

Parental knowledge and preventive role in child abuse: a cross-sectional study from a tertiary care hospital in Pakistan

Muhammad Asim Zahoor ¹, Fatima Tuz Zahra¹, Sadiq Muhammad¹, Fareeha Salman²

ABSTRACT

Objective: To assess the knowledge, attitudes, and preventive role of parents regarding child abuse (CA), and to identify factors influencing parental awareness in a tertiary care hospital setting in Pakistan.

Methods: This cross-sectional study was conducted at Mayo Hospital, King Edward Medical University, Lahore, Pakistan, from January to September 2022. A total of 114 parents of children aged ≤ 12 years were enrolled through non-probability convenience sampling. Data were collected using a pre-validated, bilingual (English and Urdu) self-administered questionnaire, adapted with permission. Demographic variables and responses to Likert-scale items assessing parental knowledge and practices related to child abuse prevention (CAP) were analyzed using SPSS v26. Chi-square test was applied to assess associations, with $p < 0.05$ considered statistically significant.

Results: The mean age of respondents was 33.7 ± 6.5 years; 60.5% were mothers. Most participants (91.2%) lived in two-parent households. While 89.5% agreed that educating children about CAP is essential, only 68.1% had discussed CAP with their children. The mean age of children suggested for CAP education was 5.9 ± 2.3 years. Knowledge gaps were observed, especially regarding physical signs of abuse and misconceptions about perpetrators. Significant associations were found between demographic variables (age, education, income) and CAP-related beliefs ($p < 0.05$). Only 5.3% reported their child had participated in a formal CAP program.

Conclusion: Although parents recognize the importance of child abuse prevention, actual engagement in preventive education remains suboptimal. Efforts should focus on structured CAP programs and parent-targeted interventions, especially in families with younger children or limited education.

Keywords: Child (MeSH); Child Abuse (MeSH); Child abuse prevention (Non-MeSH); Parents (MeSH); Role of parents (Non-MeSH), Knowledge (MeSH); Education (MeSH); Pakistan (MeSH)

THIS ARTICLE MAY BE CITED AS: Zahoor MA, Zahra FT, Muhammad S, Salman F. Parental knowledge and preventive role in child abuse: a cross-sectional study from a tertiary care hospital in Pakistan. *Khyber Med Univ J* 2025;17(2):157-63. <https://doi.org/10.35845/kmu.2025.23377>


INTRODUCTION

Child abuse (CA) remains a pervasive global issue. International estimates indicate that approximately 25–50% of children experience physical abuse, while 20% of girls and 5–10% of boys are subjected to sexual abuse. Emotional abuse is reported in 24–30% of girls and 28–29% of boys.¹ In Pakistan, Sahil's Cruel Numbers report recorded 3,364 child abuse cases in 2024, averaging nine cases per day. Victims were 53% girls and 47% boys, mostly aged 11–15 years, though even children under five were affected. Punjab accounted for 78% of cases, and 93% were police registered. Of these, 1,828 involved

sexual abuse, including 56 murders.²

Every child has the right to grow up in a safe, supportive, and nurturing environment. Preventing child abuse, whether physical, emotional, sexual, or due to neglect, requires action at all levels of society, including individual, relational, community, and societal. Effective strategies include parental education and support programs, early and routine screening for children and families, access to quality childcare, interventions for abused children, life skills training for youth, and family support services.³ Integrating prevention efforts into existing systems and promoting public awareness through media campaigns are also

- 1: Undergraduate Medical Students, King Edward Medical University, Lahore, Pakistan
- 2: Department of Community Medicine, King Edward Medical University, Lahore, Pakistan

Email : asimgujar3321@gmail.com
Contact #: +92-300-8671921

Date Submitted: May 31, 2023
Date Revised: May 22, 2023
Date Accepted: June 05, 2025

essential components.⁴

Child abuse adversely impacts nearly all domains of a child's development, including cognitive, linguistic, socio-emotional, and neurobiological growth.⁵ Numerous childhood and adolescent neurological disorders, such as internalizing and externalizing disorders, trauma- and stress-related conditions, neurodevelopmental disorders, and substance use disorders, have been strongly associated with experiences of abuse.⁶ It is therefore crucial to acknowledge that child abuse is not a minor psychological disturbance to be overlooked;⁷ rather, it must be identified and addressed as early as possible to prevent long-term harm.

Despite international and regional efforts to raise awareness and curb its incidence, there remains a significant need to provide child abuse prevention (CAP) education—particularly targeting parents. Children, too, require structured education to foster interpersonal understanding, develop self-protection skills, and manage their emotions effectively. Unfortunately, a large proportion of children globally lack this vital emotional education. It is unrealistic to expect parents alone to bear this responsibility. Hence, universal, large-scale CAP initiatives must be developed and institutionalized, potentially even enforced through legislative measures.

In Pakistan, rising cases of child abuse reported annually,² despite legal frameworks and awareness campaigns, highlight persistent gaps in prevention at the family and community levels. Parents, as primary caregivers, play a crucial role in early recognition,

protection, and response to abuse. However, there is limited empirical evidence assessing their knowledge, attitudes, and practices regarding child abuse prevention in the local context.

The present study aims to address this gap by evaluating the preventive role of parents in protecting children from abuse. By exploring parental awareness and readiness, the findings will inform targeted educational interventions and pave the way for further research in this critical yet underexplored area.

METHODS

This cross-sectional study was conducted at Mayo Hospital, King Edward Medical University, Lahore, Pakistan, from January to September 2022. A sample of 114 parents was estimated using a 95% confidence level, 5% margin of error, and an expected prevalence of 8% for parents with good knowledge about child abuse.⁸ The sample size was calculated using the formula:

$$n = \frac{Z^2 \cdot p \cdot q}{1 - \alpha/2} \times \frac{1}{d^2}$$

Here, $Z_{1-\alpha/2}$ = Confidence level 95% = 1.96; p = prevalence 8%; q = $1-p$; and d = absolute precision 5%

Participants were selected through non-probability convenience sampling based on availability and willingness to participate. Inclusion criteria required participants to be parents of at least one child aged ≤ 12 years. Parents of critically ill children were excluded to avoid undue stress.

Data collection involved a self-administered questionnaire, adapted and modified with permission from a previously validated tool.⁹ The questionnaire, available in both English and Urdu for lexical equivalence, covered demographic information and assessed the preventive role of parents in child abuse. Written informed consent was obtained from all participants.

Data were entered and analyzed using SPSS version 26. Quantitative variables such as age, number of children, and income were reported as Mean \pm SD and Median. Qualitative variables, including gender, marital status, and religion, were expressed as frequencies and percentages. Chi-square test was applied to determine statistical

significance, with a p -value < 0.05 considered significant.

RESULTS

A total of 114 parents participated in the study, with the majority being mothers (60.5%), followed by fathers (36%). Most participants (91.2%) reported that their child lived in a two-parent family (Table I). The predominant age group of parents was 31–40 years (51.8%), with a mean age of 33.7 ± 6.5 years. The majority were married (91.2%). Regarding education, 34.2% had not completed high school, and only 7% held graduate degrees, while 14% had never attended school. Most families had three to four children (46.5%), and 63.7% reported a monthly income between Rs. 5,000 and Rs. 25,000. Nearly all participants were Muslim (95.6%).

Participants demonstrated a generally high level of awareness regarding CA (Table II). Most agreed that CA is a global problem (93.9%) and acknowledged that abusers are likely to reoffend (93%). A large majority recognized that both boys and girls can be victims and that abuse is often perpetrated by men (76.3%) and even by women (83.4%). Most respondents believed abused children can be trusted (95.7%) and that children are harmed by such experiences (84.2%). While a few expressed concerns that CAP education might lead children to learn too much about sexuality (61.4% agreed or strongly agreed), the overwhelming majority supported CAP education (99%), use of educational materials (98.3%), and discussing the issue with their children (87.7%). However, 35.1% did not perceive CA as a potential risk within their own families. Importantly, 71.1% agreed that CAP education could help prevent victimization, and 63.2% believed it empowers children to resist abuse. These findings indicate overall positive attitudes toward CAP and a strong parental willingness to engage in preventive education.

Statistically significant associations were observed between demographic variables and specific CAP beliefs. Notably, parental relationships with the child were significantly linked with the belief that abuse can occur in any family ($p=0.001$). Age of respondents was

significantly associated with beliefs about the importance of audiovisual CAP materials ($p=0.036$), the absence of physical evidence in abuse ($p=0.023$), and the effectiveness of CAP education in preventing abuse ($p=0.007$). Additionally, both age ($p=0.000$) and monthly income ($p=0.003$) were significantly associated with the perception that their child could be at risk for abuse.

The figures (1a to 1e) collectively provide a narrative on parental awareness and practices related to CAP. Most respondents (Figure 1a) believed that children should learn about child abuse primarily from their parents, schools & place of worship, indicating a strong perceived role of both family and educational institutions in delivering CAP education. When asked to define child abuse (Figure 1b), most parents identified physical abuse as the main form, although some also acknowledged sexual and emotional abuse, suggesting a partial understanding of the broader spectrum of abuse types.

Among those who had discussed CAP with their children (Figure 1c), common guidance included instructing the child to report the incident, run away or scream, reflecting an encouraging level of parental engagement in preparing children to respond to abuse. In terms of perceived perpetrators (Figure 1d), parents most frequently mentioned strangers, relatives, and teachers, demonstrating awareness that abuse may be committed by both familiar and unfamiliar individuals.

However, a significant proportion of parents had not discussed CAP with their children. As shown in Figure 1e, the most cited reason was that their children were considered too young to understand the issue. This points to a need for raising awareness about age-appropriate CAP education and empowering parents to initiate such conversations early.

DISCUSSION

The present study aimed to assess parental awareness and attitudes regarding CAP and the role parents can play in safeguarding their children. The

Table I: Demographic profile of participating parents (n = 114)

Characteristics		Frequency	Percentage
Relationship with child	Father	41	36.0
	Mother	69	60.5
	Other	4	3.5
Number of children	One	12	10.5
	Two	30	26.3
	Three - four	53	46.5
	>four	19	16.7
Where does your child live?	In a two-parent family	104	91.2
	With a single parent (mother)	6	5.3
	With a single parent (father)	1	0.9
	With others	3	2.6
Age of parents/guardians	<20 – 30 years	42	36.8
	>30 – 40 years	59	51.8
	>40 years	13	11.4
	Mean ± standard deviation	33.7±6.5	
Marital status	Married	106	91.2
	Widow/widower	4	3.5
	Separated	4	3.5
Education level	Never attended school	16	14.0
	Didn't complete high school	39	34.2
	High school	28	24.6
	Some college	5	4.4
	2-years college	7	6.1
	4-years college	0	0.0
	Graduate degree	8	7.0
	Post-graduate education	11	9.6
Monthly income	No income	1	0.9
	< Rs. 5000	5	4.4
	Rs. 5000 – 15000	38	33.6
	> Rs. 15000 – 25000	34	30.1
	> Rs. 25000 – 35000	11	9.7
	> Rs. 35000	24	21.2
Religion	Islam	109	95.6
	Christianity	5	4.4
	Hinduism	0	0.0
	Sikhism	0	0.0
	Other	0	0.0

findings revealed generally positive attitudes among parents, with a high level of awareness about the prevalence and consequences of child abuse. A substantial majority recognized that abuse could affect both boys and girls and acknowledged its serious emotional and physical consequences. Most parents also supported CAP education and believed in the importance of teaching children how to protect themselves.

While most parents demonstrated good awareness, certain misconceptions and gaps persisted. For example, more than one-third of respondents did not believe that child abuse could happen in their own families, reflecting a common cognitive bias of perceived immunity. This phenomenon is not uncommon and even in developed countries like Australia, research has shown that child abuse remains largely overlooked and underestimated. Many people are unaware of its true scale and impact, often failing to recognize how widespread it is or the significant risks that children and young people face, even within their own homes.¹⁰

Although a considerable number of parents in our study expressed concern that CAP education might expose children prematurely to sexual content, global evidence indicates otherwise, comprehensive sexuality education programs across 87 countries have shown no association with earlier initiation or increased frequency of sexual activity; in fact, 37% reported delayed initiation and 31% observed decreased sexual frequency.¹¹ These findings emphasize the need for public health messaging that balances protective education with age-appropriate content.

Encouragingly, most parents expressed a willingness to engage in CAP, particularly by discussing safety strategies with their children and supporting the use of audiovisual educational materials. Nevertheless, a significant subset of parents (31.9%) had never discussed CAP with their children, with the predominant reason being the perception that the child was too young. In light of our findings, it is critical to emphasize that global evidence underscores the vulnerability

Table II: Parental knowledge and attitudes regarding child abuse and preventive education

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
CA problems exist around the world	2 (1.8)	2 (1.8)	3 (2.6)	32 (28.1)	75 (65.8)
A person who has abused a child will likely repeat the offence	3 (2.6)	2 (1.8)	3 (2.6)	24 (21.1)	82 (71.9)
Men abuse children in most cases	4 (3.5)	13 (11.4)	10 (8.8)	40 (35.1)	47 (41.2)
Females can abuse children	6 (5.3)	8 (7.0)	5 (4.4)	49 (43.0)	46 (40.4)
Boys are also abused	4 (3.5)	5 (4.4)	5 (4.4)	46 (40.4)	54 (47.4)
Girls are generally more abused than boys	3 (2.6)	4 (3.5)	2 (1.8)	36 (31.6)	69 (60.5)
Abused child will be held back from disclosing the episode by the abuser	5 (4.4)	4 (3.5)	11 (9.6)	49 (43.0)	45 (39.5)
Children who report being abused can be believed	1 (0.9)	2 (1.8)	2 (1.8)	24 (21.1)	85 (74.6)
CAP education may induce your child to know too much about sexuality	11 (9.6)	15 (13.2)	18 (15.8)	39 (34.2)	31 (27.2)
Books or audiovisual material should be taught to children dealing with CAP	1 (0.9)	1 (0.9)	0 (0.0)	18 (15.8)	94 (82.5)
Usually there is no physical evidence if a child has been abused	7 (6.1)	23 (20.2)	28 (24.6)	28 (24.6)	28 (24.6)
I can effectively discuss about CAP with my child	1 (0.9)	7 (6.1)	6 (5.3)	27 (23.7)	73 (64.0)
Most abused children are harmed by their experience	10 (8.8)	5 (4.4)	3 (2.6)	26 (22.8)	70 (61.4)
CA can happen in other families, as well as mine	40 (35.1)	16 (14.0)	21 (18.4)	22 (19.3)	15 (13.2)
CA is done mostly by the relatives	6 (5.3)	7 (6.1)	11 (9.6)	54 (47.4)	36 (31.6)
It is important to educate children about CAP	0 (0.0)	0 (0.0)	1 (0.9)	11 (9.6)	102 (89.5)
I find it important to inform my child that CA is never the child's fault	2 (1.8)	4 (3.5)	4 (3.5)	28 (24.6)	76 (66.7)
CAP education is a good way to prevent victimization against CA	2 (1.8)	0 (0.0)	3 (2.6)	28 (24.6)	81 (71.1)
CAP education improves the chance that the child would refuse to cooperate with an abuser	1 (0.9)	2 (1.8)	1 (0.9)	38 (33.3)	72 (63.2)
My child is at the age where he/she could be at risk for CA	14 (12.3)	9 (7.9)	9 (7.9)	29 (25.4)	53 (46.5)
CA is as bad as most people think	2 (1.8)	6 (5.3)	2 (1.8)	27 (23.7)	77 (67.5)

P value < 0.05 was considered as significant based on Chi Square test; CA: Child abuse; CAP: Child abuse prevention. Data is presented in frequency (percentage)

Table III: Associations between parental demographics and child abuse prevention beliefs

Statements	p value with demographic variables			
	Relationship to child	Age of respondents	Education	Monthly income
Books or audiovisual material should be taught to children dealing with Child Abuse Prevention	-	0.036	-	-
Usually there is no physical evidence if a child has been abused	-	-	0.023	-
Child Abuse can happen in other families, as well as mine	0.001	-	-	-
CAP education is a good way to prevent the victimization against Child Abuse	-	0.007	-	-
My child is at the age where he/she could be at risk for Child Abuse	-	0.000	-	0.003

P value < 0.05 was considered as significant based on Chi Square test

of children aged 10–14, who are universally considered "too young" to make informed and voluntary transitions in sexual and reproductive matters.¹² Therefore, policies and educational interventions should prioritize capacity building and supportive environments for this age group to safeguard their rights and well-being.

Significant associations were observed between demographic variables and parental beliefs CAP. The parent–child relationship was linked to the belief that abuse can occur in any family (p=0.001), with primary caregivers showing greater awareness. Parental age was significantly associated with acceptance of audiovisual CAP materials (p=0.036), recognition that

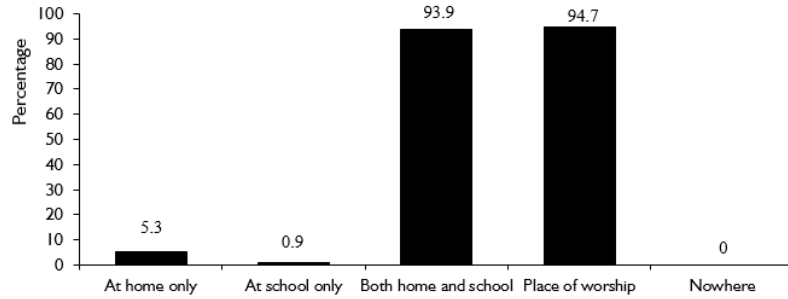


Figure 1 (a): Response to the question: “Where should children learn about child abuse?” (in percentage).

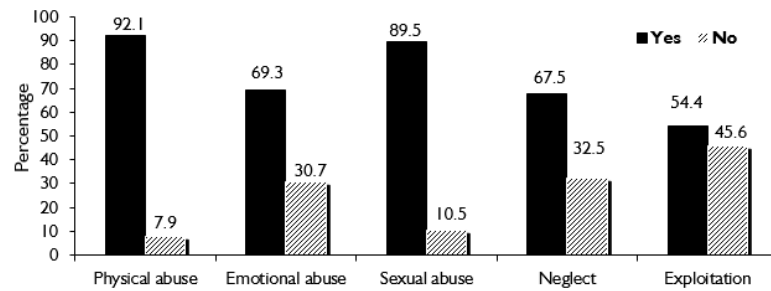


Figure 1 (b): Response to the question: “What do you think child abuse is?” (in percentage).

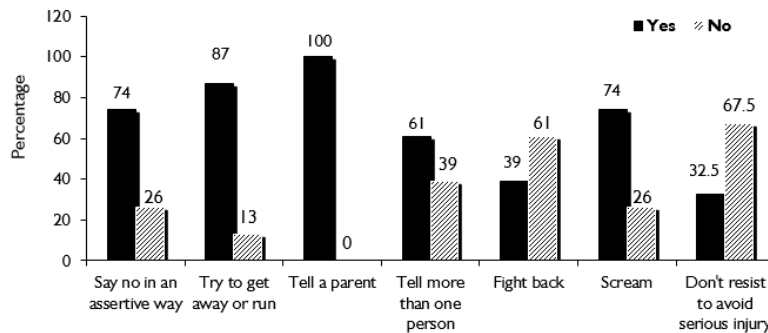


Figure 1 (c): Response to the question: “What have you told your child to do in case someone tries to abuse them?” (in percentage).

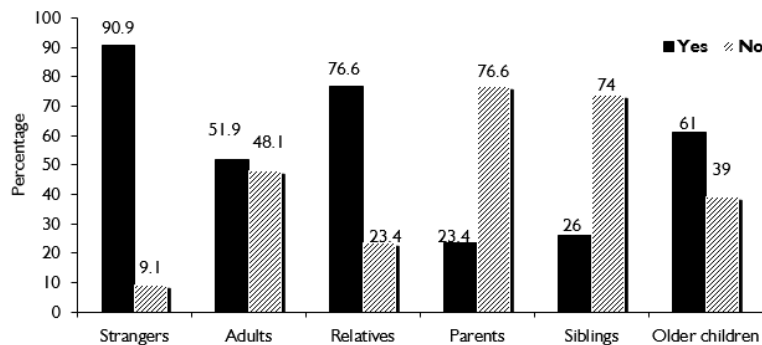


Figure 1 (d): Response to the question: “What kind of people have you told your child might try to abuse children?” (in percentage).

abuse may lack physical signs ($p=0.023$), and belief in CAP's preventive value ($p=0.007$). Additionally, both age ($p=0.000$) and income ($p=0.003$) influenced perceptions of their child's vulnerability to abuse. Systematic review evidence suggests that children's age, parental attitudes toward media, and parental involvement significantly predict both restrictive and active mediation approaches. Moreover, the type of media, sample age group, and regional context further moderate these associations, emphasizing the need for culturally and developmentally tailored CAP interventions.¹³

The visual data highlighted key themes related to parental involvement in CAP. Parents identified themselves, schools, and places of worship as primary sources of CAP education. While physical abuse was the most recognized form, many also acknowledged the existence of sexual and emotional abuse. Among parents who had discussed CAP with their children, most advised them to report the abuse, scream, or escape if faced with danger. Strangers, relatives, and teachers were frequently cited as potential abusers. In contrast, parents who had not engaged in CAP discussions often believed their child was too young-underscoring the need for age-appropriate, targeted education. These findings emphasize the critical role of educators in child protection. As supported by existing literature, teachers share a responsibility with parents and communities to safeguard the well-being of children and young people.¹¹

Child abuse in Pakistan is a complex issue that demands a coordinated, multi-level response. While many parents have a positive attitude toward child abuse prevention (CAP), they need more support, accurate information, and practical tools to take effective action. Tailored programs based on parents' age, education, and income can enhance their ability to protect children.¹⁴ Involving schools, religious institutions, healthcare providers, and media can reinforce CAP messages and encourage open discussions. Child-focused education should empower children to recognize

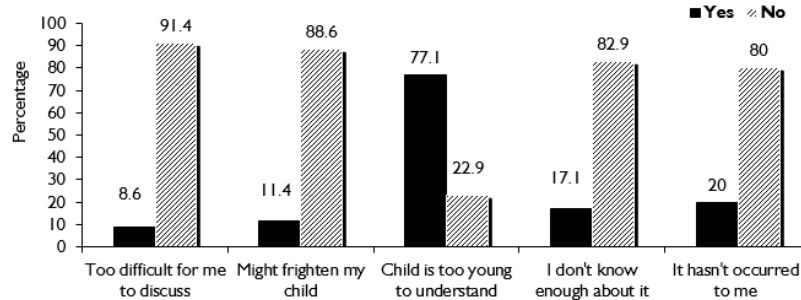


Figure 1 (e): Response to the question: "Why haven't you discussed about CAP with your child/children?" (in percentage).

abuse and assert their right to safety. Beyond awareness, lasting prevention requires sustained education, policy support, and community engagement. A collective effort from families, institutions, and policymakers is essential to build a safe, abuse-free environment for all children.

Limitations of the study

This study was limited by its single center design and relatively small sample size, which may affect the generalizability of the findings. Additionally, reliance on self-reported data may have introduced social desirability bias, potentially influencing participants' responses regarding their attitudes and practices.

CONCLUSION

This study highlights that while parental awareness regarding child abuse and its prevention is generally positive, significant misconceptions and knowledge gaps persist. A considerable number of parents underestimate their own child's vulnerability or believe children are too young for preventive education. Encouragingly, most parents acknowledged the value of CAP education and expressed willingness to engage in protective practices. These findings highlight the urgent need for culturally sensitive, age-appropriate educational interventions and policy-level support to empower parents and communities in creating a safer environment for children. Strengthening awareness, dismantling misconceptions, and fostering open dialogue between parents, educators, and policymakers are essential steps toward a sustained child protection framework in Pakistan.

ACKNOWLEDGEMENT

We are thankful to all the parents and guardians who participated in this study. This research was supported by Department of Community Medicine, King Edward Medical University Lahore, Pakistan. We are grateful to Hafeez Khosa, Nour Abu Salah, Rohma Kahooker, Sharafat Ali and Muhammad Tayyab Arshad who all took part in data collection.

REFERENCES

- Promoting research to prevent child maltreatment. Istanbul, turkey. XIXth International congress on child abuse and neglect. September,2012;2,5. [Accessed on: November 15, 2021]. [Accessed on: May 04, 2025]. Available from URL: https://www.who.int/violence_injury_prevention/violence/child/ispsca_n_report_june2013.pdf
- Bano M. SAHIL Cruel Numbers 2-024: A compilation of statistics on child sexual abuse reported cases in Pakistan. [Accessed on: May 04, 2025]. Available from URL: <https://drive.google.com/file/d/1BiZQB4r46gbYR88plzov08iuLzj606/view>
- Prevent child abuse -America. Prevention programs: An approach to prevent child abuse. [Accessed on: November 15, 2021]. Available from URL: <https://preventchildabuse.org/resource/an-approach-to-prevent-child-abuse/>
- Daro D, Donnelly AC. Child abuse prevention: accomplishments and challenges. In Myers JEB, Berliner L, Briere J, Hendrix CT, Jenny C, Reid TA (Eds.), The APSAC handbook on

child maltreatment. 2002;2nd Ed:pp:431-48. Sage Publications, Inc.

- Cicchetti D. Socioemotional, personality, and biological development: Illustrations from a multilevel developmental psychopathology perspective on child maltreatment. *Ann Rev Psychol* 2016;67:187-211. <https://doi.org/10.1146/annurev-psych-122414-033259>
- Zeanah CH, Humphreys KL. Child abuse and neglect. *J Am Acad Child Adolesc Psychiatry* 2018;57(9):637-44. <https://doi.org/10.1016/j.jaac.2018.06.007>
- Teicher MH. Adoptee rage. The wounds that time won't heal-the neurobiology of child abuse. December 22, 2015. [Accessed on: November 15, 2021]. Available from URL: <http://adopteerage.blogspot.com/2015/12/the-wounds-that-time-wont-heal.html>
- Devi AK, Mrs. Yadav R. Knowledge regarding child abuse among parents. *Int J Adv Nurs Management* 2016;4(3):191-3. <https://doi.org/10.5958/2454-2652.2016.00044.5>
- Burgess ES, Wurtele SK. Enhancing parent-child communication about sexual abuse: A pilot study. *Child Abuse Negl* 1998;22:1167-75. [https://doi.org/10.1016/s0145-2134\(98\)00094-5](https://doi.org/10.1016/s0145-2134(98)00094-5)
- Tucci J, Mitchell J. Still Unseen Ignored: Tracking community knowledge and attitudes about child abuse and child protection in Australia. August 2021. Australian Childhood Foundation. [Accessed on: April 08, 2025]. Available from URL: <https://www.childhood.org.au/app/uploads/2021/08/Still-unseen-and-ignored-report-FINAL-REPORT-17aug21.pdf>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). International Technical Guidance on Sexuality Education. The rationale for sexuality education. December 2009. [Accessed on: March 01, 2025]. Available from URL:

- <https://unesdoc.unesco.org/ark:/48223/pf0000183281/PDF/183281eng.pdf.multi>
12. Dixon-Mueller, R. How Young is “Too Young”? Comparative perspectives on adolescent sexual, marital, and reproductive transitions. *Stud Fam Plann* 2008;39(4):247-62.
13. Wang M, Lwin MO, Cayabyab Y-MTM, Hou G, You Z. A Meta-analysis of factors predicting parental mediation of children's media use based on studies published between 1992–2019. *J Child Fam Stud* 2023;32:1249-60. <https://doi.org/10.1007/s10826-022-02459-y>
14. Ahmed M. Child Abuse in Pakistan: Understanding the Crisis and Seeking Solutions. *British Pakistani Index*. [Accessed on March 30, 2025]. Available from URL: <https://pakistaniindex.org/2024/05/child-abuse-in-pakistan-understanding-the-crisis-and-seeking-solutions/>

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

MAZ: Acquisition, analysis and interpretation of data, drafting the manuscript, critical review, approval of the final version to be published

FTZ & SM: Acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

FS: Conception and study design, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors declared no specific grant for this research from any funding agency in the public, commercial or non-profit sectors

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request



This is an Open Access article distributed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

KMUJ web address: www.kmu.edu.pk

Email address: kmu@kmu.edu.pk