# RESEARCH



# Prevalence of child abuse and common mental comorbidity among university of Khartoum medical students, Khartoum, Sudan

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## Abstract

**Introduction** Child abuse and neglect are significant public health issues worldwide, with severe and lasting effects on children's mental and physical well-being. Despite being prevalent in Sub-Saharan Africa, including Sudan, limited research has been conducted on this topic. This study investigates the prevalence of childhood abuse and neglect among Sudanese medical students and explores its impact on their mental health.

**Methods** This cross-sectional study involved 313 medical students from the University of Khartoum. Participants completed a self-administered questionnaire that included the Childhood Trauma Questionnaire (CTQ-28) and the General Health Questionnaire (GHQ-12). Statistical analyses were conducted using non-parametric tests and multiple linear regression to identify correlations and predictors of psychological distress. Propensity score matching was also performed to check the effect of gender matching on the results.

**Results** Approximately 40% of students reported experiencing childhood trauma, with sexual abuse (23.3%) and emotional neglect (19.2%) being the most common types. Female students reported higher levels of psychological distress (p=0.049). Students who experienced abuse or sexual assault had significantly higher distress levels (p=0.001 and p=0.014, respectively). Still, this significance disappeared after matching Emotional abuse showed the strongest correlation with psychological distress (r=0.405), followed by emotional neglect (r=0.232). Regression analysis revealed that past abuse, sexual assault, and emotional abuse were significant predictors of distress, with emotional abuse having the most substantial impact both before (p<0.001) and after matching (p-value=0.005).

**Conclusion** Childhood maltreatment is common among Sudanese medical students and significantly affects mental health, particularly emotional abuse and neglect. The only type of abuse which significantly contributed to psychological distress was emotional abuse. More focus is needed towards emotional abuse as it is still hidden, unlike physical and sexual abuse, which show visible marks. More researches need to be done toward addressing the domains of emotional abuse and how to prevent it.

Keywords Child abuse, Mental health, Medical students, Sudan

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## Introduction

The number of children (0-14 years old) is estimated to be 2 billion in the world [1], which comprises 27% of the world's population. They are vulnerable to many risk factors that affect their quality of life and life expectancy; child abuse and neglect are among them.

The WHO stated that child abuse and neglect are serious public health problems, and defined it as "the abuse and neglect that occurs to children under 18 years of age. It includes all types of physical and/or emotional ill-treatment, sexual abuse, neglect, negligence and commercial or other exploitation, which results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power" [2].

Physical abuse, psychological abuse, sexual abuse, and neglect are the four primary categories of abuse. Child abuse is defined as an action taken when providing care that could cause harm, whereas neglect is described as an action taken when failing to give care [3].

Child Protective Services looks into allegations of child abuse and neglect involving millions of children annually. Of the nearly 3.2 million children who were the subject of child abuse allegations in 2014, 20% had mistreatment proof [4].

However, worldwide research indicates that around 3 out of 4 children between the ages of 2 and 4 frequently experience physical abuse and/or psychological abuse at the hands of their parents or other carers, while 1 in 5 women and 1 in 13 men report experiencing sexual abuse throughout their childhood [2].

An estimated 40,150 children under the age of eighteen die from homicide each year, some of which are probably the result of maltreatment of the children. This figure most likely understates the actual scope of the issue because a sizable percentage of child abuse-related deaths are mistakenly linked to falls, burns, drownings, and other incidents [2].

Girls are especially vulnerable to sexual violence, exploitation, and abuse by fighters, security forces, members of their communities, relief workers, and others in armed conflict and refugee circumstances [2].

Maltreatment of children frequently has serious short- and long-term effects on mental health. The consequences of interpersonal trauma differ from person to person and even within the same person over time. Many traumatised children do not acquire post-traumatic stress disorder (PTSD) or other disorders [5]. Individuals who experience interpersonal trauma in childhood are at increased risk for numerous common mental disorders, including attachment disorders, PTSD, depression and anxiety disorders, oppositional or conduct disorders, eating disorders, self harm and personality disorders [6–11]. Sudan is one of the largest countries in Africa. UNI-CEF estimates that over 50% of African children suffer from physical, emotional, or sexual assault on a yearly basis. Almost three out of four youngsters in sub-Saharan Africa endure severe discipline from their carers. Africa contains 41.8% of girls and 39.1% of boys worldwide, making it the continent with the greatest rate of child maltreatment [12].

Evidence suggests that there are significant levels of mental health disorders among children and adolescents in Sub-Saharan Africa. One in 7 children and adolescents faces substantial challenges, and one in every ten (9.5%) has a particular mental disorder. There are established sociodemographic correlations of psychopathology that may position children in places of severe hardship at the highest risk [13]. Numerous mental diseases have been linked to exposure to childhood maltreatment (i.e., abuse and/or neglect) [14].

According to recent epidemiological research, negative childhood experiences are linked to the onset of common mental disorders in about one-third of cases throughout life, highlighting the importance of these exposures for public health [14]. Not enough research has been done on this grave problem, despite the fact that child abuse affects people all over the world and has terrible longterm impacts on adults. In order to provide some insight into the scope of the problem, our goal in this study is to estimate the prevalence of child abuse. To be of assistance, we not only record assaults but also pay close attention to the specifics of the interaction between the abuse victims and the perpetrators, as well as the conditions and risk factors.

## **Materials and methods**

## Study design

This is an analytical, institutional and cross-sectional study carried out at the oldest medical school in Sudan, the Faculty of Medicine, University of Khartoum, which was founded in 1924 as the Kitchener School of Medicine. It is worthwhile to find out about the mental health of the students at this faculty, as they will mostly be Sudan's leading future medical professionals.

#### **Study population**

This is a study conducted among undergraduate medical students (MBBS) at Khartoum University's Faculty of Medicine. During the period of study, the total number of students was 2309, with seven batches (two batches were studying in the third year). Medical students were chosen for the study because they were more open to discussing such things and had stronger recall of past incidents. We used the simplified formula for proportions

$$n = \frac{N}{1 + Ne^2}$$

N = population size; -n = sample size -e is an appropriate sampling error. p = 0.5 and a 95% confidence level is assumed. Based on the study population, 341 students were determined to be the sample size. Using stratified systematic random sampling, the desired number of students was attained; consequently, a probability proportional to the sampling strategy was employed by calculating the number of students required from each batch in relation to the entire student population (participants were chosen at random using the Wheel of Names website).

#### Inclusion criteria

All students are included in the study.

#### Exclusion criteria

- 1. Students who decline to take part.
- 2. Any student who was unresponsive after three tries.
- 3. Any students whose contact information couldn't be located.

#### Data collection method and tools

Students' data was collected using a Google Form. Before data collection, a pilot survey was done to test the clarity and acceptability of questions and check for errors or questions that were difficult to comprehend. We employed a structured, closed-ended self-administered questionnaire composed of: a socio-demographic section, a childhood trauma questionnaire (CTQ) and a general health questionnaire (GHQ-12). The CTQ and GHQ-12 questionnaires are validated questionnaires used for childhood abuse and common mental disorders (CMDs), respectively.

We used the GHQ-12 (binary version). It is widely used questionnaire which was validated before in previous study [15]. It consists of 12 questions scored on a Likert 4-point scale from 0 to 3, to generate total scores ranging from 0 to 36. High scores indicate psychological distress. A score above or equal to a specific cut-off [11] indicates further investigation for potential common mental disorders [15, 16].

The 28-item CTQ is a retrospective self-administered instrument that was validated in previous study [17]. It is divided into six subscales that measure the intensity of various forms of childhood trauma: emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect and denial or minimization. The last scale (denial) is used to adjust for the underreporting of the abuse. Each trauma subscale receives a score between 5 and 25, except the Minimization/Denial scale, which is between 0 and 3. Also, we can dichotomize each of the five CTQ-SF dimensions into severe and non-severe, using the cutoff proposed by Bernstein & Fink, Citation 1998 in their original work. These cut-off scores were above or equal to: 13,10,8,15, and 10 for emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect, respectively [17]. For the menimization scale, item by item cut-off of 5 was used to indicate positive denial. Then the positive score in the containing 3 items represented: 1 denial score, 2 denial score and 3 denial score [18]. Regarding the total childhood trauma scale, a cut-off of 40 was used to indicate the presence of childhood trauma [19].

#### Data analysis

SPSS version 26 was used to clean and organize the data. Then normal distribution was assessed for all continuous variables, which yielded a non-normal distribution (p-value>0.001).

Frequency and descriptive statistics were used to present the whole data. Mann-Whitney test and Kruskal-Wallis test were used to determine the differences across socio-demographic characteristics and history of abuse/ trauma against the general mental health questionnaire scale (GHQ-12). The same tests were also used to determine the differences across sociodemographic data against the childhood trauma questionnaire scale (CTQ-SF). Spearman's rho test was used to assess the correlation between age and different domains of the childhood trauma questionnaire against the general mental health scale. Finally, multiple linear regression for the general mental health scale was used. The variables with *p*-values less than 0.05 from previous tests have been selected to enter the model. As the childhood trauma scale showed the highest multicollinearity, it was removed from the model. Moreover, the regression model has been controlled for the denial variable as it was inserted in Step 1, and the rest of the variables were inserted in Step 2. The idea of controlling it comes from the main aim of this variable, as it is used to assess the accuracy of self-reporting. In all tests, a *p*-value of 0.05 was used as the level of significance.

Propensity score matching was performed using the R program V 4.4.3. The matching was performed based on gender (male and female) under the effect of covariates that can contribute to it. These covariates were: academic year, marital status, income and residency. The matching algorithm was nearest neighbour with ratio 1:1 and calibre 0.2. The rest of the analysis was done just as previously mentioned for the data before the matching using SPSS version 26.

#### Results

#### Socio-demographic characteristics

The total number of medical students included was 313. The majority of them (68.7%) were females. Almost all of the sample (98.4%) were single, and the majority of them (89.9%) were living in urban areas. Only 50 students (16%) had an income less than 100 thousand SDGs (almost 40 US\$). 298 students (92.6%) had two biological parents, and only 12 students (3.8%) had single biological parents. Propensity score matching was performed based on gender and by covariates by: academic year, marital

**Table 1** The table shows the socio-demographic characteristics of the students and the univariate analysis regarding general mental health questionnaire scale

Variables		Frequency (%)	
		Before match-	After
		ing (N=313)	matching (N=188)
Age		21 (4) <sup>a</sup>	21 (4) <sup>a</sup>
Sex	Male	98 (31.3%)	94 (50%)
	Female	215 (68.7%)	94 (50%)
Academic	6th year	42 (13.4%)	17 (9%)
year	5th year	56 (17.9%)	26 (13.8%)
	4th year	36 (11.5%)	21 (11.2%)
	3rd year group (B) <sup>c</sup>	50 (16%)	31 (16.5%)
	3rd year group (A) <sup>c</sup>	46 (14.7%)	31 (16.5%)
	2nd year	44 (14.1%)	38 (20.2%)
	1st year	39 (12.5%)	24 (12.8%)
Marital Status	Single	308 (98.4%)	186 (98.9%)
	Married	4 (1.3%)	2 (1.1%)
	Divorced	1 (0.3%)	0 (0%)
family	less than 100.000 SDG	50 (16%)	39 (20.7%)
income (per	100.000–199,000 SDG	62 (19.8%)	34 (18.1%)
month)	200.000-299.000 SDG	56 (17.9%)	27 (14.4%)
	300.000-399.000 SDG	51 (16.3%)	29 (15.4%)
	400.000 SDG and above	94 (30%)	59 (31.4%)
Residency	Rural	32 (10.2%)	17 (9%)
	Urban	281 (89.8%)	171 (91%)
Level of	Not educated	7 (2.2%)	6 (3.2%)
mother	Primary school	17 (5.4%)	11 (5.9%)
education	Secondary school	80 (25.6%)	48 (25.5%)
	University graduates	209 (66.8%)	123 (65.4%)
Level of	Not educated	6 (1.9%)	5 (2.7%)
father	Primary school	15 (4.8%)	7 (3.7%)
education	Secondary school	63 (20.1%)	36 (19.1%)
	University graduates	229 (73.2%)	140 (74.5%)
structure of	Grand parents	6 (1.9%)	4 (2.1%)
family	Single biological parent	12 (3.8%)	12 (6.4%)
	Step-parent	4 (1.3%)	1 (0.5%)
	Two biological parents	289 (92.6%)	170 (90.9%)
	Uncles/Aunts	1 (0.3%)	0 (0%)

<sup>a</sup>Median(interquartile range)

<sup>c</sup>Due to various circumstances of our country, we had two batches at the same year. Group A is the batch at the start of the year, while group B is the batch at the end of the year

status, income and residency. The number of included students in the matched data is 188 (Table 1).

The median of the general mental health scale was  $17\pm7$ . When comparing different categories of sociodemographic characteristics against the general mental health scale, only females were found to have significantly higher psychological distress than males (Median =  $17.0\pm7.0$ , *p*-value = 0.049). Neither academic year, age, income, nor other family characteristics were found to be significant. After matching, the median general mental health scale was  $16\pm8$ . Age wasn't significant after matching (*p*-value = 0.924) as well as other sociodemographic variables (Table 2).

#### History of previous abuse/trauma

Only 22 students (7%) had tried to kill themselves before, and almost a third (29.3%) of the participants had been abused before. The highest percentage of abuse was done by the student's cousin (8.5%). Most of the students being molested were in the age group of 7–12 years old (15%). 84 students (27.2%) have been sexually assaulted before, with touching the student's body or genitalia being the most common mode of assault (13.6%). After matching, the percentage of sexual assaults and previous abuse decreased to 22.8% (42) and 20.4%, respectively (38). Moreover, the most common type of sexual assault was looking at genitalia (12.4%) (Table 3).

Students who have been abused or sexually assaulted before reported significantly higher psychological distress than those who hadn't (p-value = 0.001 and p-value = 0.0.014, respectively). Being abused by 2nd-degree relatives was also found to report significantly higher distress than other types of perpetrators, except cousins (p-value = 0.048). Modes of sexual assault that involved touching the perpetrator or the perpetrator touching the victim reported significantly higher distress than other methods (*p*-value  $\leq$  0.003). Propensity score matching vielded similar results with the following differences. Being molested by abused by a close family member was also a significant contributor to general mental health (p-value = 0.031). Sexual assault wasn't significant after matching (p-value = 0.204). The only significant method of sexual assault was that involved preparator touching the victim (p-value = 0.003) (Table 4).

## Childhood trauma scale

The median of the total childhood trauma scale was  $38 \pm 14$ . Almost 40% of the students had previous childhood trauma, with sexual abuse (23.32%) and emotional neglect (19.17%) being the most common. The lowest reported trauma was emotional abuse (10.5%). When assessing the relationship between childhood trauma scales and general mental health scales, all scales reported a significant correlation except physical neglect

Variables		Before matching (	N=313)	After matching (N=188)		
		GHQ-12 Scale		GHQ-12 Scale		
		Median (IQR)	<i>p</i> -value	Median (IQR)	<i>p</i> -value	
Age		17 (7) <sup>b</sup>	0.256 <sup>d</sup>	16 (8)	0.942 <sup>d</sup>	
Sex	Male	16 (7)	0.049*	16 (7)	0.378	
	Female	17 (7)		17 (7)		
Academic year	6th year	18.5 (6)	0.169	14 (6)	0.538	
	5th year	17 (5)		17 (5)		
	4th year	16.5 (7.5)		14 (8)		
	3rd year group (B) <sup>c</sup>	17 (9)		17 (9)		
	3rd year group (A) <sup>c</sup>	17 (10)		17 (7)		
	2nd year	14.5 (7.5)		14 (9)		
	1st year	17 (8)		16.5 (8)		
Marital Status	Single	17 (7)	0.393	16 (8)	0.855	
	Married	15.5 (8)		15.5 (3)		
	Divorced	11 (0)		e		
family income (per month)	less than 100.000 SDG	16 (8)	0.474	15 (9)	0.823	
	100.000–199,000 SDG	17 (8)		16 (7)		
	200.000–299.000 SDG	16 (9)		16 (10)		
	300.000-399.000 SDG	18 (6)		17 (7)		
	400.000 SDG and above	17 (8)		17 (8)		
Residency	Rural	16 (5.5)	0.437	16 (5)	0.451	
	Urban	17 (7)		16 (8)		
Level of mother education	Not educated	17 (9)	0.370	18 (5)	0.346	
	Primary school	16 (3)		15 (7)		
	Secondary school	17 (6.5)		17 (6.5)		
	University graduates	17 (7)		16 (9)		
Level of father education	Not educated	18 (2)	0.689	19 (2)	0.387	
	Primary school	15 (4)		14 (3)		
	Secondary school	17 (7)		15 (8)		
	University graduates	17 (7)		16 (8)		
structure of family	Grand parents	14.5 (15)	0.654	7 (11.5)	0.184	
	Single biological parent	15.5 (8)		15.5 (8)		
	Step-parent	13.5 (11.5)		12 (0)		
	Two biological parents	17 (7)		16.5 (8)		
	Uncles/Aunts	15 (0)		е		

#### Table 2 The table shows the univariate analysis regarding general mental health questionnaire scale

<sup>a</sup>Median(interquartile range)

<sup>b</sup>Individual parameter of the scale

<sup>c</sup>Due to various circumstances of our country, we had two batches at the same year. Group A is the batch at the start of the year, while group B is the batch at the end of the year

<sup>d</sup>Sperman rho test was used

<sup>e</sup>Coudn't be calculated due to unavailability of responses

\**p*-value < 0.05

\*\*p-value<0.01

(*p*-value<0.05). All of the scales reported a positive correlation with the general mental health scale, except the denial scale, which was negative. The highest correlation among subscales was observed in emotional abuse (r=0.405) and emotional neglect (r=0.232), which are moderate and low correlations, respectively. After matching, all the previous abuses/trauma were also significant, except sexual abuse (*p*-value=0.876) (Table 5). When assessing the childhood trauma scale against

socio-demographic characteristics, no significant values have been detected either before matching or after it (Table 6).

Two-step multiple linear regression was used for factors that contribute to the general mental health scale. The model was statistically significant (*p*-value<0.001) for two steps. Multiple factors were significant in the buffered model: being abused before, being sexually assaulted before, the perpetrator touching your body, Table 3 The table shows the frequency (%) of history of abuse/trauma of the students

Variables	Frequency (%)				
	Before matching (N=313)	After matching (N = 188)			
Did you ever tried to kill yourself?					
Yes	22 (7%)	12 (6.4%)			
No	291 (93%)	176 (93.6%)			
Have you been abused before?					
Yes	90 (29.3%)	42 (22.8%)			
No	217 (70.7%)	142 (77.2%)			
If yes, by whom? <sup>a</sup>					
Close family (father, mother, siblings)	14 (4.6%)	10 (5.4%)			
2nd degree relative (uncle, aunt, grandparents)	11 (3.6%)	6 (3.3%)			
Neighbor	20 (6.5%)	9 (4.9%)			
Cousin	26 (8.5%)	7 (3.8%)			
Age range at which you had been molested					
Not applied to me	220 (70.3%)	146 (77.7%)			
0–6 years	26 (8.3%)	13 (6.9%)			
7–12 years	47 (15%)	17 (9%)			
13–18 years	18 (5.8%)	10 (5.3%)			
More than 18 years	2 (0.6%)	2 (1.1%)			
Have you been sexual assaulted?					
Yes	84 (27.2%)	38 (20.4%)			
No	225 (72.8%)	148 (79.6%)			
If yes, what did the preparator do? <sup>a</sup>					
made you fondle (touch, kiss) him on his whole body or genitals	30 (9.7%)	13 (7%)			
fondled (touch, kiss) you on your whole body or your genitals	42 (13.6%)	20 (10.8%)			
look at your genitals or show you his/her genitals	40 (12.9%)	23 (12.4%)			
had his fingers or an object introduced into your body	15 (4.9%)	5 (2.7%)			
made you look at pornographic material	5 (1.6%)	4 (2.2%)			
make you watch him masturbating	11 (3.6%)	7 (3.8%)			

<sup>a</sup>Participants were allowed to select more than one option

the perpetrator using an object to touch you and the emotional abuse scale (*p*-value = 0.033, 0.009, 0.012, 0.003 and 0.000, respectively). For each point increase in the emotional abuse scale unit, there was a significant increase in the GHQ-12 scale by 0.56 units, indicating more distress (Table 7). Another model was also formed for matched data. The two-step model was statistically significant (*p*-value<0.001) for the two steps. Only two variables were significant, which were: minimization/denial scale (*p*-value = 0.001) and emotional abuse scale (*p*-value = 0.005). For each point increase in the emotional abuse scale unit, there was a significant increase in the GHQ-12 scale by 0.48 units, indicating more distress (Table 8).

## Discussion

This study investigates the prevalence of childhood maltreatment and its association with common mental disorders among university students in Sudan, addressing a critical gap in the limited existing research.

For physical abuse, the results align closely with prior findings in China (17.4%) [20] and Kuwait (22.5%) [21]. However, significantly higher rates were reported in other contexts. For example, a study from Pakistan found that more than half of males have been abused before, attributed to cultural norms that justify physical punishment as a disciplinary measure [22]. Similarly, in Italy, 44% of participants reported physical abuse, with cultural acceptance of stricter disciplinary practices being a potential contributing factor [23]. The lower prevalence in our study may partly be explained by our sample, which two-thirds of it were females, compared to the gender-balanced or male-dominated samples in these studies.

Even more alarming rates are reported among children in certain contexts. In Ghana, 75% of children experienced physical abuse in 2022 [24], while over 70% of children in India who engaged in child labour reported physical abuse. South Africa also showed a higher prevalence [25]. These substantial differences highlight how demographic factors, cultural norms, and study populations influence prevalence rates.

For emotional abuse, our findings were much lower than the rates reported in previous research. Studies recorded 18.6% [21] and 12% [22] prevalence rates, slightly higher than ours. However, substantially higher figures are observed in other regions, such as Italy, where 62% of participants reported emotional abuse [23]. The authors of the Italian study attributed this high prevalence to differences in cultural perceptions and Table 4 The table shows univariate analysis for history of abuse/trauma regarding general mental health guestionnaire

Variables	Before Matching (/	V=313)	After matching (N=188)		
	GHQ-12 Scale		GHQ-12 Scale		
	Median (IQR <sup>b</sup> )	<i>p</i> -value	Median (IQR <sup>b</sup> )	<i>p</i> -value	
Did you ever tried to kill yourself?		0.015*		0.123	
Yes	18.5 (15)		18.5 (18.5)		
No	17 (7)		16 (7)		
Have you been abused before?		0.001*		0.029*	
Yes	18 (8)	*	18 (8)		
No	16 (8)		16 (7)		
If yes, by whom? <sup>a</sup>					
Close family (father, mother, siblings)	17.5 (4)	0.449	18 (7)	0.031*	
2nd degree relative (uncle, aunt, grandparents)	18 (5)	0.048*	20.5 (6)	0.030*	
Neighbor	18.5 (8)	0.177	15 (8)	> 0.99	
Cousin	19 (9)	0.077	14 (8)	0.375	
Age range at which you had been molested		0.081		0.804	
Not applied to me	17 (8)		16 (8)		
0–6 years	17.5 (5)		15 (5)		
7–12 years	18 (9)		16 (12)		
13–18 years	15.5 (14)		15.5 (17)		
More than 18 years	18 (0)		18 (0)		
Have you been sexual assaulted?		0.014*		0.204	
Yes	18 (6.5)		17 (6)		
No	17 (8)		16 (8)		
If yes, what did the preparator do? <sup>a</sup>					
made you fondle (touch, kiss) him on his whole body or genitals	19.5 (8)	0.003**	18 (7)	0.135	
fondled (touch, kiss) you on your whole body or your genitals	19 (9)	0.001**	19 (13)	0.003**	
look at your genitals or show you his/her genitals	17 (6)	0.218	16 (5)	0.880	
had his fingers or an object introduced into your body	20 (23)	0.002**	17 (4)	0.332	
made you look at pornographic material	15 (3)	0.558	14.5 (4)	0.377	
make you watch him masturbating	15 (12)	0.903	15 (12)	0.579	

<sup>a</sup>The question allowed the participant to select more than one choice. Each choice has been analyzed separately against the scale

<sup>b</sup>Interquartile range

\**p*-value <0.05

\*\*p-value<0.01

Table 5 The table shows the frequency (%) for each childhood trauma and the bivariate correlation against general mental health guestionnaire scale

CTQ-SF domain	Before matching (N=	313)		After matching (N = 188)			
	Frequency of abuse/	GHQ-12 <sup>b</sup>		Frequency of abuse/	GHQ-12 <sup>b</sup>		
	neglect/trauma (%) <sup>a</sup>	r value	<i>p</i> -value	neglect/trauma (%) <sup>a</sup>	r value	<i>p</i> -value	
Emotional abuse	33 (10.5%)	0.405	< 0.001**	20 (10.6%)	0.367	< 0.001**	
Physical abuse	51 (16.3%)	0.212	< 0.001**	30 (16.0%)	0.272	< 0.001**	
Sexual abuse	73 (23.32%)	0.113	0.047*	39 (20.7%)	0.011	0.876	
Emotional neglect	60 (19.17%)	0.232	< 0.001**	37 (19.7%)	0.224	0.002*	
Physical neglect	54 (17.25%)	0.039	0.492	36 (19.1%)	0.017	0.820	
Minimization/denial	74 (23.6%)	-0.351	< 0.001**	45 (23.9%)	-0.366	< 0.001**	
1 denial score	46 (14.7%)			28 (14.9%)			
2 denial score	49 (15.7%)			29 (15.4%)			
3 denial score (total denial)							
Childhood trauma	125 (39.94%)	0.285	< 0.001**	77 (41.0%)	0.248	0.001**	

<sup>a</sup>Above the cut-off value

 $^{\rm b}{\rm Sperman}$  rho test for GHQ-12 against the individual scales of CTQ-SF

\**p*-value <0.05

\*\*p-value<0.001

Variables		Before matching ( <i>I</i>	V=313)	After matching (N = 188)		
		CTQ-SF score	CTQ-SF score			
		Median (IQR <sup>a</sup> )	<i>p</i> -value	Median (IQR <sup>a</sup> )	<i>p</i> -value	
Age		37 <sup>b</sup> (13)	0.565 <sup>d</sup>	38 <sup>b</sup> (14)	0.510 <sup>d</sup>	
Sex	Male	37 (11)	0.424	37 (11)	0.291	
	Female	38 (16)		38 (15)		
Academic year	6th year	38.5 (8)	0.444	38 (9)	0.812	
	5th year	34.5 (14.5)		35.5 (18)		
	4th year	37 (16.5)		37 (13)		
	3rd year group (B) <sup>c</sup>	40 (15)		41 (16)		
	3rd year group (A) <sup>c</sup>	37 (18)		38 (17)		
	2nd year	36 (16)		36 (15)		
	1st year	38 (13)		38.5 (9)		
Marital Status	Single	38 (14)	0.626	38 (14)	0.850	
	Married	35.5 (4.5)		36.5 (3)		
	Divorced	33 (0)		e		
family income (per month)	less than 100.000 SDG	40 (16)	0.209	41 (17)	0.166	
	100.000-199,000 SDG	37 (15)		36.5 (11)		
	200.000-299.000 SDG	39 (16)		39 (21)		
	300.000-399.000 SDG	35 (11)		35 (7)		
	400.000 SDG and above	38 (13)		39 (14)		
Residency	Rural	39.5 (18)	0.192	38 (16)	0.715	
	Urban	37 (14)		38 (14)		
Level of mother education	Not educated	51 (28)	0.308	53 (28)	0.596	
	Primary school	43 (17)		42 (16)		
	Secondary school	38 (13.5)		37.5 (12.5)		
	University graduates	37 (13)		38 (13)		
Level of father education	Not educated	51.5 (18)	0.13	51 (18)	0.684	
	Primary school	41(20)		36 (21)		
	Secondary school	39 (16)		38 (15)		
	University graduates	37 (12)		38 (11.5)		
structure of family	Grand parents	45 (39)	0.206	38.5 (27.5)	0.858	
	Single biological parent	43.5 (15)		43.5 (15)		
	Step-parent	42 (19)		39 (0)		
	Two biological parents	37 (14)		38 (13)		
	Uncles/Aunts	56 (0)		е		

**Table 6** The table shows the socio-demographic characteristics of the students and the univariate analysis regarding childhood trauma questionnaire scale

<sup>a</sup>Interquartile range

<sup>b</sup>Individual parameter of the scale

<sup>c</sup>Due to various circumstances of our country, we had two batches at the same year. Group A is the batch at the start of the year, while group B is the batch at the end of the year

<sup>d</sup>Sperman rho test was used

<sup>e</sup>Coudn't be calculated due to unavailability of responses

definitions of emotional abuse. Higher rates were also reported in India [26] and South Africa [25], with emotional abuse being the most commonly reported form of abuse in the latter.

The lower prevalence rates of both physical and emotional abuse in our study may reflect cultural differences as protective community norms may emphasise that societal attitudes significantly shape perceptions and reporting of abuse, as in Ghana [24]. Gender composition also may affect the prevalence, as men may not report the emotional abuse due to stigma. Age also plays a role, as indicated in Famularo et al., 1996 study [27] and Keyes et al., 2012 study [14], which emphasize that psychiatric comorbidities and psychological trauma can affect memory and the ability to identify abusive experiences retrospectively.

The current study found that almost a third of students had experienced sexual abuse, which is the same percentage in Pakistan [22]. Within our study, a notable **Table 7** The table shows hierarchical multiple regression analysis for factors affecting general mental health questionnaire scale (GHQ-12) buffered by minimization/denial scale before matching (N=313)

Steps	Variables	Unstan- dardized Coefficients		Standardized Coefficients	т	<i>p</i> -value	95.0% Confi- dence Interval for B	
		В	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	18.862	0.467		40.372	< 0.001	17.943	19.782
	Minimization /denial	-2.065	0.314	-0.352	-6.576	< 0.001**	-2.682	-1.447
2	(Constant)	33.243	7.248		4.587	< 0.001	18.979	47.508
	Minimization /denial	-1.380	0.348	-0.236	-3.961	< 0.001**	-2.066	-0.694
	Sex	0.546	0.713	0.039	0.766	0.444	-0.857	1.950
	Did you ever tried to kill yourself	-2.157	1.437	-0.084	-1.500	0.135	-4.986	0.672
	Have you been abused before?	-2.719	1.268	-0.191	-2.145	0.033*	-5.215	-0.224
	Have you been abused by your 2nd degree relative (uncle, aunt, grandparents)?	0.481	1.863	0.014	0.258	0.797	-3.185	4.147
	Have you been sexual assaulted?	3.700	1.407	0.253	2.629	0.009*	0.931	6.469
	Did the preparator made you fondle (touch, kiss) him on his whole body or genitals	-0.404	1.404	-0.018	-0.288	0.774	-3.166	2.359
	Did the preparator fondle (touch, kiss) you on your whole body or your genitals	-3.410	1.346	-0.179	-2.534	0.012*	-6.059	-0.761
	Did the preparator had his fingers or an object introduced into your body	-5.353	1.757	-0.178	-3.046	0.003**	-8.812	-1.894
	Emotional abuse scale	0.564	0.126	0.319	4.485	< 0.001**	0.316	0.811
	Emotional neglect scale	-0.076	0.085	-0.055	-0.899	0.370	-0.243	0.091
	Physical abuse scale	0.069	0.142	0.031	0.482	0.630	-0.211	0.349
	Sexual abuse scale	-0.194	0.129	-0.111	-1.507	0.133	-0.448	0.060

\**p*-value <0.05

\*\**p*-value<0.01

**Table 8** The table shows hierarchical multiple regression analysis for factors affecting general mental health questionnaire scale (GHQ-12) buffered by minimization/denial scale after matching (N = 188)

Steps	Variables	Unstan- dardized Coefficients		Standardized Coefficients	t	<i>p</i> -value	95.0% Confidence Interval for B	
		В	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	25.284	1.550		16.317	< 0.001**	22.227	28.341
	Minimization/Denial scale	-0.846	0.138	-0.413	-6.112	< 0.001**	-1.118	-0.573
2	(Constant)	26.925	6.483		4.153	< 0.001**	14.131	39.718
	Minimization/Denial scale	-0.522	0.160	-0.255	-3.255	0.001**	-0.839	-0.206
	Have you been abused before?	0.161	1.426	0.010	0.113	0.910	-2.652	2.975
	Have you been abused by your close family (father, mother, siblings)?	-0.926	2.186	-0.032	-0.424	0.672	-5.241	3.388
	Have you been abused by your 2nd degree relative (uncle, aunt, grandparents)?	-2.165	2.637	-0.058	-0.821	0.413	-7.369	3.040
	Did the preparator fondled (touch, kiss) you on your whole body or your genitals	-1.664	1.924	-0.076	-0.865	0.388	-5.461	2.133
	Emotional abuse scale	0.476	0.166	0.252	2.863	0.005**	0.148	0.804
	Physical abuse scale	-0.006	0.186	-0.003	-0.033	0.974	-0.372	0.360

\**p*-value <0.05

\*\*p-value<0.01

proportion of the abuse occurred through inappropriate touching, which mirrors findings from other contexts.

In Italy, 18% of students reported experiencing sexual abuse, with a significant proportion involving touching.

Furthermore, over a third of the abuse cases in Italy were attributed to school peers [23], highlighting the protective role of separated school systems in reducing

peer-to-peer abuse. Similarly, in China, a prevalence of 15.7% was recorded, which is notably lower than our findings [20].

The identity of perpetrators also varies by context. In our case, cousins are among the most frequent abusers. Parental involvement is significant, with 20% of abuse cases in Pakistan involving parents [22], compared to a smaller percentage in Italy, where in other studies, fathers account for 6% of cases [23]. Peer-related abuse is particularly high in Italy, with a third of cases involving school peers [23]. In contrast, such incidents are less frequent in Sudan due to the segregation of schools by gender, which limits interactions between peers of different genders.

Gender differences in abuse prevalence are generally minimal, as observed in Italy, China, and other global studies [20, 23, 28]. However, while the rates may not differ significantly between males and females, the severity of abuse tends to be greater for females in certain contexts [21]. These findings underscore the importance of addressing both the prevalence and the severity of abuse through culturally and socially sensitive approaches.

The current study highlights the pervasive impact of childhood maltreatment, with nearly 40% of students reporting prior trauma. Sexual abuse and emotional neglect emerged as the most prevalent forms, while emotional abuse was the least reported. These findings align with prior research demonstrating the association between maltreatment and adverse mental health outcomes. For instance, previous studies have shown that individuals who experienced sexual or physical abuse reported significantly higher psychological distress [21], consistent with the observed significant positive correlations between childhood trauma and mental health outcomes in our study. Emotional abuse exhibited the strongest correlation with mental health scales (r = 0.405), paralleling findings that link it to severe psychiatric outcomes, such as depression and anxiety [29]. Similarly, emotional neglect (r = 0.232) showed a notable yet lesser correlation with mental health, which aligns with prior literature identifying neglect as having the lowest psychological impact among maltreatment subtypes [20].

Further comparisons with existing studies underscore the predictive value of childhood maltreatment for mental health disorders. Harpur et al. noted differential effects based on the timing of maltreatment, with early childhood experiences predicting anxiety and late childhood maltreatment being more strongly associated with adolescent depression, echoing our findings regarding the varied effects of emotional abuse and neglect [30]. Moreover, the broader literature reports a 2–3-fold increase in mental disorder diagnoses among those exposed to maltreatment, with sexual and emotional abuse showing the strongest associations [31], which is consistent with the high correlation of emotional abuse found in our study. Externalizing and internalizing behaviours have also been widely documented as outcomes of maltreatment. Physical and emotional abuse are commonly associated with behaviour problems during adolescence [32], findings that parallel our results demonstrate the mental health burden of these abuse types. However, sexual abuse has shown more nuanced effects, as it was not significantly correlated with behaviour problems in some contexts [32], which may partly explain the variable psychological distress linked to different maltreatment types.

Clinical and community studies further corroborate the profound mental health risks associated with maltreatment, including PTSD, depression, anxiety, and suicidality [27]. For example, over one-third of severely maltreated children met the criteria for PTSD, while over 80% of individuals exposed to abuse or neglect were diagnosed with common mental disorders [5, 26]. These observations resonate with our findings, particularly regarding the deleterious effects of childhood maltreatment. While gender differences remain inconclusive, as noted in prior studies [14, 28], the nuanced patterns of psychiatric outcomes across maltreatment types highlight the multifaceted impact of childhood trauma.

In the regression analysis conducted before and after matching, the variable 'being abused' was statistically significant prior to matching but lost significance after. The emotional abuse was significant before and after the matching.Interestingly, sexual assault demonstrated a significant impact, unlike other forms of sexual abuse. This may be attributed to the fact that sexual assault often represents a more extreme and traumatic manifestation of sexual abuse, which can have profound and lasting psychological effects on individuals. Additionally, the lack of awareness or understanding of what constitutes sexual abuse may lead some individuals to underreport or not recognize less overt forms, thereby influencing perceived significance [33].

After propensity score matching (PSM) by gender, the variable "abuse by close family or second-degree relative" became statistically significant, whereas it was non-significant before matching. This shift suggests that gender may have confounded the association between familial abuse and mental health outcomes. Previous studies have consistently shown that childhood abuse, particularly by close family members, is a strong predictor of psychiatric disorders, including depression and PTSD [34, 35]. Our findings align with this evidence and emphasize the need to account for confounders such as gender when analyzing trauma-related variables.

## **Conclusion and implications**

Childhood maltreatment is common among Sudanese medical students and significantly affects mental health, particularly emotional abuse and neglect. The only type of abuse which significantly contributed to psychological distress was emotional abuse. More focus is needed towards emotional abuse as it is still hidden, unlike physical and sexual abuse, which show visible marks. More research needs to be done toward addressing the domains of emotional abuse and how to prevent it. Our findings suggest directing our focus toward identifying the marks of emotional abuse. Our research also highlights the need for authority over family members' sexual abuse. The family, as the main protector of children's health, have no authority or partner to protect the children from their abuse.

#### **Strengths and limitations**

Our study's major strength is the novelty of the topic as scarce literature discussed the effect of childhood abuse on general mental health. Moreover, the level of analysis was unique. Hierarchical regression was performed to account for some confounding variables. Moreover, propensity score matching was done to eliminate the selection bias. What further makes the study unique is the targeted population, which is medical students.

Multiple limitations have been noticed across the research. Firstly, the collection of data from only one faculty will hinder the generalizability of the data. Moreover, the high ratio of females to males can introduce a selection bias, but it was addressed via propensity score matching. Moreover, due to our inability to perform clinical diagnosis based on our war settings, we used a screening tool (GHQ-12) rather than a proper clinical diagnosis of mental illness. Moreover, some possible confounding factors weren't addressed in our questionnaire, such as substance abuse.

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#### Author contributions

T.M: Conceptualization and design, data collection. M.H.E: Analysis, report writing, reviewing manuscript and submission. M.Y.E: Manuscript writing and revision. M.M.T: Manuscript writing and revision. L.H: Manuscript writing and revision.

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#### Data availability

The data is available upon request from the corresponding author.

## Declarations

#### Human ethics and consent to participate

Written Informed consent was taken from all participants in this study and they agreed also to publish these results.

#### Ethics approval and consent to participate

Ethical approval was taken from department of community, faculty of medicine, University of Khartoum, Sudan. All methods used in this research was in accordance with the Declaration of Helsinki for human ethics.

## **Clinical trial number**

Not applicable.

#### **Competing interests**

The authors declare no competing interests.

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