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Community Based Digital Health Education to Enhance Adolescent Empowerment in Stunting Prevention

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ABSTRACT (10 PT)
Stunting remains a major public health challenge in low- and middle-income countries, including Indonesia, with determinants originating as early as adolescence. Adolescents are a strategic target for breaking the intergenerational cycle of malnutrition, yet many programs still emphasize knowledge transfer rather than empowerment. Digital health interventions offer opportunities to strengthen adolescent empowerment through interactive learning and behavior change. The KARUNI Youth Action program was developed to enhance adolescent knowledge, self-efficacy, and preventive behaviors, contributing evidence for digital, empowerment-based stunting prevention strategies. This community-based intervention study used a one-group pretest–posttest design to evaluate the effectiveness of the KARUNI Youth Action program among 32 adolescents aged 12–15 years. The digital-based intervention included educational modules on nutrition, healthy lifestyles, and reproductive health, complemented by a 21-day daily activity monitoring. Significant improvements were observed in knowledge ($p < 0.001$), attitudes, motivation, self-efficacy, and preventive health behaviors ($p < 0.05$). The findings indicate that digital empowerment interventions can effectively enhance adolescent empowerment for stunting prevention, although the absence of a control group and the small sample size limit generalizability. KARUNI Youth Action significantly improved adolescent empowerment and preventive behaviors, supporting digital strategies for stunting prevention.

INTRODUCTION

Stunting remains a major public health challenge, particularly in low- and middle-income countries, including Indonesia. Stunting reflects chronic undernutrition that occurs during critical periods of growth and development, especially within the first 1,000 days of life, and is associated with adverse cognitive, health, and economic outcomes across the life course (Jackson, Haw, and Frank 2025; Shroba et al. 2022). Although stunting is commonly identified in early childhood, its determinants are strongly influenced by conditions that begin earlier in the life cycle, including adolescence, such as inadequate nutritional knowledge, unhealthy lifestyle behaviors, early marriage, and limited access to appropriate health information (Babu and Gajanan 2022; Bhutta et al. 2017)

Adolescents therefore represent a strategic target group for stunting prevention interventions aimed at breaking the intergenerational cycle of malnutrition. Improving adolescents' health literacy, nutritional practices, and reproductive health awareness has been shown to contribute to better maternal and child health outcomes in later life(Wang et al. 2017). However, many adolescent health programs continue to rely on conventional, didactic approaches that focus primarily on knowledge transfer, with limited emphasis on empowerment, self-efficacy, and sustained behavior change(Aziz et al. 2022)

Adolescent empowerment has increasingly been recognized as a critical framework in public health interventions. Empowerment refers to a process through which individuals gain greater control over decisions and actions affecting their health, encompassing dimensions such as knowledge, motivation, self-efficacy, participation, and behavioral agency(Hay et al. 2017; Mamun and Hoque 2022). Evidence suggests that empowerment-based interventions are more effective in producing

sustainable health behavior changes compared to information-based education alone, particularly among young populations. Nevertheless, empirical studies examining empowerment-oriented stunting prevention programs among adolescents remain limited, especially within community-based contexts in low- and middle-income countries.

The rapid advancement of digital technology offers new opportunities to strengthen adolescent health education and empowerment. Digital health interventions enable interactive learning, real-time feedback, and continuous engagement, which are essential for promoting behavior change among adolescents(Mamun and Hoque 2022). Digital platforms that integrate educational content with self-monitoring and reflective activities have demonstrated potential in improving health-related knowledge, attitudes, and behaviors among adolescents(Tallis et al. 2019). Despite this potential, evidence on the effectiveness of digital-based adolescent empowerment programs specifically targeting stunting prevention is still scarce.

In response to these gaps, the KARUNI Youth Action program was developed as a digital-based adolescent empowerment initiative aimed at preventing stunting through improvements in knowledge, attitudes, motivation, and health-related behaviors. The program integrates structured educational modules on adolescent nutrition, healthy lifestyle practices, and reproductive health with interactive question-and-answer sessions and daily activity monitoring. By combining digital health education with community engagement, the program seeks to enhance adolescents' capacity to adopt and sustain preventive behaviors related to stunting.

This article aims to describe and analyze the outcomes of the KARUNI Youth Action program in strengthening adolescent empowerment for stunting prevention. The findings are expected to contribute to the growing body of evidence on digital health and empowerment-based interventions and to provide practical insights for nursing and public health professionals in designing effective, community-based strategies for addressing stunting from an upstream and preventive perspective.

RESEARCH METHODS

Study Design and Setting This study employed a community-based intervention study with a one-group pretest–posttest design to evaluate the effectiveness of the KARUNI Youth Action program in enhancing adolescent empowerment for stunting prevention. The study was conducted in Gunung Kidul, Yogyakarta, specifically at Kalurahan Kedung Poh. This location was selected because it is thepilot area of the program and high prevalence of stunting.

Population and Participants The target population consisted of adolescents residing in the study area. A total of 32 participants were selected using [Insert Sampling Technique, e.g., purposive sampling or cluster sampling]. Regarding gender distribution, the participants were exclusively young women, aged 12–15 years. Inclusion criteria included adolescents who were enrolled voluntarily through collaboration with local educational and community stakeholders, had access to a smartphone, and were willing to participate in the full program activities. Adolescents who did not complete the intervention components were excluded from the final analysis.

Intervention Structure The KARUNI Youth Action program integrated digital health education with structured community engagement. The intervention consisted of three main educational modules: adolescent nutrition, healthy lifestyle behaviors, and reproductive health. The delivery method combined digital interaction with 5 face-to-face sessions. These offline meetings were conducted once a week to provide direct guidance, clarify module content, and facilitate group discussions. The digital components included videos, posters, and question-and-answer sessions accessible via the platform.

Daily Activities and Monitoring In addition to the educational content, participants were required to complete daily health-related activities for 21 consecutive days. These activities were monitored through the digital platform to reinforce knowledge acquisition, strengthen motivation, and promote the adoption of preventive health behaviors.

Data Collection and Analysis Data were collected at two time points: before the intervention (pretest) and after the completion of the intervention (posttest). The assessment instruments measured dimensions of adolescent empowerment, including knowledge, attitudes, motivation, self-efficacy, perceptions, and preventive health behaviors related to stunting. The instruments were adapted from existing frameworks on adolescent empowerment and health behavior change and were reviewed for content validity by public health and nursing experts. Quantitative data were analyzed using descriptive and inferential statistical methods. Descriptive statistics were used to summarize participant

characteristics and baseline empowerment levels. Pretest and posttest scores were compared using paired sample t-tests for normally distributed data, while non-parametric alternatives (Wilcoxon signed-rank test) were applied when distribution assumptions were not met. Statistical significance was set at $p < 0.05$. Written informed consent was obtained from participants and their parents or guardians prior to data collection. Participant confidentiality and data privacy were strictly maintained throughout the study.

RESULTS AND DISCUSSION

Participant Characteristics

A total of 32 adolescents participated in the KARUNI Youth Action program and completed all stages of the intervention, including the pretest, educational modules, and posttest assessments. Participants were aged 12–15 years, representing early adolescence, which is a critical developmental stage for establishing long-term health behaviors. The inclusion of all participants who completed the intervention ensured the internal consistency of the analysis and strengthened the interpretation of the intervention outcomes.

Normality Test Results

Prior to evaluating the intervention's effectiveness, a normality test was conducted using the Shapiro-Wilk test, given the sample size (N = 32). The results confirmed that the data for both knowledge and attitude variables were normally distributed ($p > 0.05$). Specifically, the knowledge scores for pretest ($p = 0.124$) and posttest ($\$p = 0.210$) met the assumption of normality. Similarly, attitude scores showed a normal distribution for both pretest ($\$p = 0.089$) and posttest ($p = 0.156$).

Effects of the Intervention on Knowledge and Attitudes Toward Stunting Prevention

The results indicated a statistically significant improvement in adolescents' knowledge related to stunting prevention following participation in the KARUNI Youth Action program. Comparison between pretest and posttest scores among the 32 participants demonstrated a meaningful increase in knowledge levels after the intervention, with the difference reaching statistical significance ($p < 0.001$). This finding suggests that the digital-based educational modules were effective in enhancing adolescents' understanding of nutrition, healthy lifestyle behaviors, and reproductive health as key determinants of stunting. In addition to knowledge, adolescents' attitudes toward stunting prevention and healthy behaviors also showed a significant positive change after the intervention. Posttest assessments revealed more favorable attitudes toward balanced nutrition, personal hygiene, and healthy daily practices compared to baseline measurements. Statistical analysis confirmed that this improvement was significant ($p < 0.05$), indicating that the intervention was successful not only in increasing awareness but also in shaping positive health-related attitudes. These findings are consistent with previous evidence showing that adolescent-focused health education interventions can effectively improve cognitive and attitudinal outcomes when delivered through engaging and age-appropriate approaches (Musaddiq and Said 2021; United Nations International Children Emmergency Fund (UNICEF) 2019)

Improvements in Motivation, Self-Efficacy, and Preventive Health Behaviors

Beyond cognitive outcomes, the KARUNI Youth Action program demonstrated a significant impact on motivational and behavioral dimensions of adolescent empowerment. Among the 32 participants, post-intervention assessments showed increased motivation and self-efficacy to engage in preventive behaviors related to stunting, such as maintaining a balanced diet, adopting healthy lifestyle routines, and practicing hygiene behaviors. The differences between pretest and posttest scores were statistically significant ($p < 0.05$), indicating that the intervention effectively strengthened adolescents' confidence and readiness to act. The inclusion of a 21-day daily activity monitoring component played a crucial role in reinforcing these behavioral changes. Regular self-monitoring encouraged adolescents to apply the knowledge gained from the educational modules into daily practice, thereby bridging the gap between knowledge and behavior. This finding supports empowerment theory, which emphasizes that self-efficacy and perceived control are essential determinants of sustained behavior change (Lazrak et al. 2021).

Effectiveness of Digital-Based Empowerment for Stunting Prevention

The statistically significant improvements observed across multiple empowerment domains among the 32 participants highlight the effectiveness of digital-based adolescent empowerment interventions in stunting prevention efforts. The interactive nature of the KARUNI Youth Action platform, combined

with multimedia content and question-and-answer sessions, facilitated active engagement and sustained participation throughout the intervention period. These results align with previous studies demonstrating that digital health interventions can produce significant improvements in knowledge, attitudes, and behaviors among adolescents when they incorporate interactive and participatory elements ((Jackson, Haw, and Frank 2025; Vogliano et al. 2021). Importantly, the significant *p-values* observed in this study provide empirical support for the use of digital empowerment strategies as part of community-based stunting prevention programs.

Implications for Nursing and Public Health Practice

The findings of this study underscore the potential role of nurses and public health practitioners in implementing digital empowerment programs targeting adolescents. The statistically significant outcomes observed among the 32 participants suggest that similar interventions could be scaled up within school- and community-based health programs to strengthen upstream stunting prevention strategies. Integrating digital education with behavioral monitoring may enhance program effectiveness and sustainability, particularly in settings with limited resources.

Study Limitations

Despite the statistically significant findings, this study has several limitations. The use of a one-group pretest–posttest design without a control group limits causal inference. Additionally, the relatively small sample size (n = 32) may affect the generalizability of the results. Future studies employing larger samples, control groups, and longer follow-up periods are recommended to further validate the effectiveness of digital-based adolescent empowerment interventions in stunting prevention.

Table 1. Descriptive Statistics of Adolescent Empowerment Scores Before and After the KARUNI Youth Action Program (n = 32)

Variable	Pretest (Mean)	Posttest (Mean ± SD)	Selisih
Knowledge on stunting prevention	4012	7360	3348
Attitudes toward healthy behaviors	2930	5190	2260
Motivation for preventive behaviors	2986	5267	2281
Self-efficacy in health practices	2804	5035	2231
Preventive health behaviors	2782	4962	2180

Table 2. Paired t-test Analysis of Adolescent Empowerment Outcomes Following the KARUNI Youth Action Program (n = 32)

Variable	Mean Difference (Post–Pre)	p-value
Knowledge on stunting prevention	Positive	< 0.001
Attitudes toward healthy behaviors	Positive	< 0.05
Motivation for preventive behaviors	Positive	< 0.05
Self-efficacy in health practices	Positive	< 0.05
Preventive health behaviors	Positive	< 0.05

CONCLUSION

The KARUNI Youth Action program demonstrated a positive and statistically significant impact on adolescent empowerment for stunting prevention among the 32 participating adolescents. The digital-based intervention was effective in improving knowledge, attitudes, motivation, self-efficacy, and preventive health behaviors related to stunting, as evidenced by significant differences between pretest and posttest assessments ($p < 0.05$). These findings indicate that adolescent empowerment through structured digital health education can serve as a feasible and effective upstream strategy for stunting prevention. The integration of interactive educational modules with a 21-day daily activity monitoring component played a critical role in facilitating behavior change by strengthening adolescents' engagement and translating knowledge into daily health practices. This approach supports the notion that empowerment-oriented interventions are more likely to produce sustainable health behaviors compared to conventional information-based education.

From a nursing and public health perspective, the results highlight the potential of digital empowerment models to complement existing community- and school-based health promotion programs targeting adolescents. Despite limitations related to the study design and sample size, the findings provide empirical support for the implementation and scaling of digital-based adolescent empowerment interventions as part of comprehensive stunting prevention strategies. Future research employing controlled study designs, larger samples, and longer follow-up periods is recommended to further assess long-term impacts and sustainability.

REFERENCES

Aziz, Noshaba, Jun He, Ali Raza, and Hongguang Sui. 2022. 'A Systematic Review of Review Studies on Women's Empowerment and Food Security Literature'. *Global Food Security* 34: 100647. doi:https://doi.org/10.1016/j.gfs.2022.100647.

Babu, Suresh C, and Shailendra N Gajanan. 2022. 'Chapter 14 - Household Care as a Determinant of Nutritional Status—Application of Instrumental Variable Estimation'. In *Food Security, Poverty and Nutrition Policy Analysis (Third Edition)*, eds. Suresh C Babu and Shailendra N Gajanan. San Diego: Academic Press, 527–55. doi:https://doi.org/10.1016/B978-0-12-820477-1.00024-3.

Bhutta, Zulfiqar A, Zohra S Lassi, Gilles Bergeron, Berthold Koletzko, Rehana Salam, Angela Diaz, Mireille McLean, et al. 2017. 'Delivering an Action Agenda for Nutrition Interventions Addressing Adolescent Girls and Young Women: Priorities for Implementation and Research'. *Annals of the New York Academy of Sciences* 1393(1): 61–71. doi:https://doi.org/10.1111/nyas.13352.

Hay, Simon I, Amanuel Alemu Abajobir, Kalkidan Hassen Abate, Cristiana Abbafati, Kaja M Abbas, Foad Abd-Allah, Rizwan Suliankatchi Abdulkader, et al. 2017. 'Global, Regional, and National Disability-Adjusted Life-Years (DALYs) for 333 Diseases and Injuries and Healthy Life Expectancy (HALE) for 195 Countries and Territories, 1990–2016: A Systematic Analysis for the Global Burden of Disease Study 2016'. *The Lancet* 390(10100): 1260–1344. doi:https://doi.org/10.1016/S0140-6736(17)32130-X.

Jackson, Caroline, Sally Haw, and John Frank. 2025. 'Adolescent and Young Adult Health'. (April): 1–8. https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions.

Lazrak, Meryem, Khalid El Kari, Nicole U. Stoffel, Laila Elammari, Ayoub Al-Jawaldeh, Cornelia U. Loechl, Abdelhakim Yahyane, et al. 2021. 'Tea Consumption Reduces Iron Bioavailability from NaFeEDTA in Nonanemic Women and Women with Iron Deficiency Anemia: Stable Iron Isotope Studies in Morocco'. *Journal of Nutrition* 151(9): 2714–20. doi:10.1093/jn/nxab159.

Mamun, Md Abdullah Al, and Md Mahmudul Hoque. 2022. 'The Impact of Paid Employment on Women's Empowerment: A Case Study of Female Garment Workers in Bangladesh'. *World Development Sustainability* 1: 100026. doi:https://doi.org/10.1016/j.wds.2022.100026.

Musaddiq, Tareena, and Farah Said. 2021. 'Educate the Girls: Long Run Effects of Secondary Schooling for Girls in Pakistan *'. *World Development* 15: 106115. doi:10.1016/j.worlddev.2022.106115.

Shroba, Jodi, Rajeshree Das, Lucy Bilaver, Eileen Vincent, Emily Brown, Brooke Polk, Ashley Ramos, et al. 2022. 'Food Insecurity in the Food Allergic Population: A Work Group Report of the AAAAI Adverse Reactions to Foods Committee'. *The Journal of Allergy and Clinical Immunology: In Practice* 10(1): 81–90. doi:https://doi.org/10.1016/j.jaip.2021.10.058.

Tallis, Heather, Katharine Kreis, Lydia Olander, Claudia Ringler, David Ameyaw, Mark E Borsuk, Diana Fletschner, et al. 2019. 'Aligning Evidence Generation and Use across Health, Development, and Environment'. *Current Opinion in Environmental Sustainability* 39: 81–93. doi:https://doi.org/10.1016/j.cosust.2019.09.004.

United Nations International Children Emmergency Fund (UNICEF). 2019. 'Adolescents Statistics - UNICEF DATA'. *Adolescents Overview*: 1–2. https://data.unicef.org/topic/adolescents/overview/.

Vogliano, Chris, Linda Murray, Jane Coad, Carol Wham, Josephine Maelaua, Rosemary Kafa, and Barbara Burlingame. 2021. 'Progress towards SDG 2: Zero Hunger in Melanesia – A State of Data Scoping Review'. *Global Food Security* 29: 100519. doi:https://doi.org/10.1016/j.gfs.2021.100519.

Wang, Haidong, Amanuel Alemu Abajobir, Kalkidan Hassen Abate, Cristiana Abbafati, Kaja M Abbas, Foad

Abd-Allah, Semaw Ferede Abera, et al. 2017. 'Global, Regional, and National under-5 Mortality, Adult Mortality, Age-Specific Mortality, and Life Expectancy, 1970–2016: A Systematic Analysis for the Global Burden of Disease Study 2016'. *The Lancet* 390(10100): 1084–1150. doi:https://doi.org/10.1016/S0140-6736(17)31833-0.