ORIGINAL ARTICLE

Prevalence of Self-Reported Aggression and its Associated Factors among Medical Students in Karachi, Pakistan

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Abstract

Background: Aggression is an important behavioral and mental health concern that may adversely affect psychosocial well-being and interpersonal functioning. Multiple psychosocial and environmental factors may influence aggressive behavior among young adults, particularly within demanding academic settings.

Objective: To determine the prevalence of self-reported aggression and its associated factors (demographic, academic, interpersonal, and psychosocial) among medical students.

Methods: A cross-sectional study was conducted from January 2023 to April 2023 at Jinnah Sindh Medical University (JSMU) and Jinnah Medical and Dental College, Karachi. Data were collected using a structured self-administered questionnaire. Aggression was assessed using the Buss-Perry Aggression Questionnaire. Associations between self-reported aggression and psychosocial variables were examined using logistic regression analysis.

Results: Of the 220 medical students included (mean age: 21 ± 2.0 years), 40.5% reported aggression, with a higher prevalence among females than males (50.0% *vs.* 29.8%). In multivariable analysis, self-reported aggression was associated with studying in a private medical college, higher cumulative grade point average, involvement in verbal abuse, enjoying time at college, and body-shaming experiences. Lower odds of aggression were observed among male students, fourth-year students, Twitter users, and participants who shared their feelings with parents and siblings.

Conclusion: The study demonstrated a high prevalence of self-reported aggression among Pakistani medical students. Aggression was associated with psychosocial adversity, interpersonal stressors, and academic-related factors, while family emotional support appeared protective. These findings highlight the importance of trauma-informed and psychosocially responsive approaches to promote emotional well-being among medical students. Due to the cross-sectional design, the findings should be interpreted as associative rather than causal.

Keywords: *Aggression, behavior, medical students, risk factors, social factors.*

INTRODUCTION

Aggression is a significant public health concern characterized by behaviors that may cause physical or psychological harm to oneself or others [1]. It manifests in various forms, including physical aggression, verbal aggression, hostility, and anger [2]. Aggressive behavior is multifactorial and influenced by a complex interplay of biological, psychological, social, and environmental factors.

Previous studies globally have identified several factors associated with aggression, including age, gender, socioeconomic status, parental education, physical activity, physical and sexual abuse, interpersonal relationships, traumatic experiences, internet addiction, smoking, substance use, academic performance, stress, and dietary habits [3-10]. Other psychosocial factors, such as family conflict, media exposure, academic pressure, social withdrawal, exposure to violence, and mental health comorbidities, may also influence aggressive behavior [11, 12]. These risk factors can adversely affect both individuals and society, often contributing to anxiety, depression, mood disorders, violence, and impaired psychosocial functioning [1, 11, 12].

Aggressive behavior during adolescence and young adulthood has been associated with numerous adverse outcomes, including injuries, poor academic performance, absenteeism, conduct disorders, antisocial behavior, and social maladjustment [13]. Despite these consequences, behavioral and mental health issues frequently remain under-recognized and underreported, particularly in settings where psychological problems are stigmatized and open discussions regarding mental health are discouraged. In many low- and middle-income countries, including Pakistan, limited mental health resources and inadequate access to psychological support services further exacerbate these challenges [14-16].

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Aggression represents a global health concern. The World Health Organization estimates that violence and aggression-related events account for more than 1.6 million deaths annually and constitute one of the leading causes of mortality among individuals aged 15-44 years worldwide [17, 18]. In addition to mortality, aggression contributes substantially to morbidity and places a significant burden on healthcare systems.

Studies conducted in different countries have reported varying prevalence estimates and determinants of aggression among students and young adults. A study from Nigeria reported aggression among 35.4% of medical students [19], whereas studies from India and Pakistan reported prevalence estimates ranging from approximately 50% to over 80% among university students [16, 20, 21]. Previous Pakistani studies have also linked aggression with academic stress, verbal abuse, bullying, harassment, and academic performance [4, 16, 21]. These variations suggest that sociocultural and environmental contexts strongly influence aggression.

Medical students constitute a particularly important population for studying aggression and related psychosocial factors. Intensive academic demands, prolonged study hours, competitive environments, emotional exhaustion, and high expectations for academic performance characterize medical education. Such conditions may adversely affect emotional well-being, stress coping, and interpersonal functioning. Existing literature has consistently demonstrated elevated levels of stress, anxiety, depression, burnout, and maladaptive behaviors among medical students worldwide [11, 19, 21].

The Pakistani context warrants particular attention. Medical education in Pakistan is highly competitive and academically demanding. It is often accompanied by strong familial expectations, financial pressures, limited institutional mental health support, and stigma associated with seeking psychological help [4, 21]. Despite increasing concerns regarding student mental health, evidence examining aggression and its psychosocial correlates among Pakistani medical students remains limited.

Given the potential implications of aggression for students' psychological well-being, interpersonal relationships, and future professional conduct, understanding the factors associated with aggressive behavior in this population is essential. The present study aimed to determine the prevalence of self-reported aggression and examine its association with selected demographic, academic, interpersonal, and psychosocial factors among medical students in Karachi, Pakistan. The findings may contribute to the development of trauma-informed and psychosocially responsive strategies to promote emotional well-being and address behavioral health concerns among medical students.

MATERIALS AND METHODS

A cross-sectional study was conducted in from January 2023 to April 2023 at Jinnah Sindh Medical University (JSMU) and Jinnah Medical and Dental College, Karachi. The study received ethical approval from Jinnah Sindh Medical University (JSMU), Karachi (Approval No: JSMU/IRB/2022/687) and Jinnah Medical and Dental College, Karachi (Approval No. 000285123). This study was conducted in full compliance with ethical guidelines.

All male and female medical students aged 18 to 25 years who provided informed consent participated in the study. However, students who were suffering from any diagnosed chronic ailment, such as diabetes, hypertension, cardiovascular diseases, cancer, and/ or known psychiatric illness, were excluded to minimize confounders.

The sample size was calculated using OpenEpi, based on the prevalence of aggression (15.3%) [10], a 95% CI, and a 5% margin of error. The sample size came out to 200, which, after adjustment for 10% non-response, was inflated to 220. From each medical college, 110 students were enrolled in the study, yielding a total sample of 220 medical students.

The stratified sampling technique was used to collect data through a face-to-face survey; a self-administered structured questionnaire was administered by the Principal Investigator (PI) to obtain sociodemographic characteristics and information regarding aggression-associated risk factors. Buss-Perry Aggression Questionnaire (BPAQ) [2] was used to assess aggression. Before starting data collection, the enrolment list of all medical students (first- to final-year) was obtained from the student administration departments of both medical colleges. An almost equal number of students from each year of MBBS were randomly selected through the enrolment list (to get an equal representation of all years of MBBS), except for the second-year and final-year classes at JMDC. From there, 23 and 21 students were selected, respectively, due to the 22nd selected student of the final-year MBBS declining consent to participate in this study. Other students present in class that day replaced those who were not available or absent, as per the enrolment list, to meet the required sample size. Students were approached in their classrooms on a pre-selected date and time (permission for data collection had already been obtained), and questionnaires were distributed by the PI during their break time. The questionnaires were then reviewed to ensure that all forms were complete and filled out correctly.

Demographic variables included gender, age, type of medical college, educational status, type of family, marital status, siblings, type of residence, father of respondent (Deceased/ Alive), mother of respondent (Deceased/ Alive), Parents' (Divorced/ Separated), educational status of father and mother, profession of father and mother, and household monthly income.

The remaining psychosocial factors included any past traumatic experience, verbal assault, mental torture, bullying, and body shaming. Similarly, the interpersonal factors included sharing feelings with parents and siblings, involvement in verbal abuse, social media usage (WhatsApp, LinkedIn, Instagram, Facebook, Twitter-X), and enjoying time at college. The academic variable included last term CGPA (more than 3/ less than 3). All the above-stated variables were operationalized based on participants' self-reported experiences, interpersonal relationships, behavioral characteristics, and perceived social environments. Aggression was assessed using the Buss-Perry Aggression Questionnaire (BPAQ) [2]. Participants scoring above the predefined cut-off were categorized as aggressive. Verbal abuse was operationalized as participants' self-reported exposure to insulting, humiliating, threatening, or harsh verbal interactions experienced within interpersonal relationships. Body shaming was defined as experiencing negative comments, criticism, humiliation, or teasing related to body appearance, weight, or physical characteristics. Bullying refers to repeated intentional harmful behavior, including verbal, emotional, or social victimization by peers. Emotional support was assessed through participants' self-reported practice of sharing personal feelings or emotional concerns with parents or siblings. Enjoying time at college was operationalized as participants' self-perceived positive social engagement and satisfaction with college-related activities and peer interactions. Higher academic performance was operationalized as self-reported cumulative grade point average (CGPA), categorized into predefined academic performance thresholds. Social media use was assessed based on participants' self-reported use of specific platforms, including Twitter, Facebook, Instagram, and WhatsApp.

BPAQ is a validated tool (consisting of 29 items) used to assess aggression, measured on a five-point Likert scale from 1 (extremely uncharacteristic of me) to 5 (extremely characteristic of me) [2]. The minimum score is 29, and the maximum score is 145. Two items, 7 and 18, are reverse-scored. The tool consists of four (domains) subscales: 1-9 items gauge physical aggression; 10-14 items assess verbal aggression; 15-21 items deal with anger, and 22- 29 items determine hostility. In our study, aggression was assessed using BPAQ cut-off scores [2]; males with a total score above 77 and females above 68 were labeled as aggressive. On items 1-9, scores above 24 for males and above 17 for females were labeled as indicating physical aggression. On items 10-14, a score above 15 for males and above 13 for females was considered indicative of verbal aggression. On items 15-21, scores above 17 for males and above 16 for females were labeled as indicating anger. On items 22-29, scores above 21 for males and above 20 for females were labeled as indicating hostility. BPAQ scoring was done according to the cut-off scores, and its association with various risk factors was investigated [2].

Data entry and analysis were performed using SPSS version 23. Descriptive statistics (mean, standard deviation, frequencies, and percentages) were used to summarize the data. To identify factors associated with outcome (aggression), binary logistic regression analysis was performed. Initially, the univariate regression analysis was conducted to determine the association between each independent variable and the outcome. Variables with a p-value <0.05 in univariate analysis were considered for further analysis. Multicollinearity was assessed before multivariable analysis, and no evidence of severe multicollinearity was observed among the included predictors. Subsequently, these variables were entered into a multivariate regression model to identify independent predictors of self-reported aggression, while adjusting for potential confounding factors. The Hosmer-Lemeshow goodness-of-fit test indicated acceptable model fit (p-value=0.036), and the model demonstrated moderate explanatory ability (Nagelkerke pseudo $R^2 = 0.43$). AOR (adjusted odds ratios) with 95% CI (confidence intervals) were reported. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of the participants was 21 ± 2.0 years. Most participants reported that their parents were educated; 75% of fathers and 61.8% of mothers had more than 12 years of schooling. Two participants reported deceased mothers, while three reported deceased fathers (**Table 1**). Overall, 40.5% of participants reported aggression. Female participants demonstrated a higher prevalence of self-reported aggression (50%) compared with male participants (29.8%) (**Table 2**).

Table 1: Summary of respondents' characteristics (N=220).

Variables	Category	Frequency	Percentage
Demographic Factors			
Gender	Male	104	47.3
	Female	116	52.7
Age group in years	18-21	114	51.8
	22-25	106	48.2
Type of Medical College	Government	110	50.0
	Private	110	50.0
Educational status	First-year MBBS	44	20.0
	Second-year MBBS	45	20.5
	Third-year MBBS	44	20.0
	Fourth-year BBS	44	20.0
	Final-year MBBS	43	19.5
Type of Family	Nuclear	152	69.1
	Joint	68	30.9
Marital status	Married	04	1.8
	Unmarried	214	97.3
	Engaged	02	0.9
Siblings	No Siblings	07	3.2
	1-3 Siblings	160	72.7
	4 or more Siblings	53	24.1
Types of residence	Home	193	87.7
	Hostel	27	12.3
Father of respondent	Deceased	03	1.4
	Alive	217	98.6
Mother of respondent	Deceased	02	0.9
	Alive	218	99.1
Parents' Divorced/ Separated	Yes	01	0.5
	No	219	99.5

Variables	Category	Frequency	Percentage
Education status of father	12 years of schooling	55	25
	>12 years of schooling	165	75
Education status of mother	12 years of schooling	84	38.2
	>12 years of schooling	136	61.8
Father's profession	Government employee	53	24.1
	Private employee	71	32.3
	Businessman	94	42.7
	Unemployed	02	0.9
Mother's profession	Government employee	10	4.5
	Private employee	22	10.0
	Businesswoman	02	0.9
	Unemployed	186	84.5
Total Household Monthly Income in Pakistani Rupees	<0.1 million	57	25.9
	0.1 - 0.5 million	103	46.8
	>0.5 million	60	27.3
Academic Factors			
Academic Performance (Last term CGPA)	<3	65	29.5
	≥3	155	70.4
Interpersonal Factors			
Sharing Feelings with Parents	No	15	6.8
	Yes	205	93.1
Sharing Feelings with Siblings	No	29	13.1
	Yes	191	86.8
Involvement in Verbal Abuse	No	158	71.8
	Yes	62	28.1
Use of Social Media			
WhatsApp	No	3	1.3
	Yes	217	98.6
Linked-in	No	206	93.6
	Yes	14	6.3
Instagram	No	31	14.09
	Yes	189	85.9
Facebook	No	71	32.2
	Yes	149	67.7
Twitter (X)	No	176	80.0
	Yes	44	20.0
Enjoy time at College	No	18	8.1
	Yes	202	91.8
Psychosocial Factors			
Regret any Past	No	111	50.4
Traumatic Experience	Yes	109	49.5
Verbal Assault	No	190	86.3
	Yes	30	13.6
Mental Torture	Yes	193	87.7
	Yes	27	12.2
Bullying	No	149	67.7
	Yes	71	32.2
Body Shaming	No	164	74.5
	Yes	56	25.4

Table 2: Prevalence of Aggression in respondents (N=220). (Showing combined and separate statistics of 'Aggression and its four domains' according to BPAQ cut-off scores for Males & Females respondents).

Variables	Category	Frequency	Percentage
Overall Aggression (Males & Females)	Yes	89	40.5
	No	131	59.5
Aggression in Males (BPAQ Score >77)	Yes	31	29.8
	No	73	70.2
Aggression in Females (BPAQ Score >68)	Yes	58	50.0
	No	58	50.0
Physical Aggression (Males & Females)	Yes	89	40.5
	No	131	59.5
Physical aggression Males (BPAQ Score >24)	Yes	16	15.4
	No	88	84.6
Physical aggression Females (BPAQ Score >17)	Yes	73	62.9
	No	43	37.1
Verbal aggression (Males & Females)	Yes	94	42.7
	No	126	57.3
Verbal aggression Males (BPAQ Score >15)	Yes	36	34.6
	No	68	65.4
Verbal aggression Females (BPAQ Score >13)	Yes	58	50.0
	No	58	50.0
Anger (Males & Females)	Yes	92	41.9
	No	128	58.1
Anger Males (BPAQ Score >17)	Yes	38	36.5
	No	66	63.5
Anger Females (BPAQ Score >16)	Yes	54	46.6
	No	62	53.4
Hostility (Males & Females)	Yes	74	33.6
	No	146	66.4
Hostility Males (BPAQ Score >21)	Yes	28	26.9
	No	76	73.1
Hostility Females (BPAQ Score >20)	Yes	46	39.7
	No	70	60.3

In univariate analysis, self-reported aggression showed significant associations with studying in a private medical college, fourth year of study, having a higher cumulative grade point average (CGPA), sharing feelings with parents and siblings, involvement in verbal abuse, use of WhatsApp and Twitter, enjoying time at college, verbal assault, mental torture, bullying, and body shaming (**Table 3**).

In multivariable logistic regression analysis, students enrolled in private medical colleges (AOR = 3.29, 95% CI: 1.57-6.90), those with higher CGPA (aOR = 2.19, 95% CI: 1.08-4.43), participants involved in verbal abuse (aOR = 2.76, 95% CI: 1.39-5.47), those who reported enjoying time at college (aOR = 6.95, 95% CI: 1.40-34.33), and participants with traumatic experiences

Table 3: Univariate analysis showing association of aggression with respondents' characteristics.

Variables	Category	Aggression n(%)	No Aggression n(%)	Crude OR	95% CI	p-value
Demographic Factors						
Gender	Female	58(50.0)	58(50.0)	Ref		-
	Male	31 (29.8)	73(70.2)	0.42	(0.24- 0.74)	*0.003
Types of Medical College	Government	35(39.3)	75(57.3)	Ref		-
	Private	54(60.7)	56(42.7)	2.48	(1.28-3.83)	*0.009
Year of Study (MBBS Program)	1st year	16(18.0)	28(21.4)	Ref		-
	2nd year	24(27.0)	21(16.0)	2.00	(0.85-4.67)	0.109
	3rd year	22(24.7)	22(16.8)	1.75	(0.74-4.10)	0.198
	4th year	05(5.6)	39(29.8)	0.22	(0.07-0.68)	*0.009
	5th year	22(24.7)	21(16.0)	1.83	(0.77-4.32)	0.166
Academic Factors						
Academic Performance (Last term CGPA)	<3	19(21.3)	46(35.1)	Ref		-
	≥3	70(78.7)	85(64.9)	1.99	(1.07-3.71)	*0.029
Interpersonal Factors						
Sharing Feelings with Parents	No	11(12.4)	04(3.1)	Ref		-
	Yes	78(87.6)	127(96.9)	0.22	(0.06-0.72)	*0.013

Variables	Category	Aggression n(%)	No Aggression n(%)	Crude OR	95% CI	p-value
Sharing Feelings with Siblings	No	18(20.2)	11(8.4)	Ref		-
	Yes	71(79.7)	120(91.6)	0.36	(0.16-0.80)	*0.013
Involvement in Verbal Abuse	No	54(60.7)	104(79.4)	Ref		-
	Yes	35(39.3)	27(20.6)	2.49	(1.37-4.54)	*0.003
Use of Social Media						
WhatsApp	No	00(0.0)	03(2.3)	Ref		-
	Yes	89(100)	128(97.7)	0.69	(0.53-0.91)	*0.008
Linked-in	No	86(96.6)	120(91.6)	Ref		-
	Yes	03(3.4)	11(8.4)	0.38	(0.10-1.40)	0.147
Instagram	No	14(15.7)	17(13.0)	Ref		-
	Yes	75(84.3)	114(87.0)	0.79	(0.37-1.71)	0.565
Facebook	No	30(33.7)	41(31.3)	Ref		-
	Yes	59(66.3)	90(68.7)	0.89	(0.50-1.59)	0.707
Twitter (X)	No	80(89.9)	96(73.3)	Ref		
	Yes	09(10.1)	35(26.7)	0.30	(0.17-1.71)	*0.004
Enjoy Time at College	No	03(3.4)	15(11.5)	Ref		-
	Yes	86(96.6)	116(88.5)	3.70	(1.04-13.20)	*0.043
Psychosocial Factors						
Regret any Past	No	39(43.8)	72(55.0)	Ref		-
Traumatic Experience	Yes	50(56.1)	59(45.0)	0.64	(0.37-1.09)	0.106
Verbal Assault	No	68(76.4)	122(93.1)	Ref		-
	Yes	21(23.6)	09(6.9)	4.18	(1.81-9.65)	*0.001
Mental Torture	No	71(79.8)	122(93.1)	Ref		-
	Yes	18(20.2)	09(6.9)	3.43	(1.46-8.05)	*0.005
Bullying	No	47(52.8)	102(77.9)	Ref		-
	Yes	42(47.2)	29(22.1)	3.14	(1.74-5.64)	*<0.001
Body Shaming	No	53(59.6)	111(84.7)	Ref		-
	Yes	36(40.4)	20(15.4)	3.73	(1.97-7.06)	*<0.001

OR: Odds ratio, CI: Confidence interval, Ref: Reference category, *Significant at p<0.05

related to body shaming (AOR = 2.18, 95% CI: 1.02-4.65) demonstrated higher odds of reporting self-reported aggression. Conversely, male students (aOR = 0.42, 95% CI: 0.24-0.73), fourth-year MBBS students (aOR = 0.20, 95% CI: 0.06-0.65), students using Twitter (AOR = 0.30, 95% CI: 0.13-0.70), and participants who shared their feelings with parents (AOR = 0.22, 95% CI: 0.06-0.72) or siblings (aOR = 0.21, 95% CI: 0.08-0.54) demonstrated lower odds of reporting self-reported aggression (**Table 4**).

Table 4: Multivariate analysis showing association of aggression with respondents' characteristics.

Variables	Category	Aggression N=89	No Aggression n=131	aOR	Adjusted 95% CI	p-value
Demographic Factors						
Gender	Female	58(50.0)	58(50.0)	Ref		-
	Male	31 (29.8)	73(70.2)	0.42	(0.24- 0.73)	*0.002
Types of Medical College	Government	35(39.3)	75(57.3)	Ref		-
	Private	54(60.7)	56(42.7)	3.29	(1.57- 6.90)	*0.002
Year of Study (MBBS Program)	1st year	16(18.0)	28(21.4)	Ref		-
	2nd year	24(27.0)	21(16.0)	2.42	(0.97-6.01)	0.056
	3rd year	22(24.7)	22(16.8)	1.97	(0.79-4.88)	0.142
	4th year	05(5.6)	39(29.8)	0.20	(0.06-0.65)	*0.007
	5th year	22(24.7)	21(16.0)	2.08	(0.84-5.15)	0.113
Academic Factor						
Academic Performance	<3	19(21.3)	46(35.1)	Ref		-
(Last Term CGPA)	≥3	70(78.7)	85(64.9)	2.19	(1.08-4.43)	*0.028
Interpersonal Factors						
Sharing Feelings with Parents	No	11(12.4)	04(3.1)	Ref		-
	Yes	78(87.6)	127(96.9)	0.22	(0.06-0.72)	*0.013
Sharing Feelings with Siblings	No	18(20.2)	11(8.4)	Ref		-
	Yes	71(79.7)	120(91.6)	0.21	(0.08-0.54)	*0.001
Involvement in Verbal Abuse	No	54(60.7)	104(79.4)	Ref		-
	Yes	35(39.3)	27(20.6)	2.76	(1.39-5.47)	*0.004
Use of Twitter (X)	No	80(89.9)	96(73.3)	Ref		-
	Yes	09(10.1)	35(26.7)	0.30	(0.13-0.70)	*0.005
Enjoy Time at College	No	03(3.4)	15(11.5)	Ref		-
	Yes	86(96.6)	116(88.5)	6.95	(1.40-34.33)	*0.017
Psychosocial Factors						
Verbal Assault	No	68(76.4)	122(93.1)	Ref		-
	Yes	21(23.6)	09(6.9)	1.88	(0.72-4.91)	0.196
Mental Torture	No	71(79.8)	122(93.1)	Ref		-
	Yes	18(20.2)	09(6.9)	1.94	(0.75-5.05)	0.171
Bullying	No	47(52.8)	102(77.9)	Ref		-
	Yes	42(47.2)	29(22.1)	1.66	(0.81-3.40)	0.159
Body Shaming	No	53(59.6)	111(84.7)	Ref		-
	Yes	36(40.4)	20(15.4)	2.18	(1.02-4.65)	*0.042

aOR: Adjusted odds ratio, CI: Confidence interval, Ref: Reference category, *Significant at p<0.05

DISCUSSION

The present study identified a high prevalence of self-reported aggression among medical students, with approximately half of the participants reporting aggressive behaviors. This study supports earlier research showing that young adults and university students in both Pakistan [4, 11, 21] and Nigeria [19] have a high incidence of reported aggression. Those with a history of trauma or exposure to chronic psychosocial stress may develop maladaptive behaviors and emotional dysregulation, which can manifest as aggression due to experiences of emotional abuse or neglect or living through violent incidents where they were either perpetrators or victims. Other examples include bullying, name-calling, body shaming, and other forms of relational conflict. In the literature, it is documented that these experiences have the potential to disrupt emotional self-regulation processes and can contribute to psychological distress, which, when exacerbated by an individual's external environment (family, peers, school environment), socially and culturally creates a context for aggressive behaviors to occur [22]. Furthermore, the social-ecological stress-vulnerability model and the frustration-aggression hypothesis suggest that the accumulation of psychosocial stress can affect an individual's coping mechanisms and increase the likelihood of aggression, particularly among adolescents and young adults attending high-expectation educational institutions [3, 4, 5].

According to the results from the present research study, female students had a higher incidence or frequency of aggressive behaviors than male students. Research indicates that gender differences in aggression could be partly attributed to differences in how males and females perceive stressors, process their emotions, and utilize coping strategies. Female medical students may have a greater accumulation of psychosocial stressors such as academic/educational expectations, interpersonal stressors, and/or emotional exhaustion than their male counterparts. However, there have been many contradictory reports in the literature concerning gender differences and aggression [7, 8, 12, 15, 23]. Studies conducted in South Korea showed that male students exhibited higher levels of aggressive behaviors than female students [24], indicating that sociocultural context, gender roles, and environmental factors likely contribute to variations in aggressive behavior across different populations. Medical students who attended private medical schools were almost twice as likely to exhibit aggressive behaviors compared to those who attended public medical schools; therefore, it may be assumed that the sociopsychological pressures associated with [1, 21] the high cost of medical school education [21], the expectations of their parents regarding their academic performance, and the highly competitive nature of the school would account for this phenomenon. These findings are consistent with the results of studies conducted in India [8]. Academic stress and perceived pressure to perform at a high academic level likely contribute to emotional and/or behavioral dysregulation among medical students.

The present study also found that first-year students exhibited higher levels of aggression than fourth-year students. This difference may reflect difficulties in adjustment during the transition into medical education, including adaptation to academic workload, social environments, and emotional stressors. Senior students may gradually develop more effective coping strategies and emotional regulation skills over time. Comparable findings have previously been reported among medical students in Karachi, Pakistan [4].

Students with higher CGPAs had higher odds of self-reported aggression. Although academic achievement is generally considered a positive indicator, high-performing students may simultaneously experience increased psychological pressure, competition, perfectionistic tendencies, and prolonged academic stress. Such stressors may contribute to emotional exhaustion and externalizing responses. Similar associations between academic pressure and aggressive behaviors have been reported in studies conducted among university students in Bangladesh [7].

The students involved in verbal abuse showed more self-reported aggression, which could be due to verbal conflicts creating unpleasant situations. Similar findings have been reported from studies conducted in Korea [23, 24]. Our study showed a significant association between aggression and past traumatic experiences, including verbal assault, mental torture, bullying, body shame, and sexual harassment. Individuals with such experiences showed greater self-reported aggression; the findings are consistent with several other studies that revealed an association between aggression and psychosocial factors affecting mental well-being [24-26]. The observed association between traumatic interpersonal experiences and self-reported aggression may reflect underlying mechanisms of psychosocial stress and emotional dysregulation. Emerging evidence indicates that exposure to verbal abuse, humiliation, bullying, and body shaming can contribute to chronic stress activation, impaired coping responses, reduced self-esteem, and heightened emotional reactivity, all of which may increase vulnerability to externalizing behaviors. Within medical education settings, academic pressure and interpersonal stressors may further intensify these psychological responses.

Previous research regarding aggressive behavior in adolescents found that higher levels of aggression in adolescents were reported by those who had weak parenting and poor communication with their parents, siblings, and friends, as opposed to those who had good relationships with their parents, siblings, and friends. Findings from these studies revealed that having a good relationship with family members helped decrease aggression by sharing feelings, coping with stress, and reducing both anger and stress [27-32]. This suggests that there is potential to protect oneself from the negative

psychological effects of stress and trauma through close connections with others and by having emotional support from family and friends. Good family relationships can also help buffer the psychological effects of stress and trauma by fostering the development of adaptive emotion regulation and healthy coping mechanisms [5, 12, 19, 27, 28].

Interestingly, in this study, students who used Twitter had a significantly lower likelihood of self-reported aggression compared with other social media users. Possible explanations include that Twitter is primarily used to share information and participate in discussions with a larger audience. In contrast, Instagram, Facebook, and WhatsApp are typically used to communicate with friends or family on a much more personal level, often involving emotionally charged interactions [33].

There is contradictory evidence on the relationship between the use of social media and the levels of self-reported aggression. There are, for instance, studies that link Twitter usage to higher rates of aggression and hostility than other forms of social media exposure. Therefore, this finding should be interpreted with caution, and additional study is warranted [33].

Family and sociodemographic characteristics may also play a role in psychosocial outcomes and in the ways medical students respond behaviorally. Family and sociodemographic factors, such as age, parental education, parental occupation, and family environment, are likely to contribute to how students cope, their academic expectations, the degree of emotional support they receive from family, and the amount of stress they are exposed to. For example, if a student has parents who are highly educated and/or have achieved some level of professional accomplishment, these parents may hold higher academic expectations for their child, which may, in turn, lead to greater psychological pressure and emotional strain. There are also likely to be differences across academic years and developmental stages, which will affect a student's ability to adapt to school stressors and regulate their emotions in response to them. Although formal moderation analyses were beyond the scope of the current study, these factors would benefit from further study in greater longitudinal work [5, 12, 19, 27, 28, 32].

LIMITATIONS

Several limitations should be considered when interpreting the results of this study. The sample for this study was drawn from two medical schools in a single urban area, which may limit the external validity (generalizability) of the findings to students at other medical schools. The educational environment, social culture, academic stressors, and student support also differ across institutions and may affect self-reported aggression. Therefore, the results should be interpreted in the context of the study subjects' regional area. Multicentre studies, using a diverse range of institutions and geographical regions, need to be conducted to increase representation and external validity.

The second limitation of this study is the inability to establish a temporal or cause-and-effect relationship due to the simultaneous assessment of behavior and exposure in a cross-sectional design. Therefore, these variables should be viewed as correlates or associations rather than as risk factors for aggressive behavior. The temporal and causal pathways associated with psychosocial stress, traumatic events, and aggressive behavior in medical students should be better understood through longitudinal research.

Thirdly, aggressive behavior was assessed using the self-reported Buss-Perry Aggression Questionnaire (BPAQ) and categorized according to established cut-off criteria for males and females. Responses may reflect a degree of recall bias or response bias that could affect their accuracy.

Additionally, the study did not directly measure many psychological factors related to aggressive behavior (*e.g.*, emotion regulation, coping strategies, resilience, temperament, perceived stress) using validated psychological measures. Consequently, the conclusions regarding psychosocial stress and emotional dysregulation are based on existing research rather than on measures obtained in this study.

Finally, due to the relatively limited sample size of this study, detailed analysis of interactions and moderation across sociodemographic subgroups was not possible; future studies with larger samples are recommended to use continuous BPAQ scores, longitudinal methods, and more sophisticated analyses to investigate subgroup differences and psychosocial mechanisms related to aggression.

PRACTICAL IMPLICATIONS

This scholarly article discusses how these behaviors (*i.e.*, aggressive behavior towards other individuals) need to be addressed in a medical school setting, where psychosocial and institutional interventions are developed to address the high level of self-reported aggression in this study population. Medical schools can create trauma-informed and student-centered mental health interventions by implementing them into their learning environments based on the identified relationships with personal adversity, verbal abuse, trauma, and academic stressors.

Furthermore, early identification through psychosocial screening would help identify students in need of assistance. Medical schools should also strengthen their counseling services, peer-support systems, and mental health referral pathways within their institutions to foster and improve "adaptive" coping and emotional health for their students.

The implications of these findings also highlight the necessity of having anti- bullying and anti-harassment policies (including education related to verbal abuse, body shaming, and mistreatment) in place [25, 26, 31, 33]. Workshops related to stress management, emotional regulation, conflict resolution, and healthy

communication skills should be implemented to assist students with stressors (academic and psychosocial) and to help manage academic pressure [34].

Additionally, positive family and peer relationships may protect from aggressive behaviors; therefore, institutions should promote social connectedness and create an environment that encourages mentorship and psychological safety for all their students [27, 28].

To understand the pathogenesis and evaluate the relationship between aggression and student well-being, future longitudinal and multicenter studies focusing on the correlates of aggression and student well-being within the medical field are warranted.

As suggested by previous research, supportive strategies and anger management training significantly help reduce anger and self-reported aggression among medical students by improving emotional regulation and coping skills [34]. Similarly, structured anger management programs and cognitive-behavioral interventions demonstrated improvements in social problem-solving abilities, emotional resilience, and control of aggression among nursing and medical sciences students [35, 36]. In addition, a recent study (2026) reported that aggression among medical students is influenced by multiple demographic and academic factors, including academic stressors, clinical workload, gender, and residential environment, underscoring the importance of targeted psychosocial interventions within university settings to promote psychological well-being in this vulnerable population [37]. Furthermore, evidence underpins the role of emotional intelligence, mindfulness, physical activity, and stress-management approaches in reducing aggressive behavior among medical students [38, 39]. These findings have been supported by evidence-based references endorsing the proposed interventions to mitigate self-reported aggression among university students.

CONCLUSION

This study demonstrated a high prevalence of self-reported aggression among Pakistani medical students. Self-reported aggression was significantly associated with psychosocial and interpersonal factors, including traumatic experiences, verbal abuse, academic pressure, and institutional environment.

In contrast to the prior suggested supportive factors, family support was noted to have a protective role against self-reported aggression. The results thus support the importance of utilizing trauma-informed and psychosocially responsive approaches in medical education settings to support the emotional health of students and prevent maladaptive behavioral patterns.

RECOMMENDATIONS

Further recommendations for professional counselors and therapists include offering regular mental health and behavioral therapy sessions in colleges and universities to raise awareness of mental health and behavioral issues and to support healthcare professionals and college students.

This will also support the management of aggressive behavior and effectively promote the mental and physical well-being of youth. Furthermore, interventional studies can be conducted to explore causality in the future.

ETHICS APPROVAL

Permission to carry out the study was granted by the Institutional Review Board/ Ethical Review Committee of Jinnah Sindh Medical University, Karachi (Approval No. JSMU/IRB/2022/687), and the Ethical Review Committee of Jinnah Medical and Dental College, Karachi (Approval No. 000285123). All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and the Declaration of Helsinki.

CONSENT FOR PUBLICATION

Informed consent was obtained from all individual participants included in the study.

AVAILABILITY OF DATA

Data supporting the results of this study can be provided upon reasonable request.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORS' CONTRIBUTION

KF: Conceptualized the study. KF & ZA designed the study. ZA, SI, MAK, NSK, MUG collected the data. KF & ZA analyzed the data. ZA, MAK, NSK, and MUG drafted the manuscript. KF critically reviewed and revised the initial draft. All authors read and approved the manuscript.

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