Title
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A thesis submitted in partial satisfaction of the requirements for the degree Master of Art in Education

by

Samantha Rebecca Gergans

2013
ABSTRACT OF THE THESIS

Depression, Physical Symptoms, and Academic Engagement in Middle School: A Mediational Model of the Influence of Emotional and Somatic Pain on Classroom Performance

by

Samantha Rebecca Gergans

Master of Art in Education University of California, Los Angeles, 2013

Professor Sandra H. Graham, Chair

Symptoms of depression in adolescence, even at subclinical levels, can impair a student’s ability to engage in learning. It is unclear, however, what it is about depressive symptoms that produce declines in academic engagement in the classroom. The present study examined this relationship between student-reported depressive symptoms and teacher-reported academic engagement in the classroom. Specifically, this investigation explored a mediational model where somatic symptoms, which are highly related to depressive symptoms, were tested as a mediator of this relationship between student well-being and academic performance. Using a large, ethnically diverse sample of 6th-grade
students (N = 4,174, 51% female), multiple regression was used to test this mediational model. Somatic symptoms were found to be a significant mediator of the depression-engagement relationship, accounting for 68% of the influence of depressive symptoms on classroom engagement. Implications are discussed.
The thesis of Samantha Rebecca Gergans is approved.

Connie L. Kasari

Jeffrey J. Wood

Sandra H. Graham, Committee Chair

University of California, Los Angeles

2013
Introduction

Often, in light of the current budget crises, one of the first resources to be cut from our nation’s public schools is that of health services. In many of our largest public school districts, nurses and social workers may service more than 10 schools and spend as little as one day per week at each school (Thronson, 2006). We recognize that students fall behind in their classes and coursework when they are absent from school. Little is known, however, of how student-reported physical well-being may be related to teacher reports of academic engagement in the classroom, over and above other known, powerful factors such as a student’s gender, ethnicity, and reported depressed mood.

It is clear that relationships exist between students’ emotional health and their academic performance (e.g., Johnson, Crosnoe, & Elder, 2001; Klem & Connell, 2004; Lounsbury, Steel, Loveland, and Gibson, 2004). It remains unclear, however, what it is about symptoms like those seen in depression that can disable a student’s ability to focus on and engage with learning. There is some evidence that somatic symptoms (which are highly correlated with depressive symptoms) predict poorer academic performance, over and above internalizing and anxiety symptoms (Hughes, Lourea-Waddell, & Kendall, 2008).

The purpose of the present study, therefore, is to examine the specific impact of somatic symptoms on the relationship between depressive symptoms and teacher-rated academic engagement. Explicitly, in a diverse sample, is it the physical aspects of depression that are most predictive of how engaged a student is perceived to be in the classroom, over and above other known, influential factors (e.g., student gender and
ethnicity)? It is the goal of the current investigation to better understand the relationships that exist between depressive symptoms, physical complaints, and engagement in the classroom by testing a specific mediational model.

*Depression and Achievement in Adolescence*

Depression in adolescence has been shown to relate to variations in academic performance, but this relationship remains mostly undefined. In an earlier study, Willcutt and Pennington (2000) examined adolescent boys and girls who fit the diagnostic criteria for IQ-discrepant reading disorder (DSM-IV; American Psychiatric Association, 1994). These authors evaluated twin dyads with (n = 209) and without (n = 192) reading disorder (mean age 10.7 and 10.2 years, respectively) for evidence of internalizing symptoms (e.g., a score of >13 on the CDI) and externalizing symptoms (i.e., diagnostic criteria for aggression, delinquency, oppositional deviant disorder, or conduct disorder). The authors found that, after controlling for a diagnosis of Attention-Deficit Hyperactivity Disorder (ADHD), reading disability was only related to symptoms of anxiety and depression. In addition, this association was stronger for girls than for boys. Although this study specifically assessed relations between reading achievement and internalizing/externalizing symptoms, its findings highlight the following: drops in reading achievement were related to internalizing symptoms over the more outwardly disruptive, externalizing symptoms.

In a study of Finnish adolescents, Fröjd et al. (2008) evaluated associations between varying levels of depression and a variety of aspects of school performance.
Their sample was comprised of 2,516 14- to 17-year old students, and depressive symptoms were classified using the 13-item Finnish version of the Beck Depression Inventory (R-BDI; Beck, Rial, & Rickels, 1974). It was found that the lower a student’s GPA, the greater the likelihood that the student self-reported as depressed. In addition, depressive symptoms were related to self-reports of difficulties in the following: concentration, ability to read and write well, social relationships, and self-reliant school performance. Differences in gender only appeared at the extreme end of reports of depression (with girls reporting more severe symptoms). Based on their findings, the authors recommend that students who self-report difficulties in school performance should be screened for depression.

In examining the relationship between emotional outcomes and achievement in adolescence, Ansary, McMahon, and Luthar (2011) discovered an interactional relationship with SES. Their study investigated the extremes of the SES spectrum: 280 adolescents participated via an economically disadvantaged urban middle school, while 318 adolescents participated via an affluent, suburban middle school. These authors found that at the economically disadvantaged end of the spectrum, an increase in each index of emotional health (i.e., negative mood, physiological anxiety, and social anxiety) was related to declines in achievement. At the affluent end of the spectrum, however, only the index of social anxiety was related to declines in achievement. The authors conclude that, in terms of achievement,
factors of affluence may protect against some aspects of the influence of emotional health. For students at the other end of the spectrum, however, the relationship between negative mood and achievement is a salient one.

*Depression, Physical Symptoms, and Achievement in Adolescence*

What is it about depression that hurts achievement? What is significant about depression that affects concentration, ability to read and write, self-reliant school performance, etc.? Several investigators in the last 2 decades have attempted to address some of the potential particulars of this relationship.

To begin, Silverstein (1999) suggested that there are differential consequences for two types of depression: pure depression and somatic depression (depression including fatigue, appetite, and sleep disturbance). Although this study did not yet address any influence on academic performance, the author did discover that, among 8,098 adolescents participating in The National Comorbidity Survey (Kessler et al., 1994), there were no gender differences for adolescents meeting criteria for pure depression. In terms of somatic depression, however, the investigator found that significantly more girls than boys met criteria for such a diagnosis. In addition, it was found that adolescents with somatic depression were significantly more likely to meet criteria for an anxiety disorder than those with pure depression. It is concluded that, perhaps, an “anxious, somatic depression subtype” may account for adolescent gender differences in depression.

In focusing on the specific influence of internalizing symptoms on academic performance, and the routes through which this relation is strengthened, Fröjd,
Repetti, and Ullman (2005) utilized a path analysis on 248 students over 4th, 5th, and 6th-grade to test a specific model of these linkages. In examining the consequences of peer acceptance, these investigators confirmed a model that less acceptance by peers predicts lower academic self-concept, which relates to higher internalizing symptoms (average score on 26 items that describe somatic complaints and withdrawn and anxious/depressed behaviors) and, consequently, to lower academic performance. Possibly the first of its kind, this study unveiled the unique internalizing symptoms that are followed by drops academic performance.

Following this line of thought, Hughes, Lourea-Waddell, and Kendall (2008) brought in the potential influences of such symptom specificity on academic performance. Utilizing a sample of 108 participants aged 8 to 14 years, these investigators examined differences between adolescents with severe, diagnosed anxiety disorder and a control sample from the community identified as “anxious”. Student and parent reports of somatic complaints, internalizing symptoms, and anxiety were developed and matched with teacher reports of academic performance. It was found that participants with anxiety disorders reported greater somatic complaints than participants from the community sample, and that greater somatic complaints predicted poorer academic performance, over and above both internalizing and anxiety symptoms.

Current Investigation

The present study sought to examine the specific impact of somatic symptoms on the relationship between more global, depressive symptoms and teacher-rated academic
engagement. The goal of this work is to further clarify the specific aspects of depressive symptoms that may lead to declines in academic performance, with the opportunity to evaluate how teacher reports of engagement in the classroom may reliably predict student reports of their own physical, and emotional, well being.

The present study asked the question: *How do physical symptoms mediate the relationship between student-reported depressive symptoms and teacher-rated academic engagement?* It was hypothesized that physical symptoms would partially mediate the relationship between depressive symptoms and academic engagement (see Figure 1).

![Conceptual model of mediation](image)

*Figure 1. Conceptual model of mediation.*

**Research Design and Method**

**Participants**

The sample for this study consists of approximately 6,000 students from three cohorts of ethnically diverse 6th-grade students in 26 urban middle schools. For ease of comparison, only students who are members of the four major pan-ethnic groups
(Black/African-American, East/Southeast Asian-American, White/European-American, and Latino/Mexican-American) were included in these analyses, making the current investigation sample 4,174 students. An approximately equal number of males and females are represented in this sample. The ethnic composition of this sample is 32% Latino/Mexican-American, 16% White/Caucasian, 13% Asian/Asian-American, and 12% Black/African/American. The present study is part of an ongoing, longitudinal study of the effects of ethnic diversity in middle schools on a variety of psychosocial and academic outcomes. Both student assent and parent consent were required for participation in the study.

School Selection

Twenty-six schools were selected for the larger, ongoing study. These schools span across several public school districts surrounding two urban areas in the same Western state. Schools were selected based on the goal of having a variety of ethnic compositions, as determined by calculation of Simpson’s diversity index (1949):

\[
D_s = 1 - \sum_{i=1}^{g} p_i^2
\]

where \( p \) is the proportion of students in the school who are in ethnic group \( i \). This proportion is squared \( (p_i^2) \), summed across \( g \) groups, and then subtracted from 1. \( D_s \) gives the probability that any two students randomly selected from a school will be from different ethnic groups. Values can range from 0 to approximately 1, where higher values indicate greater diversity (i.e., more ethnic groups that are relatively evenly represented, or a higher probability that two randomly selected students will be from different ethnic
groups). Figure 2 illustrates the calculation of $D_s$ at three levels of diversity.

Figure 2. Levels of diversity.

Data Collection

All data were collected in the form of a survey during the Fall semester of the students’ sixth-grade year. The present study utilized data from three cohorts, Cohort 1 first surveyed in the 2009-2010 academic year, Cohort 2 surveyed in the 2010-2011 academic year, and Cohort 3 surveyed in the 2011-2012 academic year. All measures were assembled into a survey booklet. All instructions and survey items were read aloud (by either a graduate or undergraduate student of Education or Psychology from the laboratories of the longitudinal study’s principal investigators) as students followed along and responded on their own surveys.

Data collection was conducted during school hours in classrooms of participating students, with their teacher present. The survey took approximately one hour to complete. Any students scheduled to participate who were absent on the day of administration were surveyed one week later. Each student was compensated with $5 upon survey completion. While students completed the survey, their teacher completed a one-page questionnaire for each student. Each questionnaire contained six-items assessing a teacher’s rating of a student’s academic engagement in the classroom, in addition to questions regarding behavior. Each teacher was compensated with two
dollars for each questionnaire completed for participating students.

Measures

**Ethnicity.** Students’ ethnicity was assessed by self-report, choosing one of the following ten options: (1) White/Caucasian; (2) Black/African American; (3) Black/other country of origin (e.g., Belize, Guyana); (4) Mexican/Mexican American; (5) Latino/other country of origin (e.g., Guatemala, El Salvador); (6) East Asian (e.g., Chinese, Korean, Japanese); (7) Southeast Asian (e.g., Vietnamese, Cambodian); (8) Pacific Islander (e.g., Samoan, Filipino); (9) Middle Eastern/South Asian (e.g., Persian, Indian); (10) Other/Multiethnic.

**Mental Health Predictors.** Depressive Symptoms were assessed using eight items from the Short Form of the Children’s Depression Inventory (CDI, Kovacs, 1992). Students report how often, during the past two weeks, they agreed with the given prompts (e.g., “I was bothered by things that don’t usually bother me”) on a scale from 1 (“Rarely or none of the time” [less than 1 day]) to 4 (“Almost all the time” [5-7 days]) ($\alpha = .67$).

Physical Symptoms were assessed with seven items from the Physical Symptoms checklist, adapted from Add Health (Udry & Bearman, 1998). Students rated how often, in the last two weeks, they had experienced headaches, stomachaches, dizziness, tiredness, nausea, changes in appetite, and troubles with sleep. Items were rated on a scale where 1 = “not at all”, 2 = “once or twice”, 3 = “a few times”, and 4 = “almost every day” ($\alpha = .78$).

**Academic Engagement.** Academic engagement was assessed using teacher ratings of student engagement in the classroom. This measure contains six items rated on 4-
point scales assessing students’ academic engagement (e.g., “In my class, this student pays attention”) on which a teacher will indicate whether an item applies to a student 1 = “never,” 2 = “sometimes”, 3 = “usually”, or 4 = “always” (α = .74). Student engagement in the classroom has been shown to relate highly to student academic performance (Benner & Graham, 2009).

*Multiple Regression*

Multiple regression was first used in order to determine whether depressive and physical symptoms significantly predict teacher-rated academic engagement, controlling for powerful demographic influences such as SES, gender, ethnicity, and school ethnic composition. Following this, linear regression was utilized to test the hypothesized mediational model of the indirect effect of depressive symptoms on engagement via physical symptoms. Procedures outlined by Preacher and Hayes (2004) were followed in conducting the regression analyses used in testing for mediational effects.

*Results*

*Descriptives*

Differences by gender and ethnicity were seen across depressive symptoms, physical symptoms, and teacher-rated academic engagement. These means and standard deviations are presented in Table 1.
Note: Column means for the four ethnic groups with different numerical superscripts were significantly different at \( p < .01 \)

Table 1. Means and standard deviations for depression, physical symptoms, and academic engagement by gender and ethnicity.

Overall, females reported greater depressive (\( t[1,4173] = 10.9, p < .05 \)) and physical symptoms (\( t[1,4173] = 60.4, p < .001 \)) than did males, but were rated as more academically engaged by their teachers (\( t[1,4173] = 197.9, p < .001 \)). In terms of the four pan-ethnic groups included in the sample, East/Southeast-Asian American and European-American/White students are rated the most, and comparably, academically engaged by their teachers, while African-American/Black students were rated as least academically engaged. Post-hoc Bonferroni comparisons revealed that each of the three ethnic minority groups reported more depressive symptoms than European-American/White students (\( F[3, 4171] = 6.7, p < .001 \)). African-American/Black students reported the most physical symptoms while the other three ethnic groups reported comparable levels of physical symptoms (\( F[3, 4171] = 5.645, p < .001 \)). On the outcome variable, academic engagement, all groups differed significantly from one another in how
they were rated by their teachers \( (F[3, 4171] = 60.6, \ p < .001) \).

Multiple Regression

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<th>Variable</th>
<th>( B )</th>
<th>( SE(B) )</th>
<th>( \beta )</th>
<th>( R )</th>
<th>( \Delta R^2 )</th>
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Notes: \( N = 4,174 \quad ** \ p < .01 \quad *** \ p < .001 \)

Table 2. Results of linear regression analysis for teacher-rated academic engagement.

Multiple regression was carried out in three steps (blocks) designed based on the mediational hypothesis to later be tested (see Table 2). The initial block first regressed teacher-rated academic engagement on student demographic characteristics (i.e. ethnicity,
gender, school ethnic composition, and family SES) on teacher-rated academic engagement. White males with parents whose highest level of education was a high-school diploma or GED served as the reference group for all comparisons. The results demonstrate that Black/African-American males are rated significantly lower on engagement than White/European-American males ($B = -.177$, $SE = .052$, $p < .001$) while East/Southeast Asian-American males are rated as significantly more engaged than white males ($B = .171$, $SE = .047$, $p < .001$). White females are rated as more academically engaged than white males ($B = .257$, $SE = .021$, $p < .001$). Percent-same ethnicity did not significantly predict engagement, though family SES did ($B = .025$, $SE = .008$, $p < .001$).

The following block controlled for these factors while testing student-reported depressive symptoms in predicting teacher ratings of academic engagement.

The second block revealed that, above and beyond these demographic influences, student-reported depressive symptoms significantly predict teacher-rated academic engagement ($B = -.073$, $SE = .02$, $p < .001$). In the third and final block, however, when physical symptoms were entered into the model, depressive symptoms no longer significantly predicted engagement ($B = -.002$, $SE = .02$, $ns$). Physical symptoms, instead, significantly predicted teacher-rated engagement even after controlling for each demographic influence and student-reported depressive symptoms ($B = -.120$, $SE = .02$, $p < .001$). That depressive symptoms no longer significantly predicted engagement once physical symptoms were included in the model indicates that depressive symptoms may influence academic engagement by way of level of physical symptoms.
**Mediational Analyses**

Following Preacher and Hayes (2004), three regressions were carried out in order to test for a significant indirect effect of depressive symptoms on academic engagement (see Figure 3). First, physical symptoms were regressed on depressive symptoms ($B = .62, SE = .55, p < .001$). Next, academic engagement was regressed on physical symptoms while controlling for depressive symptoms ($B = -.10, SE = .02, p < .001$). Finally, academic engagement was regressed on depressive symptoms ($B = -.09, SE = .02, p < .001$). A Sobel test indicated that this indirect effect of depressive symptoms on engagement via physical symptoms is significant ($t = -5.02, SE = .01, p < .001$). 67.8% of the influence of depressive symptoms on academic engagement is accounted for by student-reported physical symptoms.

![Diagram](image)

*Figure 3. Mediational model of the significant indirect effect of depression on academic engagement via physical symptoms.*

**Discussion**

This investigation sought to demonstrate that a major component of the influence of depression on classroom performance is a student’s physical well being. The importance of students’ reports of somatic complaints is evidenced in its impact on the
relationship between their reports of depressive symptoms and their teachers’ assessments of their performance/engagement in the classroom, as these complaints account for more than 2/3 of how their level of depressed mood relates to how their teachers view their participation in the classroom. This contributes to extant literature about the relationship between student emotional health and classroom performance as it has, for the most part, been focused on student-reported mood. Physical symptoms have been treated as one correlate of both depression and engagement, but it has yet to be considered an integral part in just how a student’s mood translates into observable classroom performance. Given that health complaints can keep students at home and out of the classroom, it is important that a student’s emotional life be recognized by parents and school staff if a student’s physical health seems to be taking a toll on his academic performance.

While it is known that teacher-rated engagement in the classroom is highly related to measured academic performance (e.g. grades, test scores, etc.), it would do well to compare the current mediational model with one that explores an indirect effect of depressive symptoms on measured achievement via physical symptoms. If this indirect effect is even stronger, perhaps GPA and test performance, which are already highly monitored, may be a simple way to examine how a student’s physical health (perhaps as evidenced by records of school absences) may inform how her mood might be influencing her achievement. It is an important next step to compare this mediational model for the strength of depressed mood’s influence via physical complaints on classroom
engagement vs. actual achievement since the former tends to be suffered “silently” while the latter is more observable to bystanders.

This study, however, has several limitations that must be considered. Firstly, the data were collected at only one time point, so causal inferences of order or directionality remain speculative. Because the larger, over-arching investigation is longitudinal, however, the next step will be testing this mediational relationship across the four available time-points. Perhaps a stronger case may then be made for the importance of symptoms of somatization on classroom engagement, over and above symptoms of depression.

In addition, the influence of demographic characteristics on the model as a whole was not explored in the present analyses. There is a large literature on the differential influences of a student’s gender, ethnicity, and socioeconomic background on the relationship between their emotional well being and their ability to engage in school. Ideally, a moderated mediational model would be proposed in which each of these individual factors could be examined independently and in combination with one another. Moreover, given the strong relationships demonstrated in extant research among victimization, depression, somatization, and school performance (e.g., Juvonen & Graham, 2001), victim-status may be an individual-level factor that ought to be considered in future path models.

Lastly, the nesting of students within school needs to be considered. The current sample spans 26 school of varying types (charter, magnet, public), so it is more than likely that observations are not truly independent of one another. In the next step of
analyses, multilevel modeling should be utilized in order to examine any school-level influences on this relationship between depressive symptoms, physical symptoms, and teacher-rated academic engagement. Then, perhaps, the argument can be strengthened for the need for the return of nurses and health services in many of our nation’s schools.

Implications

This literature has thus far been focused on what influences and/or interacts with a student’s mood to hurt his or her engagement in class. Physical symptoms, in the internalizing literature, have almost exclusively been treated as a comorbid occurrence with depressive symptoms in relation to impact on academics. The findings from the present investigation, however, imply that depressive symptoms may be most detrimental to performance once somaticized. In addition, these physical complaints (e.g. concentration, attention) seem to parallel teacher perceptions within the same student (e.g. pays attention, concentrates).

More specifically, if a student is feeling emotionally compromised, this may not be readily evident to his or her teacher. It seems that when a student is feeling emotionally compromised to the point that s/he is feeling it in the effects of poor sleep and pain, his or her perceived engagement in the classroom by a teacher appears diminished. If a student is feeling both depressive and physical symptoms, s/he is reporting trouble with concentration, attention, focus, feeling like everything “is an effort” etc. If a teacher feels that a student is not as engaged as s/he should be, that teacher is reporting that the student is not concentrating, paying attention, putting forth appropriate effort, etc. as well as s/he ought to be.
If this reporting by student and teacher is, in fact, parallel, then the implications for recognition and intervention on the part of a teacher are several. If teachers are well able to determine which students are paying attention poorly, not trying as hard as they are perceived to be capable, etc., it follows that teachers may, in fact, be the most valuable, first line of defense in recognizing which students are feeling their emotional pain turn into physical. Given that these same physical symptoms are the same as those often reported by victims of bullying (Juvonen, Graham, & Schuster, 2003), teachers might be capable of recognizing the effects of the escalation of peer and other social difficulties, before these difficulties have ever been explicitly brought to teachers’ attention by students, their parents, or their peers.

Once recognized, students who are “silently” suffering may then be assisted by those school and district personnel who are trained to help students in such need. In addition, parents may then be informed of situations their children are experiencing at school of which they were previously unaware. Children and adolescents are in school more than six hours per day, so if those adults with whom they spend that time have the capability of identifying academically debilitating, though most often soundless, challenges, perhaps early intervention can prevent some of the long-term effects of adolescents’ prolonged emotional and physical pain, including escalating declines in academic performance.
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