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Exploring Psychosocial Mechanisms and Interactions: Links Between Adolescent Emotional Distress, School Connectedness, and Educational Achievement

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Abstract

Internalizing mental health issues are a significant developmental and clinical concern during adolescence, but rarely identified as a problem among school staff. Using data from the National Longitudinal Study of Adolescent Health, this study examined the associations between adolescent emotional distress, school connectedness, and educational achievement by exploring potential mechanistic and interactive roles of perceived school connectedness on the emotion–education association. Emotional distress was negatively associated with adolescents' perceptions of belonging to school, which, in turn, may negatively influence educational achievement. School connectedness also had both additive and multiplicative interaction effects on the emotion–education relationship. Results support previous evidence of school connectedness as a protective factor for adolescents with internalizing mental health concerns, although much of the work to date has focused on externalizing problems. This study informs our understanding of how, why, and for whom emotional problems influence educational outcomes in light of social support in the school context.

Keywords

Adolescent; Mental health; Emotional distress; Depression; School connectedness; School climate; Educational achievement

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Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest. The contents of this manuscript are consistent with the APA Ethical Principles of Psychologists and Code of Conduct pertaining to Research and Publication (APA Standard 8). The researchers signed an agreement, in accordance with Add Health regulations to utilize the contractual data set purchased by university faculty. The University's Internal Review Board (IRB) approved the use of this contractual data set provided that the handling and storing of sensitive data be kept confidential. Additional information regarding the Add Health Study (including informed consent) can be found at the National Longitudinal Study of Adolescent Health (Harris, 2008) Web site at <http://www.cpc.unc.edu/projects/addhealth/design>.

Introduction

Adolescence is a time characterized by significant developmental changes and contextual transitions, particularly those psychosocial (psychological and social) in nature. Given the significance of schools as a social context, researchers over the past decade have increasingly acknowledged the importance of psychosocial variables like emotional distress and school connectedness as risk, protective, and promotive factors for youth (CDC, 2009; Furlong, O'Brennan, & You, 2011; McNeely, Nonnemaker, & Blum, 2002; Resnick et al., 1997; SAMHSA, 2008). Emotional distress in particular is a significant developmental and clinical concern (Cicchetti & Toth, 1998; SAMHSA, 2008) in schools, as internalizing symptoms often go unnoticed by school personnel (Bradshaw, Buckley, & Ialongo, 2008) and frequently result in longer-term adjustment, educational, and mental health concerns if left untreated (Best, Hauser, Gralinski-Bakker, Allen, & Crowell, 2004; Fletcher, 2008; SAMHSA, 2008; Wilcox-Gok et al., 2004). In addition, a malleable sense of connectedness emerges during this time, leaving adolescents susceptible to both positive and negative influences (Goodenow, 1993), like emotional wellness or distress. Although emotional distress and a sense of belonging have both been associated with educational achievement (Anderman, 2002; Cicchetti & Toth, 1998; Fletcher, 2008; SAMHSA, 2008), the associations between educational outcomes and psychosocial variables in the context of schools remain unclear.

This study used longitudinal data to examine associations between emotional distress during early/mid-adolescence and educational outcomes in late adolescence/early adulthood, and the potential mitigating and mechanistic influences of perceived social connection and support in school. This work informs developmental research and prevention science in that we identify potential risks, buffers, and protective factors (Resnick, Harris, & Blum, 1993; Resnick et al., 1997) related to the individual student and their perception of the school context, particularly in light of the developmental nature of these associations.

Adolescent Development and Developmental Social Contexts: Risk and Protection

Role of Mental Health

Psychosocial development is especially important during adolescence, as teens are making important decisions—often with long-term consequences—regarding a variety of issues such as career/vocation and continued education. Adolescents' emotions and perceptions influence these decisions along with the interactions they have with adults and peers in multiple contexts, including schools. Although many adolescents manifest a healthy sense of self, a growing number develop in a maladjusted or pathological manner as they emerge into adulthood (SAMHSA, 2008). Thus, this transition can serve as a vulnerable stage for mental health concerns like emotional distress. In fact, about 50 % of mental health problems diagnosed in adulthood begin by early/mid-adolescence (Kessler et al., 2005).

Emotional Distress—Emotional distress refers to a variety of affective, cognitive, and somatic symptoms of depression (Radloff, 1977; Resnick et al., 1997). Studies indicate that

20–25 % of adolescents experience symptoms of emotional distress and about 10 % have moderate to severe symptomatology, with depression among the most common disorders in adolescence (SAMHSA, 2008). Approximately 20–30 % of teens have at least one major depressive episode (APA, 2000; Rushton, Forcier, & Schectman, 2002) and about 25 % of adults with mood disorders, such as depression, first experienced symptoms in early to mid-adolescence (NIMH, 2002; SAMHSA, 2008). Furthermore, rates of adolescent depressive symptoms tend to be higher among girls (Rushton et al., 2002; Seeley, Stice, & Rohde, 2009). Overall, student mental health is associated with a variety of developmental outcomes (Ialongo, Edelson, & Kellam, 2001; Roeser, Eccles, & Sameroff, 1998) including educational attainment and academic achievement (US Government Accountability Office, 2008) as well as suspension, expulsion, and credit deficiency (Gregory, Skiba, & Norguera, 2010; Kang-Yi, Mandell, & Hadley, 2013; Krezmien, Leone, & Achilles, 2006). Specifically, depression is linked with educational attainment (Fletcher, 2008) and reduced academic achievement and increased school suspensions (CDC, 2016).

Since schools have a primary responsibility to socialize and educate youth, they are ideal contexts for efforts intended to buffer risk factors (e.g., emotional distress) by supporting students. Previous research has placed much emphasis on individual (e.g., biological), family, and neighborhood factors, including mediating and moderating effects in relation to mental health factors (Fergusson & Woodard, 2002; Fletcher, 2008; Goodman, Huang, Wade, & Kahn, 2003; Henrich, Brookmeyer, & Shahar, 2005; Reinke & Herman, 2002; Rushton et al., 2002), but there has been less focus on the school context.

Role of Schools

While remarkable changes of the self are transpiring, simultaneously these shifts are occurring as adolescents interact with their evolving environments. There are key ecological changes in social contexts that are particularly evident during adolescence. For example, teens' educational experiences rapidly shift as they transition from elementary school to middle/junior high school, to high school and to work/college, with subsequent academic changes to curriculum structure, classroom expectations, and relationships with peers and teachers (Eccles, Lord, Roeser, Barber, & Jozefowicz, 1997). These relationships transform, as adolescents tend to grow more autonomous from caregivers and closer to peers and may seek support from other adults outside of the family (Roeser et al., 1998). Reciprocal processes of bonding with and supporting others lead to "feelings" (or a sense) of belonging—one of the strongest fundamental human needs (Bowlby, 1988). Thus, the way an adolescent *perceives* social connections and support in school environments can have a powerful impact on development and achievement, positively and/or negatively. Moreover, teens' emerging sense of belonging is malleable during this time and quite susceptible to both positive and negative influences (Goodenow, 1993), like emotional wellness or distress. Thus, meeting teens' need for belonging in schools becomes increasingly important during early/mid-adolescence. Furthermore, schools are a potential source of problems that can lead to emotional concerns due to bullying and other negative interactions. Nonetheless, as resiliency research suggests, supportive social relationships can play a major protective role in buffering the effects of adverse circumstances (Maddox & Prinz, 2003; Osterman, 2000; Rutter, 1987), such as emotional distress. In fact, there is growing interest in various facets

of school climate (CDC, 2009), including school connectedness, which is emerging as an important protective factor (Resnick et al., 1997).

School Connectedness—While the notion of belonging to school originated from the school dropout literature, various descriptions currently exist and include terms like connectedness, supportive relationships, school bonding, and academic engagement. Interest in school connectedness, specifically, emerged from studies involving data from the National Longitudinal Study of Adolescent Health (Add Health; Furlong et al., 2011). Studies derived from Add Health data vary in their use of items for the school connectedness scale, typically utilizing 5–8 items (see Furlong et al., 2011). There has been a lack of agreement regarding the terminology to operationalize and measure school connectedness. However, emerging research indicates that school connectedness includes supportive adults who are dedicated and attentive in the school setting; belonging to a positive, stable peer group; commitment to education among school staff; and safe and supportive psychosocial climate at school (CDC, 2009). Several studies have identified school connectedness as a critical protective factor, indicating associations with mental health and well-being (Anderman, 2002; Resnick et al., 1993; Shochet, Dadds, Ham, & Montague, 2006) and educational achievement including school performance/grades (Anderman & Freeman, 2004; CDC, 2009; Resnick et al., 1997), dropout (Goodenow, 1993), educational attainment (CDC, 2009), academic motivation (Danielsen, Wium, Wilhelmsen, & Wold, 2010), and academic achievement/test scores (CDC, 2009; Elias & Haynes, 2008). However, there has been considerably less research examining the role of school connectedness in relation to internalizing mental health problems (e.g., emotional distress or depression) and educational achievement, particularly its potential interactive and process-oriented role.

Exploring Mechanisms and Interactions

Although the associations among mental health, educational achievement, and school connectedness have been well documented, less is known about the pathways linking adolescent emotional distress and later educational outcomes. Further, while school connectedness has been shown to act as a protective factor against various negative outcomes (Brookmeyer, Fanti, & Henrich, 2006; Goodman et al., 2003; Henrich et al., 2005; Reinke & Herman, 2002), less is known about the relationships between internalizing/emotional problems, school connectedness, and educational achievement. Better understanding of the school-related factors through which emotional symptoms exert their effects on educational outcomes (mediation) and those that modify the effects of emotion on education (moderation) could begin to clarify the complex nature of adolescent development, psychopathology, and achievement, and help inform individual and systems-level preventive intervention efforts.

As previously mentioned, resiliency research suggests that supportive social relationships can play a major protective role in buffering the effects of adverse circumstances (Maddox & Prinz, 2003; Osterman, 2000; Rutter, 1987) such as emotional distress, thus supporting the case to examine school connectedness as a potential mediating and/or moderating factor. Both theory and research support examining school connectedness as a mediator and a moderator. For example, as aforementioned, numerous studies have used school

connectedness as a moderator with various predictor and outcome variables—suggesting that it may act as a buffer or protective factor, thereby increasing our understanding of relations between important predictors like emotional distress and outcomes like educational achievement. While moderators establish “when” or “for whom” a predictor is more strongly related to an outcome, mediators address “how” or “why” a variable predicts an outcome (Barron & Kenny, 1986). Thus, since we know that emotional distress is related to school connectedness and because school connectedness is associated with educational achievement, an investigation into the relationship among these variables is necessary. In fact, it may be that emotional distress leads to school connectedness and that this then leads to educational achievement. Furthermore, if school connectedness is added to the model, it might serve a protective or buffering function. Thus, the magnitude of the emotion–education association would be attenuated for increasing levels of school connectedness. A final clarification needed when examining protective effects is the type of moderation/interaction. For example, effects of school connectedness—operating at both high- and low-risk levels of emotional distress—might simply be characterized as “protective.” However, as Luthar, Cicchetti, and Becker (2000) discuss, such effects may be distinguished by using labels such as “protective-stabilizing” and “protective-enhancing”.

Furthermore, although studies have documented the mediating and moderating effects of school connectedness on relationships between various individual/familial factors and violence (Brookmeyer et al., 2006; Goodman et al., 2003; Henrich et al., 2005; Reinke & Herman, 2002), few have examined this influence on the relationship between internalizing mental health and education. Therefore, a critical question to answer is the nature and extent to which school-related factors intervene and/or strengthen/weaken the internalizing mental health–education relationship. Additionally, most studies have used cross-sectional data in order to assess the relationship between mental health factors, school factors, and educational outcomes. Thus, the effects of any one of these factors on another cannot be separated, indicating a need for longitudinal examination. Altogether, understanding the mechanisms and interactions of multiple factors and system capacities requires a comprehensive, integrative, and flexible conceptual framework with corresponding methods.

Overview of the Current Study

Grounded in ecological (Bronfenbrenner & Morris, 1998) and developmental systems perspectives (Lerner, 1991; Lerner, Lerner, De Stefanis, & Apfel, 2001), this study addresses gaps in our understanding of *how*, *why*, and *for whom* individual psychopathology (i.e., emotional distress) influences educational outcomes in light of perceptions of the school context over time. These frameworks emphasize the role of developmental processes, the significance of context, and the influence of multiple and interacting processes and interactions on development—both adaptive and maladaptive. Furthermore, these perspectives are helpful in addressing the multifaceted aspects of psychosocial issues taking into account that adolescent development uniquely occurs not only in a school context, but also during a time when significant individual changes are occurring within the person. Similarly, there are also significant changes occurring within the school context, and these youth- and school-level components are simultaneously evolving and interacting with each other. Finally, these perspectives provide information regarding buffering effects and

protective (preventive) factors, expand recognition of the relevance of environments in adolescent research, and broaden intervention options. Altogether, a growing body of research documents the associations among emotional distress, school connectedness, and educational achievement, yet little is known about the mediating and moderating functions of school connectedness—that is of *how*, *why*, and *for whom* emotional distress influences educational achievement in light of school connectedness.

Utilizing two waves of longitudinal data, we aimed to extend knowledge and build upon previous research regarding the associations between adolescent emotional distress, school connectedness, and educational achievement (school performance, educational attainment) by exploring potential mechanistic and interactive roles of perceived school connectedness on the emotion–education association. Specifically, the current study examined two lines of inquiry, as illustrated in an integrated conceptual model (see Fig. 1). We posited that school connectedness might function as a moderator and/or mediator (Baron & Kenny, 1986). For example, school connectedness could be conceptualized as a moderator of the relation between emotional distress and educational achievement; this could be the case, as evidence suggests that emotional distress might be differentially influential for individuals with high or low perceived connectedness to school. School connectedness could also be conceptualized as a mediator of the relation between emotional distress and educational achievement, as evidence suggests that the reason emotional distress is influential is that it decreases perceived connection to school. Hence, the same variable like school connectedness could be cast as a moderator and/or a mediator; thus, exploration of this variable is necessary.

Specifically, we hypothesized a negative association between emotional distress in early/mid-adolescence and educational achievement in late adolescence/young adulthood (i.e., risk), and explored a potential pathway between these variables, anticipating that perceived school connectedness would mediate the emotion–education relationship. We then investigated potential moderating effects, exploring whether perceived school connectedness added to or interacted with emotional distress in early/mid-adolescence to predict later educational achievement (i.e., protection or buffer). Given a long line of research documenting sociodemographic influences (i.e., differences in mental health problems like emotional distress; Rushton et al., 2002; Seeley et al., 2009), we included them as covariates in all analyses. Overall, refining our understanding of the associations among emotional distress, school connectedness, and educational outcomes will contribute to the empirical foundation necessary for the design and implementation of school-based preventive interventions targeting psychosocial factors and educational outcomes.

Methods

Data

Data for the study come from the National Longitudinal Study of Adolescent Health (Add Health; Harris, 2008),¹ which used a multistage probability sample design, resulting in a

¹Information regarding the Add Health Study (population, sample design, instrument, data collection) can be found at the National Longitudinal Study of Adolescent Health (Harris, 2008) Web site at <http://www.cpc.unc.edu/projects/addhealth/design>.

nationally representative survey of adolescents in grades 7 through 12 and followed into young adulthood. Three waves of survey data were collected from 1994 to 2001 consisting of vast information pertaining to contextual factors associated with adolescent development, health, and related behaviors. The current study utilized survey data from two of these waves: Wave I (1994–1995; students grades 7–12) and Wave III (2001–2002; older adolescents/young adults). Wave I instruments included the In-School Questionnaire (students), In-Home Questionnaire (parents), and In-Home Interview (adolescents); Wave III included the In-Home Interview. School records were also collected linking school performance data across all waves. There was parental consent and youth assent for Wave I and adolescent/young adult consent for Wave III.

In order to adjust for stratification and oversampling of underrepresented groups, the original Wave I In-Home weighted sample ($n = 18,924$) was utilized. The sample was then restricted to participants ages 13 through 16 because individuals with a depressive disorder begin to experience significant emotional distress symptoms early in adolescence, with various epidemiological studies reporting mean ages of onset in early to mid-adolescence (NIMH, 2002; SAMHSA, 2008). As a result, there were 7276 adolescents (with sampling weights). The mean age of students (13–16 years) for the current study was 14.71 years ($SD = 1.09$) at Wave I (approximately 21.7 years old at Wave III). The majority of adolescents were female (54.3 %; 45.7 % male) and White (60.1 %; 20 % Black; 12 % other/multiracial; 6 % Asian/Pacific Islander; 1 % Native American). On average, adolescents attained 13 years of school ($SD = 1.83$) at Wave III with an average school performance score (cumulative GPA across 3 waves) of 2.56 on a 4-point scale.

Measures

As described below, we analyzed self-report measures, school records, and parent reports. See Table 1 for scale descriptives.

Educational Achievement—We used two measures of educational achievement: (1) *school performance*—cumulative grade point average (GPA) on a 0–4 point scale across all waves (ascertained at Wave III from school transcripts as reported in the supplemental Add Health Education data [i.e., not self-reported data]) and (2) *educational attainment*—total number of school years completed (6–18 years) at Wave III. These are independent scales for analytic purposes, but are referred to collectively throughout this manuscript when appropriate.

Emotional Distress—Consistent with previous research demonstrating reliability and validity (Fletcher, 2008; Goodman et al., 2003; Longmore, Manning, Giordano, & Rudolph, 2004; Resnick et al., 1997), a modified version of the Center for Epidemiologic Studies-Depression Scale (CES-D; Radloff, 1977) was used to elicit affective, cognitive, and somatic symptoms of depression. The CES-D correlates highly with other scales measuring depressive symptoms (Longmore et al., 2004), distinguishing between individuals with clinical depression and those of nonclinical classification. Nine frequency rating items (4-point scale) from Add Health's Wave I "Feelings" Scale demonstrated good internal consistency ($\alpha = .80$) in the current study (for validated cutoff values for the modified scale,

see Santor & Coyne, 1997). Items were coded so that higher scores reflect a greater degree of emotional distress. Specifically, respondents were asked how often during the last week each of the following was true: “You were bothered by things that usually don’t bother you,” “You felt that you could not shake off the blues, even with help from your family and your friends,” “You felt that you were just as good as other people,” “You had trouble keeping your mind on what you were doing,” “You felt depressed,” “You felt that you were too tired to do things,” “You enjoyed life,” “You felt sad,” and “You felt that people disliked you.”

School Connectedness—As previously described, a variety of definitions regarding the concept of school connectedness have been operationalized in the research literature. Consistent with prior Add Health studies (e.g., McNeely et al., 2002; Resnick et al., 1997) and similar to school climate (and related) research (see Furlong et al., 2011; Waters & Cross, 2010), we used a combination of items from Add Health’s “Academics and Education” and “Personality and Family” scales (Wave I). The 7-item school connectedness scale (5-point Likert scale) demonstrated good internal consistency ($\alpha = .78$) in the current study. Items were coded so that higher scores indicated greater connectedness to school. Specifically, three items pertained to measures of social belongingness derived from Bollen and Hoyle (1990). Respondents were asked how much they agreed or disagreed to the following items: “You feel close to people at school,” “You feel like you are a part of your school,” and “You are happy to be at your school.” Another three items pertained to students’ perceptions of their teachers including: “Teachers at your school treat students fairly,” “Since school started this year, have you had trouble getting along with your teachers,” and “How much do you feel that your teacher cares about you?” As with previous studies (McNeely, 2003; McNeely et al., 2002; Resnick et al., 1997), a final question pertained to students’ views of school safety. Respondents were asked how much they agree or disagree with the statement: “You feel safe in your school.”

Covariates—We included select sociodemographic variables in the models to adjust for the potential influence on the outcomes of interest. As noted above, females tend to display more emotional/internalizing or depressive symptoms than males (NIMH, 2002; SAMHSA, 2008), particularly in adolescence (Rushton et al., 2002; Seeley et al., 2009). Additionally, both racial/ethnic minority status and low socioeconomic status² have been associated with lower levels of educational attainment and higher rates of mental health problems (NIMH, 2002; SAMHSA, 2008). Controlling for adolescents’ age at Wave I was particularly important given the range of ages (13–16 years) and potential cohort effects, as we would not expect younger students to have completed as many years of school as older students.

Overview of Analyses

Descriptive data and correlations were examined first to explore study scales and relationships among variables (see Table 1). All analyses were conducted using *Stata* 12, which adjusts estimates to account for complex survey designs. Prior to imputation and regression analyses (described below), all continuous predictor variables (including

²SES is a combination of household income and mothers and fathers level of education.

mediator, moderator and covariates) were centered at zero to prevent multicollinearity. Dichotomous variables (sex, race) were dummy coded as 0 or 1 (for race: white/nonwhite).

Missing Data

Because the data set was longitudinal in nature, some participant data were missing at subsequent waves due to attrition. At Wave I, less than 1 % of the data were missing for the predictor variables ([emotional distress: $n = 7259$ pre-imputation; $n = 7276$ post-imputation]; [school connectedness: $n = 7232$ pre-imputation; $n = 7276$ post-imputation]). Data for the educational outcome variables were missing approximately 18 % for the school performance (GPA) variable ($N = 5931$ pre-imputation; $n = 7276$ post-imputation) and less than 1 % for the attainment (years of school completed) variable ($n = 7262$ pre-imputation; $n = 7276$ post-imputation). Possible sources of missing educational data include alternative grading systems, school suspensions/expulsions, dropout, graduation, and attrition. Nonetheless, methods to account for missing data were employed using multiple imputation.

Because listwise deletion methods can create an unacceptable level of bias into the sample (see Enders, 2006), multiple imputation with chained equations was used in order to correct for the remaining missing values on survey items and school data. This allowed for the statistical estimation of the data, hypothesis testing, and comparison of group differences (Rubin, 1987). The missing responses were averaged across five imputations; thus, the final data set for regressions is simply an estimation of information passed by the observed data. Regression results are presented for both the multiply imputed and non-imputed data as a form of sensitivity analysis, but narrative findings are reported using only multiply imputed data ($N = 7276$).

It should be noted that preliminary analyses include Wave II predictor variables (emotional distress and school connectedness); however, these analyses were not included in subsequent analyses due to inconsistent findings across the five imputed data sets when school connectedness was a predictor and outcome. Parameter estimates rebounded from positive to negative across the five imputed data sets for analyses involving the Wave II school connectedness variable, while Wave I correlations and regressions were consistent across imputed data sets. Thorough re-examination of the data for coding errors was conducted as well as analyses rerun; however, the findings remained the same. Therefore, while procedures to account for missing data were employed to estimate subsequent waves of missing data, the large variance among the multiply imputed data sets for the school connectedness variable made the variable unstable for use in a regression analysis. As a result, only Wave I predictors are used in the subsequent analyses for outcomes at Wave III.

Regression Models—We then conducted a series of regression analyses to determine main effects of emotional distress and school connectedness on educational achievement, and the potential causal pathways were explored as mediation effects following procedures used by Preacher and Hayes (2004), originating from the work of Baron and Kenny (1986). The model is illustrated in Fig. 2, and the steps for estimating the “total” (path c), “main” (paths a & b), “direct” (path c’), and “indirect” (paths ab) effects are included in the figure notes. Mediation tests were conducted using the *Stata* command, *sgmediation* (Ender, 2010),

which uses bootstrap³ analyses to estimate the indirect effect of emotional distress on educational outcomes through school connectedness. We then specified a post-estimation command to produce bias-corrected confidence intervals for the indirect effect.

To demonstrate potential moderating interactions using multiple regression, main, additive, and multiplicative interaction models were analyzed (see Fig. 3 for models, steps, and equations). Main effects were analyzed by regressing both educational outcomes independently on emotional distress, while “additive” effects were examined by regressing education on both emotional distress and school connectedness simultaneously. In order to test the interaction, a new variable was created consisting of the 2-way product of the centered predictor variables (emotional distress \times school connectedness). This interaction term was then included in the regression as a third predictor alongside its component predictor (emotional distress) and moderator (school connectedness) variables to test the “multiplicative” interaction effect on the two educational outcome variables. We graphed the effects for further interpretation of findings when the interaction term significantly added new variance to the model. Although not traditional, in order to reflect nuances in the data, with particular emphasis on adolescent scores “in the margins” (very high and very low school connectedness; ± 2 SD), we plotted a broad range of school connectedness scores including ± 1 SD and ± 2 SD. From a practitioner standpoint, it is important to examine students who fall in these ranges to both examine those with more significant needs or at higher risk (who often do not receive adequate support) as well as explore those with significant protective factors that prevent problems and promote health and well-being.

Results

Descriptives

Emotional distress scores were slightly skewed in a positive direction indicating that most adolescents were not experiencing clinically significant distress based on estimated CES-D cutoff scores ($M_{\text{items}} = 0.64$, $SD = 0.47$; 0–3 scale) (see Table 1). The average school connectedness scores suggested that most students felt connected to their school ($M_{\text{items}} = 3.75$, $SD = 0.67$; 1–5 scale). Significant correlations ($p < .01$) were evident between study variables, suggesting that emotional distress, school connectedness, school performance, and educational attainment are interrelated.

Mediation

The mediation analyses (see Table 2) included a series of three distinct regression models for each educational outcome independently (broken down to 4 steps). These “mechanism” analyses⁴ indicated that emotional distress predicted lower levels of educational achievement overall (path c: school performance [$\beta = -0.38$, $SE = 0.03$, $p < .001$]; educational attainment [$\beta = -0.58$, $SE = 0.06$, $p < .001$]), as well as a lower degree of

³Bootstrapping involves resampling in order to make inferences about the population rather than assumptions about the distribution of the population (Lockwood & Mackinnon, 1998; Preacher & Hayes, 2004). Thus, the assumption of normality is not required.

⁴It should be noted that the signs between the variables are inconsistent, that is, there is a negative relationship between emotional distress and both school connectedness and educational achievement, while there is a positive relationship between school connectedness and educational achievement. This could appear to lead to inconclusive results; however, when calculating the effect of an inconsistent mediational model, the absolute values are used in the Sobel test.

perceived school connectedness (path a: $\beta = -0.56$, $SE = 0.03$, $p = .001$). Additionally, school connectedness predicted higher levels of educational outcomes after controlling for emotional distress (path b: school performance [$\beta = 0.23$, $SE = 0.02$, $p = .001$]; educational attainment [$\beta = 0.39$, $SE = .04$, $p = .001$]), whereas emotional distress predicted lower levels of educational outcomes with school connectedness included in the model (path c': school performance [$\beta = -0.25$, $SE = .03$]; educational attainment [$\beta = -0.36$, $SE = .06$, $p = .001$]). Overall, the indirect effect (paths ab) of school connectedness on the emotional distress–educational achievement relationship was significant for both school performance ($\beta = -0.13$, $SE = .01$, bias-corrected 95 % CI -0.15 , -0.10) and educational attainment ($\beta = -0.22$, $SE = .03$, bias-corrected 95 % CI -0.27 , -0.17). Altogether, the proportion of the total effect of emotional distress on educational achievement mediated by school connectedness (paths ab/c) was .35 for school performance and .39 for educational attainment. This indicates that school connectedness mediated 35 % of the total effect of emotional distress on school performance and approximately 40 % on educational attainment. Altogether, findings support partial mediation given that the c' paths remained significant for the associations between emotional distress and educational achievement.

Moderation

Moderation analyses indicated that emotional distress accounted for 20 % of the variance in school performance and 16 % of the variance in educational attainment (Table 3). The negative coefficient (Model 1/ b_1) suggests that adolescents who reported higher levels of emotional distress also reported lower levels of educational attainment and diminished school performance. The “additive” effects estimates suggest that school connectedness and emotional distress together accounted for 22 % of the variance in school performance and 17 % of the variance in educational attainment. When school connectedness was added to the model, it attenuated the negative influence on both educational outcomes, indicating that adolescents' perceptions of school connection may contribute to the effects of emotional distress on educational achievement. The positive coefficient (Model 2/ b_2) suggested that higher connectedness was associated with higher levels of educational achievement.

For the multiplicative model, emotional distress, school connectedness, and the interaction term accounted for 23 % of the variance in school performance and 18 % in educational attainment. The regression coefficient of the interaction term was significant for school performance ($\beta = -0.13$, $SE = 0.04$, $p = .001$) as well as educational attainment ($\beta = -0.13$, $SE = 0.06$, $p = .05$), suggesting that school connectedness moderated the relationship between emotional distress and educational outcomes. We then calculated estimates for educational outcomes for the range of possible scores representing values on the centered emotional distress scale (± 1.5 from the scale mean), derived from the original 0–3 frequency rating scale, and computed a range of values to illustrate influences at varying degrees of school connectedness. Figure 4a, b illustrates the main effect of emotional distress along the x-axis; the moderating school connectedness variable is represented by five lines depicting a range of computed values (at mean, $\pm 1SD$ and $\pm 2SD$) from “very low” to “very high.”

Generally, school connectedness significantly moderated the emotional distress–educational achievement relationship, particularly for students with lower risk (emotional distress).

Nonetheless, as seen by small increments in R^2 and the small partial correlations (see Table 3), it appears that this interaction may not significantly add to the model, except when school connectedness is very high. As illustrated in Fig. 4a, b, 2-way interactions revealed how the emotion–education relationship varied by levels of school connectedness. It appears that the emotional distress–*school performance* relationship was strongest in the case of average to very high school connectedness and low risk (emotional distress) while weakest for high risk (emotional distress). The emotional distress–*educational attainment* association was strongest when connectedness to school was very high and risk (emotional distress) was low. Adolescents experiencing various levels of school connectedness did not substantially differ in school performance under conditions of high emotional distress, but did for educational attainment. Differences were noted with increasing degree under conditions of high and average levels of connectedness and notably under low distress. Overall, youth reporting higher levels of connectedness attained higher levels of education and performed better in school than individuals reporting lower levels of school connectedness, particularly when risk (emotional distress) was average or low.

Discussion

The current study aimed to examine the relationship between education and internalizing depressive symptoms longitudinally, while exploring both individual and contextual variables as well as risk and protective factors. Building on previous research, we provided additional support for ongoing school mental health efforts aimed at removing barriers to learning and promoting positive development (Adelman & Taylor, 2000, 2007; Weist, 2008). Our results indicated that when adolescents felt connected to their schools, they earned higher grades and completed more years of school, an effect consistent with previous research (Resnick et al., 1997). This finding is important in light of existing evidence that emotionally distressed adolescents felt less connected to their school, earned lower grades in school, and completed less years of school than their emotionally healthier counterparts (Anderman, 2002; Fletcher, 2008), indicating mental health as a risk factor for later educational outcomes.

Our findings also suggest that adolescent perceptions of school connectedness may be mechanisms through which emotional distress influences both educational attainment and school performance (partial mediation). Thus, being an emotionally distressed adolescent may negatively affect sense of connectedness, which, in turn, may negatively influence educational achievement. This is consistent with conceptual notions of emotional concerns which often involve loss of interest in social activities as well as social withdrawal.

This study further suggested that adolescents' perceptions of school connectedness might contribute to the effects of emotional distress on educational achievement (moderation), thereby serving a protective or buffering function. Overall, the findings generally suggest that as school connectedness increases, the levels of educational attainment and school performance increase across levels of risk (emotional distress). However, the findings illustrate that school connectedness demonstrates the strongest effect at low levels of risk (emotional distress) and somewhat at average levels. In predicting school performance (GPA), it appears that those with low levels of school connectedness are no different than

those with high levels of connectedness for those with high levels of risk (emotional distress). Thus, the protective or buffering function may not be well supported for those with significant emotional distress and warrants further investigation. Altogether, it appears that school connectedness plays a “protective-reactive” function for the emotional distress–school performance relationship and a generally “protective” function for the emotional distress–educational attainment relationship except in the case of very high school connectedness where it appears to play a “protective-reactive” function (see Luthar et al., 2000 for full descriptions of protective constructs).

Although the current study draws upon longitudinal data, which are non-experimental, and thus we cannot infer causality, the findings are consistent with prior research indicating that school connectedness is a critical protective factor for adolescents (CDC, 2009; Goodenow, 1993). Moreover, examining such models could provide more insight into the paths and mechanisms through which emotional distress may influence educational outcomes. Combining methods and synthesizing findings from “competing” models (mediation, moderation) yields a more comprehensive profile of adolescent development than relying on any single approach, simple (linear, main/direct effects, simple regression) or complex (mediation, moderated multiple regression). Our findings collectively provide valuable evidence to inform school mental health research methodology, school psychology practice, and educational policy.

Limitations

As previously mentioned, possible sources of missing educational data include alternative grading systems, school suspensions/expulsions, dropout, graduation, and attrition. Although the current study used multiple imputation procedures in order to minimize the biases due to study attrition, there may be implications of the potential sources of missing data. For example, those who dropped out of school may be missing data at Wave III, but may have had average or high school performance scores earlier in their development (Wave I). Thus, imputed data may not accurately reflect mental health concerns or low school connectedness (or other influential factors) in later waves which may have influenced educational outcomes. Additionally, despite using estimation techniques, it appeared that the data may not be trustworthy post-imputation at Wave II due to large variance and inconsistent analysis results among the five imputed data sets in the preliminary analyses; thus, the analyses were restricted to data collected at Wave I and Wave III. This created a missed opportunity to leverage Wave II data in order to test prospective mediation rather than cross-sectional mediation at Wave I (that is, mediation assumes a temporal precedence of the risk factor influencing the mediating mechanism). Indeed, a prospective model that predicts school connectedness at Wave II (controlling for Wave I) would allow for a more rigorous test of mediation. Also, controlling for baseline by including Wave I in the model would expand the research questions to establish that the predictors are associated with change in educational achievement rather than simply examining achievement in late adolescence/young adulthood.

Despite inclusion of specific information regarding mental health, school factors, and educational achievement, the Add Health data did not utilize comprehensive measures of

these factors and should be considered for future studies (e.g., internalizing/emotional problems often include anxiety symptoms). It should also be noted that the majority of cases were not clinically significant for depression. Also, school climate and “connectedness” research is evolving and, at times, is inconsistent or contradictory (e.g., definition, nature, factor structures, outcomes/findings) across studies, including researchers using the same data set. We conceptualized school connectedness broadly and combined perceptions of belonging, support, and safety, which may have blurred specific aspects of connectedness useful for guiding services and programs. Future research should continue to clarify how school connectedness should be conceptualized, defined, and measured to advance research on this relevant protective factor. Furthermore, while demographic variables were included as covariates in the current study, these factors may also serve as additional effect modifiers (e.g., gender differences in adolescents’ internalizing symptoms [Rushton et al., 2002] may serve as a second effect modifier). Given the complexity of current study models, a thorough investigation of demographic factors was beyond the scope of this study; however, future research should explore these factors in detail.

In order to provide evidence of multidimensional processes and interactions, it is also essential that additional *school-level variables* (e.g., engagement; school size, type, urbanicity; availability of mental health services and evidence-based practices; organizational change), *individual characteristics* (e.g., genetic, biological, medical) and *social ecologies* (e.g., family connectedness, community support) be thoroughly investigated, both separately and simultaneously, including mediation and moderation. While these results provide some preliminary evidence of processes and interactions, the analyses did not fully account for the complex, bidirectional relationships, joint contributions of individual and school-level variables, or causal pathways (observational study); this is an area that requires more rigorous methods in order to infer causality (e.g., propensity score matching, multilevel modeling, simulation studies, randomized intervention study). Furthermore, replication of the models to other populations and contexts are needed. Nonetheless, the current study was grounded in relevant and empirically supported theory and was guided by prior study data and best practice methodology. Additionally, the current study’s method and findings provide some reassurance of opportunities to promote mental health and educational achievement, despite many unwavering or uncontrollable factors by school personnel (e.g., socioeconomic status, biological predispositions, family functioning).

Conclusions and Implications for School Mental Health Professionals

The results of this study provided preliminary support for interventions targeting school connectedness and climate early in adolescence and through elementary school; such approaches may have a preventative impact on negative psychosocial and educational variables later in adolescence and adulthood. Given the developmental dimension of emotional functioning and the transitional nature of adolescents’ schooling, it is essential to examine influences and interactions over time, as did this study. This study also illustrates the need for an essential understanding of how individual and systems-level factors may jointly operate to hinder and/or promote functioning.

Schools play a natural role in providing protective factors such as pro-social connections with others (e.g., caring adults, students) and promoting wellness and resilience. Thus, school personnel can be influential change agents in facilitating a positive and supportive school environment and by providing evidence-based prevention and intervention programs and services. Furthermore, school personnel play key roles in supporting student mental health through their involvement in multidisciplinary teams, Individual Education Program (IEP) goals, and response to intervention (RTI) activities. Given their expanded role as consultants and systems' change agents, school psychologists and other school-based health professionals can: (a) facilitate the development of educators' mental health competencies; (b) create home-school communication and connections; (c) collaborate and expand capacities for organizational change; (d) foster healthy student-teacher relationships; (e) promote and enable supportive teacher networks; and (g) encourage inclusive, pro-social peer networks, and interactions. School psychologists are also trained in assessment and data management to plan, monitor, and evaluate programs and activities. As mentioned, school climate methods and tools are evolving, but "best practice" and evidence-based criteria are emerging in the research literature. Finally, school mental health professionals possess a unique capacity for calling attention to the cost-effectiveness of school-wide, universal approaches (e.g., depression prevention) when integrated with tailored strategies (e.g., depression intervention; Herman, Merrell, Reinke, & Tucker, 2004). This requires school mental health professionals to possess or acquire methodological knowledge and skills in order to continuously evaluate and improve—not just outcomes—but interactions and processes as well.

Altogether, this study begins to address gaps in our understanding of *how*, *why*, and *for whom* emotional functioning affects educational outcomes, with a particular focus on psychosocial mechanisms and interactions of the school context. Our focus on the school-related factors through which emotional factors exert their effects on educational outcomes (mediation) and those that modify the effects of emotion on education (moderation) provides some insight into the complex nature of adolescent developmental systems.

Given that adolescence is a time when individuals are making important decisions about their future, some with significant distal effects, it is essential to understand the developmental and contextual aspects of emotional functioning and how they may affect educational achievement. Simply recognizing that these complex interactions and processes exist provides school mental health practitioners, researchers, and policymakers insight into how actions and decision-making within school environments are associated with educational outcomes. Comprehensive actions require an integrative model—one that incorporates multiple facets operating simultaneously and one that accounts for complex developmental person-context interactions and processes. By conceptualizing research, policy, and practice in developmental systems terms, we may begin to disentangle the effects of various factors at multiple levels, incorporating diverse systems, and contexts.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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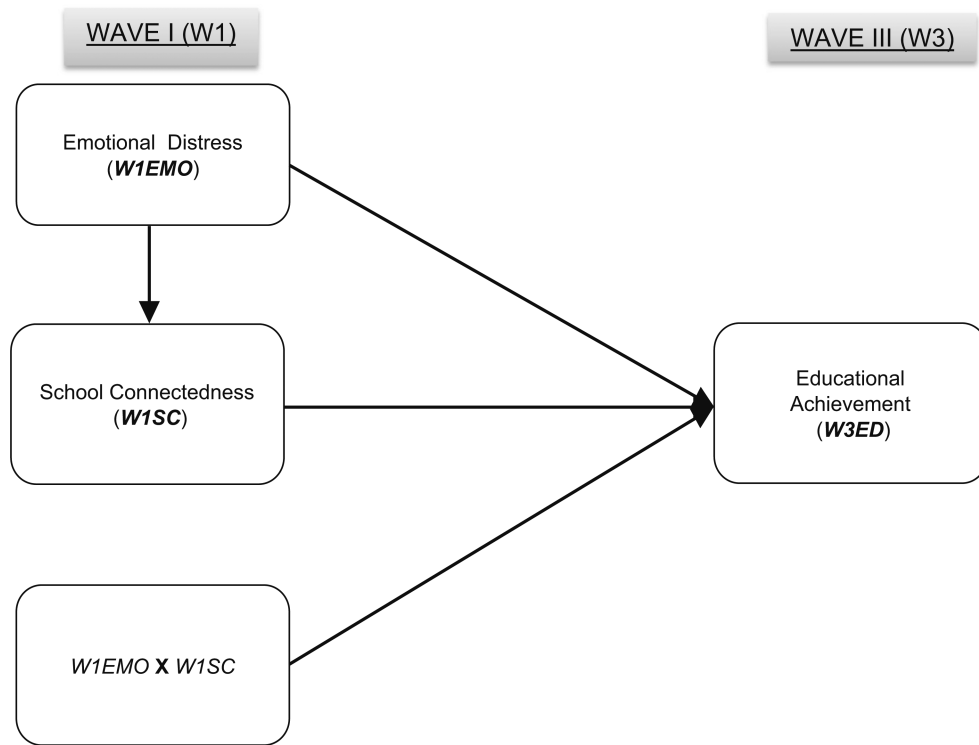


Fig. 1. Integrated conceptual model: exploring mechanisms and interactions among emotional distress and school connectedness in early/mid-adolescence (W1) and educational achievement in late adolescence/young adulthood (W3)

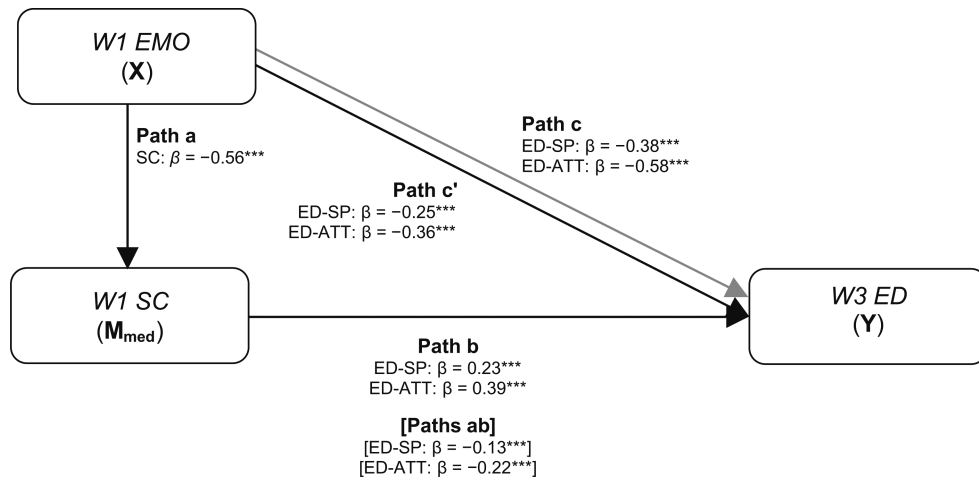


Fig. 2. Mediation (mechanism): modeling direct, indirect, and total effects of emotional distress (*EMO*) and perceived school connectedness (*SC*) on educational achievement (*ED*). *Notes* Wave I = W1; Wave III = W3. Predictor (**X**) = *EMO*; mediator (**M_{med}**) = *SC*; outcome (**Y**) = *ED*; educational achievement (*ED*) is comprised of 2 variables (separate analyses): *ED-SP* = school performance (cumulative GPA at W3); *ED-ATT* = educational attainment (total number of years of school completed at W3). *Path a* effect of *EMO* (*X*) on *SC* (**M_{med}**), *path b* effect of *SC* (**M_{med}**) on *ED* (**Y**), controlling for *EMO* (*X*). *Path c* “total” (main) effect of *EMO* (*X*) on *ED* (**Y**). *Path c* “direct” effect of *EMO* (*X*) on *ED* (**Y**), after including *SC* (**M_{med}**) in the model; *paths ab* “indirect” effect of *EMO* (*X*) on *ED* (**Y**) through *SC* (**M_{med}**). **p* .05, ***p* .01, ****p* .001

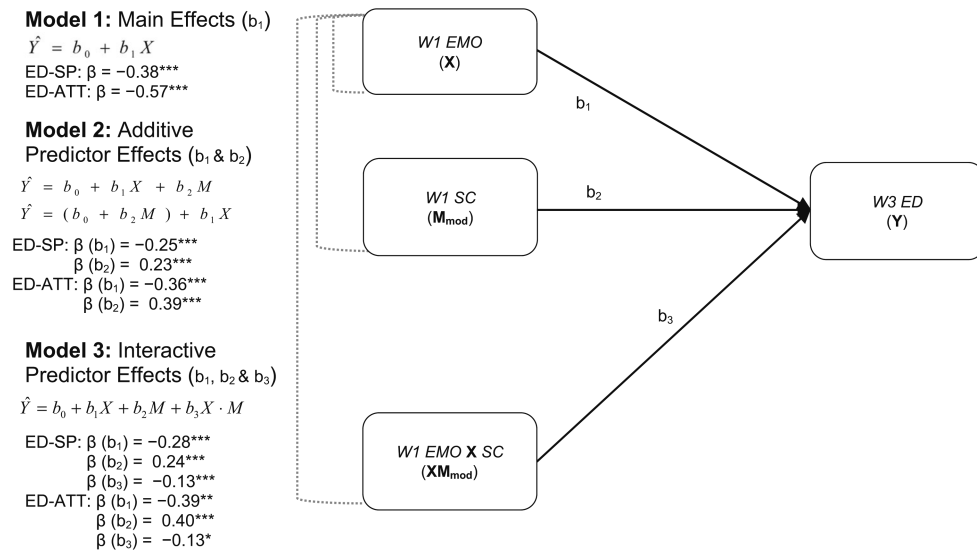


Fig. 3. Moderation (interaction): modeling perceived school connectedness (*SC*) in early/mid-adolescence (*W1*) as a moderator of the relationship between emotional distress (*EMO*) in early/mid-adolescence (*W1*) and educational achievement (*ED*) in late adolescence/early adulthood (*W3*). *Notes* Wave I = *W1*; Wave III = *W3*. Predictor (**X**) = *EMO*; moderator (**M_{mod}**) = *SC*; outcome (**Y**) = *ED*; educational achievement (*ED*) is comprised of 2 variables (separate analyses): *ED-SP* = school performance (cumulative GPA at *W3*); *ED-ATT* educational attainment (total number of years of school completed at *W3*). *Model 1* simple regression analysis examining single predictor effect of *EMO* (*X*) on *ED* (*Y*), *Model 2* multiple regression analysis examining additive predictor effects of *EMO* (*X*) + *SC* (*M_{mod}*) on *ED* (*Y*); *Model 3* multiple regression analysis including the multiplicative interaction term *EMO* × *SC* (*XM_{mod}*) among additive predictor effects (*EMO* [*X*] + *SC* [*M_{mod}*]) on *ED* (*Y*); if *SC* (*M_{mod}*) moderates the *EMO* (*X*)–*ED* (*Y*) relation, the *EMO* (*X*)–*ED* (*Y*) relation differs in direction and/or magnitude by the level of *SC* (*M_{mod}*)

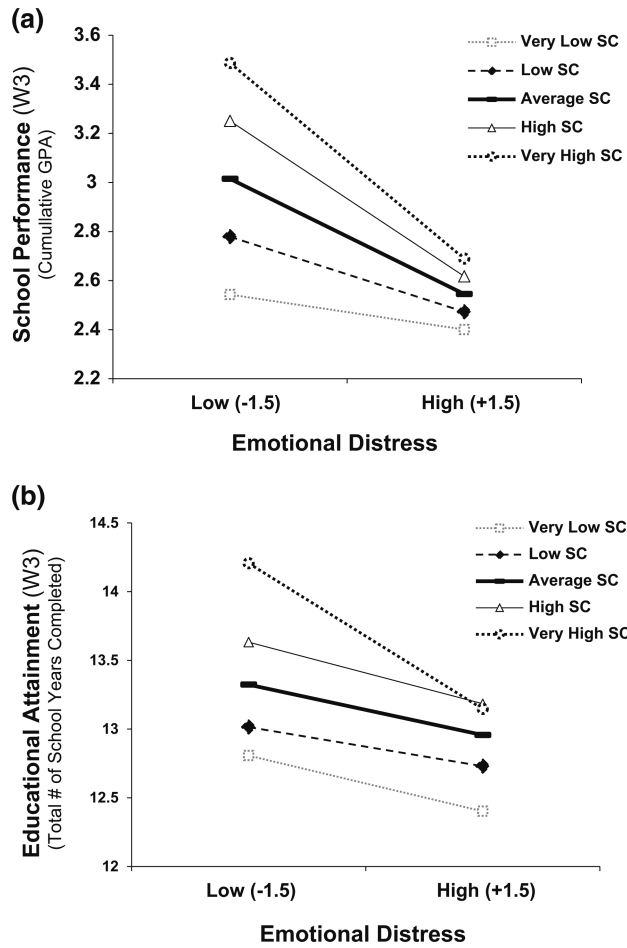


Fig. 4. **a** Emotional distress (*EMO*) at Wave I (W1) predicting school performance at Wave III (W3) for 5 levels of perceived school connectedness (*SC*) at Wave I (W1). *Notes school performance* = cumulative GPA across 3 waves at Wave III (W3); scale range 0.0–4.0; possible *EMO* scores range from –1.5 to +1.5 (equivalent to 0–3 scale after centering); *SC* scores represent standard deviations from mean: –2SD (very low), –1SD (low), 0/mean (average), +1 SD (high), +2SD (very high). **b.** Emotional distress (*EMO*) at Wave I (W1) predicting educational attainment at Wave III (W3) for 5 levels of perceived school connectedness (*SC*) at Wave I (W1). *Notes educational attainment* = total number of school years completed at Wave III (W3); scale range: 6–22 years; scale range 0–4.0; possible *EMO* scores range from –1.5 to +1.5 (equivalent to 0–3 scale after centering); *SC* scores represent standard deviations from mean: –2SD (very low), –1SD (low), 0/mean (average), +1 SD (high), +2SD (very high)

Table 1
Descriptive statistics and correlations among study variables (before imputation)

Variable	Wave										
	M	SD	Min.	Max.	2.	3.	4.	5.	6.	7.	8.
Wave I (W1) predictors (psychosocial)											
1. [W1EMO] emotional distress ($N = 7259$; $\alpha = .80$)	0.64	0.47	0	3	-.37**	-.20**	-.14**	.11**	-.10**	-.18**	-.10**
2. [W1SC] school connectedness ($N = 7232$; $\alpha = .78$)	3.75	0.67	1	5	.24**	.17**	.17**	-.07**	.04**	-.01	.06**
Wave III (W3) outcomes (educational achievement)											
3. [W3ED-SP] school performance ($N = 5931$)	2.56	0.85	0	4	.56**	.56**	.56**	-.06**	.25**	-.16**	.15**
4. [W3 ED-ATT] educational attainment ($N = 7262$)	13.11	1.80	6	18	.22**	.26**	.26**	.22**	.26**	-.07**	-.01
Covariates											
5. Age ($N = 7276$)	14.72	1.01	13	16					-.20**	.04**	-.06**
6. SES ($N = 7276$)	0.09	0.71	-2.38	10.11						.01	.11**
7. Bio-sex ($N = 7276$)	0.46	0.50	0	1							.01
8. Race ($N = 7276$)	0.60	0.49	0	1							

* $p < .05$

*** $p < .001$

** $p < .01$

Table 2
Mediation analysis of emotional distress (EMO) and school connectedness (SC) on educational achievement (ED)

Step (path)/variable	Multiply imputed (N = 7276)					Not imputed (SP: N = 5931; ATT: N = 7262)				
	Stand. coef. (β)	SE ^d	Unstand. coef.	95% CI ^b LL UL	R ²	Stand. coef. (β)	SE ^d	Unstand. coef.	95% CI ^b LL UL	R ²
EID-SP (school performance)										
Step 1 ^c (path c) ("total effect")	-0.38***	0.03	-13.49	-0.44 -0.33	.20	-0.37***	0.03	-12.07	-0.43 -0.31	.19
Step 2 ^d (path a)	-0.56***	0.03	-22.63	-0.61 -0.51	.15	-0.57***	0.03	-19.18	-0.63 -0.51	.16
Step 3 ^c (paths b and c')					.23					.21
WISC (b)	0.23***	0.02	-10.74	0.19 0.28		0.22***	0.02	8.82	0.17 0.27	
WEMO (c')	-0.25***	0.03	-8.38	-0.31 -0.19		-0.25***	0.03	-7.59	-0.31 -0.18	
Step 4 ^c (paths ab) ("indirect effect")	-0.13***	0.01	-10.35	-0.15 -0.10		-0.12***	0.02	-8.35	-0.15 -0.10	
ED-ATT (educational attainment)										
Step 1 ^c (path c) ("total effect")	-0.58***	0.06	-9.88	-0.47 -0.69	.16	-0.58***	0.06	-10.03	-0.69 -0.48	.16
Step 2 ^d (path a)	-0.56***	0.03	-22.63	-0.61 0.51	.15	-0.56***	0.03	-22.61	-0.61 -0.51	.15
Step 3 ^c (paths b and c')					.18					.18
WISC (b)	0.39***	0.04	9.93	0.47 0.31		0.39***	0.04	9.93	0.31 0.47	
WEMO (c')	-0.36***	0.06	-5.70	-0.48 -0.23		-0.36***	0.06	-6.13	-0.48 -0.24	
Step 4 ^c (paths ab) ("indirect effect")	-0.22***	0.03	-8.50	-0.27 -0.17		-0.22***	0.03	-8.75	-0.27 -0.17	

ED is comprised of 2 variables (separate analyses): ED-SP school performance, ED-ATT educational attainment. Demographic characteristics at W1 were covariates in these analyses; multiply imputed = average across 5 imputations using Rubin's (1987) rule; CI confidence intervals, LL lower limit, UL upper limit, stand. coef. (β) standardized coefficient, unstand. coef. (t/z) unstandardized coefficient

* p .05

** p .01

*** p .001

^a SE linearized standard error for steps 1-3; bootstrapped SE for step 4 (indirect effect)

^b CI confidence intervals, normal based: steps 1-3; bootstrapped with bias correction: step 4 (indirect effect)

Dependent variable = Wave III (W3) educational achievement (ED)

Dependent variable = Wave I (W1) school connectedness (SC)

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Table 3

Moderated multiple regression analysis of emotional distress (EMO) and school connectedness (SC) on educational achievement (ED)

Variable/model	Multiply imputed (N = 7276)					Not imputed (SP: N = 5931; ATT: N = 7262)						
	Stand. coef. (β)	SE	Unstand. coef.	95 % CI LL UL	R^2 (UL)	Incr. R^2	Semi-par correl.	Stand. coef. (β)	SE	Unstand. coef.	95 % CI LL UL	R^2 (UL)
ED-SP (school performance)												
Model 1 (b_1) ("main effect of W1EMO")	-0.38***	0.03	-11.35	-0.45 -0.31	-0.31		.20 (.25)	-0.37***	0.03	-10.77	-0.44 -0.30	.19 (.24)
Model 2 ("additive")						.22 (.28)						.21 (.27)
W1EMO (b_1)	-0.25***	0.03	-7.39	-0.31 -0.18	-0.18			-0.25***	0.04	-6.79	-0.32 -0.17	
W1SC (b_2)	0.23***	0.02	10.28	0.19 0.28	0.28			0.22***	0.02	8.82	0.17 0.27	
Model 3 ("multiplicative")						.23 (.30)						.22 (.28)
W1EMO (b_1)	-0.28***	0.03	-8.30	-0.34 -0.21	-0.21			-0.27***	0.04	-7.58	-0.34 -0.20	
W1SC (b_2)	0.24***	0.02	10.59	0.20 0.28	0.28			0.23***	0.03	9.14	0.18 0.27	
W1EMO \times W1SC (b_3)	-0.13***	0.04	-3.01	-0.21 -0.04	-0.04			-0.13**	0.04	2.88	-0.21 -0.04	
ED-ATT (educational attainment)												
Model 1 ("main effect of W1EMO")	-0.57***	0.06	-10.28	-0.69 -0.47	-0.47		.16 (.19)	-0.58***	0.06	-10.28	-0.69 -0.47	.16 (.19)
Model 2 ("additive")						.17 (.21)						.17 (.21)
W1EMO (b_1)	-0.36***	0.06	-6.11	-0.47 -0.24	-0.24			-0.35***	0.06	-6.13	-0.47 -0.24	
W1SC (b_2)	0.39***	0.04	9.93	0.32 0.47	0.47			0.39***	0.04	9.93	0.31 0.47	
Model 3 ("multiplicative")						.18 (.22)						.18 (.22)
W1EMO (b_1)	-0.39**	0.06	-6.49	-0.50 -0.27	-0.27			-0.39***	0.06	-6.50	-0.50 -0.27	
W1SC (b_2)	0.40***	0.04	9.93	0.32 0.47	0.47			0.40***	0.04	9.94	0.32 0.48	
W1EMO \times W1SC (b_3)	-0.13*	0.06	-2.18	-0.25 -0.01	-0.01			-0.13*	0.06	-2.13	-0.01 -0.25	

ED is comprised of 2 variables (separate analyses): ED-SP school performance, ED-ATT educational attainment. Demographic characteristics at W1 were covariates in these analyses, multiply imputed average across 5 imputations using Rubin's (1987) rule, LL lower limit, UL upper limit

Cohen's f^2 (1988) effect size: $f^2 = .02$: small, $f^2 = .15$: medium, $f^2 = .26$: large

* $p < .05$

100' *d*

10' *d*
**

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