

Anxiety and Depression and Associated Factors Among a Sample of Semi-Rural High School Students in Georgia

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ABSTRACT

Background: Anxiety and depression can affect adolescents' health and current literature lacks studies of youths living in non-urban settings.

Methods: We used chi-square and t-tests on data collected from self-administered online surveys, completed by 9th-grade students (n=222) attending a large, semi-rural public high school in the state of Georgia, to assess the prevalence of symptoms of anxiety and depression and associated factors.

Results: Almost half of the students self-reported anxiety (43%) or depression (55%) and students who self-reported either condition were more likely to report poorer sleep hygiene, sleepiness, race-related mistreatment, and higher stress.

Conclusions: Our findings suggest that symptoms of anxiety and depression are prevalent among youths in semi-rural settings and further research is needed to understand the role of modifiable risk factors and identify effective interventions.

Keywords: Adolescent mental health; adolescent sleep; anxiety; depression; semi-rural

INTRODUCTION

A 2016 study estimated that 10.5% of US adolescents were clinically diagnosed with anxiety and 6.1% were diagnosed with depression (Ghandour et al., 2019). Several factors are known to increase the risk of anxiety and depression among US youth, including stress and sleep deprivation (Lawrence et al., 2017; Conklin et al., 2018). However, previous studies have focused predominantly on youths living in urban settings and the literature is lacking in studies representative of rural settings. This study sought to estimate the prevalence of these conditions and identify associated factors among a sample of youth living in a semi-rural setting

METHODS

Data were collected in Spring 2019 from 222 (out of 545 enrolled) 9th-grade students attending a racial/ethnically and economically diverse, semi-rural public high school in Georgia, US. The self-administered online survey included students' demographics, self-reported anxiety and depression, and potentially modifiable factors shown in the literature to influence anxiety and depression, including sleep patterns and various sources of stress. The protocol was approved by the Institutional Review Board at Emory University.

If students reported experiencing "anxiousness" often or "having anxiety", they were categorized as reporting anxiety. Depression symptoms were assessed using five questions adapted from the Patient Health Questionnaire-9 (PHQ-9) Scale, which has demonstrated reliability and validity (Richardson et al., 2010; Kroenke et al., 2001). Respondents with a summed score of 5 or more points (out of 20), indicating mild depression, were categorized as experiencing depression.

Demographic information on all enrolled 9th grade students was obtained from school records, included age, sex, race, ethnicity, and income level. Modifiable risk factors for anxiety and depression were measured using adapted versions of the Epworth Sleepiness Scale (ESS), the Adolescent Sleep Hygiene Scale (ASHS), and the Adolescent Stress Questionnaire (ASQ) (Janssen et al., 2017; Storfer-Isser et al., 2013; Anniko et al., 2018). A higher score on the ESS, ASHS (reverse coded), and ASQ indicated a higher level of day-time sleepiness, better sleep hygiene, and high stress, respectively. Other measures included self-reported average hours of sleep and experiences of race-based discrimination as well as school attendance and performance.

Independent two-sample t-tests and chi-square tests were conducted to examine the prevalence of risk factors among those with self-reported anxiety and depression symptoms

compared to those without any symptoms. All analyses were performed using SAS 9.4 (SAS Institute, Cary NC).

RESULTS

There were no significant differences by sex or age between students who responded to the survey and those who did not. Survey participants were on average 15.3 (SD=0.5) years old and 53% were female (Table 1). Half of the students (54%) identified as White, 10% as Black or African American, and 23% as Hispanic or Latino; half of the students received free or reduced lunch (49%).

Compared to students without symptoms, students reporting anxiety (N=95) and experiencing depression (N=121) were more likely to be female, 72% (p<0.01) and 64% (p<0.01), respectively. While there were race/ethnic differences in the prevalence of reporting anxiety (p=0.05) with 13% of Black students reporting symptoms compared to their other race peers, 40.4%-48.7%. There were no such differences for symptoms of depression, prevalence 47.8%-60.7 for all, p=0.45.

There were no differences in school attendance, academic performance, household rules regarding use of technology,

or commitments outside of school between those reporting anxiety or depression compared to those who reported no symptoms.

Compared to students reporting no symptoms, students reporting anxiety experienced more sleepiness (Epworth Sleepiness Scale 10.1 (3.8) vs. 8.5 (3.6)) and poorer sleep hygiene, Adolescent Sleep Hygiene Scale 3.0 (0.6) vs. 3.4 (0.6), p<0.01 for all. Students reporting anxiety were also more likely to experience race-based discrimination, 17.9%, vs. 6.7%, p=0.03 and a higher level of school-related stress, Adolescent Stress Questionnaire score 9.8 (5.1) vs. 2.9 (3.15); p<0.01 than their symptom-free peers.

Students experiencing depression not experiencing depression scored higher on the Epworth Sleepiness Scale, 10.3 (3.8) vs. 8.5 (3.6); p<.01 and lower on the Adolescent Sleep Hygiene Scale, 2.9 (0.6) vs. 3.4 (0.6), p<.01, compared to those who reported no symptoms. Students with depression also reported more experiences of discrimination, 22.3% vs. 6.7%, p<0.01) and higher stress levels, 9.8 (4.9) vs. 2.9 (3.1); p<0.01). (Table 2).

Table 1

Demographic Characteristics of Semi-rural 9th-grade students stratified by self-reported symptoms of anxiety or depression

	TOTAL N=222	None N=76	Anxiety Symptoms N=95	p-value ^a	Depression Symptoms N=121	p-value ^a
Age (Mean, SD) N=209	15.3 (0.5)	15.3 (0.5)	15.2 (0.5)	0.13	15.3 (0.5)	0.79
Sex (N, %)						
Male	104 (46.9)	51 (67.1)	27 (28.4)	<.01*	44 (36.4)	<.01*
Female	118 (53.2)	25 (32.9)	68 (71.6)		77 (63.6)	
Race/Ethnicity (N, row %)^b						
White	119 (100.0)	35 (29.4)	58 (48.7)	0.05	68 (57.1)	0.45
Black/African American	23 (100.0)	10 (43.5)	3 (13.0)		11 (47.8)	
Hispanic/Latino	52 (100.0)	21 (40.4)	21 (40.4)		25 (48.1)	
Other	28 (100.0)	10 (35.7)	13 (46.4)		17 (60.7)	
Eligible for Free and Reduced Lunch (N, %) N=209	103 (49.3)	40 (54.8)	39 (42.9)	0.13	50 (45.1)	0.20
Living in two households (N, %) N=220	37 (16.8)	8 (10.5)	17 (17.9)	0.18	21 (17.7)	0.17
Worked/Volunteered in the past week (N, %) N=219	22 (10.1)	8 (10.7)	8 (8.4)	0.62	10 (8.3)	0.58

^a P-values result of t-tests for continuous variables and of chi-square test comparison of proportions comparing anxiety symptoms and depression symptoms to those in none. All p values <0.05 were considered statistically significant and were denoted with an asterisk.

^b Other: include students who are Asian/Asian American, Native American/American Indian, and Multiracial.

Table 2

Lifestyle, Academic and Psychosocial Factors Associated with Self-Reported Symptoms of Anxiety or Depression among Semi-rural 9th-grade students

	TOTAL N=222	None N=76	Anxiety Symptoms N=95	p-value ^a	Depression Symptoms N=121	p-value ^a
Self-Reported Mental Health Symptoms (N, %)						
Self-reported anxiety ^b	95 (42.8)	0 (0.0)	95 (100.0)	-	75 (62.0)	-
Self-reported depression ^c N=217	121 (55.8)	0 (0.0)	75 (79.0)	-	121 (100.0)	-
Sleep						
Hours of Sleep (Mean, SD) N=212	7.1 (1.4)	7.2 (1.2)	6.7 (1.5)	0.01*	6.9 (1.5)	0.09
Sufficient Sleep (\geq 8hrs/night) (N, %) N=212	70 (33.0)	26 (35.6)	21 (22.3)	0.06	35 (30.4)	0.50
Epworth Sleepiness Scale Score ^d (Mean, SD) N=220	9.7 (3.8)	8.5 (3.6)	10.1 (3.8)	<.01*	10.3 (3.8)	<.01*
Adolescent Sleep Hygiene Scale ^e (Mean, SD) N=219	3.1 (0.6)	3.4 (0.6)	3.0 (0.6)	<.01*	2.9 (0.6)	<.01*
Technology Use						
Rules in household limiting technology use (N, %) N=218	75 (34.4)	21 (27.6)	33 (35.1)	0.30	47 (38.8)	0.11
School Attendance and Academic Performance						
Number of Days Absent (Mean, SD) N=207	6.3 (6.8)	5.4 (5.6)	6.6 (6.1)	0.22	6.4 (7.3)	0.67
Year Average Course Grade (Mean, SD) N=206	85.7 (9.0)	85.9 (7.1)	85.6 (10.2)	0.82	86.0 (9.5)	0.67
EOC 9Lit Achievement Level (N, %) ^f N=207	133 (64.3)	42 (59.2)	61 (67.0)	0.30	74 (66.7)	0.30
EOC Algebra Achievement Level (N, %) ^f N=171	64 (37.4)	19 (29.7)	29 (43.9)	0.09	36 (42.4)	0.11
Discrimination (N, %)						
Felt treated worse than people of other races in the past 12 months N=216	18 (8.3)	6 (8.0)	5 (5.3)	0.47	12 (9.9)	0.65
Felt emotionally upset due to treatment based on race in the past 30 days N=216	33 (15.3)	5 (6.7)	17 (17.9)	0.03*	27 (22.3)	<.01*
Stress						
Stress Questionnaire Score ^g (Mean, SD) N=217	7.1 (5.3)	2.9 (3.1)	9.8 (5.1)	<.01*	<.01*	<.01*
During the past 6 months (N, %)^h						

How stressful have you found going to school	117 (53.9)	13 (17.1)	73 (77.7)	<.01*	<.01*	<.01*
How stressful has pressure to fit in with peers felt	57 (26.3)	3 (4.0)	40 (42.6)	<.01*	<.01*	<.01*
How stressful has concern about your future felt	104 (47.9)	10 (13.2)	66 (70.2)	<.01*	<.01*	<.01*
How stressful have you found not getting enough time for leisure	56 (25.8)	6 (7.9)	36 (38.3)	<.01*	<.01*	<.01*
How stressful have you found having too much homework	108(49.8)	17 (22.4)	61 (64.9)	<.01*	<.01*	<.01*

^aP-values result of t-tests for continuous variables and of chi-square test comparison of proportions comparing anxiety symptoms and depression symptoms to those in none. All p values <0.05 were considered statistically significant and were denoted with an asterisk.

^bSelf-reported anxiety was based on responding “Anxiousness” to “Do you often have problems with any of the following? (choose all that you experience often)” and “Anxiety” to “Do you have any of the following conditions? (select all that apply)”.

^cSelf-reported depression symptoms were based on the PHQ-9 Scale. The 5 items assessed depression symptoms in the past 7 days and were scored from 0=not at all to 4=every day. A sum score was calculated and those who scored <5 were categorized as no depression symptoms and those who scored ≥ 5 were categorized as having depression

^dThe Epworth Sleepiness Scale Score is calculated by summing 8 items scored from 0=would never doze or sleep to 3=high chance of dozing or sleeping. A total score of 0-10=normal range, 11-14=mild sleepiness, 15-17=moderate sleepiness, and ≥ 18 = severe sleepiness.

^eAn adapted version of the Adolescent Sleep Hygiene Scale was used. The items measured 5 domains of sleep hygiene: physiological, behavioral arousal, cognitive/emotional, sleep environment, and bedtime routine. The items were reversed coded so the higher the score, the better sleep hygiene practice. Scores of each item were averaged to calculate the score for the respective domain. The scores for the 5 domains were then averaged to calculate the overall score.

^fStudents who were categorized as proficient or distinguished learners were reported here

^gA higher the Adolescent Stress Questionnaire score indicates a higher level of stress

^hStudents who reported “moderately stressful”, “quite stressful”, and “very stressful” to each of the stress items were categorized as “stressed” and reported here. Students who reported “not stressful at all” or “a little stressful” were categorized as “not stressed”

DISCUSSION/CONCLUSIONS

Our results suggest that anxiety and depression are common among the semi-rural high school students studied, especially among females. Our sample had a higher prevalence of adolescents reporting anxiety (43%) and experiencing depression (55%) compared to the estimated national prevalence of clinically diagnosed anxiety (11%) and depression (6%) in adolescents in the US (Ghandour et al., 2019). Similar to youth living in more urban settings we found sleepiness, poor sleep hygiene, stress, and experience of discrimination to be positively associated with these symptoms (Lawrence et al., 2017; Conklin et al., 2018).

Limitations

This study has a number of limitations including the use of a single convenience sample, which limits our ability to generalize our results, and the cross-sectional design, which precludes our ability to make inferences about the temporality between anxiety and depression and their associated factors. Additionally, we used a self-report measure of anxiety. The extent to which these symptoms would correlate with physician-diagnosed anxiety is unclear. However, previous studies have suggested that symptoms of anxiety and depression may predict the prevalence of these two conditions among adolescents (Calling et al., 2017; Karevold et al., 2009).

Strengths

A major strength is that we studied semi-rural high school students, a population not well represented in the current literature, which primarily includes studies of urban youth (Lawrence et al., 2017; Conklin et al., 2018). Furthermore, questions from previously validated instruments were used to assess the constructs of interests.

Our findings suggest that symptoms of anxiety and depression are common among youth living in semi-rural communities and that these symptoms are associated with several potentially modifiable risk factors. Further research is needed to estimate the prevalence of other mental health conditions, understand the extent to which these associated factors impact students' mental health, and identify intervention strategies that will minimize their risk.

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