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Elevated depression and anxiety in urban and female secondary school students in Bangladesh during the COVID-19 pandemic: a pilot study

Nusrat Jahan[1], Musfiqul Anwar Siraji[2] and Azharul Islam[1*]

[1]*Department of Educational and Counselling Psychology, University of Dhaka, Dhaka-1000, Bangladesh*

[2]*Department of History and Philosophy, North South University, Dhaka, Bangladesh*

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Abstract

This cross-sectional pilot study examined depression and anxiety disparities among Bangladeshi Secondary School Certificate (S.S.C.) examinees during COVID-19. Two secondary schools were selected by feasibility/administrative access (one urban, one rural; from Dhaka and Rangpur), and 195 students (M_{age} = 14.79 years, SD = 0.92 years; 158 female, 37 male) completed the Beck Depression Inventory for Youth (BDI-Y) and the Beck Anxiety Inventory for Youth (BAI-Y). Urban students reported significantly higher depression (ΔM = 6.93, $p < .001$, $q < .05$, d = .64) and anxiety (ΔM = 3.59, p = .012, q = .024, d = .38) than rural peers. Females exhibited significantly greater anxiety than males (ΔM = 4.29, p = .017, q = .023, d = .44). No significant difference was observed in depression scores between males and females (p = .07, q = .07, d = 0.38). Findings of the pilot indicate elevated scores of anxiety and depression across subgroups and may inform school-based supports, with attention to urban contexts and gender-responsive approaches.

Introduction

The COVID-19 pandemic has profoundly disrupted adolescent mental health globally through prolonged school closures, social isolation, and academic uncertainty(1). Adolescents, undergoing critical developmental transitions(2), face heightened vulnerability to these stressors, with depression and anxiety rising markedly during the pandemic(3,4). In Bangladesh, where adolescents comprise 20% of the population(5), these impacts were amplified by infrastructural inequities. Urban-rural disparities in digital access (e.g., internet, devices) exacerbate academic stress, particularly for students preparing for high-stakes exams, such as the Secondary School Certificate (SSC), which shape future educational and career pathways(6).

*Author for Correspondence: azharulislam@du.ac.bd

School closures limit access to educational resources and peer networks while reducing mental health support[7,8]. The shift to online learning disproportionately affected rural students due to unreliable electricity and limited technology[6]. Conversely, urban students faced intense academic competition, excessive screen time, and heightened exposure to pandemic-related news[9]. These disruptions align with Bronfenbrenner's ecological systems theory, where breakdowns in microsystems (such as schools and peers) and macrosystems (including economic instability) compound adolescent distress[10].

Gender differences in pandemic-related mental health are well-documented. Females report higher depression and anxiety globally, potentially due to sociocultural factors (e.g., gendered expectations, domestic burdens) and greater sensitivity to social isolation[11,12]. In Bangladesh, patriarchal norms may further restrict emotional expression among males, potentially biasing self-report data[13]. Regionally, urban Bangladeshi adolescents have exhibited higher distress levels than their rural peers in prior studies, possibly due to denser environments, reduced community cohesion, and increased academic pressure[14–16].

While cross-cultural studies confirm pandemic impacts on youth mental health[3,17], few examine high-stakes exam cohorts in low-resource settings. Koly and colleagues[18] found that urban adolescents reported higher distress than their rural peers, but none specifically investigated SSC examinees, a critical gap given the exam's lifelong implications. In Bangladesh, the SSC is the first nationwide, high-stakes credential that channels students into subsequent academic tracks and scholarship/college opportunities. This gatekeeping function generates sustained performance pressure, amplified by exam-centric study routines, coaching classes, and strong parental/teacher expectations, at a sensitive developmental period (mid-adolescence) when autonomy and coping resources are still maturing. Pandemic-related disruptions (e.g., exam postponements, compressed syllabi, increased catch-up intensity) likely compounded these demands, with urban students also contending with higher density, longer commutes, and digital fatigue. Against this backdrop, SSC examinees constitute a theoretically and contextually plausible at-risk group for elevated internalizing symptoms.

Anchored in Bronfenbrenner's ecological systems theory[10], we expected that microsystem disruptions (e.g., school closure, reduced peer contact), exosystem barriers (e.g., digital divide, differential access to online schooling), and macrosystem stressors (e.g., economic uncertainty, gendered norms) would be associated with greater internalizing symptoms, particularly for urban and female examinees navigating the SSC. In the current study, urban and rural status were assigned based on school location using the Bangladesh Bureau of Statistics' administrative designations: urban (Dhaka District metropolitan jurisdictions) and rural (Rangpur District upazilas).

We therefore asked: (1) whether urban SSC examinees report higher depression and anxiety than rural examinees during the COVID-19 pandemic, and (2) whether female SSC

examinees report higher depression and anxiety than male examinees during the COVID-19 pandemic.

Materials and Methods

Participants

Two schools were selected based on feasibility/administrative access (one urban, Dhaka, and one rural, Rangpur), and students were recruited on-site with the permission of the schools. A total of 318 secondary school students (SSC examinees) were recruited through purposive sampling. After excluding incomplete responses, the final sample consisted of 195 participants (with 100% complete data), comprising 158 females (81%) and 37 males (19%). The mean age was 14.79 years (SD = 0.92), with females averaging 14.82 years (SD = 0.94) and males 14.68 years (SD = 0.85). Participants were primarily in Class 9 (61%) and Class 10 (39%); 99% received education in Bangla. Geographically, 57% of the participants were from Rangpur (rural) and 43% from Dhaka (urban). Nearly all (99%) lived with family. Socioeconomic status was predominantly middle-class (94%), with 3.1% in the higher class and 2.6% in the lower class. Religious affiliation was 92% Muslim and 7.7% Hindu. A subset (9.2%) reported family deaths due to COVID-19, and 96% were fully vaccinated. Demographic characteristics are summarised in table 1.

For a two-sample t-test comparing key groups (e.g., urban vs. rural or female vs. male) with a medium effect size (Cohen's d = 0.5), α = .05, and 80% power, a minimum sample size of 128 was required. Our final sample (N = 195) exceeded this threshold.

Table 1. Demographic characteristics of the participants (N = 195)

Variable	Overall (N = 195)	Female (n = 158)	Male (n = 37)
	n (%)	*n (%)*	*n (%)*
Age (*M, SD*)	14.79 (0.92)	14.82 (0.94)	14.68 (0.85)
Education Status			
Class 9	118 (61.0%)	87 (55.0%)	31 (84.0%)
Class 10	77 (39.0%)	71 (45.0%)	6 (16.0%)
Medium of Education			
Bangla	194 (99.0%)	157 (99.0%)	37 (100.0%)
English	1 (0.5%)	1 (0.6%)	0 (0%)
History of mental health			
No	179 (92.0%)	143 (91.0%)	36 (97.0%)
Yes	11 (5.6%)	10 (6.3%)	1 (2.7%)
Not interested	5 (2.6%)	5 (3.2%)	0 (0%)
Division			
Rangpur	111 (57.0%)	75 (47.0%)	36 (97.0%)
Dhaka	83 (43.0%)	82 (52.0%)	1 (2.7%)
Rajshahi	1 (0.5%)	1 (0.6%)	0 (0%)

Variable	Overall (*N* = 195)	Female (*n* = 158)	Male (*n* = 37)
	n (%)	*n (%)*	*n (%)*
Living Area			
Rural	113 (58.0%)	78 (49.0%)	35 (95.0%)
Urban	82 (42%)	80 (51%)	2 (5.4%)
Living people			
Family	193 (99.0%)	156 (99.0%)	37 (100%)
Hostel/Hall	1 (0.5%)	1 (0.6%)	0 (0%)
Others	1 (0.5%)	1 (0.6%)	0 (0%)
Monthly Income (*M, SD*)	29,206.41 (23,073.62)	29,729.43 (24,668.73)	26,972.97 (14,447.68)
SES			
Middle Class	184 (94.0%)	149 (94.0%)	35 (95.0%)
Higher Class	6 (3.1%)	5 (3.2%)	1 (2.7%)
Lower Class	5 (2.6%)	4 (2.5%)	1 (2.7%)
Religion			
Islam	180 (92.0%)	148 (94.0%)	32 (86.0%)
Hindu	15 (7.7%)	10 (6.3%)	5 (14%)
COVID affected			
No	193 (99.0%)	157 (99.0%)	36 (97.0%)
Yes	2 (1.0%)	1 (0.6%)	1 (2.7%)
Family members died of COVID-19			
No	177 (91.0%)	144 (91.0%)	33 (89.0%)
Yes	18 (9.2%)	14 (8.9%)	4 (11%)
Vaccinated			
Two doses	188 (96.0%)	152 (96.0%)	36 (97.0%)
One does	7 (3.6%)	6 (3.8%)	1 (2.7%)

Note. SES = Socioeconomic status

Measures

A demographic questionnaire was used to collect data on age, gender, grade level, medium of instruction, residence, socioeconomic status, religion, family living arrangements, COVID-19 vaccination status and family history of COVID-19 mortality. The Beck Depression Inventory for Youth (BDI-Y)[19] is a 20-item scale that assesses depressive symptoms using a 4-point Likert scale (1 = Not at all to 4 = All the time). The validated Bangla version of the BDI-Y[20] demonstrated good reliability (Cronbach's α = .77–.88) in our target population. Anxiety symptoms were measured using the 20-item Beck Anxiety Inventory for Youth (BAI-Y)[19] instrument with the same 4-point response format as the BDI-Y. The Bangla adaptation of the BAI-Y[20] also demonstrated high internal consistency (α = 0.77–0.88).

Procedure

Ethical approval was obtained from the Research Ethics Committee of the Department of Educational and Counselling Psychology, University of Dhaka (Ref: DECP/09/27). School heads provided institutional consent, and participants/parents provided informed assent/consent after being informed of study objectives. Participation was voluntary and anonymous, with no incentives offered. Data collection occurred face-to-face in classrooms during the COVID-19 pandemic. Strict safety protocols (masking, distancing) were enforced. Researchers provided standardised verbal instructions and participants completed questionnaires under supervision within 10–25 minutes. Researchers addressed queries during this process.

Statistical Analysis

Analyses were conducted in *R*[21]. Data were cleaned by removing incomplete or invalid responses and screening for outliers or entry errors (*IQR* rule and visual inspection). Descriptive statistics (means, SDs for continuous variables; frequencies, percentages for categorical variables) characterised the sample using the *gtsummary* package[22]. Levene's test (via rstatix)[23] was used to check the homogeneity of variance among the groups (rural vs urban; male vs female). For group mean comparisons for depression and anxiety scores between the groups (rural vs urban; male vs female), Independent Samples *t*-tests (in case of equal variance) or Welch's *t*-tests (if unequal variance) were used. Primary contrasts (urban vs rural; female vs male) were conducted for BDI-Y and BAI-Y using Welch's or independent-samples t-tests as appropriate. We controlled the false discovery rate(FDR) using the Benjamini–Hochberg (BH) method at $q = .05$ and reported adjusted q-values. Statistical significance was set at $q < .05$. Effect sizes were calculated using Cohen's d (via rstatix).

Results and Discussion

Table 2 presents descriptive statistics for depression and anxiety scores. Participants reported moderate to high symptom levels, with a mean depression score (BDI-Y) of 33.84 (SD = 11.09) and a mean anxiety score (BAI-Y) of 35.64 (SD = 9.90). Scores spanned the full clinical range for both measures (BDI-Y: 20-75; BAI-Y: 20-68).

Table 2. Descriptive statistics for depression and anxiety scores

Measure	N	Min	Max	Mean	SD
BDI-Y	195	20	75	33.84	11.09
BAI-Y	195	20	68	35.64	9.90

Note. BDI-Y = Beck Depression Inventory for Youth; BAI-Y = Beck Anxiety Inventory for Youth

Urban participants reported significantly higher depression and anxiety than rural peers (Table 3). Levene's test indicated unequal variances for depression ($p < .05$); therefore, we applied Welch's *t*-test. The mean depression score for urban participants (M = 37.86, SD = 12.59) was significantly higher than their rural counterparts (M = 30.93, SD = 8.85); Welch's t (136.76) = -4.27, $p < .001$, $q < .05$ ΔM = -6.93, 95% CI (-10.12, -3.72), d = 0.64 (moderate). Equal variances were assumed for anxiety ($p \geq .05$). The mean anxiety score of the urban participants (M = 37.72, SD = 10.47) was also significantly higher than the rural participants (M = 34.13, SD = 9.23); t (193) = -2.53, p = .012, q = .024 ΔM = -3.59, 95% CI (-6.38, -0.79), d = 0.38 (small).

Table 3. Depression and anxiety scores by geographic location

Measure	Group	N	Mean	SD	*t*	*p*	Cohen's *d*
BDI-Y	Rural	113	30.93	8.85	-4.27	<.001	0.64
	Urban	82	37.86	12.59			
BAI-Y	Rural	113	34.13	9.23	-2.53	.012	0.38
	Urban	82	37.72	10.47			

Note. BDI-Y = Beck Depression Inventory for Youth; BAI-Y = Beck Anxiety Inventory for Youth

Female participants reported significantly higher anxiety than males, but no significant difference emerged for depression (Table 4). Equal variances were assumed for anxiety ($p \geq .05$). The mean anxiety score for female participants (M = 36.46, SD = 10.13) was significantly higher than the mean anxiety score for male participants (M = 32.16, SD = 8.11); t (193) = 2.40, p = .017, q = *.023, ΔM* = 4.29, 95% *CI* (0.77, 7.81), d = 0.44 (small). For depression scores, the assumption of equal variance was not met ($p < .05$); therefore, we used Welch's *t*-test. The mean depression score of females (M = 34.54, SD = 11.66) did not significantly vary from the mean score of males (M = 30.84, SD = 7.66); Welch's t (80.26) = 2.37, p = .070, q = *.07*,

ΔM = 3.71, 95% *CI* (-0.59, 6.82), although the effect size was small-to-moderate (d = 0.38), warranting cautious interpretation given the small male subsample (n = 37).

Table 4. Depression and anxiety scores by gender

Measure	Sex	N	Mean	SD	*t*	*p*	Cohen's *d*
BDI-Y	Female	158	34.54	11.66	2.37	.070	0.38
	Male	37	30.84	7.66			
BAI-Y	Female	158	36.46	10.13	2.40	.017	0.44
	Male	37	32.16	8.11			

Note. BDI-Y = Beck Depression Inventory for Youth; BAI-Y = Beck Anxiety Inventory for Youth

This pilot study reveals significant mental health disparities among Bangladeshi secondary students during COVID-19, with urban adolescents exhibiting substantially higher depression (d = 0.64) and anxiety (d = 0.38) than rural peers, a pattern aligning with global reports of heightened psychological vulnerability in densely populated areas during health crises[9,24]. Urban environments likely amplify stressors through constant pandemic-related media exposure[25], intense academic competition, and compulsory online learning, which increases digital fatigue through prolonged screen time, a known risk factor for irritability and sleep disturbances[8,26]. Conversely, rural students' relatively lower distress may reflect stronger community cohesion, which functions as a protective buffer in collectivist societies during adversity[27]. Nevertheless, their clinically elevated symptom levels (mean BDI-Y = 30.93; BAI-Y = 34.13) remain alarming given Bangladesh's severe mental health resource shortages[28], particularly in non-urban regions where access to care remains critically limited[29].

Females reported significantly greater anxiety than males (d = 0.44), extending cross-cultural evidence of adolescent females' heightened vulnerability to internalising disorders[30,31]. This likely reflects the complex intersection of biological sensitivities during puberty and sociocultural pressures, including disproportionate domestic responsibilities and academic expectations during lockdowns[3,11]. The non-significant difference in depression (p = .07), despite a moderate effect size (d = 0.38), may indicate that cultural norms suppress male emotional disclosure[12], consistent with recent Bangladeshi studies that have noted gendered response patterns in self-reports[13].

These findings demand context-sensitive interventions. For urban youth, integrating telehealth[32] with structured screen-time limits may help mitigate digital stressors, while stress-reduction workshops[33] can help build coping capacity. Rural communities would

benefit from leveraging existing social networks through community-led support programs, an approach that has been shown to improve reach in resource-limited settings[14]. Crucially, Bangladesh must address its mental health workforce deficit (0.5 psychiatrists/100,000 people; WHO)[34] by embedding counsellors in schools and expanding training programs[28,35]. Gender-sensitive approaches should simultaneously challenge stigma around male help-seeking while creating safe spaces for females, a dual strategy found effective in patriarchal contexts[12]. Parental education initiatives could further strengthen home-based support, as family engagement consistently predicts the success of interventions in low-resource environments[6,7].

We acknowledge several limitations of the study. First, the feasibility-based school access and pandemic-era schedules resulted in a female-skewed sample, which limited the accuracy of male estimates. Second, in-class supervised administration may have introduced social desirability bias; stigma might differentially suppress boys' symptom reporting. Third, the instruments are self-report screeners without diagnostic confirmation; therefore, we avoid clinical language and do not apply cut-offs. Fourth, primary comparisons (urban vs. rural; female vs. male) were conducted for BDI-Y and BAI-Y using Welch's or independent-samples t-tests as appropriate. While FDR procedures reduced Type I error, generalizability remains limited. Given the pilot scope, skewed group sizes, and minimal between-group variation in SES, we did not fit multivariable models to avoid overfitting; adjusted modelling is planned for a larger follow-up. These factors highlight the need for larger, probability-based samples and covariate-adjusted models in future studies.

Interpreted through an ecological lens, urban contexts may be associated with greater exposure to stressors at the microsystem (loss of school-based structure/peers), exosystem (screen time and digital fatigue) and macrosystem (economic uncertainty) levels, while gendered expectations may further shape internalizing risk among girls. Given pilot design and non-probability sampling, these patterns should be considered provisional and hypothesis-generating; nevertheless, they may inform the design of tiered, school-embedded supports and gender-responsive engagement strategies.

Competing interests

The author(s) declare no competing interests.

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