Prevalence and correlates of depressive symptoms in secondary school children in Dhaka city, Bangladesh

Asaduzzaman Khan^{1¥}, Rushdia Ahmed² and Nicola W Burton³

¹*School of Health and Rehabilitation Sciences, The University of Queensland, Australia*

²*Health Systems and Population Studies Division, The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B)*

³*School of Human Movement & Nutrition Sciences, The University of Queensland, Australia*

¥ Corresponding autor (AK)

School of Health and Rehabilitation Sciences
The University of Queensland
Brisbane, QLD 4072
Australia

Phone: +61 7 3346 7456

Fax: +61 7 3365 1877

Email: a.khan2@uq.edu.au

Twitter handle: @khan2_asad

LinkedIn: <https://au.linkedin.com/in/asad-khan-49895632>

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Abstract

Objectives: Depression is a leading contributor to the global burden of disease, and often starts at a young age. Depression in young people can increase the risk of unhealthy lifestyle behaviour and can lead to substantial disability, social problems, poor health, and suicide. Other research has examined depressive symptoms among adult populations in Bangladesh, but little is known about other age groups. The aim of this study was to assess the prevalence and socio-demographic correlates of depressive symptoms among secondary school children of Dhaka city, Bangladesh.

Design: A self-completed questionnaire was administered to 898 students from eight secondary schools of Dhaka, the capital City of Bangladesh. Of the respondents, 755 (372 males, 383 females; average age 14.26 years; SD 1.15) completed the 10-item Center for Epidemiological Studies Depression Scale (CESD-10). A score of 10 or more was used to indicate depressive symptoms. Parents completed a separate questionnaire to provide individual and household/family-level data. Generalized Estimating Equations (GEE) was used to assess sociodemographic and lifestyle factors associated with adolescent depressive symptoms.

Results: Among the responding adolescents, 25% reported depressive symptoms with prevalence more common among females than males (30% vs. 19%). Factors significantly associated with symptoms of depression included being female, aged 15-16 years, self-perception of non-normal weight, feeling unsafe at school, sleep disturbance, low life satisfaction, high intake of sugary drinks, and regularly skipping breakfast.

Conclusion: Depressive symptoms are prevalent among secondary school children in urban Bangladesh. Interventions for adolescents with depressive symptoms could focus on lifestyle practices such as weight management, personal safety, sleep hygiene and healthy eating.

Keywords: depression, children, adolescent, depressive symptoms, wellbeing, mental health, Bangladesh.

Background

Depression is a leading contributor to the global burden of disease, and often starts at a young age with 8.2% of the global non-fatal disease burden among young people aged 10–24 years (Gore, Bloem et al. 2011). Among adolescents (aged 10-19 years), depression is a leading cause of Disability Adjusted Life Years (DALYs) for females, and the second leading cause for males (WHO 2014). Adolescents face many challenges and potentially stressful situations related to educational commitment, social behaviour, sexual development, familial factors, emotional conflicts and substance use, which can increase vulnerability to depression (Saluja and Overpeck 2004, Nolen-Hoeksema and Hilt 2012, Thapar, Collishaw et al. 2012, Masoumi and Shahhosseini 2017). Depression in adolescence can increase the risk of behavioural problems (e.g., aggression, misconduct), unhealthy lifestyle behaviours (e.g., disturbed eating/sleeping, substance abuse) and can lead to academic disruption, social problems, poor health, substantial disability or suicide (Thapar, Collishaw et al. 2012). Depressive symptoms in adolescence can be a precipitant of depression during adulthood (Kisch, Leino et al. 2005).

Although depression among adolescents has been widely studied in the developed world, relatively less is known about depression in low and middle income countries (LMIC). Available evidence from studies using self-reported measures of depression suggests a wide disparity in prevalence estimates across cultural and geographic settings. One recent systematic review of six studies among Indian adolescents reported prevalence ranging from 0.50% to 60.0% (Aggarwal and Berk 2015). This variation could be due to the use of different measurement tools (i.e., Beck Depression Inventory [BDI], Depression, Anxiety and Stress Scale [DASS], Mini International Neuropsychiatric Interview for Children and Adolescents [MINI- KID],

General Health Questionnaire [GHQ], and the Development and Wellbeing Assessment (DAWBA), different sample sizes (ranging from 80 to 6721) and varying sampling strategies and study designs. A relatively large cross-sectional study that used the BDI with 964 Indian adolescents aged 14-18 years, reported an overall prevalence of 60.7% with 37% of respondents categorised as having mild, 19.4% as moderate and 4.3% as severe depression (Rani, Karunanidhi et al. 2010). A similar prevalence was reported in a Sri Lankan study in which 57.7% of 891 adolescents aged 14-19 years were identified as having depressive symptoms as measured by the 20 item Centre for Epidemiologic Studies Depression Scale (CESD-20) (Perera, Torabi et al. 2006). A systematic review of studies among Iranian adolescents documented a prevalence of 43.6% from studies using the BDI, 15.9% from studies using the Symptoms Checklist-90 (SCL-90) and 13.1% from studies using the Children Depression Inventory (CDI) (Sajjadi, Mohaqeqi et al. 2013).

As with developed countries, available evidence from LMIC suggests that female adolescents are more at risk of depression than their male counterparts (Rodrigo, Welgama et al. 2010, Sajjadi, Mohaqeqi et al. 2013, Aggarwal and Berk 2015). Low self-esteem, poor peer acceptance, academic difficulties, family hassles, poor inter-parental relationship, poor adolescent-parent relationship, school absenteeism, and school dropout have been shown to have a positive association with depression among adolescents (Rani, Karunanidhi et al. 2010, Sajjadi, Mohaqeqi et al. 2013, Kaur and Sapra 2014, Aggarwal and Berk 2015). A recent systematic review reported that low socioeconomic status, low parental education, authoritarian parenting styles, and poor academic performance were associated with adolescent depression (Sajjadi, Mohaqeqi et al. 2013). A study among Pakistani adolescent and young adult females documented

that depression was significantly associated with being unemployed, underage marriage, early child-bearing, infertility, violence and sexual harassment (Afzal, Rana et al. 2008).

In Bangladesh, a South Asian country with 159 million people in a small land area of 130,170 square kilometres, epidemiological data on mental disorders are scarce. The first national survey on mental health was conducted in 2009 and documented that 21.2% of the 1253 participating adolescents aged 12-17 years had mental disorders as diagnosed by psychiatrist interview using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) criteria (Rabbani, Alam et al. 2009). One recent systematic review reported the prevalence of mental disorders ranged from 13.4% to 22.9% among Bangladeshi children aged 2-16 years (Hossain, Ahmed et al. 2014). Although there are some data available on mental disorders of adolescents in Bangladesh (Jahan, Hasan et al. 2004, Rabbani, Alam et al. 2009), little is known about depression specifically. Depression in adolescence is associated with poor health behaviours and social challenges (Brooks, Harris et al. 2002), and can predispose risky sexual behaviour and partner violence (Nduna, Jewkes et al. 2010) and early heart diseases (Goldstein, Carnethon et al. 2015). It is, therefore, crucial to develop better understanding about depression in Bangladeshi adolescents, which constitute 20.5% of the country's population. The aim of this study was to assess the prevalence and socio-demographic correlates of self-reported depressive symptoms among secondary school children in Dhaka, the capital city of Bangladesh.

Methods

Eight secondary schools purposively selected from Dhaka city, Bangladesh, participated in a questionnaire survey during November 2012 to January 2013 on the health and psychosocial wellbeing of adolescents [details elsewhere (Khan and Burton 2016)].

These schools were selected based on their convenient accessibility and to provide a mix of public (Bangla medium) and private (English medium) schools for socio-economically diverse range of participants. The mainstream Bangla medium schools are public schools (with minimal or no tuition fees) which offer the national curriculum using Bangla as the medium of instruction. In contrast, English medium schools are privately managed schools (with tuition fees) and classes are conducted in English. These schools follow the UK-based curriculum for General Certificate of Education (GCE) 'O' and 'A' levels, and are only accessible to relatively high income families.

From each selected school, all students in grades 7-10 (aged 13-16 years) were invited to participate in the study. After obtaining individual written informed consent from the students and their parents, students completed the written survey in the classroom setting under the supervision of the principal investigator (AK). A section of the survey was completed at home by one parent of the participating student to provide household/family level data. Of the 1476 students who received the questionnaire, 898 responded with a response rate of 60.8%. The study was approved by the Behavioural Social Sciences Ethics Review Committee at The University of Queensland, Australia.

Outcome measures

Depressive symptoms were measured using the 10-item Centre for Epidemiologic Studies Depression Scale (CESD-10). The CESD-10 has been shown to be an acceptable self-reported tool to screen depression in adolescents in the community and non-clinical setting (Bradley, Bagnell et al. 2010, Haroz, Ybarra et al. 2014). Items ask how often respondents have experienced each of 10 symptoms during the past week (e.g., felt depressed, felt lonely, felt fearful, felt that everything was an effort etc.) using

a 4-point Likert scale for responses with 0 indicating “rarely or none of the time” and 3 indicating “most or all the time”. The internal consistency, measured by Cronbach’s alpha coefficient, for this study was 0.84. A total score for each adolescent was obtained summing the scores across 10 graded items with an admissible range of 0 to 30. A higher score indicated more depressive symptoms, with a score of 10 or more used to indicate presence of depressive symptoms (Radloff 1997). This cutoff of ≥ 10 was used in descriptive analysis, but because the cutoff has not been validated in Bangladesh, we used the total CESD score as a continuous variable to examine correlates of depressive symptoms: a similar approach was used in a previous analysis of CESD-20 data in Bangladesh (Black, Baqui et al. 2009).

Other measures

In addition to the CESD-10, the participating students completed a self-administered questionnaire that included items to assess demographics, dietary and life-style factors. Students were asked about their school (e.g., sport activities/facilities at school, school performance, feeling safe at school), self-reported health (e.g., general physical and psychosocial health), dietary behaviour (e.g., consumption of fast food, sugar-sweetened soft-drink, fresh vegetables), and participation in physical activities. Parents completed a separate questionnaire to provide information on individual (e.g., marital status, occupation), adolescent health conditions and sleep quality, and household/family (e.g., family income, household composition) level data.

Students’ height and weight were measured by the research team members. The Centers for Disease Control and Prevention (CDC) growth charts were used to determine the corresponding body mass index (BMI) for-age and sex percentile (Ogden and Flegal 2010). Obesity was defined as a BMI at or above the 95th percentile for

children of the same age and sex; overweight was a BMI between the 85th and 95th percentiles, normal weight was a BMI less than the 85th percentile but at or above the 5th percentile, and underweight was a BMI less than the 5th percentile.

Statistical Analysis

The proportions of adolescents who reported experiencing depressive symptoms were identified. Chi-square tests were used to examine differences in proportions of depressive symptoms by gender and age. In order to identify correlates of depressive symptoms (depression measured using total CESD-10 score), we used Generalized Estimating Equations (GEE) which takes into account the non-independence of students' depressive symptoms nested within their schools. Each school was treated as a clustering variable in the analysis as students who belong to the same school are likely to share some common characteristics, and as such, the CESD score at the student level could not be regarded as independent of each other. Initially, the association between depressive symptoms and potential explanatory variables was determined using univariate GEE, and variables with univariate p-values <0.20 were include as covariates in the subsequent multivariable GEE modelling. Before conducting multivariable modelling to identify correlates of depressive symptoms, collinearity of the explanatory variables was examined. School type (mainstream Bangla medium and English medium) was significantly associated with having a playing field in the school and as such, a decision was made to exclude school type from multivariable modelling. Similarly, family income was dropped from the analysis due to its significant association with father's education and occupation. All model assumptions (e.g. normality, outliers) were examined to ensure validity of the findings. Correlate estimates are presented in the form of odds ratios (exponent of regression coefficients)

and their 95% confidence intervals. All tests were performed at the 5% level of significance.

Results

Study participants

Of the 898 adolescents who participated in the survey, 755 (84%: average age 14.26 years; SD 1.15) completed the CESD-10 and thus formed the basis of the present study. Approximately half (49%) of the study participants was male and nearly one quarter (24%) was overweight or obese (Table 1). Over half (54%) of the respondents' mothers had tertiary qualifications, and 25% were employed. Nearly half (47%) of the participating adolescents' monthly family income was BD Taka 50,000 (US \$ 640) or more.

Proportion of depressive symptoms

Among the respondents, 25% reported experiencing depressive symptoms (CESD-10 score ≥ 10) during the prior week, with a higher prevalence among female adolescents than males (30% vs. 19%, $p < 0.001$). The proportions of adolescents experiencing depressive symptoms increased with increasing age, with a prevalence of 17% in those aged 13 and 37% in those aged 16 years ($p < 0.0001$). Figure 1 shows the proportions of adolescents reporting depressive symptoms by gender and age. Female adolescents reported more depressive symptoms than their male counterparts across all ages, with a significant gender difference in adolescents aged 15 years (38% vs. 25%, $p = 0.036$). For both female and male adolescents, depressive symptoms were significantly and positively associated with age ($p = 0.009$ and $p = 0.019$, respectively).

Correlates of depressive symptoms

Table 2 presents the adjusted odds ratios among adolescents with depressive symptoms compared to those without. The analyses showed that after adjusting for other covariates, female adolescents had more than twice the odds of reporting symptoms of depression than their male counterparts (OR 2.64; 95% 1.67-4.19). The odds of reporting depressive symptoms were much higher among adolescents aged 15 or 16 years than those aged 13 years (OR=2.80 and 3.67, respectively, $p=0.001$). In addition, symptoms of depression were significantly and positively associated with low life satisfaction, self-perception of non-normal weight (underweight or overweight/obese), feeling unsafe at school, and parent reported sleep disturbance of adolescents. Adolescents who reported high intake of sugary drinks (5 or more per week) or who regularly skipped breakfast (3 days or more per week) had increased odds of reporting symptoms of depression.

Although physical activity, father's occupation and family income were significantly associated with adolescents' depressive symptoms at the unadjusted univariate analyses, their adjusted association at the multivariable modelling was not significant. Furthermore, there were no significant associations between adolescents' depressive symptoms and parental education, household composition, or adolescent body mass index.

Discussion

The findings of the present study indicate that self-reported depressive symptoms are common among adolescents in Dhaka City Bangladesh, with a prevalence of one in four (25%). This is much higher than the 14% reported in a Bangladeshi study conducted in 2012 among 2440 adolescents aged 13-19 years (Nasreen, Alam et al. 2016). However, that study used a different questionnaire (Beck Depression Inventory) and targeted disadvantaged girls and boys living in a rural district and urban slums of Dhaka city.

The prevalence of depressive symptoms found in the present study is however much lower than the 49% reported in another study conducted in 2012, and using the same questionnaire (CESD) with 165 urban adolescents selected from two urban schools in Bangladesh (Billah and Khan 2014). That other study was with older adolescents aged 15-19 years (as opposed to 13-16 years in the present study), and the present study demonstrated much higher odds of depression among older than younger adolescents. Depressive symptoms were less common in the present study than in some other Asian studies; 36% in Sri Lankan adolescents aged 14-18 years (Rodrigo, Welgama et al. 2010), 38% in Iranian male adolescents [average age:15.44 (SD 0.68)] (Ghofranipour, Saffari et al. 2013); and 59% in Indian adolescents aged 15-18 years (Verma, Jain et al. 2014). These other studies used the longer version of the CESD (CESD-20), with older adolescents. Differences in prevalences may also due to different cultures experiencing depressive symptoms differently (Stein, Gonzalez et al. 2012).

In the present study, female adolescents had more than twice the odds of reporting depressive symptoms than their male counterparts, which supports other findings in Asian countries (Rodrigo, Welgama et al. 2010, Sajjadi, Mohaqeqi et al. 2013, Kaur, Cheong et al. 2014, Verma, Jain et al. 2014, Nasreen, Alam et al. 2016). Other research has suggested that female adolescents have more challenges during this life transition because of the significant changes associated with puberty which include morphological development (e.g., growth of secondary sex characteristics), physiological changes (e.g., hormonal concentrations), and other bodily manifestations (e.g., skin changes, growth spurt, menstrual period) (Angold, Costello et al. 1998). In addition, various social taboos and gender role norms in Asian societies may predispose females to depression symptoms. Females may experience social restrictions and pressures, constrained opportunities and gender discrimination in Asian societies (Afzal,

Rana et al. 2008). Due to the social taboo attached to sexuality, there is often a lack of meaningful dialogue between adolescents and their parents about pubertal changes and their potential impact on adolescents' emotional and physical health, especially among females (Prasla 2012).

Although there was no significant difference in self-reported depressive symptoms between participants aged 13 and 14 years, those aged 15 or 16 years had a significantly higher prevalence of depressive symptoms than those aged 13 years. This is consistent with what has been reported elsewhere (Mohanraj and Subbaiah 2010, Rodrigo, Welgama et al. 2010). Older adolescents may experience more stressors that can precipitate depressive symptoms, like peer influence, increasing autonomy, independence from family, and difficulties with social adjustments (Mohanraj and Subbaiah 2010). As there was limited age variability in the present study, further research is needed to understand age differences in depressive symptoms among adolescents in Bangladesh.

Adolescents' perceptions of being either overweight or underweight were significantly associated with increased reporting of depressive symptoms, which is consistent with some other findings (Atlantis and Ball 2008). However, the majority of the evidence in this area suggests that only perceptions of being overweight significantly increase the odds of psychological distress. An Australian longitudinal study found that adolescents who perceived themselves as overweight had more depressive symptoms than those who perceived themselves as the "right" weight, after adjusting for potential confounders (Al Mamun, Cramb et al. 2007). Research from cross-sectional studies of Chinese adolescents suggests that perceptions of being overweight was associated with depression more than perceptions of being normal or underweight (Xie, Liu et al. 2003, Tang, Yu et al. 2010). Weight related perceptions

may be influenced by cultural norms and social desirability, and include a process of self-appraisal and social comparison of body image and physical attractiveness (Felts, Parrillo et al. 1996, Ozmen, Ozmen et al. 2007) determined by exposure to pervasive imported Western media, advertising, fashion and lifestyle among adolescents (Unger, Yan et al. 2001). Evidence also suggests that standards of muscularity for males and slimness for females has an important role for adolescents in establishing body image standards and weight norms (Felts, Parrillo et al. 1996). As overweight/obesity is viewed as an undesirable and stigmatizing characteristic with attached discrimination and prejudices (Puhl and Brownell 2001), the fear of such stigma and discrimination may trigger feelings of depression among those who perceive their weight status does not conform to a societal ideal norm (Atlantis and Ball 2008). Adolescents who perceive themselves as overweight often feel isolated or discriminated against in social contexts, which can lead to poor psychosocial functioning including family disharmony and trouble at schools (Xie, Chou et al. 2011), which in turn are precursors for adolescent depression.

The present study also showed a significant association between parent-reported adolescent sleep disturbance and adolescent-reported depression symptoms, which is consistent with other research (Guo, Deng et al. 2014, Sivertsen, Harvey et al. 2014). Sleep disturbances have previously been shown as significantly associated with the severity of depression, with insomnia the most frequent (Urrila, Karlsson et al. 2012). Depression and sleep disturbance are likely to have a bidirectional relationship (Harvey 2006). A study among 3186 Chinese adolescents aged 13-18 years demonstrated that those who had depressive symptoms were also at a higher risk of sleep disturbance (Guo, Deng et al. 2014), and another cohort study found that sleep disturbance among Chinese adolescents predicted the development and persistence of depressive symptoms

(Fan, Zhou et al. 2016). There is also evidence to suggest that insomnia is an independent risk factor for first and recurrent episodes of depression (Riemann, Berger et al. 2001).

The present study found that adolescent report of having five or more sugary drinks, and skipping breakfast for four or more days, per week was positively associated with adolescents' depressive symptoms. High sugar intake and skipping breakfast can dysregulate blood glucose levels which is detrimental for mood. Although researchers have found some linkages between sugar sweetened soft drinks and some chronic conditions (e.g., cardiovascular diseases, type 2 diabetes, hypertension) (Greenwood, Threapleton et al. 2014, Kim and Je 2016, Narain, Kwok et al. 2016), evidence of a relationship between sugar sweetened drinks and depression is yet to be confirmed. Skipping breakfast has previously been demonstrated as inversely associated with depressive symptoms (Lien 2007, Richards and Smith 2016, Tajik, Latiffah et al. 2016). One cross-sectional study among Norwegian adolescents showed that skipping breakfast for three or more days per week was significantly associated with mental distress (Lien 2007). A cross-sectional analysis demonstrated that not eating breakfast everyday was associated with high level of depression, stress and anxiety; but was not predictive of the mental health conditions at 6-month follow-up (Richards and Smith 2015).

This study has some limitations to be considered when interpreting results. Depressive symptoms were assessed using the self-reported CESD-10 scale which is not a diagnostic interview. Although the CESD-10 has acceptable reliability and validity in measuring adolescents' depressive symptoms, it has not been validated among Bangladeshi adolescents. The non-random selection of schools from Dhaka city is unlikely to represent all the high schools of the country, and as such, generalization is

limited. Only interested students of the participating schools completed in the survey, which may have provided volunteer bias. Despite these limitations, the present study provides insights on an important and understudied public health issue of adolescents' mental health.

In summary, our study shows that one in every four participating secondary school students reported experiencing depressive symptoms. Symptoms were more prevalent among females, older adolescents; and those who skipped breakfast frequently, have high intake of sugary drinks, have sleep disturbance or those who do not feel safe at school. Accordingly, interventions for adolescent depression could target lifestyle practices such as weight management, personal safety, sleep hygiene and healthy eating. Further population-based studies that also include rural and semi-urban areas are recommended to develop a better understanding of the prevalence and factors associated with depressive symptoms among school children in this country.

Acknowledgements

We are very grateful to all students and their parents who participated in the study. We also thank the teachers/headmasters/principals of the participating schools for their support in the implementation of this project. Special thanks are due to Mahfuzul Kabir of Data Analysis and Technical Assistance (DATA), Bangladesh for his painstaking help with data entry. Our thanks also go to Parveen A Khanum, Shuhana Sultana, Nazneen A Khanum, Areebah S Khan and Shanchita R Khan for their sincere assistance with data collection.

Conflict of interest: None to declare.

Funding: None to declare.

Key messages:

- One fifth of the Bangladesh population are adolescents, but little is known about their mental health.
- In an urban-based sample of 755 adolescents in Dhaka city, this study found that one in four reported depressive symptoms.
- Depressive symptoms were associated with being female, older, self-perception of non-normal weight, low life satisfaction, feeling unsafe at school, sleep disturbance, high intake of sugary drinks, and skipping breakfast.
- This information can be used to develop pragmatic strategies to help adolescents who are at risk of developing depressive symptoms.

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Table 1: Demographics of participating adolescents of Dhaka city, Bangladesh (n=755)

Table 2: Factors associated with self-reported depressive symptoms among adolescents of Dhaka city, Bangladesh

Figure 1: Proportions of adolescents with self-reported depressive symptoms by gender and age