining accessible digital games with facilitated board-based sessions—into school curricula and national adolescent health programs to maximize coverage, inclusivity, and overall efficacy.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest related to this study.

REFERENCES

Andrew, L., Barwood, D., Boston, J., Masek, M., Bloomfield, L., & Devine, A. (2023). Serious games for health promotion in adolescents–a systematic scoping review. *Education and Information Technologies*, *28*(5), 5519–5550.

Chan, H. H.-K., Kwong, H. Y. C., Shu, G. L. F., Ting, C. Y., & Lai, F. H.-Y. (2021). Effects of experiential learning programmes on adolescent prosocial behaviour, empathy, and subjective well-being: A systematic review and meta-analysis. *Frontiers in Psychology*, *12*, 709699.

Gkintoni, E., Vantaraki, F., Skoulidi, C., Anastassopoulos, P., & Vantarakis, A. (2024). Promoting physical and mental health among children and adolescents via gamification—A conceptual systematic review. *Behavioral Sciences*, *14*(2), 102.

Huang, K.-Y., Kumar, M., Cheng, S., Urcuyo, A. E., & Macharia, P. (2022). Applying technology to promote sexual and reproductive health and prevent gender based violence for adolescents in

low and middle-income countries: digital health strategies synthesis from an umbrella review. *BMC Health Services Research*, *22*(1), 1373.

Idhayanti, R. I., Patimah, D., Sukini, T., Masini, M., & Saputra, W. J. (2023). APLIKASI REHAT REMAJA SEHAT UNTUK MENINGKATKAN PENGETAHUAN DAN SIKAP REMAJA TENTANG MASA PUBERTAS. *Jurnal Sains Kebidanan*, *5*(2), 50–59.

Jorm, A. F., & Kitchener, B. A. (2021). Increases in youth mental health services in Australia: Have they had an impact on youth population mental health? *Australian & New Zealand Journal of Psychiatry*, *55*(5), 476–484.

Lehtimaki, S., Martic, J., Wahl, B., Foster, K. T., & Schwalbe, N. (2021). Evidence on digital mental health interventions for adolescents and young people: systematic overview. *JMIR Mental Health*, *8*(4), e25847.

Ma, K. K. Y., Anderson, J. K., & Burn, A. (2023). School-based interventions to improve mental health literacy and reduce mental health stigma–a systematic review. *Child and Adolescent Mental Health*, *28*(2), 230–240.

Mancone, S., Corrado, S., Tosti, B., Spica, G., & Diotaiuti, P. (2024). Integrating digital and interactive approaches in adolescent health literacy: a comprehensive review. *Frontiers in Public Health*, *12*, 1387874.

Marsiami, A. S. (2021). Pengaruh Penerapan Game Edukasi Kesehatan Reproduksi (KEPO) terhadap Keterampilan Remaja. *Jurnal Ilmiah Kesehatan*, *10*(2), 77–84.

McHugh, M. K., Dixit, N., Alper, J., & National Academies of Sciences and Medicine, E. (2023). *Engaging Community Health Workers/Youth Ambassadors to Improve Health Literacy*.

Nobre, J., Oliveira, A. P., Monteiro, F., Sequeira, C., & Ferré-Grau, C. (2021). Promotion of mental health literacy in adolescents: a scoping review. *International Journal of Environmental Research and Public Health*, *18*(18), 9500.

Nurhidayah, R., Bastian, A., & Wati, P. D. K. (2024). PENGEMBANGAN APLIKASI SAKTI REMAJA SEBAGAI UPAYA OPTIMALISASI LAYANAN KESEHATAN JIWA UNTUK REMAJA. *Jurnal Abdi Masyarakat*, *8*(1), 266–275.

Oktaria, R., & Martha, E. (2023). Analisis Penggunaan Media Belajar Pendidikan Kesehatan Reproduksi Berbasis Aplikasi Android dan Website: Sistematic Review. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, *6*(12), 2397–2404.

Piolanti, A., & Foran, H. M. (2022). Efficacy of interventions to prevent physical and sexual dating violence among adolescents: a systematic review and meta-analysis. *JAMA Pediatrics*, *176*(2), 142–149.

Rahmawaty, F., Silalahi, R. P., Berthiana, T., & Mansyah, B. (2022). Faktor-Faktor yang Mempengaruhi Kesehatan Mental pada Remaja: Factors Affecting Mental Health in Adolesents. *Jurnal Surya Medika (JSM)*, *8*(3), 276–281.

Rubio, C., & Besoain, F. (2025). Pervasive Games for Sexual Health Promotion: Scoping Literature Review. *JMIR Serious Games*, *13*, e58912.

Sarmini, S., Putri, A., Maria, C., Syahrias, L., & Mustika, I. (2023). Penyuluhan Mental Health Upaya Untuk Meningkatkan Kesehatan Mental Remaja. *Monsu'ani Tano Jurnal Pengabdian Masyarakat*, *6*(1), 154–161.

Sutiawati, D. N., Suitini, T., Fauziah, M., Purwati, N. H., & Nuraidah, N. (2024). Effectiveness of Video and Leaflet Educational Media in Increasing Adolescent Mental Health Literacy. *Jurnal Keperawatan*, *9*(1), 93–108.

Wahyudi, G., & Raharjo, R. (2023). Positive Impact Of Health Education Through Video Media to the Improvevement of Adolescent Reproductive Health Knowledge. *Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery)*, *10*(3), 405–411.