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Effectiveness of Brief Online Education in Enhancing Parental Knowledge on Child Growth and Health Monitoring

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ABSTRACT

Introduction: Monitoring children's growth and development is essential, yet many parents face barriers in accessing reliable health education. While online learning offers potential solutions, evidence of its effectiveness remains limited, particularly in developing countries. This study assessed the impact of a pediatrician-led online session, consisting of a brief presentation and interactive discussion via Zoom, conducted in collaboration with a community clinic, on parental knowledge regarding child growth and health monitoring.

Methods: A single-group pretest-posttest design was conducted with 77 eligible participants from a publicly accessible webinar in collaboration with a private clinic in Bantul, Yogyakarta, Indonesia. The intervention included a pediatrician-led session covering growth milestones, health indicators, and monitoring techniques. A ten-item online questionnaire was developed and validated for content by four experts using the Content Validity Index (CVI), resulting in an average S-CVI of 0.95. Wilcoxon Signed-Rank Test and effect size analysis were performed.

Results: Participants' knowledge significantly increased following the intervention ($p = 0.001$) with a medium to large effect size ($r = 0.52$). There was an improvement in participants' knowledge scores from a median of 70 (IQR 60–80) to 100 (IQR 85–100). No significant differences were found across demographic variables such as age, gender, or occupation ($p > 0.05$).

Conclusion: This study demonstrated a positive shift in parental knowledge after a brief Zoom-based session. The findings underscore the potential of accessible online education to initiate broader community involvement in child health monitoring. Sustained impact will require integration with ongoing education, system-level support, and attention to barriers such as digital access and health literacy.

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INTRODUCTION

Worldwide, children's health and growth problems have become critical concerns as a rising number of children struggle with malnutrition, stunting, developmental delays, and mental health. In 2022, statistics from UNICEF, WHO, and the World Bank (2023) revealed that 148.1 million children under five years of age suffered from stunting, 45 million experienced wasting, and 37 million were classified as overweight, underscoring the global scale of these health issues (1). According to the Global Report on Children with Developmental Disabilities (2023), approximately 316.8 million children and adolescents worldwide experience developmental disabilities, with a global prevalence ranging from 2% to 25%. The highest prevalence is observed in Africa (33.8%) and Southeast Asia (15%), with lower-middle-income countries (LMICs) showing a higher burden, including idiopathic developmental intellectual disability at 3.2% compared to 0.4% in high-income countries (2). From the same source, the prevalence of mental health problems among children with developmental disabilities ranges from 30% to over 50%, significantly exceeding the prevalence in neurotypical children. Moreover, more than 13% (166 million) of adolescents aged 10–19 globally live with a diagnosed mental disorder (3).

Many of these conditions, however, go undetected in the early stages due to their gradual development and subtle symptoms (2). In addition to delayed symptom identification, limited access to health facilities and environmental and social factors also contribute to this (4). As a result, delayed recognition of these health problems can hinder timely intervention and exacerbate long-term consequences (2). One of the primary contributors to this delay is the lack of parental involvement in monitoring their children's growth, often driven by insufficient knowledge, misinformation, and various social and economic barriers (5,6). Factors influencing parental health literacy and digital accessibility in Indonesia include socio-economic disparities, geographical variations in internet access, and the availability of healthcare resources, particularly village health posts (posyandu), which affect health information access (7).

Indonesia is fourth in the world with the largest child population, namely 80 million children (8). Republic Indonesia Ministry of Health (2023) reported that although stunted toddlers decreased to 21.5%, wasting increased to 8.5% from 7.7%, and overweight increased to 4.2% from 3.5% (9). Malnutrition is the cause of morbidity and even death in many children, especially in developing countries (10). partisiThe 2018 National Socio-Economic Survey results also show that around 1.11% of Indonesian children aged 2-17 are people with disabilities (11). Apart from that, there are 29% of Indonesian children and teenagers aged 15-24 years suffer from emotional and mental disorders, such as symptoms of depression (3). These data confirmed existing health concerns regarding children's health and growth call all parties to action.

Republic Indonesia Minister of Health Regulation No. 25 of 2014 concerning Children's Health Efforts explains that improving children's physical, cognitive, mental, and psychosocial health is achieved out by monitoring growth, development, and developmental disorders according to a schedule based on age. Furthermore, prevention activities themselves consist of three categories, namely primary prevention (vaccination, health education), secondary (periodic examinations), and tertiary (rehabilitation, treatment) (12). Hence, parents have a crucial influence in shaping their children's physical and mental development. A study evidenced that the development of character, personality, cultural values, religious values, morals, and basic skills is greatly influenced by family education (13).

Enhancing parental knowledge through health education is a fundamental strategy for monitoring children's growth and development. Evidence suggests that health education on monitoring growth and development can significantly improve knowledge and behavior (14). Health education within communities is desired to foster greater health awareness, facilitating improved healthcare access (15). Effective health education necessitates a comprehensive approach that considers cultural and contextual factors, engages policy stakeholders, and employs evidence-based strategies to enhance outcomes and mitigate health disparities (16). However, parental access to health education remains constrained by multifaceted barriers, including occupational burdens, geographical limitations, and time constraints (17). Consequently, contemporary health education initiatives emphasize digitalization, equity, and the prevention of infectious diseases as key priorities (18).

Despite the growing popularity of digital platforms for health education, few studies in Indonesia have rigorously evaluated their effectiveness in enhancing parental knowledge, particularly in the context of child growth and development monitoring. Given the persistent challenges in parental access to conventional health education,

such as time constraints, geographic barriers, and work-family conflict (19), this study aims to assess the impact of a two-hour pediatrician-led online educational session, consisting of a structured presentation followed by interactive discussion, delivered via Zoom in collaboration with a community clinic, on parental knowledge regarding child growth and health monitoring. This study was guided by the following research question: "Does a brief, pediatrician-led online educational session delivered via Zoom improve parental knowledge regarding child growth and health monitoring in the community setting?"

METHOD

Study Design

This study employed a quasi-experimental, single-group pretest-posttest design (without control, non-randomization) to assess the impact of a brief online educational intervention on parental knowledge of child growth and health monitoring. This design was selected to explore knowledge changes within the same group of participants before and after the intervention, without including a control group, as the study was primarily exploratory. The intervention was delivered via a synchronous webinar facilitated by a pediatrician, and data were collected through structured pre- and post-intervention assessments using online forms.

Population and Sample

A total of 108 individuals attended the online educational session, of whom 77 completed both the pre-test and post-test and were included in the final analysis. A total sampling technique was applied, where all eligible participants were invited to complete the questionnaires. Inclusion criteria were: (1) full participation in the webinar session, (2) age ≥18 years, and (3) provision of informed consent. Most participants were women aged 26–45 years, reflecting the typical profile of primary caregivers in the local community. While participation was voluntary and may reflect self-selection bias, the sample size was sufficient to detect meaningful changes in knowledge within this quasi-experimental pre-post design without a control group.

Study Setting

This study was conducted in 2024 using the Zoom Meeting platform in collaboration with a private clinic in the Bantul region of Yogyakarta. Participant recruitment was carried out through targeted invitations disseminated via social media, primarily WhatsApp, focusing on reaching individuals within the designated geographical area. The online educational session lasted two hours, consisting of a 90-minute segment dedicated to material delivery and an interactive question-and-answer session, followed by a concluding discussion. A modest incentive in the form of door prizes was provided to enhance participant engagement and encourage active involvement.

Data Collection Procedures and Instrumentation

The pre-test was administered immediately before the session, and the post-test immediately after. Both assessments were conducted online using Google Forms with identical item sets to measure knowledge improvement. The questions come from the material provided in ten binary questions with TRUE and FALSE answer choices. All items questioned were reviewed for it's construct and face validity. Content validity of the questionnaire was assessed by four experts: one pediatric health specialist, one public health researcher, and two community empowerment practitioners. Each expert independently rated the relevance of each item using a dichotomous scale (1 = relevant, 0 = not relevant). The item-level content validity index (I-CVI) was calculated by dividing the number of experts rated each item as relevant by the total number of experts. The results showed that all items met the minimum I-CVI threshold of 0.75 (20), with eight items scoring 1.00 and two items scoring 0.75. The Scale-Level CVI (S-CVI) was also calculated, with S-CVI/UA = 0.80 and S-CVI/Ave = 0.95, indicating excellent overall content validity.

Data Analysis

The data analysis was carried out using SPSS software. Normality of data was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Since the data were not normally distributed, the Wilcoxon Signed-Rank Test was used to compare pre- and post-test scores. Effect size (r) was calculated to determine the magnitude of the intervention effect. Kruskal-Wallis and Spearman correlation tests were used to explore differences across demographic variables.

Ethical Approval

This research has received ethical approval by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Muhammadiyah University of Yogyakarta with No. 043/EC-KEPK FKIK UMY/I/2024. In addition, consent via e-informed consent was obtained from participants before data collection.

RESULTS

Of the 108 individuals who attended the session, 77 participants (89.6% female; majority aged 26–35 years) completed both the pre- and post-tests and were included in the final analysis. As for employment, participants work in various formal and non-formal fields. More clear participant characteristics can be seen in Table 1 as follows.

Table 1. Participant Characteristics

Variable	Category	n	Percentage (%)
Gender	Man	8	10.4
	Woman	69	89.6
Age	17 – 25 years	2	2.6
	26 – 35 years	34	44.2
	36 – 45 years old	26	33.8
	46 – 55 years old	14	8.2
	>65 years	1	1.3
Occupation	Teacher	25	32.5
	Health workers (Doctor, Midwife, Nurse, Pharmacist, Clinic Director, Teacher, Lecturer, Assistant Lecturer)	27	35.1
	Formal sector employees (government employees, State-owned enterprises employees, private employees)	12	15.6
	Non-formal sector workers (Entrepreneur, Laborer)	3	3.9
	Student/Students	2	2.6
	Housewife	8	10.4

As presented in Table 2, There was an improvement in participants' knowledge scores from a median of 70 (IQR 60–80) in the pre-test to 100 (IQR 85–100) in the post-test. Given the non-normal distribution of the data ($p < 0.001$), the Wilcoxon Signed-Rank Test was employed, revealing a statistically significant improvement in knowledge scores ($p = 0.001$).

Table 2. Normality and Wilcoxon Signed-Rank Test Results

	Kolmogorov-Smirnov [a]			Shapiro-Wilk			Wilcoxon's Rank Sum Test			
	Statistics	df	Sig.	Statistics	df	p	Mean (SD)	Median (IQR)	Std. Error Mean	p
Pre-Test	0.194	77	0.000	0.920	77	0.000	73.25 (±12.819)	70 (60 - 80)	1.461	0.001
Post-Test	0.353	77	0.000	0.699	77	0.000	91.82 (±12.537)	100 (85 - 100)	1.429	

df: Degree of Freedom; IQR: Interquartile Range; SD : Standard Deviation

"To enhance interpretive clarity, Figure 1 presents a bar chart illustrating the distribution of pre- and post-intervention knowledge scores, showing a clear shift toward higher scores following the webinar intervention."

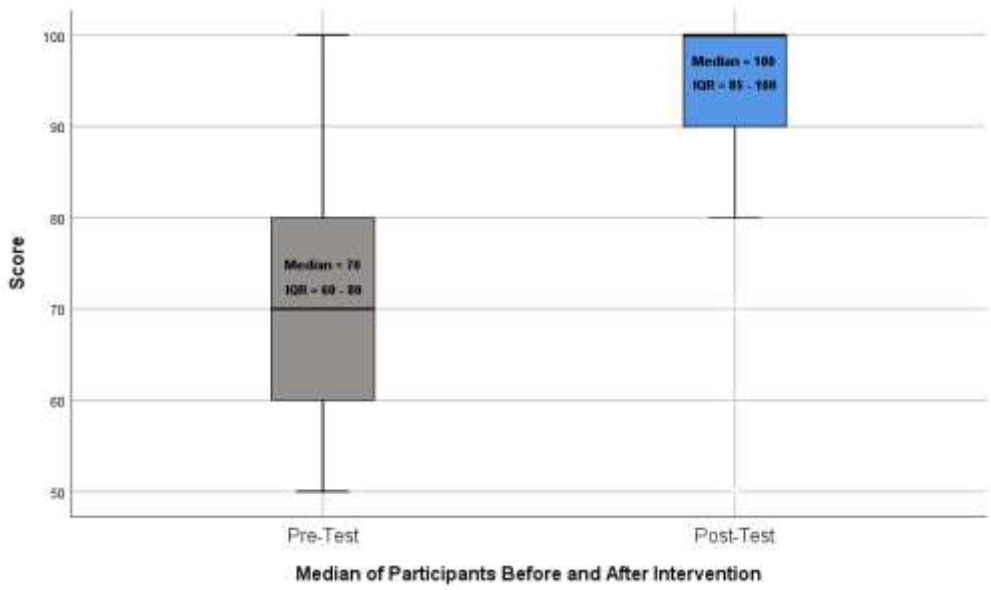

Figure 1. Median Knowledge Scores Before and After the Intervention

The calculated effect size was r = –0.52, indicating a medium-to-large effect of the intervention. The negative sign is a statistical artifact of the Wilcoxon test ranking direction and does not imply a decrease in knowledge; participants' knowledge scores clearly increased after the intervention. Furthermore, no significant differences in knowledge scores were found across gender, age, age groups, or occupational categories, as shown in Table 3. The intervention's effects appeared consistent across demographic groups, with no notable variation based on gender, age, or occupation.

$$r = \frac{Z\ \ Z}{\sqrt{n}\sqrt{n}} = \frac{-6.460-6.460}{\sqrt{154}\ \ \sqrt{154}}$$

$$= \frac{-6.460}{12.40967365}$$

$$= -0.520561635 \approx 0.52$$

Table 3. Relationship between Knowledge and Gender, Age, and Occupation

Variables	Pre-Test (p)	Post-Test (p)
Gender (Kruskal-Wallis's test)	0.877	0.303
Age (Spearman's test)	0.627	0.968
Age Category (Kruskal-Wallis's test)	0.631	0.878
Occupation (Kruskal-Wallis's test)	0.240	0.522

DISCUSSION

This study demonstrates that a brief, pediatrician-led online educational session can significantly improve parental knowledge regarding child growth and development monitoring. Such knowledge is essential to enable early detection of growth issues, improve home-based care practices, and strengthen demand for essential health services, contributing to better child health outcomes (21), (22). Using a synchronous webinar format via Zoom successfully engaged participants from various backgrounds, suggesting that digital platforms offer a practical alternative to conventional health education, particularly when time and accessibility constraints are typical.

The significant enhancement in knowledge observed in this study aligns with findings from previous research. Zoom-based health education has been shown to enhance understanding of health topics (23), including parental

awareness of children's health (24). Webinars are considered practical and effective for delivering new knowledge and skills (25), (26) and are increasingly recognized as a relevant method for health promotion (27). Previous study showed that participants have also reported satisfaction with webinars that improve knowledge on early detection and reporting (28). Satisfaction with learning via webinar was higher than with asynchronous online learning, but lower than with face-to-face learning (26). While innovative features of video conferencing platforms can boost user engagement (29), challenges such as internet stability and data usage remain (30). Nonetheless, Zoom offers several advantages, including ease of use, affordability, and valuable data management tools (31). These findings support using online meeting platforms to increase community knowledge about child health monitoring.

The medium effect size observed in this study indicates a meaningful impact of the intervention, despite its brief duration. Interestingly, no significant differences in knowledge improvement were found across demographic characteristics such as gender, age, or occupation. This finding contrasts with existing literature suggesting that knowledge acquisition can be influenced by both internal factors (e.g., age, gender) and external factors (e.g., education, occupation, information access, and socio-cultural context) (32). Sawan's (2020) also highlights the role of individual, organizational, and technological factors in shaping knowledge sharing. Moreover, individuals with higher education levels are generally more inclined to value and seek out health information (33). The uniform effect across demographic groups in our study may also be supported by broader evidence. A previous study found that synchronous learning promotes comparable knowledge gains across participants regardless of background (34). Moreover, digital health modalities such as telehealth have been shown to enhance equitable access to health education, especially among underserved populations. Finally, behavioral medicine frameworks suggest that inclusive design and delivery strategies are critical in ensuring digital interventions reach diverse users effectively (35,36).

Although Zoom is a practical platform for delivering education, several challenges must be considered. These include limited time availability, high internet costs, and unstable connections, which can hinder learning (24). Gegenfurtner and Ebner (2019) found that webinars shorter than 90 minutes and scheduled during working hours tend to attract more participants, while a stable internet connection is essential for effective digital education (25). Unreliable connectivity remains a significant barrier, often resulting in unclear delivery of content and disrupted learning experiences (37). In addition to technical issues, prolonged or high-intensity use of Zoom may negatively impact users' physical and mental well-being (38). For example, Kaur *et al.*, (2021) reported that 38.5% of participants experienced visual fatigue during online learning sessions (39).

In this study, an interesting contributing factor to the interactivity of the session and the enhancement of participants' knowledge was the implementation of modest door prizes. These incentives effectively increased engagement despite their inherently short-term impact. Incentive-based strategies have been shown to mitigate participation barriers, attract a more diverse audience, and promote active involvement, particularly among individuals who might otherwise exhibit limited engagement (40). Empirical evidence suggests that incentives can significantly enhance participation in health education programs; however, sustaining long-term behavioral change necessitates continuous reinforcement through complementary motivational approaches (41). For instance, incorporating structured social interactions, peer support mechanisms, and challenge-based learning can facilitate a gradual transition from extrinsically driven engagement to intrinsic motivation, thereby promoting sustained behavioral modifications (42). While incentives serve as an effective mechanism for fostering immediate participation, further research is warranted to identify optimal incentive models that maximize effectiveness while adhering to ethical considerations. Institutional financial incentives invoke complex normative issues including distributive justice, solidarity, and conflicts of interest (43). Moreover, empirical evidence suggests that financial compensation does not inherently introduce undue or unjust inducement, though rigorous ethical oversight is required to safeguard informed consent and fair participation (44,45). Additionally, future investigations should explore strategies for integrating incentives with evidence-based behavioral reinforcement techniques to ensure lasting knowledge retention and meaningful improvements in health-related behaviors (41).

Although the observed increase in knowledge is a valuable outcome, it should be viewed as an initial step toward community empowerment. The next steps include hands-on workshops for parents, integration of child growth monitoring into school-based and community health activities, and the development of digital tools such as mobile apps to support sustained practice. Knowledge is essential in increasing public awareness and changing behavior

(46). Beyond improved knowledge, communities require sustained multisectoral collaboration and support, especially with health facilities, targeted education on child health, and practical skills to monitor child growth and development actively (41).

Limitations and Cautions

This study is subject to several limitations. First, it measured only immediate changes in knowledge and did not assess longer-term outcomes such as changes in awareness, attitudes, or behavior. Second, while the questionnaire evaluated general understanding of child growth and development monitoring, it did not capture participants' practical skills or ability to apply the knowledge in real-world settings. Future research should include follow-up assessments and incorporate behavioral and skill-based evaluations better to understand the sustained impact of online health education interventions.

This study is exploratory in nature, focusing on the immediate impact of a brief online educational intervention without a control group or long-term follow-up. Future methodological refinements may include incorporating randomized controlled designs, assessing behavioral outcomes beyond knowledge acquisition, and conducting longitudinal evaluations to capture sustained effects. Such approaches would provide a stronger basis for causal inference and deepen the understanding of digital health education's long-term role in strengthening parental health literacy.

Recommendations for Future Research

Future studies should investigate online education's long-term impact on parental knowledge and behavioral changes in monitoring child growth and development. Employing study designs with control groups and follow-up assessments is recommended to strengthen causal inferences. In addition, future research should explore changes in attitudes and caregiving practices after the intervention and the effectiveness of more interactive or personalized digital learning approaches. While brief sessions may boost participant engagement due to their convenience (24), future programs should also consider strategies for sustaining learning outcomes, such as follow-up sessions or modular series. Achieving a balance between accessibility and long-term effectiveness is essential. Subsequent studies should also include more diverse participant populations and account for factors such as digital literacy, educational background, and cost-effectiveness to enhance the scalability and relevance of online health education initiatives.

CONCLUSION

This study indicated a positive change in parental knowledge following a brief online educational session, suggesting that such interventions may be an entry point for strengthening community engagement in child health monitoring. Using Zoom as a delivery platform was perceived as effective in facilitating knowledge acquisition. However, several contextual factors, such as internet connectivity, high data costs, frequent technical disruptions, and potential physical strain, may influence learning experiences and should be considered in future implementations. While knowledge is a key foundation, it alone is insufficient to achieve behavioral change. Therefore, online education initiatives should be integrated into broader, continuous health promotion efforts. The global strategy emphasizes people-centred, ethical, and interoperable digital health aligned with WHO standards, ensuring security, equity, sustainability, and effectivit. Cross-sector collaboration, including support from healthcare providers and community organizations, is essential to ensure sustainable and equitable access to child health information and services.

AUTHOR'S CONTRIBUTION STATEMENT

Merita Arini designed the research design, coordinated the project, provided the methodological framework, validated and supervised the research process, and led the writing of the manuscript. Edwin Tohaga, Desiani Wahyu Utami, Warkim Sutarto, Fauzan Adima, Abdul Latif Kurniawan, and Teuku Ilham Noeryosan contributed to data collection. Erwin Astha Triyono participated in data analysis and interpretation. Harumi Iring Primastuti supported the writing of the manuscript and contributed to the literature review. Wan Hasliza Wan Mamat provided critical

revisions and cross-checked the final manuscript. All authors have read and approved the final version of the manuscript.

CONFLICTS OF INTEREST

The author(s) declared no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

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

The authors declare the use of generative AI and AI-assisted technologies in the preparation of this manuscript. Tools such as [e.g., ChatGPT, Grammarly] were employed solely to support language refinement, improve clarity, and enhance the readability and structure of the text. All content and interpretations remain the sole intellectual product of the authors, and the use of AI was limited to editorial assistance in accordance with ethical publication standards.

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