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Android Application-Based Dental Disease Prevention Education on Dental Health Knowledge and Behaviour among Adolescents

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ABSTRACT

Background: Dental and oral health problems affect nearly half of the world's population. The 2018 Indonesian Basic Health Research reported that 57.6% of Indonesians experienced dental and oral health problems, with periodontitis affecting 67.8% of those aged ≥15 years. Adolescents experience dental health problems that are not markedly different from those of children and adults, including gingivitis, periodontitis, dental caries, pulpitis, and dental calculus. One promotive strategy is education delivered through media that utilise current technology, namely Android-based applications, which are predominantly used by adolescents. Objective: This study aimed to analyse the effectiveness of Android application-based dental disease prevention education in improving dental health knowledge and behaviour among adolescents. Method: This study used a pre-experimental design with a pretest and posttest one group design. This manuscript reports the results of the intervention group, consisting of 53 junior secondary school (Madrasah Tsanawiyah) students in South Jakarta who received dental health education through the Android-based application "Edugi-Remaja". Knowledge and behaviour were measured before and after the intervention using a validated and reliable questionnaire. Data normality was assessed using the Shapiro-Wilk test; the Wilcoxon Signed-Rank Test was used to analyse the knowledge variable, and the Paired Samples t-Test was used for the behaviour variable. Results: The mean knowledge score increased from 7.96 ± 1.13 (pretest) to 8.77 ± 1.37 (posttest), a statistically significant difference ($p < 0.001$). The mean behaviour score increased from 35.40 ± 4.17 (pretest) to 37.34 ± 4.13 (posttest), also statistically significant ($p<0.001$). Conclusion: Android application-based dental disease prevention education using Edugi-Remaja significantly improved dental health knowledge and behaviour among adolescents, indicating its potential as a supportive digital health promotion medium in the school setting.

INTRODUCTION

Dental and oral health is an inseparable part of general health; a person experiencing dental and oral health problems will also be affected in terms of overall health, meaning that dental and oral diseases can become a risk factor for other diseases (Octavianita et al., 2024). The 2018 Basic Health Research (Riskesdas) found that dental and oral health problems among adolescents are not markedly different from those found in children and adults, including gingivitis, periodontitis, dental caries, pulpitis, and dental calculus. The prevalence of periodontitis among the population aged 15 years and above, according to the 2018 Riskesdas, was 67.8%, meaning that seven out of every ten Indonesians experience periodontitis (Kemenkes RI, 2018; Suratri et al., 2020)

One promotive strategy for dental and oral health is education delivered through media that make use of current technology (Andriyanto & Hidayati, 2018). The use of communication devices such as mobile phones and smartphones in Indonesia continues to increase every year, since such devices make it easy for the public to access information, including health information. Smartphones can be used as a medium for Android-based health education by installing applications on the device; through such applications, users can obtain information on how to prevent dental disease (Pawarti et al., 2020; RI, 2018).

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The highest users of Android-based information media on smartphones are dominated by adolescents, accounting for 75.50% of users. The popularity of Android-based application use among adolescents makes this technology highly potential to be used as a medium for dental and oral health promotion among this age group (Safura et al., 2022).

A number of studies have examined the development of dental health promotion media (Kristianto et al., 2022) demonstrated that an Android-based e-book, was an innovative method for improving children's behaviour in maintaining dental and oral hygiene. The “Oral Health” application developed for Android was effective in improving adolescents' knowledge of oral hygiene and periodontal disease, particularly when combined with video content (Marchetti et al., 2018). This finding is reinforced by Zahid et al., who demonstrated that the “Brush DJ” application could be used as an effective medium for improving dental and oral health knowledge, attitudes, and behaviour(Zahid et al., 2020).

Based on the background above, the research problem may be formulated as follows: “How does Android application-based dental disease prevention education improve dental health knowledge and behaviour among adolescents?” This study specifically aimed to analyse the differences in dental health knowledge and behaviour before and after Android application-based education was provided.

This study is considered urgent because dental health problems among adolescents remain high, further compounded by the suboptimal implementation of the School Dental Health Programme (UKGS) at the junior secondary school level. An alternative solution in the form of Android-based dental health education is therefore needed as a preventive measure against dental disease, with the application expected to serve as a guide for adolescents in maintaining their dental and oral health.

METHOD

This study used a pre-experimental design with a pretest and posttest one group design, comprising two stages: the design and development of the Android application, and the testing of the application's effectiveness in the target group using a quantitative pre-experimental approach. This design was used to analyse the effectiveness of Android application-based dental disease prevention education in improving dental health knowledge and behaviour among adolescents. The intervention received dental health education through the Edugi-Remaja Android application,

The study was conducted among junior secondary school (Madrasah Tsanawiyah) students in South Jakarta, using a purposive sampling technique. The inclusion criteria were: junior secondary school students aged 13–16 years, in possession of an Android mobile phone, and willing to participate as a respondent. This manuscript reports the results obtained from 53 respondents in the intervention group who had completed both the pretest and posttest measurements at the time of reporting; data collection for the control group and the between-group comparative analysis are ongoing and will be reported separately.

The Edugi-Remaja application was developed using Android Studio with an SQLite database, and comprises six main features: a user profile, educational materials (covering gingivitis, periodontitis, dental caries, dental calculus, oral cancer, dental and oral care, and correct toothbrushing techniques), educational videos, a pretest feature, a posttest/quiz feature, and a question-and-answer (Q&A) feature(Maiyana, 2018; Safaat, 2026.). During implementation, the application was accessed by respondents through the Expo Go platform on their Android devices. Screenshots of the main features are presented in Figure 1 and Figure 2.

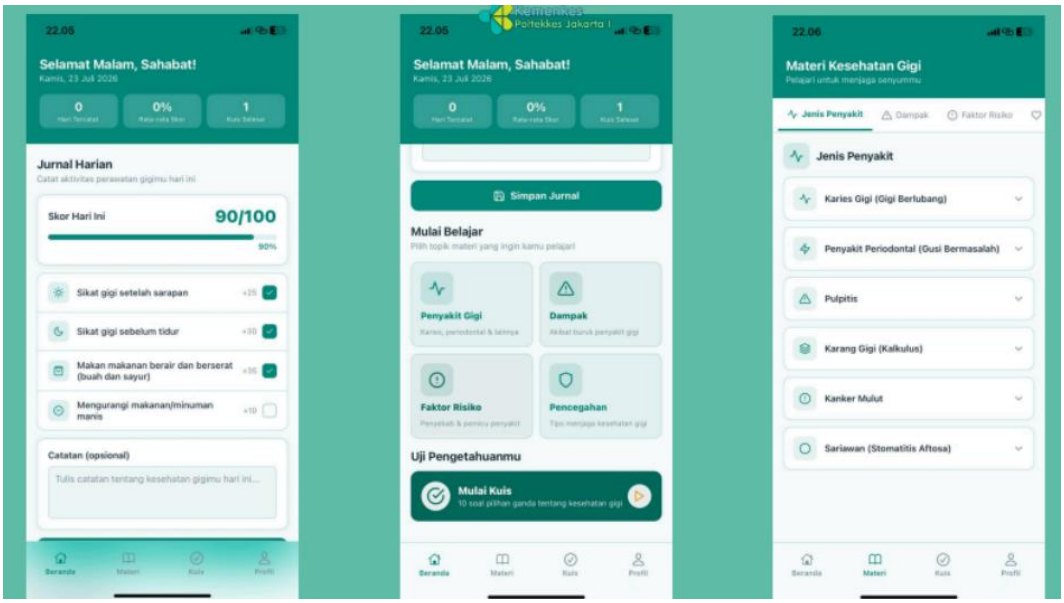


Figure 1. Home Dashboard and Educational Material Menu of the Edugi-Remaja Application

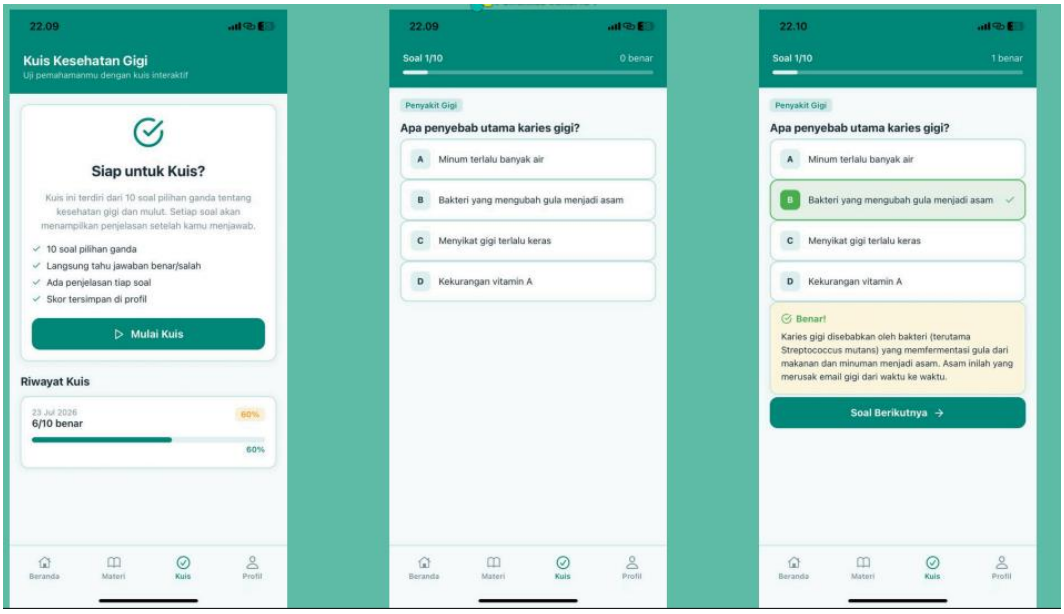


Figure 2. Quiz Feature of the Edugi-Remaja Application

The research instrument consisted of a validated and reliable questionnaire measuring junior secondary school students' knowledge and behaviour regarding dental disease prevention. Data were analysed using univariate analysis (frequency distribution for categorical data; mean and standard deviation for numerical data) and bivariate analysis. A Shapiro-Wilk normality test was performed prior to bivariate analysis, given a sample size greater than 50. Where data were normally distributed, the Paired Samples t-Test was used to compare pretest and posttest scores; where data were not normally distributed, the Wilcoxon Signed-Rank Test was used.

RESULT

Table 1. Mean Knowledge and Behaviour Scores Before and After Intervention

Variable	Measurement	N	Mean ± SD	Min–Max
Knowledge	Pretest	53	7.96 ± 1.13	6–10
	Posttest		8.77 ± 1.37	5–10
Behaviour	Pretest		35.40 ± 4.17	25–44
	Posttest		37.34 ± 4.13	26–44

Table 1 shows that, among the 53 respondents, the mean knowledge score before the intervention (pretest) was 7.96 ± 1.13, with a range of 6–10. After the intervention (posttest), the mean knowledge score increased to 8.77 ± 1.37, with a range of 5–10, an increase of 0.81 points. For the behaviour variable, the mean score before the intervention was 35.40 ± 4.17, with a range of 25–44, and increased to 37.34 ± 4.13, with a range of 26–44, after the intervention, an increase of 1.94 points. These descriptive findings indicate an increasing trend in both knowledge and behaviour scores following the intervention, with a larger increase observed for behaviour than for knowledge.

Table 2. Shapiro-Wilk Normality Test Results

Variable	Measurement	N	Statistic	p-value
Knowledge	Pretest	53	0.916	0.001
	Posttest		0.828	0.000
Behaviour	Pretest		0.979	0.462
	Posttest		0.972	0.242

Note: Data are normally distributed if p > 0.05.

The Shapiro-Wilk normality test showed that the knowledge data yielded p-values of 0.001 (pretest) and 0.000 (posttest), both below 0.05, indicating a non-normal distribution for the knowledge variable at both time points. In contrast, the behaviour data yielded p-values of 0.462 (pretest) and 0.242 (posttest), both above 0.05, indicating a normal distribution for the behaviour variable at both time points. Based on these results, the Wilcoxon Signed-Rank Test was used to analyse differences in the knowledge variable, while the Paired Samples t-Test was used to analyse differences in the behaviour variable.

Table 3. Wilcoxon Signed-Rank Test Results for Knowledge Before and After Intervention

Wilcoxon Test	Value
Total sample	53.000
Test statistic	684.500
Standardized test statistic	3.770
Significance	0.000

Note: p < 0.05 indicates a significant difference.

Table 3 shows that the analysis produced a standardized test statistic of 3.770 with p < 0.001, indicating a significant difference between knowledge scores before and after the intervention. Of the 53 respondents, 30 showed an increase in their knowledge score, 10 showed a decrease, and 13 showed no change. These findings indicate that the intervention was effective in improving respondents' dental health knowledge.

Table 4. Paired Samples t-Test Results for Behaviour Before and After Intervention

Paired Samples t-Test	Value
Total sample	53.000
t value	-3.816
Degrees of freedom	52.000
Significance	0.000

Note: p < 0.05 indicates a significant difference.

Table 4 (paired samples t-test) produced a t-value of -3.816 with 52 degrees of freedom and $p < 0.001$. Since $p < 0.05$, there was a statistically significant difference between behaviour scores before and after the intervention. The mean behaviour score increased from 35.40 ± 4.17 at pretest to 37.34 ± 4.13 at posttest, an increase of 1.94 points, indicating a significant improvement in dental health behaviour following the intervention.

DISCUSSION

This study found an increase in both dental health knowledge and behaviour following the intervention using Edugi-Remaja among 53 respondents. The mean knowledge score increased from 7.96 ± 1.13 to 8.77 ± 1.37, while the mean behaviour score increased from 35.40 ± 4.17 to 37.34 ± 4.13. These increases were statistically significant for both knowledge (Wilcoxon, $p < 0.001$) and behaviour (Paired Samples t-Test, $p < 0.001$). For knowledge, 30 respondents showed an increase, 13 showed no change, and 10 showed a decrease, indicating that a positive change occurred in the majority of respondents, although the response to the intervention was not entirely uniform. Edugi-Remaja therefore demonstrates potential in supporting improvements in adolescents' dental health knowledge and behaviour; however, because this study employed a pre-experimental design without a comparison to a concurrent control group at this stage of reporting, these findings cannot yet be interpreted as evidence of a causal relationship.

The improvement in knowledge is consistent with the structure of Edugi-Remaja, which presents dental health material through several media formats and is complemented by a quiz feature. While the educational material provides information, the quiz gives users the opportunity to review and evaluate their own understanding. This finding is in line with previous research showing that the Brush DJ application improved knowledge, attitudes, and several aspects of oral health behaviour among high-school students(Zahid et al., 2020). That study, however, also indicated that the application was not always superior to conventional education and encountered challenges related to usability and changes in certain toothbrushing habits, suggesting that the advantage of digital media does not lie solely in the application format, but in the quality of its content, its interactivity, and its ease of use.

The 1.94-point improvement in behaviour is an important finding, as it shows that change was not limited to the knowledge domain. Edugi-Remaja includes a Daily Journal feature and a Daily Score feature that allow users to record and monitor their dental health activities. These features may support self-monitoring, a process in which individuals observe and evaluate their own behaviour. This mechanism is consistent with previous research demonstrating that a self-efficacy-based mobile application intervention improved adolescents' oral health behaviour (Marashi et al., 2024). Although self-efficacy was not measured in the present study, the monitoring and feedback features of Edugi-Remaja provide a theoretical basis suggesting that the application may function not only as a source of information, but also as a tool that helps users apply that information to their daily habits.

This finding is also consistent with previous research reporting a change in dental health behaviour following education delivered through WhatsApp reminders among adolescents, using a before-and-after design without a control group(Hernelalija & Salfiyadi, 2024). This similarity suggests that digital media can be a feasible means of supporting adolescent dental health education. Edugi-Remaja is more integrated in nature, as its educational material, quiz, daily journal, and scoring features are contained within a single application. However, this study has not compared Edugi-Remaja with other media, so it cannot yet be concluded that Edugi-Remaja is more effective than WhatsApp, other applications, or face-to-face education.

These findings should be interpreted with caution, as the evidence regarding the effectiveness of mobile health interventions among adolescents remains evolving. A recent systematic review and meta-analysis indicated that mHealth interventions can provide benefits for oral hygiene, but that their effect on oral health behaviour among adolescents remains limited and not always consistent (Saxena et al., 2025);the authors emphasised the need for interventions that are more engaging and specifically designed to suit adolescent characteristics. This underscores the relevance of the Edugi-Remaja approach, which combines education with user activity, while also indicating that the improvements obtained in this study need to be confirmed through research with a stronger design and more rigorous monitoring.

Overall, the findings indicate that Edugi-Remaja has potential as a supportive medium for dental health promotion among adolescents, given its ability to significantly improve knowledge and behaviour scores following the intervention. Its contribution lies not only in the delivery of educational material, but also in providing activities that allow users to test their understanding and monitor their own behaviour. Nonetheless, the pre-experimental design, the limited number of respondents at this stage, self-reported behavioural measurement, and the absence of self-efficacy and application-engagement measures represent limitations that should be considered. Subsequent stages of this research will incorporate a control group, a larger sample, and comparative analysis to determine whether the improvements observed can be attributed to the application and sustained over time.

CONCLUSION

Edugi-Remaja demonstrates potential as a digital-based medium for dental health promotion among adolescents. Among 53 respondents, the mean knowledge score increased from 7.96 to 8.77 and the mean behaviour score increased from 35.40 to 37.34, both statistically significant ($p < 0.001$). These results indicate a positive change following the intervention; however, the causal effectiveness of Edugi-Remaja cannot yet be confirmed, as this stage of reporting does not include a concurrent control group comparison. Edugi-Remaja can therefore be used as a supportive medium for dental health education in the school setting, while further testing using a full experimental design with a control group is required to strengthen the evidence for its effectiveness.

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REFERENCES

Andriyanto, A., & Hidayati, R. N. (2018). Literature Review: Utilization of Health Promotion Media (Smartphone) To Prevent And Control Glucose Type 2 Diabetes. *J. Ners Dan Kebidanan*, *5*(2), 172–177.

Hernelalija, & Salfiyadi, T. (2024). Pengaruh Pendidikan Kesehatan Gigi Dan Mulut Melalui Media Aplikasi Whatsapp Terhadap Perubahan Perilaku Kesehatan Gigi Pada Remaja Di Desa Lugu Sekbahak. *Multiple Journal of Global and Multidisciplinary*, *2*(7), 2301–2311.

Kemenkes RI. (2018). Hasil utama riskesdas 2018. *Jakarta: Kemenkes RI*.

Kristianto, J., Dwiastuti, S. A. P., & Ratuela, J. (2022). The Efficiency Model Of Mentoring Through Ebook Keep Your Teeth & Oral Healthy, Based On Android To Improving The Degree Of Dental And Oral Hygiene And Knowledge In Student Of Elementry Class V Jakarta, In 2022. *Jurnal Health Sains*, *3*(10), 1555–1566.

Maiyana, E. (2018). Pemanfaatan android dalam perancangan aplikasi kumpulan doa. *Jurnal Sains Dan Informatika: Research of Science and Informatic*, *4*(1), 54–65.

Marashi, S. Z., Hidarnia, A., Kazemi, S. S., & Shakerinejad, G. (2024). *The effect of educational intervention based on self-efficacy theory on promoting adolescent oral health behaviors through mobile application : a randomized controlled trial study*. *24*(1283), 1–9.

Marchetti, G., Fraiz, F. C., Nascimento, W. M. do, Soares, G. M. S., & Assunção, L. R. da S. (2018). Improving adolescents' periodontal health: evaluation of a mobile oral health App associated with conventional educational methods: a cluster randomized trial. *International Journal of Paediatric Dentistry*, *28*(4), 410–419.

Octavianita, D., Purnama, T., Emini, E., & Nurilawaty, V. (2024). Bingo Game in Improving Dental Health Knowledge in Elementary School. *Journal Center of Excellent: Health Assistive Technology*, *2*(2), 75–80. https://doi.org/10.36082/jchat.v2i2.1784

Pawarti, F., Maryani, Y., & Susatyo, J. (2020). ABDHI Application Android Based as A Media for Dental Health Education in the Pandemic Time Covid-19. *Jurnal Kesehatan Gigi*, *8*(1), 28–32.

RI, K. K. dan I. (2018). *Survey Penggunaan TIK serta Implikasinya terhadap Sosial Budaya Masyarakat*. Badan Penelitian dan Pengembangan Sumber Daya Manusia, Kementerian Komunikasi dan Informatika RI.

Safaat, N. (n.d.). *Pemrograman Aplikasi Mobile Smartphone dan Tablet PC Berbasis Android*. Informatika.

Safura, N. A. E., Musthofa, S. B., & Shaluhiyah, Z. (2022). Aplikasi berbasis android sebagai media promosi kesehatan gigi dan mulut dalam meningkatkan pengetahuan, sikap, dan perilaku remaja: a scoping review. *Syntax Literate: Jurnal Ilmiah Indonesia*, *7*(9), 18314–18325.

Saxena, N., Kaurani, P., Marwah, N., & Kauveettil, V. (2025). Effect of mHealth Interventions on Oral Hygiene and Oral Health Behavior in Children From Infancy to Adolescence: A Systematic Review and Meta-Analysis. *International Journal of Paediatric Dentistry*. https://doi.org/10.1111/ipd.70052

Suratri, M. A. L., Jovina, T. A., & Andayasari, L. (2020). Pengaruh hipertensi terhadap kejadian penyakit jaringan periodontal (periodontitis) pada masyarakat Indonesia (data Riskesdas 2018). *Buletin Penelitian Kesehatan*, *48*(4), 227–234.

Zahid, T., Alyafi, R., Bantan, N., Alzahrani, R., & Elfirt, E. (2020). Comparison of effectiveness of mobile app versus conventional educational lectures on oral hygiene knowledge and behavior of high school students in Saudi Arabia. *Patient Preference and Adherence*, 1901–1909.