Adolescents with Depressive Symptoms and their Challenges with Learning in School

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Abstract

We examine school performance among 83 adolescents at-risk for major depression. Negative mood interfered with subjective measures of school performance, including ability to do well in school, homework completion, concentrate in class, interact with peers, and going to class. No significant relationships were found for mood and objective measures of school performance (school attendance, English and math grades). Students with a college-educated parent had stronger performance in objective measures (school attendance and math grades), while males had lower English grades. In qualitative interviews, adolescents reported that negative thinking led to procrastination, which led to poor school performance, which led to more negative thinking. Adolescents with depressive symptoms that do not meet the threshold for referral report struggles in school. Understanding the specific challenges faced by adolescents with even low levels of depressive symptoms can help school nurses, teachers, and parents identify appropriate interventions to help adolescents succeed in school.

Keywords

Depression; Adolescent; Education; Mental Health

Introduction

Adolescence is a time when depressive symptoms increase substantially. In later adolescence (ages 15–18), lifetime prevalence for major depression is very similar to

prevalence for adults (Hankin, 2006). Adolescence is also a crucial time in the development of human capital. This is a time when key decisions are made, such as choosing to stay in school, to take a college-preparatory curriculum and invest in higher education (Chen, Wu and Tasoff, 2010). This can have long-term implications for employability and earnings.

Previous research examining the relationship between depression in adolescence and subsequent educational attainment has had mixed findings. The National Comorbidity Study (NCS), a representative sample of adults in the United States (US) found that those who recalled early-onset mood disorder were less likely to graduate high school or college (Kessler, Foster, Saunders & Stang, 1995). A second analysis of NCS found that males who recalled onset of depression prior to age 16 had a reduced likelihood of graduating from high school (Wilcox-Gok, Marcotte, Farahati & Borkoski, 2004). Other studies have found that the relationship of depression on educational attainment is stronger for females. Fletcher (2008), examining data from the National Longitudinal Study of Adolescent Health (AddHealth) found that adolescent females with depression had reduced likelihood of high school graduation and college enrollment. An analysis using genetic markers found that female adolescents with depression had greater decreases in school performance than males (Ding, Lehrer, Rosenquist & Audrain-McGovern, 2009). In addition, an analysis of data from a randomized trial of patients with chronic depression found that females with early onset major depressive disorder were less likely to complete college and had lower expected earnings (Berndt, Koran, Finkelstein & Gelenberg, et al., 2000).

Other studies have not found a strong association between depressive symptoms in adolescence and subsequent educational attainment. The Dunedin birth cohort study found that anxiety and depression in adolescence had weak associations with subsequent educational attainment (Miech, Caspi, Moffitt & Wright, et al., 1999). An analysis of the NCS data found that depression did not have a significant association with educational attainment (Jayakody, Danzinger & Kessler, 1998). The NCS Replication (NCS-R) in 2001–02 did not find that major depression or dysthymia were associated with decreased probability of completing high school and college (Breslau, Lane, Sampson & Kessler, 2008). A study examining adults in the Baltimore Area Catchment Study, found that depression did not have a strong association with educational attainment (Eaton, Muntaner, Bovasso & Smith, 2001). A study of secondary school students in Finland found a negative cycle, where depressive symptoms led to school burn-out, which in turn led to greater rates of depressive symptoms (Salmela-Aro et al., 2009).

Beyond major depression, many adolescents have symptoms of depression, where although not rising to the level of clinical depression, can still adversely affect functioning. About 20–50% of adolescents are reported to have subsyndromal levels of depression, defined as depressive symptoms that are less severe than major depression (Hankin, 2006). These adolescents are at high risk for developing major depression (Fergusson, Horwood, Ridder & Beautrais, 2005; Cuijpers, de Graff, & van Forsselaer, 2004). There is some evidence that adolescents with dysthymic disorder (mild, chronic depression) may have lower levels of social support than adolescents with a history of major depression (Klein, Lewisohn & Seeley, 1997). This may be due to the longer duration of dysthymia as compared to the duration of major depressive episodes, one of the key defining criteria for major depression (US DHHS, 1999). A longitudinal study of patients with early onset dysthymic disorder found that longer duration of dysthymic disorder was associated with decreased functional impairment 10 years later (Klein, Shankman & Rose 2006, 2008). However, as mentioned above, the NCS-R did not find that dysthymia was associated with the probability of completing high school or college (Breslau et al., 2008).

The purpose of this paper is to examine the relationship between depressive symptoms and school performance in a sample of adolescents at-risk for major depression. This study goes beyond objective measures of school performance to also examine adolescents' perceptions of school performance. This study also incorporates qualitative analyses to help understand the adolescents' experiences.

Methods

Study Design

The data for this study were collected during the screening and baseline interviews in the Competent Adulthood Transition with Cognitive-behavioral and Interpersonal Training (CATCH-IT) trial. CATCH-IT is a randomized controlled trial of an Internet-based depression prevention measure, targeting adolescents at risk of depression. The study design has been described elsewhere (Van Voorhees, Vanderplough-Booth, Fogel & Gladstone, et al., 2008; Van Voorhees, Fogel, Reinecke & Gladstone et al., 2009). Adolescents with sub-threshold levels of depressive symptoms were identified by universal screening during primary care appointments. Adolescents were defined as having sub-threshold levels of depression if they indicated both depressed mood and either loss of pleasure or irritability for a few days or more in the past two weeks. Adolescents had to meet these criteria both at an initial screening and again at an intake interview 1–2 weeks later. Thirteen primary care sites from five healthcare organizations, located in the Midwest and southern United States, participated in the study. Eighty-three adolescents who were identified as having subthreshold levels of depressive symptoms participated in this study. As this paper is not testing the differences between the two randomized groups, the 83 participants are analyzed as a whole.

Adolescent Recruitment

Recruitment took place from February 1, 2007 to November 30, 2007. Adolescents were eligible for the study if they were between the ages of 14–21 and met sub-threshold criteria for depression (depressed mood and loss of pleasure or irritability for a few days or more in the past two weeks) at initial screening and again 1–2 weeks later at a formal eligibility assessment. After complete description of the study, written consent was obtained (parental consent was obtained for those under age 18 and assent for those individuals). Individuals were excluded if they met the criteria for major depression (three individuals with borderline major depression were included at the request of their physicians), had bipolar disorder, eating disorders, panic disorder, substance abuse, conduct disorder, generalized anxiety disorder, schizophrenia, suicidal ideation or intent, or were undergoing active treatment for major depression. Individuals were not excluded if they had symptoms of conduct disorder, generalized anxiety disorder, or past substance abuse.

All protocols were approved by the University of Chicago Institutional Review Board and local institutional review boards, and all procedures were Health Insurance Portability and Accountability Act (HIPAA) compliant. The trial is registered at clinicaltrials.gov with identifier number NCT00145912.

Sample Participation

A comparison of sample demographics to national adolescent demographics shows that the sample is comparable to the national population. In the US national population, about 51 percent of adolescents ages 15–21 are male and 37 percent are of minority descent (Census, 2008). In our sample, about 42 percent are male, and about 39 percent are of minority descent. Since sample participants were recruited at primary care centers, it is possible that

adolescents in our sample have greater access to health care or greater motivation to seek care.

In addition to the quantitative analyses, qualitative interviews were conducted. Physician interviews were recorded and transcribed. Two independent reviewers listened to and evaluated the baseline interviews for themes based on a grounded theory approach (Glaser & Strauss, 1967). The adolescents' interview comments were analyzed using Atlas (Atlas.ti, 2008) and final themes and subtheme coding achieved > 90% concordance between the two raters. We report the education themes from the initial interviews. These interviews were conducted in the summer of 2008 at the University of Chicago Medical Center.

Dependent Variables

Objective Education Measures—This was measured first by whether the participant is currently attending school (yes/no), and the most recent letter grade in English and Math (4=A, 3=B, 2=C, 1=D or lower). These educational measures were adapted from the AddHealth Wave I in-home questionnaire (AddHealth, 2008) to allow for comparison of these results to other studies.

Subjective Education Measures—This was measured by whether participants believed that feeling down or sad has affected their ability to do well in school, and whether feeling down or sad has affected the ability to do well in school in the following ways: concentrating on or completing homework, problems with teachers, concentrating in class, coming to class on time/avoiding absences, and dealing with other students or fitting in. These items were measured on a four point scale (1=not at all, 2=a little, 3=somewhat, 4=a lot). As with the school performance items, these items were adapted from the AddHealth Wave I in-home interview (AddHealth, 2008). Additionally, these items were selected based on previous qualitative research of young adults with depression, which found that many young adults with depression identified struggles with role transitions and relationships with family and peers (Kuwabara, Van Voorhees, Gollan & Alexander, 2007). Thus, these measures of perceived school performance were chosen to assess the relationships between depression and functioning in school.

Independent Variables

Center for Epidemiologic Studies Depression (CES-D)—The Center for Epidemiologic Studies-Depression (CES-D) scale assesses depressive symptoms. The CES-D asks a series of 20 questions about depressed mood. The CES-D has been validated in adolescents (junior and senior high school students), in males and females, and in white and non-white American English speaking populations (Radloff, 1977, 1991). Items were imputed for those who responded to at least 10 of the 20 questions, to avoid losing cases where respondents answered most of the CES-D items. The imputation method used for this variable was Stata's impute procedure (Stata, 2003). Stata uses numerous other variables in the data set and analyzes the relationship of these variables to a particular variable using as relevant linear regression for continuous variables and logistic regression for categorical variables to impute the missing value. For the values for CES-D, the imputation was based on the values of 12 study eligibility assessment items: the 9-item Patient Health Questionnaire (PHQ-9) (Sptizer et al., 1999), and 3 other items of whether the respondent reported difficulty in work or take care of things at home or get along, often felt hopeless about the future in the past two weeks, and had serious thoughts of ending his/her life in the past month.

Individual Demographic Characteristics—Control variables included age, gender, and race. Age was measured in a continuous manner while race, gender, and education were

measured as binary variables (race: white=0/non-white=1), (gender: female=0/male=1), (education: college educated=1 versus not college educated =0). For example, a binary (0/1) variable with a value of 1 for education indicates that the highest-educated parent had a college degree and was included as a measure of the family's socioeconomic status (SES) (Wooldridge, 2000). Parental education was dichotomized into two categories (college educated versus not) to limit the number of categorical variables in the models given the small sample size of the data set. As inter-generational transfer of education is high (Haveman and Wolfe, 1995), it is important to account for parental education when assessing student's educational attainment.

Protective Factors for Depressive Symptoms—Protective factors included self-efficacy and support from family and friends. Descriptions of these variables have been previously published elsewhere (Van Voorhees, Vanderplough-Booth, Fogel and Gladstone, et al., 2008). Figure 1 lists the components of these variables and the Cronbach's alpha for the self-efficacy scale. The support items were binary yes/no items and were just added together for a total score.

General Health—General health was included as a measure of physical health, which may be correlated to depressive symptoms and also school performance (Ojeda, Frank, McGuire, et al., 2009, Ettner, 2000). Respondents were asked to rate their general health (1=excellent, 2=very good, 3=good, 4=fair, 5=poor). The responses were collapsed into a binary measure to preserve degrees of freedom in a small sample with fair/poor=1 and excellent/very good/good=0.

Anxiety—Co-occurring anxiety was defined as a binary variable with a positive value indicating the respondent reported being very anxious, nervous or panicky in the last four weeks, or had an episode or spell with sudden onset of anxiety, heart pounding, shortness of breath or lightheadedness in the past four weeks.

Substance Use—Substance use was defined as a binary variable with a positive value indicating that the respondent reported binge drinking (more than five alcoholic drinks in one day) in the past four weeks or marijuana use in the past 6 months. Adolescents who were identified as having current substance use disorders were excluded from the study, as the design of Project CATCH-IT was to examine depressive symptoms in the absence of co-occurring substance use problems. However, adolescents with less severe substance use were not excluded.

Delinquency—Delinquent behavior was defined as a binary variable with a positive value indicating that the respondent reported ever engaging in two or more fights, bullying someone two or more times, or stealing items worth $20 or more on two or more occasions. Adolescents who were identified as having conduct disorder were excluded from the study, as Project CATCH-IT sought to examine depressive symptoms in the absence of co-occurring conduct disorder. However, adolescents with less severe delinquent behaviors were included in the study.

Analytic Methods

As appropriate, logistic regression or linear regression was used to examine the relationship between depressive symptoms and the educational outcomes. Linear regression is used when the outcome variable in the model is continuous, as it is in all outcomes studied in this study with the exception of school attendance. Linear regression relates changes in the outcome, or dependent variable, to changes in the predictors, or independent variables, as a linear relationship (Wooldridge, 2000). Beta coefficients are included in the regression equation

with each predictor multiplied by its specific beta coefficient. Logistic regression is used when the outcome variable is dichotomous; in this study, in the outcome of school attendance. Linear regression is not appropriate when examining dichotomous variables, as it can predict outcomes as less than zero or greater than one (Wooldridge, 2000). Logistic regression models utilize a density function that requires outcomes to fall between 0 and 1. Coefficients from logistic regressions are reported here as odds ratios; e.g. if the model is examining the association of parental education on probability of attending school and if the odds ratio for parental education is 6.7, this indicates that the odds of attending school for students with a college-educated parent is 6.7 times greater than the odds for students without a college-educated parent, all else held constant (Szklo and Nieto, 2004).

Three multivariate models were analyzed for each of the nine educational outcome variables. The first model examined the relationship between CES-D score and the educational outcome, controlling for demographic variables (age, gender, race, and parental education). The second model included all analyzed in Model 1 and also controlled for protective factors for depression: self-efficacy, support of family and friends and general health. The third model included all analyzed in Model 1 and also controlled for co-occurring mental health conditions (substance use, delinquency and anxiety). Due to statistical over-adjustment concerns, the protective factors and general health variables were not included in Model 3. Stata SE Version 10.0 (College Station, TX) was used to conduct the statistical analyses. As this is a small sample, we did not wish to lose individuals to item non-response. Therefore, missing items were imputed using Stata's ICE program for multiple imputation (UCLA, 2008). Multiple imputation uses Monte Carlo estimation to create 5 simulated datasets based on observed values of all predictor variables in the models, and combines the estimates from the five datasets to reduce the uncertainty (Stata, 2009). As discussed below, results were qualitatively similar in the imputed and non-imputed samples.

Results

Descriptive Statistics

Descriptive statistics of the sample are reported in Table 1. The average age was almost 18 years, a lower percentage were male, and slightly more than one-third were non-white. More than half reported a parent with a college degree. Approximately 88% reported current school attendance. Participants had high levels of depressive symptoms, by virtue of the recruitment focus. The average CES-D score was slightly above 22. As many population-based studies designate anyone with a CES-D score above 16 as depressed (Radloff, 1977, Chan, Orlando, Ghosh-Dastidar & Duan et al., 2004, Needham and Crosnoe, 2005, Pickard, Dalal & Bushnell, 2006), the average CES-D score indicates a higher rate of depressive symptoms in this sample than in the general population.

Depressed Mood and Objective School Performance

Table 2 shows analyses for measures of objective school performance, attending school, English and math grades. With regard to attending school, being male was significantly associated with lower odds for attendance and having a parent college graduate was significantly associated with higher odds for attendance. This pattern occurred in all models, with the exception of parent college graduate approaching significance in Model 2 (p=0.055). Depressive symptoms did not have any significant association with attending school. With regard to English grade, few covariates were statistically significant. In model 3, having anxiety was significantly associated with higher English grades. In Models 2 and 3, gender approached statistical significance, with being male associated with lower grades in English (p=0.060 and p=0.098 respectively). Depressive symptoms did not have any significant association with English grade. With regard to math grade, those of non-white

race had lower math grades, although this was only statistically significant in Model 2 and approached significance in Models 1 and 3 (p=0.053 and p=0.072, respectively). In Model 2, reporting fair/poor general health was significantly associated with lower math grades, while having lower levels of friends support was associated with higher math grades (approaching significance with p=0.082), and having a college-educated parent was associated with higher math grades (approaching significance with p=0.051). In Model 3, anxiety was significantly associated with higher math grades. Depressive symptoms did not have any significant association with math grades.

Depressed Mood and Subjective School Performance

Table 3 shows the relationship between depressive symptoms and subjective measures of school performance – whether depressive symptoms affect the ability to do well in school, concentrate on or complete homework and have problems with teachers. With regard to ability to do well in school, no covariates were statistically significant in this model, although the relationship between greater friends support and problems with ability to do well in school approached significance (p=0.067). Higher levels of depressive symptoms were significantly associated with higher levels of reporting that feeling down or sad affects the ability to do well in school (p<0.001 in Models 1, 2, and 3). With regard to concentrating on or completing homework, no covariates were statistically significant. Higher levels of depressive symptoms were significantly associated with higher levels of problems concentrating on or completing homework in Model 1 (p=0.001), although significance was lost when controlling for protective factors, and this only approached significance when controlling for other mental health problems (p=0.085). With regard to problems with teachers, younger students were associated with higher levels of reporting problems with teachers (p=0.027 and p=0.017 in Models 1 and 2, respectively), although this lost statistical significance once other mental health problems were controlled for (p=0.097). Higher levels of depressive symptoms were not significantly associated with problems with teachers.

Table 4 shows the relationship between depressive symptoms and subjective measures of school performance – whether feeling down or sad has led to problems with the ability to concentrate in class, go to class and deal with other students. With regard to concentrating in class, those of nonwhite race reported problems with ability to concentrate in class, although this was not significant in Model 1 and only approached significance in in Models 2 and 3 (p=0.082 and p=0.087, respectively). Higher levels of depressive symptoms were significantly associated with greater problems concentrating in class (p<0.001, p=0.001, and p=0.028 in Models 1, 2 and 3, respectively). With regard to attending class, no covariates were statistically significant. Higher levels of depressive symptoms were associated with greater problems going to class, although this only approached significance when controlling for protective factors (p=0.002, p=0.051, and p=0.031 in Models 1, 2, and 3, respectively). With regard to dealing with other students, anxiety was associated with higher levels of problems dealing with other students (Model 3, p=0.047). Higher levels of depressive symptoms were significantly associated with greater problems dealing with other students (p<0.001, p=0.001, and p=0.020 in Models 1, 2, and 3, respectively).

Several sensitivity analyses were conducted (data not shown). Results under imputation were qualitatively similar to non-imputed results. However, the magnitude of the CES-D coefficient was somewhat higher and statistical significance was somewhat greater in the non-imputed results in models 2 and 3. Thus, the imputed results reported here represent a more conservative estimate of the association between depressive symptoms and school performance. Results were qualitatively similar when outcome variables were not imputed. Results were also qualitatively similar when using an alternative measure of depressive symptoms, the Patient Health Questionnaire-Adolescent (PHQ-A). Also, results were generally qualitatively similar when males and females are analyzed separately. However,

most coefficients lost statistical significance, particularly for males, most likely due to the smaller sample size.

Qualitative Analysis

Three major themes emerged from the exploratory analysis of interview transcriptions: difficulty completing assignments, concentrating in class, and cyclical patterns. Cyclical patterns include situations in which negative thinking led to procrastination and poor outcomes, which in turn led to greater procrastination and negative thinking. Excerpts from interviews reflecting each theme are listed below.

Completing Assignments

Just about every time I've ever had a paper assignment I've gotten myself cranked up and anxious as soon as I got the assignment, and then not started on it until the night it was due because I didn't want to have to think about it.

I often get depressed and put off my work and it doesn't get done and I feel unmotivated to do work.

I had already procrastinated in writing a paper, after the deadline passed and I was still not finished. I began to get frustrated with myself and had a crying fit in which I desperately wanted to hurt myself.

Concentrating in Class

I did awful on a history quiz and had bad thoughts about myself. Now every time I'm in history class I keep thinking of that quiz.

Not being able to pay attention in class is causing me to not perform in tests which will make my applications look bad and not get a job offer.

I really want [to] do well in school, but sometimes I freeze up before the tests. I can't concentrate, no matter how long I've studied. This obviously puts my goal of doing well in school on hold.

School Affected by Depressive Symptoms

Getting down on myself by thinking I didn't have the brains for my math class only made it harder and took away the motivation to study.

I gave up on getting the best grades I could.

Lack of confidence in academic abilities and social skills leads to less ability to concentrate and more distant social relationships.

Negative thinking reduces your confidence, therefore making it harder to do the things you want and are even capable of doing.

I'll feel too anxious and unhappy to get my work done well or on time, which will make me feel guilty, which will make me not want to think about working, which will make the problem even worse, etc etc etc.

Ditching school makes me behind in all my classes, then I get very stressed about when I'm going to get all my work done, then I procrastinate and sometimes never do my work.

Discussion

This study found that for a sample of US adolescents at risk of developing depression, increasing depressive symptoms are associated with many measures of impaired school performance. Although there was no statistically significant relationship between depressive symptoms and objective school performance (staying in school or English and math grades), there was a statistically significant relationship between depressive symptoms and perceptions of impairment in functioning. Participants with greater depressive symptoms were more likely to report that feeling down or sad affected their ability to do well in school, concentrate on or complete homework, to concentrate in class, attend class, and deal with other students. There was only one perception of impairment that was not significant and that was the relationships between depressive symptoms and problems with teachers. These results were generally consistent after controlling for protective factors for depression and other mental health disorders (with the exception of completing homework, which lost statistical significance after protective factors were included in the model). In addition, the qualitative analysis helps to understand the nature of depressive symptoms on school performance. Respondents reported that depressive symptoms and negative thoughts led to poor school performance, which in turn led to more negative thoughts, generating a cycle. Thus, while it may be too soon to see strong outcomes in objective measures of school performance (i.e. English or math grades), the long-term impact of these struggles may negatively impact school performance whether in high school or even post high school and also future labor market productivity.

As in previous work in the Dunedin study (Miech, Caspi, Moffitt & Wright et al., 1999), the NCS-R (Breslau, Sampson & Kessler, 2008) and the Baltimore Area Catchment Study (Eaton, Muntaner, Bovasso & Smith, 2001), we did not find strong negative associations between depressive symptoms and traditional measures of school performance. Unlike previous studies, however, we go beyond the objective measures of school performance to examine the ways in which adolescents believe their schooling is adversely affected. Since the adolescents in the sample had low levels of depressive symptoms, it is possible we are seeing early struggles in school, which if not addressed, may contribute to long-term struggles culminating in poor grades and lower rates of school completion.

With regard to other variables in the models, males had lower attendance in school and also lower English grades. This is consistent with prior research examining gender differences in school performance (Marsh and Yeung, 1998). Students of nonwhite race reported lower math grades. This is consistent with previous literature on the differences in standardized score testing between black and white students (Vanneman, Hamilton, Baldwin Anderson & Rahrnan, 2009). Students who had a parent with a college degree reported higher rates of attending school and math grades (approaching significance in Model 2 only). This is consistent with prior research on the inter-generational transmission of education (Haveman and Wolfe, 1995). Students with anxiety also reported higher English and math grades, and were more likely to report that depressive symptoms affect their ability to deal with other students at school. This is consistent with previous research which found that anxiety was not significantly associated with decreased educational attainment (Miech et al., 1999).

In addition to the quantitative study, the qualitative analyses provide insight into why students with depressive symptoms feel they struggle with school. The students reported that problems build up over time where negative thinking leads to procrastination, which can lead to further negative thinking, and falling further behind in school. The qualitative results are consistent with Salmela-Aro and Holopainen (2009) who found evidence of a negative cycle between depressive symptoms and school burn-out in adolescents in Finland. Although it goes beyond the scope of this study to suggest specific interventions that might

improve this cycle, it is possible that measures to reduce student anxiety (Alexander and Onwuegbuzie 2007) and improve school connectedness (Catalano, Haggerty, Oesterle & Fleming et al., 2004) may be particularly helpful to adolescents with depressive symptoms.

Some limitations to this study should be noted. Only 83 respondents completed the baseline interview, and there is some item non-response on individual items. Multiple imputation was conducted to avoid loss of cases, and results are qualitatively similar to the non-imputed results. Additionally, this sample is not nationally-representative. It is a study of adolescents with subthreshold levels of depressive symptoms. It took place in the Midwest and southern United States at 13 participating primary care sites. In addition, it is possible that the poor perceptions of school performance could simply be the result of the depressive symptoms of the respondents where negative thinking could be causing the respondents to report that they struggle in school when objective measures indicate that they are not. However, the qualitative interviews provide insight as to how current struggles could have a negative effect on school performance. Additionally, there is variation in responses to the ways in which negative mood was associated with schooling (i.e. problems with concentrating in class, attending class and dealing with other students were identified as problematic while problems with teachers was not). This variation supports the point that respondents were not simply stating that every aspect of school is problematic.

Implications for School Nursing Practice

School nurses are in a unique position to help students struggling with depressive symptoms, as children and adolescents with depressive symptoms often present to the school nurse with somatic complaints (Campo et al., 1999, Shannon et al., 2010). Common somatic symptoms associated with anxiety and depression include stomachaches, recurrent abdominal pain (RAP), headaches, and musculoskeletal pain (Figure 2). Additionally, students presenting with multiple somatic complaints are also more likely to have mental health problems (Lieb et al., 2000). School nurses have the opportunity to identify students who are presenting regularly with somatic complaints, the so-called "frequent flyers" to the school health office and can work with teachers and parents to refer students to appropriate mental health services (Shannon et al., 2010). Furthermore, previous evidence has shown that, in the absence of a registered school nurse, students with somatic complaints are more likely to simply be sent home from school (Pennington & Delaney, 2008, Wyman, 2005) or returned to class untreated (Shannon et al., 2010), which can result in missed opportunities for the student to receive needed mental health care. School nurses can facilitate communication between students, teachers, parents and other mental health professionals to help identify and refer students at risk for depressive symptoms.

Conclusion

This study sheds shows that adolescents at risk for depression perceive these symptoms as negatively affecting school performance. Notably, adolescents report that depressive symptoms leads to difficulties in coming to and concentrating in class and dealing with other students, and that struggles with school become a negative cycle. Interventions addressing these problems while depressive symptoms are low may help interrupt the negative cycle and improve educational trajectories. Understanding particular factors affecting school performance can help school nurses, mental health personnel, parents, teachers and school administrators to identify targeted interventions, such as interventions to promote study skills to reduce procrastination and complete assignments. Teachers may be in a unique position to help, as many students reported struggles in interactions with peers, but not with teachers. Furthermore, understanding ways in which depressive symptoms may manifest in a

school setting can help school nurses to identify those who are struggling and propose solutions.

Acknowledgments

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Self-Efficacy (1=strongly agree, 4=strongly disagree)
Cannot solve problems
Feel pushed around
Have little control
Can do anything [R]
Often feel helpless
Future depends on me [R]
Scale created by factor analysis: alpha=0.73. Responses were imputed for those with at least 5 items.

Family Support (1=yes, 0=no)	**Friend Support** (1=yes, 0=no)
My family gives me the moral support I need.	My friends give me the moral support I need.
I get good ideas on how to do or make things from my family.	Most other people are closer to their friends than I am. [R]
Most other people are closer to their families than I am. [R]	My friends enjoy hearing about what I think.
When I confide in the members of my family who are closest to me I get the feeling that it makes them uncomfortable. [R]	Certain friends come to me when they have problems or need advice.
My family enjoys hearing what I think.	I rely on my friends for emotional support.
Members of my family share many of my interests.	If I felt that one or more of my friends were upset with me, I'd keep it to myself. [R]
	I feel that I'm on the fringe of my circle of friends. [R]
Certain members of my family come to me when they have problems or need advice.	
I rely on my family for emotional support.	I have a friend I could go to if I were just feeling down without feeling funny about it later.
My family and I are very open about what we think.	My friends and I are very open about what we think.
My family is sensitive to my personal needs.	My friends are sensitive to my personal needs.
Members of my family come to me for emotional support.	My friends come to me for emotional support.
Members of my family are good at helping me solve problems.	My friends are good at helping me solve problems.
I have a deep, sharing relationship with a number of members of my family.	I have a deep, sharing relationship with a number of friends.
Members of my family get good ideas from me on how to do or make things.	My friends get good ideas from me on how to do or make things.
It makes me uncomfortable when I confide in members of my family. [R]	I feel uncomfortable when I confide in friends.
Members of my family seek me out for companionship.	My friends seek me out for companionship.
I think my family feels that I'm good at helping them solve problems.	I think my friends feel that I'm good at helping them solve problems.
I don't have a relationship with my family that's as close as other peoples' relationships with family members. [R]	I don't have a relationship with a friend that's as intimate as other peoples' relationships with friends. [R]
I wish my family were much different. [R]	I've recently got a good idea about how to do something from a friend.
	I wish my friends were much different. [R]

Scale created by summing the components. Responses were imputed for those with at least 15 items.

Figure 1.
Protective Factors for Depression [R]=Item reversed

Stomachache
Recurrent abdominal pain (RAP)
Headaches
Musculoskeletal pain
Multiple somatic complaints

Source: Shannon et al., 2010

Figure 2.
Somatic Symptoms Associated with Depression and Anxiety in Children and Adolescents

Table 1

Descriptive Statistics (n=83, missing data imputed by multiple imputation)

	Mean	SD	Percent	Frequency
CES-D score (high value indicates more depressive symptoms)	22.380	11.834		
Age	17.446	2.059		
Male (1=male, 0=female)			43.4%	36
Non-white race			38.1%	32
Highest educated parent is college graduate			56.9%	47
Self-efficacy scale	1.030	0.647		
Family support scale	12.731	11.224		
Friend support scale	15.128	6.733		
General health fair/poor			23.6%	20
Substance use			21.0%	17
Delinquency			37.8%	30
Anxiety			52.3%	43
Currently attending school			87.7%	73
Most recent grade in English (4=A, 3=B, 2=C, 1=D or lower)	2.828	1.166		
Most recent grade in Math (4=A, 3=B, 2=C, 1=D or lower)	2.562	1.339		
Feeling down or sad has affected ability to do well in school (1=Not at all, 2=A little, 3=Somewhat, 4=A lot)	2.586	1.148		
Feeling down or sad has affected ability to concentrate on or complete homework (1=Not at all, 2=A little, 3=Somewhat, 4=A lot)	2.557	1.166		
Feeling down or sad has led to problems with teachers (1=Not at all, 2=A little, 3=Somewhat, 4=A lot)	1.605	1.348		
Feeling down or sad has affected ability to concentrate in class (1=Not at all, 2=A little, 3=Somewhat, 4=A lot)	2.575	1.203		
Feeling down or sad has led to problems coming to class on time or avoiding absences (1=Not at all, 2=A little, 3=Somewhat, 4=A lot)	2.044	1.275		
Feeling down or sad has led to problems dealing with other students or fitting in (1=Not at all, 2=A little, 3=Somewhat, 4=A lot)	2.110	1.203		

Table 2

Relationships between Depressive Symptoms (CESD) and Objective School Performance: Attending School & High English and Math Grades (n=83)

Variable	Attending School			English Grade			Math Grade		
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
CES-D Score	1.015 (0.938–1.098)	0.962 (0.822–1.126)	0.995 (0.900–1.101)	0.005 (0.011)	0.005 (0.015)	−0.009 (0.014)	0.004 (0.014)	0.010 (0.017)	−0.013 (0.015)
Age	0.994 (0.678–1.456)	0.815 (0.455–1.462)	1.039 (0.679–1.590)	0.088 (0.065)	0.099 (0.064)	0.125 (0.069)#	−0.022 (0.071)	−0.016 (0.068)	0.005 (0.079)
Male	0.146 (0.025–0.868)*	0.085 (0.008–0.854)*	0.148 (0.023–0.952)*	−0.428 (0.261)	−0.495 (0.257)#	−0.406 (0.241)#	0.186 (0.382)	0.150 (0.375)	0.268 (0.360)
Non-white race	0.372 (0.077–1.806)	0.261 (0.018–3.892)	0.379 (0.066–2.193)	−0.221 (0.246)	−0.413 (0.289)	−0.176 (0.253)	−0.581 (0.293)#	−0.968 (0.315)**	−0.523 (0.285)#
Parent college graduate	6.722 (1.165–38.800)*	24.321 (0.927–638.137)#	7.154 (1.166–43.905)*	0.345 (0.324)	0.425 (0.317)	0.319 (0.318)	0.546 (0.355)	0.833 (0.389)#	0.511 (0.344)
Self-efficacy	--	0.101 (0.003–3.015)	--	--	−0.008 (0.383)	--	--	−0.065 (0.313)	--
Family support	--	1.131 (0.655–1.952)	--	--	0.012 (0.028)	--	--	0.041 (0.027)	--
Friends support	--	1.120 (0.760–1.649)	--	--	−0.040 (0.029)	--	--	−0.055 (0.030)#	--
General health fair/poor	--	2.945 (0.144–60.264)	--	--	−0.215 (0.358)	--	--	−0.821 (0.356)*	--
Substance Use	--	--	0.587 (0.076–4.540)	--	--	−0.421 (0.327)	--	--	−0.378 (0.478)
Delinquency	--	--	0.722 (0.130–4.009)	--	--	0.054 (0.299)	--	--	−0.138 (0.356)
Anxiety	--	--	2.146 (0.193–23.819)	--	--	0.641 (0.306)*	--	--	0.710 (0.330)*
Constant	--	--	--	1.259 (1.151)	1.630 (1.243)	0.646 (1.231)	2.700 (1.242)*	3.011 (1.464)*	2.323 (1.349)#

Note: Missing data imputed by multiple imputation.

\# = p <0.10,

* = p <0.05,

** = p <0.01,

*** = p <0.001

Table 3

Relationships Between Depressive Symptoms and Subjective School Performance: Ability to Do Well in School, Ability to Concentrate on Homework and Problems with Teachers

Variable	Ability to Do Well In School			Concentrate/Complete Homework			Problems with Teachers		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
CES-D Score	0.053 (0.010)***	0.053 (0.012)***	0.053 (0.013)***	0.037 (0.010)**	0.020 (0.014)	0.025 (0.014)#	0.002 (0.011)	0.012 (0.013)	0.003 (0.012)
Age	0.046 (0.049)	0.027 (0.052)	0.070 (0.055)	0.023 (0.054)	−0.004 (0.052)	0.026 (0.058)	−0.132 (0.058)*	−0.141 (0.057)*	−0.113 (0.066)#
Male	0.198 (0.221)	0.328 (0.218)	0.162 (0.225)	0.068 (0.228)	0.123 (0.228)	0.074 (0.237)	0.209 (0.238)	0.339 (0.241)	0.198 (0.256)
Non-white race	−0.066 (0.209)	0.129 (0.278)	−0.069 (0.222)	−0.037 (0.250)	0.039 (0.296)	−0.039 (0.256)	0.017 (0.239)	0.267 (0.274)	0.021 (0.246)
Parent college graduate	0.036 (0.224)	0.014 (0.286)	0.064 (0.227)	0.173 (0.233)	0.100 (0.319)	0.136 (0.237)	0.174 (0.300)	−0.005 (0.362)	0.205 (0.275)
Self-efficacy	--	−0.118 (0.228)	--	--	−0.521 (0.301)	--	--	0.381 (0.353)	--
Family support	--	−0.008 (0.030)	--	--	−0.019 (0.028)	--	--	−0.036 (0.023)	--
Friends support	--	0.056 (0.027)#	--	--	0.016 (0.029)	--	--	0.040 (0.026)	--
General health fair/poor	--	−0.013 (0.257)	--	--	−0.324 (0.292)	--	--	0.189 (0.280)	--
Substance Use	--	--	−0.238 (0.286)	--	--	0.118 (0.290)	--	--	−0.221 (0.352)
Delinquency	--	--	0.235 (0.237)	--	--	0.000 (0.297)	--	--	0.158 (0.288)
Anxiety	--	--	0.093 (0.257)	--	--	0.418 (0.322)	--	--	0.056 (0.373)
Constant	0.520 (0.864)	0.121 (1.005)	0.007 (0.984)	1.218 (0.982)	2.674 (1.203)*	1.204 (1.092)	3.662 (1.000)***	2.974 (1.185)*	3.257 (1.187)**

Note: Missing data imputed by multiple imputation.

= p <0.10,

* = p <0.05,

** = p <0.01,

*** = p <0.001

Table 4

Relationships Between Depressive Symptoms (CES-D) and Subjective School Performance: Problems with Ability to Concentrate in Class, Go to Class, Relationships with Other Students

Variable	Concentrate in Class			Coming to Class/Avoiding Absences			Deal with Other Students		
	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
CES-D Score	0.042 (0.009) ***	0.041 (0.012) **	0.031 (0.013) *	0.037 (0.011) **	0.030 (0.015) #	0.037 (0.016) *	0.051 (0.011) ***	0.052 (0.014) **	0.038 (0.015) *
Age	−0.065 (0.050)	−0.087 (0.052)	−0.053 (0.053)	0.102 (0.063)	0.086 (0.064)	0.087 (0.069)	−0.062 (0.055)	−0.042 (0.057)	−0.041 (0.058)
Male	0.092 (0.210)	0.212 (0.217)	0.134 (0.217)	0.030 (0.263)	0.114 (0.282)	0.089 (0.272)	0.307 (0.262)	0.184 (0.279)	0.339 (0.261)
Non-white race	0.414 (0.244)	0.470 (0.262) #	0.449 (0.251) #	0.203 (0.280)	0.432 (0.319)	0.232 (0.303)	0.118 (0.248)	0.037 (0.272)	0.157 (0.251)
Parent college graduate	0.072 (0.215)	0.034 (0.289)	0.036 (0.218)	−0.243 (0.277)	−0.474 (0.391)	−0.263 (0.283)	0.109 (0.245)	0.153 (0.280)	0.068 (0.251)
Self-efficacy	--	−0.145 (0.272)	--	--	−0.035 (0.373)	--	--	0.085 (0.275)	--
Family support	--	−0.014 (0.033)	--	--	−0.039 (0.034)	--	--	0.019 (0.024)	--
Friends support	--	0.019 (0.026)	--	--	0.026 (0.029)	--	--	−0.024 (0.026)	--
General health fair/poor	--	−0.447 (0.288)	--	--	0.096 (0.322)	--	--	0.430 (0.295)	--
Substance Use	--	--	−0.140 (0.283)	--	--	0.054 (0.390)	--	--	−0.224 (0.343)
Delinquency	--	--	−0.106 (0.251)	--	--	−0.276 (0.335)	--	--	−0.047 (0.272)
Anxiety	--	--	0.461 (0.303)	--	--	−0.050 (0.382)	--	--	0.573 (0.282) *
Constant	2.527 (0.918) **	3.050 (1.150) *	2.383 (0.993) *	−0.517 (1.152)	0.031 (1.346)	−0.161 (1.300)	1.805 (0.987) #	1.430 (1.153)	1.495 (1.072)

Note: Missing data imputed by multiple imputation.

= p <0.10,

* = p <0.05,

** = p <0.01,

*** = p <0.001