

Depressive Symptoms and Associated Factors among School Adolescents in Sousse-Medina : A Cross-Sectional Study

Haggui. R ⁽¹⁾, Nouir. S ⁽¹⁾, Mabrouk. S ⁽¹⁾

⁽¹⁾ Department of Pediatrics, Sahloul University Hospital, Faculty of Medicine of Sousse, Sousse, Tunisia

ABSTRACT

Adolescent depression is a major public health problem and remains insufficiently detected within school environments, despite its impact on social relationships, family functioning, and academic performance. This cross sectional analytic study aimed to estimate the prevalence of depressive symptoms among school-attending adolescents in Sousse-Medina and identify factors associated with depressive symptoms. Between November 2024 and January 2025, 390 students aged 12 to 18 years from three public schools completed an anonymous self-administered questionnaire. Depressive symptoms were measured using the Depression subscale of the Hospital Anxiety and Depression Scale (HADS-D), and statistical comparisons were performed using a 5% significance threshold. A probable depressive state (HADS-D ≥ 11) was found in 50.3% of participants, while 38.2% had borderline scores. Higher depressive levels were observed among adolescents from non-married parental settings ($p = 0.001$), those reporting sleep disturbances ($p = 0.001$), suicidal thoughts ($p = 0.001$), and exposure to physical aggression ($p = 0.024$). No significant differences were noted regarding age, sex, school performance, or substance use. The marked prevalence of depressive symptoms indicates the potential need for routine mental-health screening in schools and for strengthening psychological support services targeted toward vulnerable students.

Keywords : Adolescents; Depression; HADS-D; Mental health; School environment; Tunisia.

RESUME

La dépression à l'adolescence représente un enjeu majeur de santé publique et demeure insuffisamment diagnostiquée en milieu scolaire, malgré son retentissement sur les relations sociales, le fonctionnement familial et les performances académiques. Cette étude transversale analytique visait à estimer la prévalence des symptômes dépressifs chez les adolescents scolarisés à Sousse-Médina et à identifier les principaux facteurs en lien avec ces symptômes. Entre novembre 2024 et janvier 2025, 390 élèves âgés de 12 à 18 ans issus de trois établissements publics ont rempli un questionnaire anonyme auto-administré. Les symptômes dépressifs ont été évalués à l'aide de la sous-échelle « Dépression » du Hospital Anxiety and Depression Scale (HADS-D), et les comparaisons statistiques ont été réalisées avec un seuil de significativité de 5 %. Un état dépressif probable (HADS-D ≥ 11) a été observé chez 50,3 % des participants, tandis que 38,2 % présentaient des scores intermédiaires. Des niveaux plus élevés de symptômes ont été relevés chez les adolescents issus de parents non mariés ($p = 0,001$), ceux rapportant des troubles du sommeil ($p = 0,001$), des idées suicidaires ($p = 0,001$) ou une exposition à une agression physique ($p = 0,024$). Aucun écart significatif n'a été mis en évidence selon l'âge, le sexe, les performances scolaires ou la consommation de substances. La fréquence importante des symptômes dépressifs souligne la nécessité d'un dépistage systématique en milieu scolaire et du renforcement des dispositifs d'accompagnement psychologique, notamment pour les adolescents les plus vulnérables.

Mots-clés : Adolescents ; Dépression ; HADS-D ; Santé mentale ; Milieu scolaire ; Tunisie.

Corresponding author:

Dr Roua Haggui

Email: Rouahaggui32@gmail.com

INTRODUCTION

Adolescence is a sensitive period marked by important biological, psychological, and social changes that can affect emotional vulnerability. Depression is among the most common mental health conditions in this age group and has been identified as an important contributor to functional impairment, affecting school achievement, family relationships, and social integration (1, 2).

Recent studies indicate that depressive symptoms have become more frequent among adolescents over recent years, reflecting a broader deterioration in youth mental health (3, 4). In North African countries such as Tunisia, surveys have reported high levels of emotional distress among school-aged adolescents, especially among girls (5). Regional studies conducted in school settings have also reported the presence of depressive symptoms of varying severity among Tunisian adolescents (6). The interpretation of these results is limited by differences in methodology and screening instruments.

Recognizing depression during adolescence remains challenging, as symptoms can be subtle, context-dependent, or masked by the emotional fluctuations typical of this developmental stage (7). In Tunisia, only a few studies have explored depressive symptoms in school populations, and none have specifically examined adolescents in Sousse-Medina using a validated psychometric instrument.

Given the paucity of recent and region-specific data, this study aims to assess the prevalence of depressive symptoms among adolescents attending public schools in Sousse-Medina and to identify associated sociodemographic, familial, behavioral, and psychosocial factors.

METHODS

Study design and setting

This cross-sectional analytic study was conducted between November 2024 and January 2025 in three public schools located in Sousse-Medina, an urban district in central Tunisia. The selected institutions included one middle school and two high schools, covering different school levels.

Study population

The target population consisted of students aged 12 to 18 years enrolled in the selected public schools in Sousse-Medina.

Sampling procedure and sample size

Schools were selected from the official list provided by the Regional Delegation of Education. Cluster sampling was used at the classroom level: in each selected school, intact classes were included, and all students in those classes were invited to participate. The minimum required sample size was estimated at 384 participants assuming an expected prevalence of 50%, a conservative estimate commonly used when no reliable local prevalence is available

because it yields the maximum required sample size (19), a 95% confidence level, and a 5% margin of error. To compensate for potential non-responses, 390 students were ultimately included.

Assessment of depressive symptoms

Depressive symptoms were assessed using the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D), originally developed by Zigmond and Snaith (8). Although initially developed for adult clinical populations, the HADS has also been used in adolescent populations and has demonstrated acceptable psychometric properties, including internal consistency and construct validity, in several validation studies (8, 18).

This instrument comprises seven items, each scored from 0 to 3, yielding a total score ranging from 0 to 21. The following categories were used:

- 0–7: no depressive symptoms
- 8–10: borderline symptoms
- ≥11: probable depressive symptoms

Other variables

Data were collected through an anonymous self-administered questionnaire exploring:

- Sociodemographic characteristics: age, sex, school level
- Family context: parental marital status, family conflicts, bereavement or chronic illness in the household
- School-related factors: class repetition, academic performance
- Health-related variables: chronic disease, sleep disturbances
- Behavioral factors: tobacco use, alcohol and cannabis consumption, physical activity
- Psychosocial experiences: exposure to physical or sexual aggression, stressful life events
- Suicidal ideation

Data collection procedure

Authorizations were obtained from the Regional Delegation of Education and the directors of the participating schools. Data were collected during scheduled classroom sessions. All students present on the day of data collection were invited to participate. Before questionnaire administration, students were informed about the objectives of the study and the voluntary and anonymous nature of their participation. Questionnaires were completed individually without the presence or involvement of teachers. After collection, questionnaires were reviewed for completeness, and those with incomplete or inconsistent responses were excluded from the analysis.

Statistical analysis

Data were analyzed using SPSS version 21. Quantitative variables were presented as means and standard deviations, while qualitative variables were expressed as frequencies and percentages. Associations between depressive symptoms (HADS-D categories) and independent variables were exa-

mined using the Chi-square test or Fisher's exact test when appropriate. A p-value < 0.05 was considered statistically significant.

Because the primary objective of this study was descriptive and exploratory, and because several variables presented sparse distributions across categories, multivariable modelling was not considered sufficiently robust. Therefore, only bivariate analyses were performed.

Ethical considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki. Authorization was obtained from the Regional Delegation of Education and the directors of the participating schools. Participation was voluntary and anonymous. Written informed consent was obtained from the parents or legal guardians of all participating minors. Assent was also obtained from the adolescents before questionnaire administration.

Given the observational nature of the study and the use of an anonymous self-administered questionnaire in a school setting, formal ethical committee approval was not required according to local regulations.

At the end of the survey, all participants were informed about the availability of school health and psychological support services and were encouraged to seek professional help if they experienced emotional distress or suicidal thoughts.

RESULTS

Characteristics of the study population

A total of 398 students were invited to participate. Eight questionnaires were excluded because of incomplete or inconsistent responses, resulting in a final analytical sample of 390 adolescents (participation rate: 98%).

A total of 390 adolescents aged 12 to 18 years participated in the study. The mean age was 16.7 ± 2.0 years. Girls represented 52.6% of the sample. Most adolescents lived with married parents (82.7%), while 17.3% reported parental separation or divorce. Nearly one-third of students (28.5%) had repeated at least one academic year, and 36.2% reported poor academic performance. Sleep disturbances were reported by 32.3% of participants. Exposure to physical aggression (21.8%) and stressful life events (38.1%) was reported by several participants.

Prevalence of depressive symptoms

According to the HADS-D classification, 50.3% of adolescents presented probable depressive symptoms (HADS-D ≥ 11), while 38.2% had borderline scores (8–10). Only 11.5% fell within the normal range. (table1)

Table 1 : Distribution of depressive symptoms according to the HADS-D scale

HADS-D Category	Score range	n (%)
Normal	0–7	45 (11.5%)
Borderline	8–10	149 (38.2%)
Definite depression	≥ 11	196 (50.3%)
Total	—	390 (100%)

Factors associated with depressive symptoms

• Sociodemographic factors

No significant association was found between depressive symptoms and age ($p > 0.05$) or sex ($p > 0.05$). Academic performance and class repetition were also not significantly related to depressive status.

• Family environment

Depressive symptoms differed significantly according to parental marital status ($p = 0.001$), with higher symptom levels observed among adolescents whose parents were not married compared with those living with married parents. (table2)

Table 2 : Depressive symptoms according to parental marital status

Parental marital status	Non-definite depression n (%)	Definite depression n (%)	p-value
Divorced	36 (18.6%)	16 (8.2%)	0.001*
One parent deceased	21 (10.8%)	12 (6.1%)	
Married	126 (64.9%)	162 (82.7%)	
Separated	11 (5.7%)	6 (3.1%)	

Health-related factors

Sleep disturbances were significantly associated with depressive symptoms ($p = 0.001$). Adolescents reporting sleep difficulties were more likely to present depressive scores.

Sleep disturbances were analyzed as associated symptoms commonly co-occurring with depressive symptomatology. (table3)

Table 3 : Association between sleep disturbances and depressive symptoms

Sleep disturbances	No/Borderline depression n (%)	Definite depression n (%)	p-value
Yes	95 (25.5%)	148 (74.5%)	0.001
No	277 (74.5%)	51 (25.5%)	

Psychological and psychosocial experiences

Depressive symptoms were more frequent among adolescents reporting suicidal thoughts ($p = 0.001$). Exposure to physical aggression was also significantly associated with higher depressive scores ($p = 0.024$). (table4)

Table 4 : Association between psychosocial factors and depressive symptoms

Variable	No/Borderline depression	Definite depression	p-value
	n (%)	n (%)	
Suicidal ideation			
Yes	34 (22.4%)	68 (38.1%)	0.001
No	118 (77.6%)	128 (61.9%)	
Physical aggression			
Yes	52 (26.8%)	72 (37.7%)	0.024
No	142 (73.2%)	119 (62.3%)	

No significant association was found between depressive symptoms and gender or parental education level.

DISCUSSION

This study highlights a substantial burden of depressive symptomatology among school-going adolescents in Sousse-Medina, with 50.3% classified as having probable depressive symptoms according to the HADS-D scale. This proportion exceeds most estimates reported in adolescent populations worldwide, generally ranging between 20% and 35% (2, 3), and is consistent with recent evidence suggesting a global increase in adolescent psychological distress (6).

At the national level, school-based surveillance data such as the EnCLASS study reported that approximately 14–15% of adolescents are at risk of depression (4). However, this estimate cannot be directly compared with the present study due to important methodological differences, including the use of different screening instruments, diagnostic thresholds, and population characteristics. The EnCLASS study is based on a standardized surveillance system, whereas the present study used the HADS-D scale in a specific urban Tunisian school population. These differences may partly explain the higher prevalence observed in our study. Other Tunisian studies have reported intermediate prevalence estimates ranging from 20% to 35%, further highlighting the heterogeneity of findings in this context (5, 9).

These findings should be interpreted within a broader conceptual framework of adolescent emotional distress rather than as a direct estimate of depressive disorders. The use of the Hospital Anxiety and Depression Scale (HADS), originally developed for adult clinical settings (8), captures symptom intensity rather than diagnostic entities. Its application in adolescent and Arabic-speaking populations may therefore influence prevalence estimates, particularly in non-clinical school settings.

A structured pattern of associations emerges across different levels of influence. At the structural level, family instability appears as a central correlate of depressive symptoms. Adolescents from separated, divorced, or widowed parents separated, divorced, or widowed parents exhibited higher depressive symptom scores, reinforcing evidence that family cohesion and parental stability are key determinants of emotional security and psychological resilience during adolescence (1, 12).

At the environmental level, exposure to physical aggression was significantly associated with higher depressive symptomatology. This is consistent with literature demonstrating that violence exposure constitutes a major stressor linked to internalizing psychopathology through chronic activation of stress-response systems and impaired emotional regulation (7, 15).

At the clinical expression level, sleep disturbances and suicidal ideation were strongly associated with depressive symptoms. These variables likely reflect core components of the depressive phenotype rather than independent risk factors. Sleep disturbance is increasingly recognized as both a precursor and

consequence of depressive states, mediated by circadian dysregulation and neurobiological alterations in affective systems (11, 16). Similarly, suicidal ideation is best conceptualized as an indicator of severity within the depressive spectrum and is consistently associated with higher levels of psychological distress in adolescents (3, 17).

In contrast, no significant associations were observed with age, sex, academic performance, or substance use. The absence of gender differences contrasts with much of the literature reporting higher depressive symptoms among female adolescents (1, 2). This discrepancy may be partly explained by a ceiling effect due to the high overall prevalence of symptoms, which reduces variability between subgroups. Cultural factors may also influence the expression and reporting of emotional distress. Moreover, gender differences may be more evident in clinically diagnosed depression than in symptom-based screening approaches. Overall, these findings suggest that depressive symptomatology in this population is primarily shaped by psychosocial and environmental determinants rather than demographic characteristics. This aligns with ecological models of adolescent mental health, which emphasize the dynamic interaction between individual vulnerability and contextual influences across family, school, and community systems (13, 14).

This study provides valuable data from a North African context, where epidemiological evidence on adolescent mental health remains limited.

The high prevalence observed may be partly explained by measurement bias related to the use of a screening tool, as well as selection bias due to the inclusion of public schools only and reporting bias inherent to self-administered questionnaires.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings.

First, the assessment of depressive symptoms was based on a self-administered screening instrument (HADS-D). Although widely used in epidemiological research, the Hospital Anxiety and Depression Scale was originally developed for adult clinical populations and its psychometric properties in adolescent and Arabic-speaking populations remain only partially validated. Consequently, the use of this tool may have influenced the estimation of depressive symptom prevalence and potentially led to over- or underestimation of symptom burden.

Second, the study relied on self-reported data for all variables, including sensitive domains such as suicidal ideation, exposure to violence, and psychosocial stressors. This may have introduced information bias, including underreporting or overreporting due to recall bias or social desirability bias.

Third, the cross-sectional design does not allow for temporal or causal inferences. Associations identified between depressive symptoms and sociodemographic or psychosocial variables should therefore be interpreted as correlational rather than causal rela-

tionships.

Fourth, the absence of multivariate analysis limits the ability to identify independent predictors of depressive symptoms. The results reflect crude associations that may be influenced by unmeasured confounding factors, such as socioeconomic status, parental education, or family functioning variables not fully captured in the study.

Fifth, the study population was limited to adolescents enrolled in public schools in an urban district of Sousse-Medina. This may restrict the generalizability of the findings to adolescents in private schools, rural areas, or those not attending school, who may have different psychosocial profiles and mental health needs.

Finally, although suicidal ideation was assessed as part of the questionnaire, the study did not include a structured clinical psychiatric evaluation. Therefore, depressive symptom classification was based solely on screening scores rather than clinical diagnosis.

CONCLUSION

This study identified a high frequency of depressive symptoms among school-going adolescents in Sousse-Medina based on a screening instrument. These findings suggest a considerable level of psychological distress within this population, highlighting adolescent mental health as an important public health concern in the school environment.

Depressive symptomatology was associated with family structure, exposure to physical aggression, sleep disturbances, and suicidal ideation. However, these associations should be interpreted with caution given the cross-sectional design and the absence of multivariate adjustment, and should not be considered as causal relationships.

It is also important to emphasize that the assessment was based on a screening scale rather than a clinical diagnostic interview. Therefore, the results reflect the burden of depressive symptoms rather than confirmed depressive disorders.

These findings support the value of school-based mental health awareness and early identification strategies, while highlighting the need for further studies using validated diagnostic tools and longitudinal designs to better understand adolescent mental health in this setting.

REFERENCES :

- [1] Thapar A, Collishaw S, Pine DS, Thapar AK. Depression in adolescence. *Lancet*. 2012;379(9820):1056–67.
- [2] Shorey S, Ng ED, Wong CHJ. Global prevalence of depression among adolescents: A meta-analysis. *Br J Clin Psychol*. 2022;61(2):287–305.
- [3] Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S. Global prevalence of depressive symptoms among youth during the COVID-19 pandemic: a meta-analysis. *JAMA*. 2021;325(11):1142–50.
- [4] EnCLASS. Étude nationale sur la santé mentale des collégiens et lycéens en France. Paris: Assurance Maladie; 2022.
- [5] Amara A, Sahli J, Mellouli M, Zedini C, Mtiraoui A, Ghardallou M. Mental disorders among Tunisian adolescents. *Rev Epidemiol Sante Publique*. 2023;71:101660.
- [6] World Health Organization. Adolescent mental health. Geneva: WHO; 2021.
- [7] Silva SA, Silva SU, Ronca DB, Gonçalves VSS, Dutra ES, Carvalho KMB. Common mental disorders in adolescents: a systematic review and meta-analysis. *PLoS One*. 2020;15(4):e0232007.
- [8] Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand*. 1983;67:361–370.
- [9] Sendi I, Chouikh A, Ammar A, Bouafia N. Depression among Tunisian adolescents: prevalence and associated factors. *Int J Adolesc Med Health*. 2018;33(1).
- [10] EnCLASS. Dégradation de la santé mentale des jeunes entre 2018 et 2022. Paris: Assurance Maladie; 2024.
- [11] Hertenstein E, et al. Sleep disturbances in mental disorders: a meta-analysis and review. *Sleep Med Rev*. 2019;43:54–70.
- [12] Carlson MJ, Berger LM. Parental involvement and adolescent well-being. *Soc Serv Rev*. 2013;87(2):213–49.
- [13] Bronfenbrenner U. The ecology of human development. Harvard University Press. 1979.
- [14] Patel V, Saxena S, Lund C, et al. The Lancet Commission on global mental health and sustainable development. *Lancet*. 2018;392:1553–1598.
- [15] McLaughlin KA, Sheridan MA, Lambert HK. Childhood adversity and neural development: stress pathways. *Annu Rev Clin Psychol*. 2019;15:435–464.
- [16] Baglioni C, Battagliese G, Feige B, et al. Insomnia as a predictor of depression: meta-analytic evidence. *J Affect Disord*. 2016;193:10–18.
- [17] Nock MK, Green JG, Hwang I, et al. Prevalence, correlates, and treatment of lifetime suicidal behavior among adolescents. *Psychol Med*. 2013;43(12):2605–2615.
- [18] White D, Leach C, Sims R, Atkinson M, Cottrell D. Validation of the Hospital Anxiety and Depression Scale for use with adolescents. *Br J Psychiatry*. 1999;175:452–454.
- [19] Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med*. 2013;35:121–126.