

Attitudinal Change Through *SmartShield*: Findings From a Quasi-Experimental Study on Sexual Abuse Prevention in Malaysian Primary Schools

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ABSTRACT

INTRODUCTION: Child sexual abuse remains a significant public health concern because of its long-term consequences for children's psychological, emotional, and social well-being. Although school-based prevention programmes have consistently improved knowledge, their influence on attitudes toward self-protection has received less attention. *SmartShield* is a culturally adapted, video-based educational programme developed to promote positive attitudes toward child sexual abuse prevention among Malaysian primary school children. **MATERIALS AND METHODS:** A quasi-experimental controlled trial was conducted using stratified multistage cluster sampling. Six government primary schools were randomly selected from five geographic regions of Malaysia, with one lower and one upper primary class recruited from each school. A total of 912 students participated. Lower primary students received *SmartShield* 1 (one module), whereas upper primary students received *SmartShield* 2 (two modules), delivered through 20-minute video-guided sessions. Attitudes were measured using validated questionnaires at baseline and at Weeks 2 and 4. Repeated measures analysis of variance, adjusted for sex and geographic region, was used to evaluate intervention effects. **RESULTS:** The intervention group demonstrated significantly greater improvements in attitude scores than the control group at all follow-up assessments ($p < 0.001$). Among lower primary students, adjusted mean scores increased from 70.7% to 91.2%, compared with 75.1% to 83.1% in the control group. Among upper primary students, scores increased from 69.2% to 84.0%, whereas the control group improved from 67.6% to 80.4%. **CONCLUSION:** The *SmartShield* program effectively improved attitudes toward child sexual abuse prevention among Malaysian primary school children.

KEYWORDS: attitude; child sexual abuse; effectiveness; prevention; *SmartShield*

INTRODUCTION

Child sexual abuse (CSA) is a serious public health issue that affects children in many regions of the world. World Health Organisation (WHO) reports indicate that roughly one in five girls and one in seven boys suffer sexual abuse during their childhood years.¹ These figures are likely underestimated, as many cases remain undisclosed due to fear, shame, or the absence of adequate support systems.² As a result, CSA continues to be a hidden yet widespread problem that requires sustained public health attention. The consequences of CSA can be profound and long-lasting. Children who experience sexual abuse are at increased risk of mental and emotional difficulties, including depression, anxiety, and post-traumatic stress disorder.³ In addition, they may experience low self-esteem, difficulties in academic performance, and challenges in forming healthy relationships.⁴ These adverse effects often persist into adulthood, affecting overall health, educational attainment, and quality of life.⁵

Primary school years represent a critical period in a child's cognitive, emotional, and social development. During this stage, children begin to understand rules, boundaries, emotions, and social interactions more clearly. Introducing education on personal safety and self-protection during this developmental phase is therefore particularly important.⁶ The schools serve as optimal venues for imparting this knowledge, as children dedicate significant time there and can acquire learning within a safe and structured environment.⁷

Many school-based CSA prevention programs focus primarily on providing factual knowledge, such as identifying inappropriate touch or recognizing trusted adults. While this knowledge is essential, it may not be sufficient on its own. Children also need to develop positive attitudes toward self-protection, including confidence in recognising unsafe situations, asserting personal boundaries, and seeking help when necessary.⁸ Attitudinal readiness plays a key role in determining whether children are willing and able to apply what they have learned in real-life situations.⁹ Without adequate emphasis on attitudes, children who possess knowledge about CSA may still hesitate to act when confronted with risky or confusing situations. Fear, uncertainty, emotional pressure, or the involvement of familiar individuals can limit their responses. Strengthening children's attitudes toward self-protection is therefore an important component of effective CSA prevention efforts.¹⁰

In Malaysia, relatively few CSA prevention programs have been systematically evaluated for their impact on children's attitudes.¹¹ Teachers often report uncertainty in addressing this sensitive topic, and some schools lack appropriate resources to deliver prevention education effectively.¹² These challenges highlight the need for a structured, developmentally appropriate, and culturally relevant program that supports both children and educators. The *SmartShield* educational program was developed to address this gap. It is an interactive, video-based module designed to teach children about body safety and sexual abuse prevention in a child-friendly and engaging manner. However, its effectiveness in shaping children's attitudes toward CSA prevention has not been examined. This research aimed to determine the impact of the *SmartShield* program on attitudes toward preventing child sexual abuse (CSA) among lower and upper primary school children in Malaysia.

MATERIALS AND METHODS

The study employed a quasi-experimental controlled trial design. The target participants were students enrolled in government primary schools in Malaysia, specifically Standard 2 (ages 7-9) and Standard 4 (ages 10-12), corresponding to lower and upper primary school periods, respectively. Only students attending the selected schools and whose parents provided consent were eligible. Children were excluded if they had identified learning disorders, such as attention deficit disorder or dyslexia, or if they were absent during the implementation of the *SmartShield* programme. A small number of participants were lost to follow-up due to absenteeism during the post-intervention assessment. Consequently, only participants with complete pre- and post-intervention data were included in the final analysis. The same inclusion and exclusion criteria were applied consistently across both intervention and control groups to minimize potential selection bias.

A stratified multistage cluster sampling approach was employed. The states in Malaysia were divided into five regions: i) Northern, ii) Middle, iii) Southern, iv) Eastern, and v) East Malaysia. Six government primary schools were chosen randomly from lists provided by each region's respective state education departments.

One lower primary class and one upper primary class were randomly selected from each school. Every student in the selected classes was invited to participate in the study. Allocation to the intervention and control groups was performed at the school level.

Using Power and Sample Size Calculation software (Microsoft Corp., 2012), the sample size required was identified by comparing two means. The predicted minimum detectable difference was determined at 2 using a significance level of 0.05, a power of 80%, and a standard deviation (SD) of 3.47 from a CSA prevention study conducted in New Zealand called 'Feeling Special, Feeling Safe'.¹³ Participants were distributed equally across the control and intervention groups (ratio 1:1). A minimum sample size of 380 children was needed after considering a design effect of 2. However, the final estimated sample size for each control and intervention group, comprising lower and upper primary school students, was 456 after accounting for a 20% non-response rate.

The intervention consisted of two educational programs: i) *SmartShield 1* (for lower primary students), and ii) *SmartShield 2* (for upper primary students). Age-appropriate materials were integrated into the programs, specifically designed for primary school children and consistent with the Malaysian Ministry of Education standards. *SmartShield 1* emphasized self-protection and the concept of sexual dignity. The content of *SmartShield 1* was known as Module 1. *SmartShield 2* addressed risk awareness and self-protection, misconceptions, sexual dignity, moral boundaries, self-acceptance, and body positivity. The content of *SmartShield 2* is divided equally between Module 2A and Module 2B.

SmartShield 1 and *SmartShield 2* questionnaires assessed attitudes related to child sexual abuse (CSA) prevention in lower and upper primary school students, respectively. The *SmartShield 1* questionnaire comprises items corresponding to the content presented in Module 1. It consists of 5 items with an internal consistency of 0.786.¹⁴ The *SmartShield 2* questionnaire encompasses a broader range of topics related to Modules 2A and 2B. It consists of 11 items, and the internal consistency was 0.784.¹⁴ A 5-point Likert scale was used to rate attitudes: 5=Strongly agree, 4=Agree, 3=Not sure, 2=Disagree, and 1=Strongly disagree. Items with negative wording were scored in reverse. The *SmartShield 1* questionnaire ranged from 5 to 25 points, while the *SmartShield 2* questionnaire ranged from 5 to 55 points. Raw scores were summed and transformed into percentage values, with higher percentages reflecting more favourable attitudes among students.

Ethical clearance was granted by the Human Research Ethics Committee, Universiti Sains Malaysia (USM/JEPeM/20110554). Participant recruitment for this study occurred between June 2023 and August 2024. Data was collected over two weeks for lower primary and four weeks for upper primary school children. Teachers assisted in delivering informed consent forms to parents or guardians, highlighting the voluntary nature of participation and the freedom to withdraw at any point. Those who consented were required to complete the consent form along with the self-administered questionnaire.

At baseline (Week 0), lower primary students completed a guided self-administered questionnaire capturing sociodemographic data and baseline *SmartShield 1* attitude items. Right after baseline, the intervention group received *SmartShield* Module 1, while the control group continued with the standard curriculum. In Week 2, both groups completed the *SmartShield 1* questionnaire for Module 1. At baseline (Week 0), upper primary

students completed a guided self-administered questionnaire capturing sociodemographic data and baseline *SmartShield 2* attitude items. Right after baseline, the intervention group received *SmartShield* Module 2A, while the control group continued with the standard curriculum. In Week 2, both groups completed the *SmartShield 2* questionnaire for Module 2A. The intervention group then received Module 2B, and in Week 4, both groups completed the questionnaire for Module 2B.

All assessments were conducted during regular school hours under the supervision of classroom teachers. For upper primary students, the intervention was administered in two distinct 20-minute sessions (Modules 2A and 2B) to sustain attention and promote engagement. Each session incorporated interactive video content facilitated by classroom teachers within the school environment. The control group continued following the standard curriculum and did not receive any component of the *SmartShield* modules throughout the study period. Data were analysed using IBM SPSS Statistics version 29.0 (SPSS Inc., 2019). Preliminary data cleaning was performed to ensure accuracy before analysis. Repeated measures ANOVA was conducted to assess within- and between-group differences in attitude scores over time, adjusting for potential confounders such as sex and geographical zone.

RESULTS

SmartShield 1 for lower primary school children

A total of 440 lower primary school children were included in the intervention group and 441 in the control group, with response rates of 96.5% (440/456) and 96.7% (441/456), respectively. The distribution of sex was comparable between the two groups, with males accounting for 48.2% of the intervention group and 51.7% of the control group, and no significant difference observed ($p=0.944$). Participants were also evenly distributed across all geographical zones, including Eastern, Southern, Northern, Middle, and East Malaysia, with no significant difference between the intervention and control groups ($p=0.844$). Most participants in both groups were Malay. The sociodemographic characteristics of the lower primary school children are presented in Table I.

Table I. Sociodemographic attributes of lower primary school children

Variable	Intervention (n = 440)		Control (n = 441)		p-value ^a
	n	(%)	n	(%)	
Sex					
Male	212	(48.2)	228	(51.7)	.944
Female	228	(51.8)	213	(48.3)	
Zone					
Eastern	88	(20.0)	87	(19.7)	.844
Southern	89	(20.2)	88	(20.0)	
Northern	88	(20.0)	87	(19.7)	
Middle	89	(20.2)	89	(20.2)	
East Malaysia	86	(19.5)	90	(20.4)	
Race					
Malay	422	(95.9)	416	(94.3)	.030
Non-Malay	18	(4.1)	25	(5.7)	

^aChi-Square

The group-time interaction of the RM ANOVA showed a significant difference in mean attitude score changes between the intervention and control groups after adjusting for sex and zone for Module 1 ($p<.001$) (Table II).

Table II: Comparisons of attitude toward sexual education among lower primary school children between the intervention and control groups

Group	n	Adjusted Mean ^a (SD ^b)		Adjusted Mean Diff. ^c (95% CI ^d)		F stat ^e (df ^f)	p-value ^g
		Base ^h	Post ⁱ	Base ^h	Post ⁱ		
Module 1							
Intervention	440	70.7 (19.06)	91.2 (11.04)	70.7 (68.86,72.51)	91.2 (90.11, 92.34)	5.91 (1)	.015
Control	441	75.1 (19.93)	83.1 (12.76)	75.1 (73.35,77.00)	83.1 (82.01, 84.24)		

^aAdjusted Mean, ^bStandard deviation, ^cAdjusted Mean Difference, ^dConfidence interval, ^eF statistic, ^fDegree of freedom,

^gRM ANOVA, ^hBaseline, ⁱPost-intervention

The group effect of the RM ANOVA showed a significant difference in mean attitude score changes between the intervention and control groups after adjusting for sex and zone for Module 1 [mean (95% CI): 81.0 (86.4, 88.0) versus 79.1 (78.1, 80.2), $p=0.015$].

SmartShield 2 for upper primary school children

A total of 441 upper primary school children were included in the intervention group and 436 in the control group, with response rates of 96.7% (441/456) and 95.6% (436/456), respectively. The distribution of boys and girls was comparable between the two groups, with no significant difference observed ($p=0.421$). Participants were also evenly represented across all geographical zones, including Eastern, Southern, Northern, Middle, and East Malaysia, with no significant difference in zonal distribution between the intervention and control groups ($p=0.799$). The majority of participants in both groups were Malay. The sociodemographic characteristics of the upper primary school children are presented in Table III.

Table III: Sociodemographic attributes of upper primary school children

Variable	Intervention (n = 441)		Control (n = 436)		p value ^a
	n	(%)	n	(%)	
Sex					
Male	209	(47.4)	223	(51.1)	0.421
Female	232	(52.6)	213	(48.3)	
Zone					
Eastern	89	(20.2)	87	(20.0)	0.799
Southern	87	(19.7)	89	(20.4)	
Northern	88	(20.0)	83	(19.0)	
Middle	88	(20.0)	87	(20.0)	
East Malaysia	89	(20.2)	90	(20.6)	
Race					
Malay	401	(90.9)	415	(95.2)	<0.001
Non-Malay	40	(9.1)	21	(4.8)	

^aChi-Square

The group-time interaction of the RM ANOVA showed a significant difference in mean attitude score changes between the intervention and control groups after adjusting for sex and zone for Module 2A ($p<.001$), Module 2B ($p<0.004$) and overall, for the combination of Module 2A and Module 2B ($p<0.001$) (Table IV).

The group effect of the RM ANOVA showed a significant difference in mean attitude score changes between the intervention and control groups after adjusting for sex and zone for Module 2A [mean (95% CI): 87.8 (87.0, 88.6) versus 83.8 (83.0, 84.6), $p<0.001$], Module 2B [mean (95% CI): 80.7 (79.8, 81.6) versus 79.0 (78.1, 79.9), $p=0.008$], and overall, for combination of Module 2A and Module 2B [mean (95% CI): 76.6 (75.9, 77.2) versus 74.0 (73.4, 74.7), $p<0.001$].

Table IV: Comparisons of attitude toward sexual education among upper primary school children between the intervention and control groups

Group	n	Adjusted Mean ^a (SD ^b)		Adjusted Mean Diff. ^c (95% CI ^d)		F stat ^e (df ^f)	p-value ^g
		Base ^h	Post ⁱ	Base ^h	Post ⁱ		
Module 2A							
Intervention	441	81.6 (13.73)	94.0 (7.85)	81.6 (80.32, 82.79)	94.0 (93.26, 94.82)	49.92 (1)	< 0.001
Control	436	78.0 (12.68)	89.6 (8.80)	78.0 (76.80, 79.29)	89.6 (88.78, 90.34)		
Module 2B							
Intervention	441	70.6 (15.06)	90.8 (9.41)	70.6 (69.10, 72.03)	90.8 (89.83, 91.85)	7.05 (1)	0.008
Control	436	70.7 (16.30)	87.2 (12.07)	70.7 (69.24, 72.19)	87.3 (86.22, 88.26)		
Overall							
Intervention	441	69.1 (11.40)	84.0 (5.85)	69.2 (68.07, 70.22)	84.0 (83.42, 84.65)	30.56 (1)	<0.001
Control	436	67.6 (11.62)	80.4 (7.22)	67.6 (66.53, 68.70)	80.4 (79.75, 80.98)		

^aAdjusted Mean, ^bStandard deviation, ^cAdjusted Mean Diff, ^dConfidence interval, ^eF statistic, ^fDegree of freedom,

^gRM ANOVA, ^hBaseline, ⁱPost-intervention

DISCUSSION

The results provide strong evidence that the *SmartShield* program effectively enhances attitudes toward sexual abuse prevention among Malaysian primary school children, with notable improvements among intervention participants at both lower and upper primary levels compared to controls. These findings are consistent with previous studies that have similarly demonstrated the positive impact of structured school-based programs on children's attitudes toward sexual abuse prevention. A study conducted in Thailand among primary and secondary school students demonstrated that a whole-school program, adapted from the World Health Organization's life skills development framework, effectively fostered positive attitudes toward the prevention of sexual abuse and violence. The program's participatory learning approach significantly improved students' attitudes toward gender roles, equipping them with greater awareness of abuse prevention.¹⁵

Similarly, in Nigeria, a mobile health (mHealth) intervention delivered through a series of online modules over 12 weeks significantly improved students' mean attitude scores related to sexual and reproductive health, indicating a marked improvement following the intervention.¹⁶ This may be attributed to the support provided by the internet-based and mobile helpline sexual health information platform implemented in Nigeria since 2007. In Turkey, the implementation of a modular training program targeting both school children and their parents also led to significant improvements in parents' attitudes toward child sexual abuse prevention.¹⁷ In Zhejiang, China, a picture book prevention program significantly improved kindergarten children's attitudes toward recognizing potentially abusive situations and rejecting inappropriate touch requests through compelling message framing.¹⁸ Similarly, in the Guangdong and Yunnan provinces, a school-based online sexual education initiative known as 'You and Me,' delivered through cartoons over four to eight weeks, significantly improved vocational high school students' attitude scores toward sexual and reproductive health.¹⁹

In Delhi, India, an 'Assertiveness Training Program' for adolescent girls was found to be effective in strengthening attitudes toward sexual abuse prevention, with 70% demonstrating a favourable attitude and a significant correlation observed between knowledge and attitude.²⁰ A community-based intervention called '*Active Growth*' was implemented in secondary schools in Vietnam to promote child sexual abuse prevention. The program significantly improved positive attitudes, increasing from 22.2% to 54.0%. However, the findings also indicated that many children felt uncomfortable discussing sexual topics with parents and

teachers, which may have limited their ability to protect themselves or support others.²¹ The sex education coaching program implemented in elementary schools in Korea was associated with significantly improved sex-related attitudes among students.²² A study in Sumatra, Indonesia, utilized game-based learning through laptops and smartphones to educate primary school children about sexual health. Following the intervention, attitude scores toward safe sexual behaviour significantly increased from 30.0% to 47.8%.²³ The game-based learning approach has effectively delivered sexual education.²⁴

A school program called ‘Neither Ogres nor Princesses’ was implemented in Spain during the first year of secondary education, providing 20.7 hours of sex education over four years. The program significantly improved students’ attitudes, with girls showing better changes than boys.²⁵ However, in Kwangwon, South Korea, middle school students received a CD-ROM-based sexual violence prevention education. No significant differences in attitudes were found between the experimental and control groups. This may be due to limited access to the CD-ROM, which was restricted to a one-hour session during class time, with the post-test conducted eight days later.²⁶ Children’s attitudes towards sexual abuse prevention are often shaped by their parents’ level of awareness and beliefs. When parents are well-informed and conscious of the risks, they are more likely to engage in meaningful conversations and provide guidance that empowers their children to protect themselves.²⁷ Transparent and honest communication between parents and children regarding body safety and abuse prevention is essential in nurturing children’s attitudes, enhancing awareness, and promoting a more responsive and proactive strategy for their safety.²⁸

The strengths of *SmartShield* lie in its unique contribution from the Southeast Asian context, providing content tailored explicitly to Malaysia’s cultural and educational background, which sets it apart from many other interventions developed in different settings. For universal programs to be inclusive and effective across various populations, culturally sensitive program components should be included.²⁹ A review of CSA interventions in Asia shows that stopping CSA requires culturally sensitive approaches and better coordination between governments, NGOs, and local communities.³⁰

Furthermore, prior studies in Malaysia have mainly concentrated on moral education or general reproductive health.^{31,32} The *SmartShield* modules are innovative and contextually relevant because they primarily target CSA prevention with an emphasis on attitude improvement. Digital, video-based content facilitated consistent communication, improved implementation, and made the program adaptable, especially in situations with limited resources.^{33,34} Concise, targeted sessions align effectively with children’s attention spans and can be easily integrated into existing educational programs without disrupting the core curriculum. Nonetheless, this study has several limitations. First, it relied on self-reported attitudes, which may be subject to social desirability bias. Children may look around or feel peer pressure to align their answers with those of others, especially if the questions seem awkward or unfamiliar. Second, the follow-up period was relatively short (two to four weeks), which limited our ability to assess the long-term retention of attitude changes or their potential translation into behaviour. Third, although the sampling was broad, excluding students with learning difficulties may limit generalizability to children with special needs.

Future work should consider longer follow-ups to determine whether improved attitudes are sustained and whether they lead to the adoption of protective behaviours. The role of parents and teachers as co-facilitators could be explored to help reinforce learning beyond the classroom. In addition, adapting and validating the

SmartShield module for various cultural groups and language contexts within Malaysia, such as vernacular schools, may help broaden its accessibility and impact.

CONCLUSION

SmartShield has proven to be an effective intervention for improving attitudes related to sexual abuse prevention in primary school settings in Malaysia. The program used an age-appropriate, culturally sensitive, and interactive approach that helped engage students effectively. This highlights the importance of using school-based interventions that match children's developmental needs to promote personal safety. Including such programs in the national education curriculum can be a valuable step toward strengthening child protection and creating safer learning environments. Our findings suggest that *SmartShield* could be a scalable model for integrating national health initiatives into school health curricula. The Ministry of Education and related stakeholders could consider incorporating such modules into comprehensive child protection policies.

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CONFLICT OF INTEREST

There were no conflicts of interest between the contributors of this research.

INSTITUTIONAL REVIEW BOARD (ETHICS COMMITTEE)

Ethical approvals were obtained from the Human Research Ethics Committee, Universiti Sains Malaysia (USM/JEPeM/20110554).

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