RESEARCH ARTICLE

Screening of depression among school-going adolescents of district Rawalpindi using PHQ-9 questionnaire: A cross-sectional study

Humaira Mahmood, Waqas Farooq, Naheed Kazmi, Zainab Sabir, Izzah Nawaz, Khursand Bint-e-Azam

Abstract

Objective: To determine the prevalence of depression and sociodemographic factors associated with depressive symptoms among adolescents.

Method: The descriptive, cross-sectional study was conducted from July to November 2024 at public and private schools in Rawalpindi, Pakistan, ZA Public Secondary School, Government Graduate College Dhoke khabba, FG Sir Syed Model Public School (Boys), and Zia-ul-Islam National secondary school, and comprised students of either gender aged 14-17 years. The Patient Health Questionnaire-9 was used to screen and classify the severity of depressive symptoms. The association of demographic variables with depression severity was explored. Data was analysed using SPSS 27.0.1.

Results: Of the 358 adolescents, comprising 190(53.1%) were boys, 168(46.9%) were girls and 116(38%) were aged 16 years. The level of depressive symptoms was minimal in 169(47.2%) cases, mild in 98(27.4%), moderate in 66(18.4%), moderately severe in 22(6.1%) and severe in 3(0.8%). Depression severity was significantly correlated with age, female gender and family income ($p<0.05$). Parental marital status and a history of mental illness in the parents did not significantly correlate ($p>0.05$) with severity of depressive symptoms.

Conclusion: Depression was found to be highly prevalent among school-going adolescents, with more than half reporting mild to severe symptoms. Age and family income were the significant factors associated with depressive symptoms.

Keywords: Adolescents, Depression, Depressive disorder, Mental health, PHQ9. (JPMA 76: 904; 2026)

DOI: https://doi.org/10.47391/JPMA.30343

Introduction

Mental health is an essential component of overall wellbeing, particularly in the adolescent population. Mental health issues, such as depression, anxiety and stress, are the leading causes of disabilities among children and adolescents globally, posing a substantial public health challenge in the 21st century.[1] The World Health Organisation (WHO) defined health as "a state of complete physical, mental and social wellbeing", reflecting the long-standing recognition of mental health as essential to overall wellbeing. It is critical to address mental health issues at every stage of life, but it is especially crucial to do so throughout adolescence (10-19 years of age), which is a special and formative time for social and emotional development that sets the stage for long-term and cross-generational health and wellbeing.[2]

Adolescents are defined by the United Nations (UN) as individuals aged 10-19 years old. Between childhood and adulthood, individuals undergo a very crucial transformation involving immense development and growth maturation stages that provide the basis for long-term health and wellbeing.[3] Adolescence is a period of many changes, beginning with puberty and a series of physical and metabolic changes in the young person's body, including those related to sleep, circadian rhythms and physical growth. Behaviours include sensation seeking, refocusing motivation and attention, and experiencing new things — shifting social situations, duties and responsibilities — that are all part of this journey from childhood to adulthood. Adolescence is the key formative phase in which there is both high potential and greater susceptibility. Mental health is important at this time as it goes on to influence broader wellbeing. In comparison with younger children and adults, adolescents are more likely to experience psychological distress due to increased exposure to negative experiences, such as accidents, depression, drug use, unplanned pregnancies, and other risky acts — all potentially having a lasting impact on mental health outcomes in adulthood.[4]

Approximately 1.3 billion people, or 16% of the global population, are adolescents.[5] Pakistan currently has very few programmes to address and support the health of adolescents even though they comprise >21% of the population.[6]

The UN Sustainable Development Goals (SDGs), particularly Goal 3, aim at ensuring the health and wellbeing of all ages,

Department of Public Health, Armed Forces Postgraduate Medical Institute, National University of Medical Sciences, Rawalpindi, Pakistan.

Correspondence: Waqas Farooq. e-mail: waqasr.56@gmail.com

ORCID ID: 0009-0004-5001-095X

Submission completed: 04-03-2025 **1st Revision received:** 03-06-2025

Acceptance: 18-02-2026 **Last Revision received:** 17-02-2026

recognising adolescent health as central in achieving the goal.[7] Mental health diseases in children and adolescents represent a significant public health issue, with global prevalence rates estimated at 17-20%. In addition, it is estimated that between one-fourth and one-third of teenagers have at least one diagnosable mental health disorder.[8] Among mental disorders, depression is a primary cause of disability globally, and a major contributor to the global disease burden. Depression negatively affects both psychological and physical health in adolescents, and can result in behavioural problems, social impairment and a major decline in the quality of life (QOL).[9]

Adolescent depression is emerging as an important threat to public health.[10] An estimated 10% of teenagers experience a major depressive episode, which raises their risk of academic, familial, social struggles, and a 16-fold heightened risk of suicidal ideation.[11] Depression, as a major disease burden among adolescents, poses various risks, including suicide, poor academic performance, substance abuse, and strained parent-child relationships.[12]

Given the prevalence of depression among adolescents, the early identification of depressive symptoms is critical. The Patient Health Questionnaire-9 (PHQ-9) was developed in 2001 as a questionnaire to screen and diagnose clinical depression with more reliability. It measures the level of depression patients are suffering from by assessing the number of depressive symptoms they have experienced in the preceding two weeks.[13]

Through the use of mental health screening in educational institutions, depression symptoms can be identified early on. The current study was planned to determine the prevalence of depression among school-going adolescents, and the factors associated with depression in this population.

Subjects and Methods

The descriptive, cross-sectional study was conducted from July 5 to November 30, 2024, at public and private schools in Rawalpindi, Pakistan, ZA Public Secondary School, Government Graduate College Dhoke khabba, FG Sir Syed Model Public School (Boys), and Zia-ul-Islam National secondary school, and comprised students of either gender aged 14-17 years. A multistage sampling technique was employed to avoid biases, and to ensure that the sample was representative of the adolescent population in urban schools. In the first stage, the Rawalpindi district was divided into its administrative subunits, that is, tehsils; and one tehsil was randomly selected using a lottery method for unbiased selection. In the second stage, two public and two private schools were purposively selected in the selected tehsil to represent various socioeconomic backgrounds. In the third stage, lists of students aged 14-17 years were obtained from the selected schools. Each eligible student was allotted a number, and then selection was done using simple random sampling technique through the lottery method by conducting a draw. Students who met the inclusion criteria, but had previously been diagnosed with mental disorders or had received treatment for mental disorders were excluded.

The sample size was calculated using the WHO calculator[14] with the help of formula: $n = Z^2 \times p(1-p) / d^2$, where Z was 1.96 for 95% confidence interval (CI), p was 0.23, indicating 23% prevalence of depression, and margin of error (d) was 0.05.[15] The sample size was inflated by >30% to improve the power of the study, enhance the generalisability of the results, and minimise possible errors of sampling.

Data was collected using the validated and self-administered PHQ-9,[16] which assessed nine key symptoms of depression, as defined by the Diagnostic and Statistical Manual of Mental Disorders Edition 4 (DSM-IV). All the nine items focused on feelings and experiences within the two preceding weeks, and were scored on a four-point Likert scale, ranging from 0 = not at all to 3 = nearly every day. Ethical approval (Re: 487-AAA-ERC-AFPGMI) was obtained from the Institutional Review Board of AFPGMI. Permission from school administration and informed consent from participants and their parents were obtained before data-collection.

Data was analysed using SPSS 27.0.1. Data was presented as frequencies and percentages. Chi-square test of independence was used to assess the association of depression severity with demographic variables. Univariate linear regression analysis was used to identify predictors of depression. $P<0.05$ was considered significant.

Results

Of the 358 adolescents, comprising 190(53.1%) were boys, 168(46.9%) were girls and 116(38%) were aged 16 years. The majority of participants 340(95%) lived with both parents, and family income in 147(41.1%) cases ranged Pakistani rupee (PKR) 30,000 and PKR60,000 per month. There were 8(2.2%) participants who reported having a parent with a mental illness (Table 1).

The level of depressive symptoms was minimal in 169(47.2%) cases, mild in 98(27.4%), moderate in 66(18.4%), moderately severe in 22(6.1%) and severe in 3(0.8%). There were 169(47.2%) adolescents having none to minimal depressive symptoms, while 98(27.4%) and 66(18.4%) adolescents exhibited mild and moderate depressive symptoms, respectively (Figure 1).

The responses to PHQ-9 questionnaire suggested different levels of depression severity (Figure 2).

Table-1: Demographic characteristics and their association with depression categories (n=358).

Variable	n (%)	Normal (I) %	Mild (II)%	Moderate (III)%	Mod. Severe (IV)%	Severe (V)%	χ^2	df	p-value
Gender									
Male	190 (53.1)	53.7	23.7	15.3	6.3	1.1	6.90	4	0.141
Female	168 (46.9)	41.1	30.4	22.0	6.0	0.6			
Age (years)									
14	39 (10.9)	94.9	2.6	0.0	2.6	0.0	60.40	12	<0.001
15	65 (18.2)	63.1	18.5	16.9	1.5	0.0			
16	136 (38.0)	32.4	32.4	23.5	10.3	0.6			
17	118 (33.0)	41.5	33.1	19.5	5.1	0.3			
Family Structure									
Both Parents	340 (95.0)	48.2	26.8	18.2	5.9	0.9	1.38	4	0.84
Single Parent	18 (5.0)	38.9	27.8	22.2	11.1	0.0			
Family Income									
<30,000	96 (26.8)	29.2	32.2	26.0	12.5	0.0	27.71	8	<0.001
30–60,000	147 (41.1)	51.0	26.5	17.7	4.1	0.7			
>60,000	115 (32.1)	59.1	22.6	13.0	3.5	1.7			
Parent Mental Illness									
Yes	8 (2.2)	50.0	0.0	50.0	0.0	0.0	7.19	4	0.126
No	350 (97.8)	47.7	27.4	17.7	6.3	0.9			

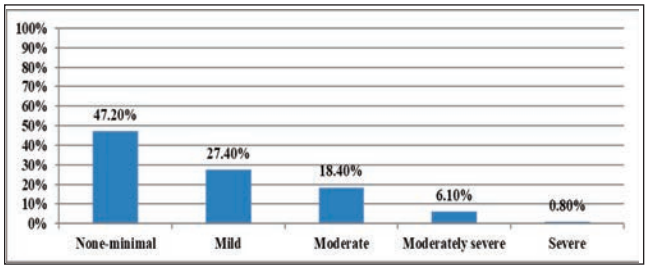

Figure-1: Severity of depressive symptoms among the participants.

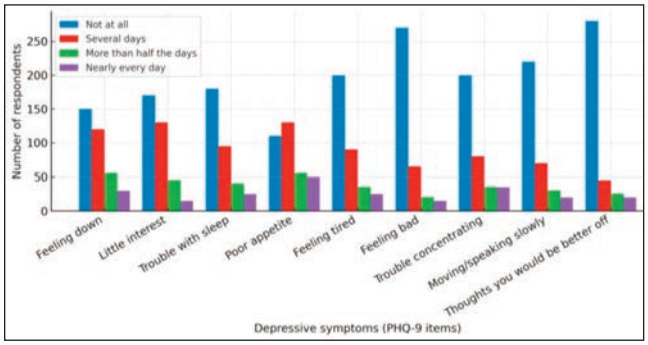

Figure-2: Frequency of participants for each PHQ 9 question.

Table-2: Univariate linear regression analysis.

Predictor of depression	Unstandardised coefficients		Standardised coefficients	*t*-test	*p*-value
	B	Sd. error	Beta		
Gender (male=1,female=2)	0.307	0.100	0.156	3.052	0.002
Age (years)	0.264	0.51	0.262	5.137	<0.001
Living with (Both parents=1, Single parent=0)	-0.108	0.225	-0.024	-0.480	0.632
Family income	-0.272	0.064	-0.213	-4.221	<0.001
Has parent have any mental illness (yes=1, no=0)	-0.110	0.333	-0.017	-0.331	0.741

Gender had no influence on depression category (p=0.141), but among the females, a larger proportion had mild and moderate depression (Table 1). The level of depression was significantly associated with age and family income (Table 1).

Linear regression analysis showed that depression severity was significantly correlated with age, female gender and family income (p<0.05), while parental marital status and a history of mental illness in the parents did not significantly correlate (p>0.05) with severity of depressive symptoms (Table 2).

Discussion

The current study comprised 358 adolescents aged 14-17 years in Rawalpindi, with the aim of assessing the prevalence of depression and to examine the sociodemographic factors associated with depressive symptoms. Mood disorders and signs of depression are major public health concerns affecting adolescents, necessitating early prevention and treatment efforts as a priority.[17]

The current results revealed a significant prevalence of depression symptoms among participants: 47.2% reported none to minimal symptoms, 27.4% experienced mild symptoms, 18.4% had moderate symptoms, while 6.1% and 0.8% reported moderately severe and severe symptoms, respectively. A study done in Hong Kong reported similar results with respect to moderate (16.1%) and moderately severe (5.5%) depressive symptoms.[18] Likewise, studies in India demonstrated a comparable level of depressive symptoms

among adolescents.[19] In particular, a study in Haryana, India,[20] indicated that mild depression was the most prevalent type, which mirrored the pattern observed in the current study.

A systematic review and meta-analysis encompassing 62 original studies and 232,586 children and adolescents suggested that the prevalence of positive depression screening ranged between 10.3% and 54.5%, illustrating the broad variability in depressive symptoms among adolescents across different regions.[21] Similarly, findings from a Nigerian study echoed the current results, showing that lower family income was linked with higher depression rates, with the majority of adolescents experiencing minimal to mild symptoms.[22]

Conversely, a Jordanian study reported a higher prevalence of moderate to severe depression compared to the current findings. Both studies, however, highlighted a significant association between depression and socioeconomic factors, suggesting that economic challenges may intensify depressive symptoms in adolescents.[23]

In line with the current results, a study in from Macau demonstrated a strong association between depression and lower family income among adolescents, further supporting the connection between socioeconomic status and mental health outcomes.[24] Research in Saudi Arabia reported higher levels of depressive symptoms across mild, moderate and severe categories compared to the current findings, suggesting regional differences in adolescent depression prevalence.[25]

A study in Bangladesh found a 36.6% prevalence of adolescent depression, with 32.5% reporting mild symptoms, 20.6% moderate symptoms, 10.9% moderately severe symptoms, and 5.1% severe symptoms — rates notably higher than those observed in the current study.[26]

Regarding gender differences, the current study found significant association between gender and depression categories, which aligned with previous research indicating that female adolescents aged 13-18 years were more likely to exhibit depressive symptoms.[27]

The current study has limitations of having a cross-sectional design based on self-reported data and reliance on a screening tool rather than clinical diagnosis. In addition, a comprehensive multivariate analysis was not conducted to completely account for potential confounding variables. These limitations have affected the generalisability of the findings.

Conclusion

The prevalence of depression was found to be significant among the adolescents in Rawalpindi, revealing that nearly half had none to minimal symptoms, while the rest experienced varying degrees of depression. Significant associations were found with age and family income, indicating that older adolescents and those from lower-income families were at a higher risk. Although gender and family structure were not significant factors, differences from other studies suggest the impact of cultural and contextual differences. Comparisons with global research reveal both similarities and regional disparities, emphasising the need for tailored mental health interventions addressing specific adolescent risk factors.

Acknowledgement: We are grateful to the participating institutions and students.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. Otto C, Reiss F, Voss C, Wüstner A, Meyrose AK, Hölling H, et al. Mental health and well-being from childhood to adulthood: design, methods and results of the 11-year follow-up of the BELLA study. Eur Child Adolesc Psychiatry. 2021;30:1559-77. doi:10.1007/s00787-020-01630-4.
2. Guthold R, Carvajal-Velez L, Adebayo E, Azzopardi P, Baltag V, Dastgiri S, et al. The importance of mental health measurement to improve global adolescent health. J Adolesc Health. 2023;72:S3-6. doi: 10.1016/j.jadohealth.2021.03.030.
3. World Health Organization. Adolescent health. [Online] [Cited 2026 January 29]. Available from: URL: https://www.who.int/health-topics/adolescent-health
4. Lukoševičiūtė-Barauskienė J, Žemaitaitytė M, Šūmakarienė V, Šmigelskas K. Adolescent perception of mental health: it's not only about oneself, it's about others too. Children (Basel). 2023;10:1109. doi:10.3390/children10071109.
5. UNICEF. Adolescents overview. [Online] [Cited 2026 July 11]. Available from: URL: https://data.unicef.org/topic/adolescents/overview/
6. Abdullah MA, Tasneem Shaikh B. Investing in the future: prioritizing adolescent health in Pakistan. J Soc Health Sci. 2023;2:1-4.
7. Ross DA, Hinton R, Melles-Brewer M, Engel D, Zeck W, Fagan L, et al. Adolescent well-being: a definition and conceptual framework. J Adolesc Health. 2020;67:472-6. doi:10.1016/j.jadohealth.2020.06.042.
8. Abbasi LN, Hyasat A, Alsha'er A, Warawrah A, Jaser G, Shelbayeh M, et al. Adolescent depression prevalence and factors: a Jordanian cross-sectional study. Cureus 2024;16:eXXXXX.
9. Beigrezaei S, Darabi Z, Davies IG, Mazidi M, Ghayour-Mobarhan M, Khayyatzadeh SS. Higher global diet quality score is related to lower prevalence of depression and poor quality of life among adolescent girls. BMC Psychiatry. 2023;23:665. doi:10.1186/s12888-023-05118-3.
10. Gunlicks-Stoessel M, Liu Y, Parkhill C, Morrell N, Choy-Brown M, Mehus C, et al. Adolescent, parent, and provider attitudes toward a

machine learning-based clinical decision support system for selecting treatment for youth depression. BMC Med Inform Decis Mak. 2024;24:18. doi:10.1186/s12911-024-02402-3.

11. Aitken M, Sagar A, Courtney D, Szatmári P. Development, reach, acceptability and associated clinical changes of a group intervention to improve caregiver-adolescent relationships in the context of adolescent depression. JCPP Adv. 2023;3:e12200. doi: 10.1002/jcv2.12168.
12. Li M, Wang J, Ma P, Sun W, Gong H, Gao Y. The relationship between harsh parenting and adolescent depression. Sci Rep. 2023;13:20647. doi:10.1038/s41598-023-20647-0
13. Keyes KM, Gary D, O'Malley PM, Hamilton A, Schulenberg J. Recent increases in depressive symptoms among US adolescents: trends from 1991 to 2018. Soc Psychiatry Psychiatr Epidemiol. 2019;54:987-96. doi:10.1007/s00127-019-01697-8
14. Lwanga SK, Lemeshow S. Sample size determination in health studies: a practical manual. Geneva: World Health Organization, 1991.
15. Shaikh A, Mahnoor S, Saleem A, Rashid M, Faheem D, Ahmad F. Mental health of adolescents and its association with their educational systems: a cross-sectional study on high school students. Int J Psychol Educ Stud. 2023;10:323-33. doi:10.52324/ijpes.2023.xxxxx
16. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med 2001;16:606-13. doi: 10.1046/j.1525-1497.2001.016009606.x.
17. Fonseca-Pedrero E, Díez-Gómez A, Pérez-Albéniz A, Al-Halabí S, Lucas-Molina B, Debbané M. Youth screening depression: validation of the patient health questionnaire-9 (PHQ-9) in a representative sample of adolescents. Psychiatry Res 2023;328:115486 doi: 10.1016/j.psychres.2023.115486
18. Leung DYP, Mak YW, Leung SF, Chiang VCL, Loke AY. Measurement invariances of the PHQ-9 across gender and age groups in Chinese adolescents. Asia Pac Psychiatry 2020;12:e12381 doi: 10.1111/appy.12381.
19. Nirudya V, Reddy MM, Chandrasekhar RS, Purushotham A, Ranjitha M. Prevalence of depression in school-going adolescents and its impact on scholastic performance: a cross-sectional study. Cureus. 2023;15:e38340.

doi: 10.7759/cureus.38340.

20. Mohta A, Malhotra S, Gupta SK, Mani K, Patra BN, Nongkynrih B. Depression among adolescents in a rural area of Haryana, India: a community-based study using patient health questionnaire-9. Cureus 2021;13:e18388. doi: 10.7759/cureus.18388
21. Li JY, Li J, Liang JH, Qian S, Jia RX, Wang YQ, et al. Depressive symptoms among children and adolescents in China: a systematic review and meta-analysis. Med Sci Monit 2019;25:7459-70 doi: 10.12659/MSM.916774.
22. Bassey E, Essien E, Eleazu F, Abang R, Ochijele E, Daniel F. The relative role of family affluence and social support on depression and self-esteem among adolescents in Nigeria: a cross-sectional study. Acta Med Acad 2024. doi: 10.5644/ama2006-124.421.
23. Dardas LA, Silva SG, Smoski MJ, Noonan D, Simmons LA. The prevalence of depressive symptoms among Arab adolescents: findings from Jordan. Public Health Nurs 2018;35:100-8. doi:10.1111/phn.12363
24. Ng TF, Lio LI. Family factors and major depression in Macau adolescents. Med Sci Discov 2022;9:181-8. doi:10.36472/msd.v9i3.xxx
25. Alharbi R, Alsuhaibani K, Almarshad A, Alyahya A. Depression and anxiety among high school students at Qassim region. J Fam Med Prim Care 2019;8:504-10. doi:10.4103/jfmpc.jfmpc_374_18
26. Anjum A, Hossain S. Factors associated with depressive symptoms among urban and semi-urban school adolescents in Bangladesh: a pilot study. Int Health 2019;14:xxx-xxx. doi:10.1093/inthealth/ihzxxx
27. Shorey S, Ng ED, Wong CHJ. Global prevalence of depression and elevated depressive symptoms among adolescents: a systematic review and meta-analysis. Br J Clin Psychol 2021;61:287-305. doi:10.1111/bjc.12333

Author Contribution:

HM: Supervision, overall guidance, ensuring the study adhered to ethical standards and research protocols, review and final approval.
WF: Concept, design, developing the study objectives, methodology, data collection and drafting and final approval.
NK: Writing the initial draft, compiling and summarizing key findings while preparing tables and figures.
ZS & KBA: Data collection, using the PHQ-9 questionnaire, managed data entry and statistical analysis.
IN: Review, editing, coherence, accuracy, formatting, citation and referencing.