

Parental Perception of Preschool Children's Mental Health and Synchronous Online Education Effectiveness in Knowledge Enhancement

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ABSTRACT

Introduction: Mental health in children is crucial for their growth, development, and academic achievement. The high prevalence of mental health disorders in children necessitates efforts to enhance parental knowledge via more accessible channels. This study aims to evaluate parental perceptions of children's mental health and assess the impact of online mental health education on parental knowledge.

Methods: A quasi-experimental design using a single-group pre-test and post-test method was conducted with 52 participants. The intervention consisted of synchronous mental health education delivered via an online meeting platform, with data collected through pre- and post-test evaluations using Google Forms.

Results: 53.8% of parents were concerned about their child's mental health, yet 40.4% were unsure about their capacity to recognize symptoms, and 78.8% had never conducted early screening. The Wilcoxon Signed-Rank Test indicated no statistically significant difference in knowledge scores before and after the intervention ($p=0.177$). However, the mean score increased slightly from 6.71 (SD=1.05) in the pre-test to 6.98 (SD=1.29) in the post-test. The effect size ($r = -0.64$, 95% CI = $[-0.91, -0.37]$) shows an impact classified as moderate to large.

Conclusion: While many parents are concerned for their children's mental health, many cannot recognize symptoms and have not undertaken early screening. Although statistical significance was not achieved, the observed effect size and knowledge improvement in specific individuals highlights online education's potential to enhance parental understanding of children's mental health. It is imperative to advance the exploration of interactive and adaptable learning strategies to maximize the effectiveness of educational interventions.

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INTRODUCTION

Mental health is a condition of mental well-being in which a person is aware of his abilities, can overcome problems, can learn and work well, contributes to his environment, can make decisions, and can build good relationships (1). Apart from that, mental health is also a dynamic internal balance where a person is able to harmonize universal values in society. The definition of mental health is very crucial where mental health is closely related to physical health, behavior, and is an intrinsic component of overall health (2). Children and adolescents are at risk of experiencing poor mental health due to various factors such as violence, discrimination, conflict and poverty (3).

The prevalence of poor mental health in children is increasing over time. According to the WHO report, around 10-20% of children and adolescents worldwide experience mental health problems, many of which are undetected or untreated (4). However, specific data on the prevalence of mental health problems in preschool children globally is still limited. In Indonesia, there is no specific data discussing the prevalence of mental health problems in preschool children. However, based on a national survey, around 9.8% of children aged 5-17 years experience mental health problems (5). In comparison, in India, a developing country in Asia, research shows that children not in parental care showed a higher prevalence of mental problems (84.30%) compared to those in parental care (48.70%), with conduct problems being the most common behavioral issue (84.30%), followed by peer problems (48.30%), emotional problems (55.60%), and hyperactivity (32.30%) (6). This prevalence shows the importance of early intervention in detecting and treating mental health problems from an early age.

Studies show that active parental participation fosters better emotional regulation and social skills in children (7). The role of parents in shaping preschool children's mental health is critical yet often insufficiently addressed. The growing demand for accessible ways to educate parents about children's mental health is driven by several challenges, such as limited time and insufficient resources (8). Web-based meeting platforms, including webinars, offer a viable solution to improve parental involvement and learning. These virtual platforms enable parents to attend educational sessions from anywhere, significantly boosting participation rates (8). Meanwhile, studies about the effectiveness of this approach in improving parental knowledge about preschool children's mental health are still limited, especially in limited resources countries such as Indonesia (9,10). This study aims to describe parental perceptions regarding preschool children's mental health, including their concerns, perceived symptoms, and involvement in early detection efforts. Moreover, this study evaluates the effectiveness of virtual education in increasing parental knowledge, providing insights into its potential role in supporting parental learning on children's mental health.

METHOD

Research Type

This study utilized a quasi-experimental design with a non-randomized, single-group pre-test and post-test format. The intervention consisted of a synchronous educational session on preschool children's mental health conducted via an online platform for approximately two hours. The educational session was designed to be interactive to enhance participant engagement and minimize passive learning. The session included a structured discussion and a Q&A segment, allowing participants to seek clarification and engage directly with the material. A communicative presenter, a psychiatric expert specializing in the field, actively encouraged participation, while a moderator facilitated the session to ensure smooth interaction. The educational content was delivered using visually appealing slides to maintain participants' attention. Moreover, a door prize session with low-value cash incentives was also included to enhance engagement, ensure retention throughout the session, and encouraging active participation. Combining synchronous interaction and incentive-based participation aimed to create an engaging learning environment and maximize the intervention's impact without reducing the core elements of the intervention.

Population and Sample/Informants

The participants in this research were parents of children of TAUD Lembah Qur'an, an Islamic preschool in Sleman, Yogyakarta Special Region Province who were invited to participate in the study voluntarily. Fifty-two parents (n=52) from a total of 65 students of this school participated in the study, with the inclusion criteria being individuals over 18 years old who were willing to attend the entire Zoom session on preschool children's mental health.

Research Location

This study was conducted in March 2024 on the Zoom platform, within a health education forum for parents of students at TAUD Lembah Qur'an, Yogyakarta.

Instrument

This research used an online questionnaire, with the tests consisting of 10 statements with true/false answer choices. The questionnaire was designed based on the material provided during the educational session to ensure that the measurement accurately assessed the effectiveness of the material delivery. Given the online nature of the health education session, ease of completion was a key consideration to ensure participant engagement and minimize response fatigue. The straightforward format of the questionnaire facilitated full participation while capturing essential aspects of parental knowledge. Given the online nature of the health education session, ease of completion was a key consideration to ensure participant engagement and minimize response fatigue. The straightforward format of the questionnaire facilitated optimum participation while capturing the essential aspects of parental knowledge.

Three experts (a psychiatrist and two public health experts) reviewed the questionnaire to establish validity. Content validity was assessed using the Content Validity Index (CVI), with the Scale-Level CVI/Average (S-CVI/Ave) reaching 0.93 and the Scale-Level CVI/Universal Agreement (S-CVI/UA) at 0.80, indicating strong content validity. Additionally, a layperson reviewed the questionnaire to ensure clarity and face validity (11).

Item analysis was conducted to evaluate the questionnaire's psychometric properties, focusing on item difficulty and item discrimination (12). The item difficulty index ranged from 0.45 to 0.90, indicating a well-balanced distribution of question difficulty. The item discrimination index ranged from 0.20 to 0.60, with 7 out of 10 items demonstrating good discrimination ability (≥ 0.30), ensuring that the test effectively distinguished participants with higher and lower knowledge levels. These results confirmed that the questionnaire was a valid and reliable tool for assessing parental knowledge.

Data Collection Procedures

This research collected data by administering pre- and post-tests using Google Forms, distributed before and immediately after the educational intervention. Using Google Forms ensured efficient data collection, allowing participants to complete the tests remotely and conveniently while enabling researchers to analyze responses systematically.

Data Analysis

The data collected were analyzed using descriptive statistics, including frequency, mean, standard deviation, and median. A normality test was conducted before testing the difference between pre-and post-test scores. The Kolmogorov-Smirnov Test indicated that the data was not normally distributed. A mean difference test, specifically the Wilcoxon Signed Ranks Test, was then used to assess any changes in the participants' knowledge levels before and after the intervention. Effect size calculations (r) were also performed, along with 95% confidence intervals (CI) for effect size, to measure the strength and precision of the intervention's impact. A post hoc sensitivity analysis was conducted using G*Power 3.1 to determine the minimum detectable effect size given the sample size and statistical power ($\alpha = 0.05$, power = 0.80). This analysis aimed to assess whether the study had sufficient power to detect meaningful effects despite the small sample (13). Additionally, statistical analysis was also conducted using SPSS 22 to evaluate the comparison of knowledge between variables, including age (Kruskal-Wallis H test) and occupation category (Mann-Whitney U test).

Ethical Approval

This research has received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta with No. 043/EC-KEPK FKIK UMY/I/2024. Before the research was conducted, all participants received a detailed explanation and provided consent online via Google form.

RESULTS

A total of 52 participants completed both the pre-test and post-test in this study. As shown in Table 1, the majority were female (98.1%), with most participants aged 31–40 years (42.3%). Furthermore, 69.2% (n=36) of participants were employed.

Table 1. Distribution of Participant Characteristics (n=52)

Participant Characteristics	Frequency (n)	Percentage (%)
Sex		
- Man	1	1.9
- Woman	51	98.1
Age		
- <30 years	20	38.5
- 31 – 40 years	22	42.3
- >40 years	10	19.2
Occupation		
- Teacher	12	23.1
- Health workers	4	7.7
- Self-employed	1	1.9
- Housewife	16	30.8
- Other (civil servant, employee and student)	19	36.5

Source: Primary Data

Table 2 indicates that 53.8% of participants reported concerns about their child's mental health, reflecting a considerable level of apprehension. Furthermore, 40.4% of participants were uncertain about mental disorders symptoms in their children. These findings suggest potential gaps in recognizing early signs of mental health issues in children. However, 78.8% had not engaged in screening or early detection.

Table 2. Parents' Perception Related to Children's Mental Health

Statement	Frequency (n)	Percentage (%)
I'm worried that my child has a mental/emotional disorder		
- No	24	46.2
- Yes	28	53.8
I think my child is showing symptoms of mental/emotional disorders		
- Doubtful	21	40.4
- No	26	50.0
- Yes	5	9.6
I have carried out screening/early detection of children's emotional mental health problems		
- No	41	78.8
- Yes	11	21.2

Source: Primary Data

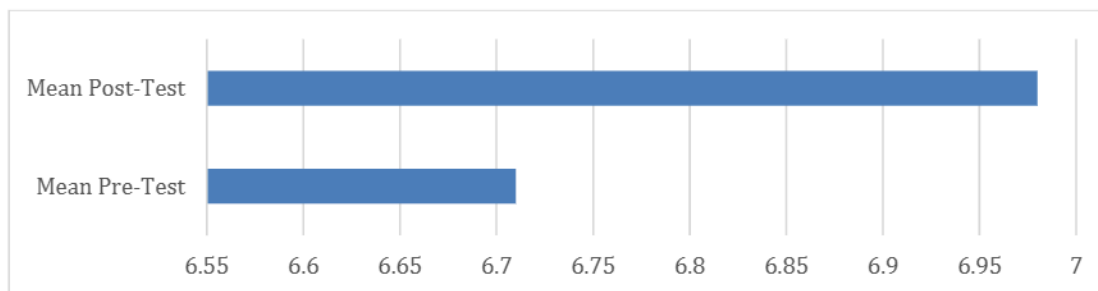
Table 3 indicates that the normality test showed a non-normal distribution of the data ($p = 0.000$), leading to using the Wilcoxon Signed-Rank Test. The test revealed no statistically significant difference between pre-test and post-test scores ($p=0.177$). Despite this, the mean pretest score was 6.71 (SD=1.05), and the mean post-test score slightly increased to 6.98 (SD=1.29) (Figure 1). The median pre-test and post-test scores remained at 7.00, suggesting no substantial shift in the central tendency of knowledge scores.

The Wilcoxon test yielded a test statistic (W) of 181.5, with a Z-score of -4.62 (Table 3). Hence, the effect size (r) was -0.64, with a 95% confidence interval (CI) of [-0.91, -0.37], indicating a moderate to large effect. The negative r-value results from the mathematical formulation of the Wilcoxon test, where the sign of Z determines the direction of r, rather than indicating a negative impact of the intervention itself. To further clarify the distribution of knowledge change, we examined individual score variations. A total of 42.3% of participants showed an increase in scores, 38.5% remained the same, and 19.2% experienced a decline. This variation may reflect differences in individual comprehension, test-taking conditions, or potential external factors. Given the small sample size (n = 52),

the study may be underpowered to detect statistically significant differences, despite the observed effect size suggesting a meaningful impact. This result suggests that while statistical significance was not achieved, the intervention had a meaningful impact on knowledge improvement for some participants.

A post hoc sensitivity analysis was conducted to determine the minimum detectable effect size given the sample size and statistical power. Using GPower 3.1, with an alpha level of 0.05, power ($1-\beta$) of 0.80, and a two-tailed Wilcoxon signed-rank test, the minimum detectable effect size (r) was calculated as 0.40, which falls within the moderate effect size range (13). The observed effect size in this study ($r = -0.64$, 95% CI = $[-0.91, -0.37]$) exceeded this threshold; however, the p -value remained non-significant ($p = 0.177$). This discrepancy suggests that factors such as data distribution and within-group variability may have influenced the statistical significance, despite the intervention demonstrating a meaningful effect.

Moreover, Table 4 summarizes the Kruskal-Wallis H and Mann-Whitney U test results for knowledge scores across age and occupation categories. No significant differences were found based on age (pre-test: $p=0.306$; post-test: $p=0.777$) or occupation (pre-test: $p=0.992$; post-test: $p=0.716$), indicating that neither factor influenced knowledge levels before or after the intervention.



Source: Primary Data

Figure 1. Mean Improvement from Pre-test to Post-test

Table 3. Normality Test, Wilcoxon Signed Ranks Test, and Effect Size

	Kolmogorov-Smirnov			Median	Mean	SD	Wilcoxon Signed Ranks Test			Effect Size	95% CI for r
	Statistics	df	p				p	W	Z	r	
Pre-Test Score	0.192	52	0.000	7	6.71	1.05	0.177	181.5	-4.62	-0.64	[-0.91, -0.37]
Post-Test Score	0.208	52	0.000	7	6.98	1.29					

Source: Primary Data

df=degrees of freedom, SD=standard deviation

Table 4. Comparison of Knowledge by Demographic Attributes

Test	Variables	p	
		Pre-Test	Post-Test
Kruskal-Wallis H	Age category	0.306	0.777
Mann-Whitney U	Occupation category	0.992	0.716

Source: Primary Data

DISCUSSION

This study initially explored parental awareness and understanding of preschool children's mental health, focusing on concerns, symptom recognition, and early detection efforts. A synchronous virtual education intervention was implemented to assess changes in knowledge through pre-and post-tests. The findings suggest that the intervention has potential benefits in increasing parental knowledge while revealing several areas for improvement. These results highlight the importance of accessible virtual education for parents, particularly in Indonesia, where

early childhood mental health remains an underexplored topic (9,10). Expanding such initiatives could help bridge knowledge gaps and strengthen early detection efforts.

This study found that nearly all participants were women, reflecting a common trend in which mothers are more active in children's health and education programs than fathers. This finding aligns with findings from Pérez-Jorge et al. (2021), highlighting that women are often more engaged in health promotion efforts, particularly in school and community settings. Additionally, research suggests empowering women in decision-making regarding children's health and education significantly enhances child well-being (15). Community-based health education programs targeting women have been shown to improve maternal and child health outcomes (16). However, the gender imbalance observed in this study also underscores the limited participation of fathers despite their crucial role in shaping children's health behaviors and providing emotional support (17). While this study did not specifically explore the reasons behind fathers' low involvement, previous literature suggests that workplace commitments, societal norms, and traditional gender roles often act as barriers (6). Given the importance of paternal engagement in child mental health, future interventions should consider strategies to increase male caregiver participation. Initiatives such as flexible scheduling, father-focused outreach, and workplace-friendly health education programs may help bridge this gap and promote shared parental responsibility for child well-being (18).

Most participants in this study were aged 31–40, a demographic typically engaged in the childcare life cycle. While no significant differences in knowledge about preschool children's mental health were observed across age groups, this segment remains relevant to the intervention design. A previous study also stated that the age group 31–40 years is the age that is actively involved in searching for health information where literacy and cognitive skills are better (19). They are millennials, known as digital natives with high connectivity, and their specific trait may hinder their engagement with traditional approaches to health communication (20). In addition, this age range has a significant influence on searching for health information online, due to habits regarding the use of digital devices (21). Hence, these characteristics suggest that digital-based educational interventions may be particularly effective for engaging this age group.

Participants in this research had a variety of work backgrounds, with only 30.8% being homemakers. This situation reflects that the issue of children's mental health can attract interest from various levels of society. Moreover, there was no significant difference in knowledge between the housewife mom and working parent, which indicates that the job did not influence knowledge before or after the education session in this study. In contrast with research, housewife mothers face multiple barriers that prevent them from accessing health education about their children's health. These barriers can be categorized into structural, financial, social, and personal factors (22–24). Meanwhile, working parents may lack the time to attend health education sessions or discuss children's health (25). Therefore, providing accessible education, such as online webinars used in this study, offers a potential solution to bridge this gap and ensure broader parental engagement in children's mental health. This finding also aligns with a previous review that public health programs should be designed with an inclusive approach and emphasizes the importance of community involvement in achieving better results (26).

This research also found concerns and awareness of children's mental health, where the results of this study show that the majority of the participants are concerned about their children's emotional/ mental health problems. Meanwhile, this research also shows that the majority of participants have not carried out mental health screening on children. This data aligns with a review, which found that although many parents have significant concerns about their children's mental health, few take proactive action, such as consulting with mental health professionals or carrying out screening (27). Research in Spain found that the level of awareness of parents regarding signs of children's mental disorders does not always directly correlate to the early detection measures they take, so increasing knowledge for parents and health service providers regarding early detection is very necessary (28). Lack of adequate information, social stigma, and insufficient resources in the community are the main obstacles to the early detection of children's mental health disorders (29).

Another important finding of this study is the limited ability of parents to recognize mental problems in children. A large proportion of parents express uncertainty about their children as exhibiting symptoms of mental disorders, while only a small proportion confidently recognize such symptoms. This finding aligns with a study in Ethiopia, which highlighted that low awareness and inadequate parental knowledge about childhood mental disorders pose significant challenges to treatment access (30). Parental knowledge plays a crucial role in early detection and

has important implications for children's mental health, enabling timely intervention (31). Educational programs can increase understanding and knowledge with accurate information, control one's health, reduce complications, and increase satisfaction, as indicated by improved quality (32). Research in Egypt explains that health education programs can increase knowledge and change attitudes so that, in the end, they can reduce stigma and increase understanding about mental health (33).

This study shows increased knowledge mean scores after an education session. Although the intervention did not yield statistically significant results, it increased parental knowledge of preschool children's mental health. The effect size suggests a moderate to large impact, highlighting the intervention's potential to enhance awareness and understanding. The lack of statistical significance despite a moderate effect size may reflect the complexity of learning processes rather than the effectiveness of the intervention itself. Additionally, the study's sample size of 52 participants may have limited its statistical power to detect significant differences, particularly with a p-value of 0.177. Given that p-values are sensitive to sample size, the absence of statistical significance does not necessarily indicate the absence of an effect but may instead reflect the study's limited power (34). Nonetheless, small sample sizes, while limiting the detection of statistically significant effects, can still provide valuable preliminary insights, particularly in exploratory research contexts where larger studies are not feasible. Given the study's design and sample size limitations, it is crucial to consider effect size and confidence intervals to better interpret the results (35). Relying solely on p-values may not fully capture the practical significance of an intervention. These alternative approaches are particularly important in educational and behavioral research, where outcomes are often influenced by multiple factors and may not always reach strict statistical thresholds. Additionally, while a priori power analysis is useful in larger-scale studies, its applicability in small, context-specific research—such as this study involving parents from a single school—is more limited.

The contradiction between a nonsignificant p-value and a moderate-to-large effect size (r) in this study can be explained by the nature of the statistical measures and the characteristics of the data. Effect size provides insight into the magnitude of change, which in this study suggests a meaningful improvement in knowledge despite the lack of statistical significance. In contrast with p-value, the effect size (r) quantifies the strength of the relationship between variables, which can remain substantial even when the p-value is insignificant because of limited statistical power. Additionally, binary scoring (1 = correct, 0 = incorrect) rather than a Likert scale contributed to the observed pattern. Since the study assesses knowledge, a binary scoring system is more appropriate than a Likert scale, which is better suited for measuring attitudes or perceptions. The binary nature of the responses leads to more pronounced shifts in scores pre- and post-intervention, which can result in a relatively high effect size, even if the statistical test does not detect a significant difference (36). This aligns with the objective of knowledge-based assessments, where a direct shift from incorrect to correct responses better reflects learning outcomes than subjective scaling.

Furthermore, differences in individual learning experiences likely influenced outcomes, with some participants benefiting more than others. A study shows that individual differences in learning experiences can skew results, with some participants benefiting more than others, complicating the interpretation of group-level data (37). Improvements in knowledge and awareness may not have been fully captured by the common assessment method, as conceptual understanding often develops progressively and may not be immediately reflected in test scores. These findings align with prior research indicating that educational interventions can foster meaningful learning outcomes, even if not always reflected in statistical significance in the short term (38). Meanwhile, research indicates that while educational interventions can yield short-term learning benefits, these effects often diminish over time, necessitating follow-up assessments to evaluate long-term knowledge retention and behavioral changes. Longitudinal analyses and follow-up data collection are necessary to assess the persistence of intervention effects, suggesting that intervention designers should plan for additional support to evaluate long-term outcomes and potential fade-out of learning effects (39). Also, follow-up assessments are essential to determine whether knowledge improvements translate into meaningful behavioral changes (40). These findings underscore the importance of using diverse assessment approaches to better capture knowledge acquisition and behavioral change over time.

The findings of this study can be better understood through the Health Belief Model (HBM), which explains how individuals' health-related behaviors are shaped by their perceptions and motivations. Although this study did not explicitly measure HBM dimensions, the model provides a relevant perspective for understanding parental engagement in online education (41). Parents may have been motivated to participate based on the perceived

relevance of the material, previous experiences, or general interest in their child's well-being. The session likely acted as a cue to action, encouraging participation, while knowledge retention and application may have depended on parents' self-efficacy in utilizing the information gained. The structured nature of the session provided accessible information, but the extent to which parents internalized and applied the knowledge likely varied. Future interventions could incorporate interactive elements to reinforce engagement and enhance self-efficacy, ultimately improving knowledge acquisition and application.

The absence of statistically significant differences in knowledge scores across age categories and occupations before and after the intervention suggests that these demographic factors did not substantially influence the observed changes. However, it is important to note that other unmeasured factors, such as prior exposure to similar topics, motivation to learn, or informal discussions outside the study setting, could still have contributed to the results. Prior experiences with health-promoting activities can enhance participation in future health promotion efforts. Meanwhile, exposure to conflicting health information can reduce intentions to engage in health information sharing and seeking, which are crucial for public health promotion (42). Motivation plays a crucial role in the success of educational programs. Studies indicate that motivated individuals are more likely to engage with the material and apply it to their lives, as seen in interventions targeting the disease (43). Conversations outside formal settings can reinforce learning. For example, discussions among peers about health topics can enhance knowledge retention and application, as noted in community health studies (44). While these unmeasured factors can enhance the outcomes of health education sessions, they also introduce variability that may complicate the assessment of educational effectiveness. Understanding these dynamics is essential for designing more impactful health education strategies. Future research should explore these potential influences more comprehensively by incorporating additional variables or qualitative insights to better understand the mechanisms driving knowledge changes.

The intervention effectively raised awareness and strengthened parental understanding, demonstrating its potential to enhance early childhood mental health literacy. Consistent with research, online education offers an accessible and scalable learning approach, though engagement may vary depending on content, format, and participant characteristics (8,18). Many studies also revealed that participants highlighted the importance of convenience, connection, and comfort in their virtual learning experience (45). Although this study did not specifically evaluate digital learning barriers, observations during the discussion sessions indicated that participants generally did not experience significant technical difficulties. There were no reports of audio or video disruptions, and the Google Form-based quiz was easily accessible to all participants. Additionally, the use of Zoom as the educational platform did not appear to be a barrier, as most participants—who belong to the millennial generation—are already familiar with such technology (20). These findings suggest that, in the context of this study, access to technology and digital literacy were unlikely to be major obstacles to participant engagement. However, despite the absence of technical difficulties in this study, existing literature highlights several challenges that should be considered when implementing online education. Studies have reported issues such as internet instability, limited access to devices, varying levels of digital literacy, and difficulties in maintaining participant engagement, particularly in lower-resource settings (46,47). Furthermore, differences in socioeconomic background and prior experience with digital tools can impact the effectiveness of online learning (46). Future research should explore these factors in diverse populations to ensure that digital health education is accessible and effective for all target groups.

Engagement strategies played a crucial role in mitigating passive learning and enhancing the effectiveness of the online session. The inclusion of a structured Q&A segment allowed participants to clarify concepts and interact directly with the expert, while guided moderation ensured a smooth and participatory discussion. Visual aids and modest door prizes further helped sustain attention and motivation. These approaches addressed common challenges in online health education, where maintaining engagement can be difficult. While peer learning was not incorporated due to time constraints, literature suggests that short, focused educational sessions are often preferable in community-based settings. A study revealed that participants generally prefer shorter, more convenient sessions, and most respondents favored one 30 to 60-minute session annually, indicating that brevity and convenience are crucial for retention (48). Meanwhile, a scoping review found that short educational programs often do not produce significant changes without intervention or continuous material reinforcement (49). A research also states that longer and more sustained interventions are needed to see significant impacts (50). At the other hand, the long duration of the education

program could impact participants' retention (51). Hence, education strategies should be formulated specifically to suit learner contexts. A prior study emphasized that programs that adapt to participants' cultural and demographic characteristics, such as those targeting underserved populations, have also been successful (52). Future research could explore additional interactive elements, such as peer discussions or follow-up sessions, to reinforce learning and long-term knowledge retention.

One contributing factor to knowledge improvement in this study was the use of modest door prizes, which effectively boosted engagement despite its short-term impact. Incentives can lower participation barriers, attract a more diverse audience, and encourage involvement, particularly in populations that might otherwise disengage (53). Incentive-based strategies have been shown to enhance participation in health education programs, yet sustaining long-term behavior change requires continuous motivation and integration with other supportive strategies (51). For example, incorporating social interactions and challenges can gradually transition motivation from external rewards to internal drive, fostering more sustainable behavioral changes (54). While incentives can drive immediate engagement, future research should explore optimal incentive models that balance effectiveness with ethical considerations and ensure lasting knowledge retention and behavioral changes (55).

Limitations and Cautions

This study has notable strengths, including a synchronous expert-led education session and a virtual format that enhanced accessibility, reduced participation barriers, and accommodated diverse parental backgrounds. Interactive elements, such as a Q&A session and gamification using modest door prizes, were included to promote engagement and clarify participants' understanding. Moreover, a brief, structured educational session was chosen in this community-based health intervention, as it is more feasible and maintain participant engagement and retention. However, the absence of a peer-learning component due to time constraints may have limited opportunities for collaborative knowledge-sharing, which could further enrich the learning experience. A potential influence of self-selection bias is recognizing that parents who voluntarily participated may have had a preexisting interest in their children's mental health. This phenomenon could limit the generalizability of our findings to less-involved populations. Nevertheless, the one-time intervention with immediate pre- and post-test evaluation restricts insights into long-term knowledge retention and behavioral application. Additionally, the lack of a control group limits the ability to establish a direct causal relationship between the intervention and knowledge changes, as external factors may have influenced the results. While the findings indicate a positive change in knowledge scores, this study did not assess the practical impact of the intervention, such as parents' ability and willingness to conduct early detection. However, this study did not assess its practical impact, such as parents' ability and willingness to conduct early detection.

Recommendations for Future Research

Future studies should consider incorporating a non-equivalent control group or waitlist control design to strengthen causal inference. Multidimensional assessment methods, including qualitative insights and observational tools, should also be considered to provide a more nuanced understanding of knowledge application beyond standardized tests. The qualitative analysis of the participants' learning experiences could provide deeper insights into how knowledge acquisition occurs beyond the structured intervention. Some alternative measurements, e.g., case-based or applied knowledge assessments, may provide deeper insight into parental decision-making processes. Additionally, incorporating longitudinal assessments, including follow-up assessments (e.g., one month or longer after the intervention) to evaluate long-term knowledge retention and its impact on parental practices in detecting mental health issues is essential rather than focusing solely on knowledge improvement. Expanding the sample size and participant diversity, including greater paternal involvement, will offer a more comprehensive perspective on how different groups respond to educational interventions. While a formal pre-study power analysis was not conducted, future studies should incorporate power calculations in the design phase to ensure adequate statistical sensitivity. Exploring alternative learning approaches like interactive or blended models, incentive based-engagement, and expanding outreach could enhance engagement and knowledge application (52), (56). In contrast, tailoring interventions based on participant characteristics, digital literacy, and learning preferences may further optimize effectiveness (57). Moreover, tailoring strategies (e.g., flexible scheduling, workplace-based learning

programs, targeted outreach, and framing child mental health education as a shared parental responsibility) for increasing male caregivers' or fathers' participation in health promotion for children should also be considered because of their critical role in shaping parenting. Lastly, operational research by fostering cross-sector collaboration between education, healthcare, and social services can support the development of sustainable and scalable mental health education programs for parents (58). Addressing these aspects will help refine educational strategies, maximize engagement, and enhance the overall impact on early childhood mental health literacy.

CONCLUSION

This study revealed that while parents expressed concern about preschool children's mental health, they lacked the ability to recognize early signs and engage in early detection practices. The synchronous virtual education intervention enhanced parental knowledge, demonstrating its potential as an accessible and scalable learning model. Despite the limited sample size, the effect size analysis suggests that the intervention had a meaningful impact. Future studies should use larger sample sizes, control groups, and a priori power analysis to enhance statistical sensitivity. Given parents' time constraints, shorter, more frequent educational bursts may be a viable alternative to long-duration or complicated education sessions. Refining learning methods—gamification, structured peer discussions, follow-up sessions, or blended learning models—could also enhance engagement and knowledge retention. The predominance of female participants highlights the need for greater paternal involvement in mental health education. Hence, future interventions should explore father-focused workshops, workplace-friendly formats, and targeted outreach strategies to foster shared parental responsibility. Finally, cross-sector collaboration is crucial for improving parental mental health literacy and early detection efforts. Partnering with the government, healthcare providers, education institutions, and community organizations can help integrate mental health education into parenting programs, facilitate continued learning, and strengthen early detection practices. Establishing structured referral pathways and community-based support systems can enhance accessibility and ensure long-term impact in promoting child mental health awareness and intervention.

AUTHOR'S CONTRIBUTION STATEMENT

Conceptualization, MA, WAP; methodology, MA; formal analysis, MA, HIP; investigation, MA, WAP; resources, WAP; data curation, HIP; writing—original draft preparation, MA, HIP; validation, WAP, WHWM, writing—review and editing, MA, WAP, HIP, WHWM; supervision, MA. All authors have reviewed and approved the final version of the manuscript for publication.

CONFLICTS OF INTEREST

The authors confirm that there are no competing interests or potential conflicts that could have influenced the research, analysis, or conclusions presented in this manuscript.

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