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Associations Between Emotional Engagement With School and Behavioral and Psychological Outcomes Across Adolescence

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Although a small body of research suggests that emotional engagement with school is related to youth behavioral and psychological outcomes, it remains unclear whether these associations represent causal relationships and at what age engagement matters most for student outcomes. Using data from two large, national surveys, this study uses three analytic strategies to reduce threats to causal inference and assess whether the central relationship changes as youth age. Results across both data sets are consistent with a causal relationship between emotional engagement with school and youth behavioral and psychological outcomes that decreases somewhat as youth age. Given the importance of emotional engagement for these outcomes, and the importance of avoiding problem behaviors and maintaining healthy psychological functioning for students' long-run outcomes, research should continue to explore the ways in which schools and educational policy can influence students' engagement.

Keywords: *socioemotional development, delinquency, depressive symptoms, self- esteem, school engagement, school connection*

There is a growing interest among researchers, policymakers, and practitioners in the ways in which schools influence student outcomes beyond academic skills and, in particular, how schools can prevent problem behaviors and promote positive youth development. Youth who are able to navigate the middle and high school years without engaging in problem behavior and while maintaining a positive sense of self are more likely to graduate high school and have more positive long-run labor market, health, and other outcomes (Farkas, 2011; Heckman, Stixrud, & Urzua, 2006; Wang & Fredricks, 2014). One school mechanism that may meaningfully influence students' behavioral and psychological outcomes is emotional engagement with school, defined as students' sense of connection to and liking of school. Previous research has associated emotional engagement with such outcomes (Fredricks, Blumenfeld, & Paris, 2004; Upadyaya & Salmela-Aro, 2013; Wang & Degol, 2014); however, two important questions must be answered before using this literature to motivate policy or practice. First, it is unclear whether these associations represent causal relationships. It is plausible that youth's extant levels of problem behavior and psychological functioning facilitate school engagement, rather than vice versa, or that family characteristics simultaneously influence both engagement and outcomes, threats that have not been consistently addressed in the existing literature. Second, it is not clear for whom engagement matters for these outcomes, both in terms of broad generalizability and with respect to age, a variable that should directly inform intervention efforts.

The current study addresses these concerns. First, it uses three robust modeling techniques in two national samples in order to provide more rigorous estimates of the association between emotional engagement and delinquent behavior, depressive symptoms, and self-esteem and to explore the replicability of these associations. Strategies include using lagged dependent variables to reduce the threat of bidirectionality and sibling fixed effects and first-difference specifications to control for important family and child characteristics. Second, to inform policymakers about the optimal timing of engagement programs, analyses assess whether the central relationship changes as youth age. Given the importance of behavioral and psychological outcomes in the achievement of both short- and long-run educational goals, identifying whether and when emotional engagement influences these outcomes is a question paramount to designing both productive policy and effective pedagogy.

School Engagement

School engagement is a multidimensional construct encompassing students' behaviors, thoughts, and emotions about school. Behavioral engagement measures students' participation in school using indicators such as extracurricular involvement, attendance, and participation in school-based

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activities. Cognitive engagement reflects mental investment in school and is measured with indicators of academic effort and thoughtfulness (sometimes defined as self-regulated learning) as well as measures of school relevance and belief in the long-run benefits of school. Emotional engagement—the key variable in the present study—is defined as students' affective responses to school, peers, and teachers, including a sense of belongingness in or connectedness to school. Both the definition and measurement of emotional engagement with school overlap substantially with measures of relatedness and school connection. Although operational definitions of engagement vary across studies, these definitions reflect the broadest consensus within the developmental and education literatures (Fredricks, Filsecker, & Lawson, 2016; Reschly & Christenson, 2012; Wang & Degol, 2014).

Emotional Engagement, Problem Behaviors, and Psychological Functioning

Recent research has sought to determine if the three domains of engagement differentially predict student outcomes, particularly outcomes across different developmental domains. Theoretical work suggests that emotional engagement with school may be particularly relevant for preventing problem behaviors and promoting healthy psychological functioning. Self-determination theory (SDT) asserts that students develop optimally when schools meet three psychological needs—autonomy, competency, and relatedness. SDT argues that students engage in schools to the extent that schools meet these needs, and this engagement causes students to internalize the goals, values, and skills schools promote (Deci & Ryan, 1994; Deci, Vallerand, Pelletier, & Ryan, 1991; Ryan & Deci, 2009; Skinner & Pitzer, 2012). This internalization lays a foundation for both healthy psychological functioning and the absences of problem behaviors by creating a motivational context that promotes goal-directed student action, which helps students deal constructively with failure and challenges (Skinner & Pitzer, 2012). Notably, Deci, Ryan, and colleagues (e.g. Deci et al., 1991; Ryan & Deci, 2009) highlight the importance of youth's *emotional* connection with school in facilitating internalization; indeed, Ryan and Deci (2009) note that when youth experience relatedness in school they *want* to internalize the values and goals that schools promote, also leading to the adoption and internalization of practices related to behavioral and cognitive engagement. The sense of emotional connection creates a context in which youth strive to meet school's expectations of them and to form healthy in-school relationships (Ryan & Deci, 2009). This process is likely both to impact problem behaviors, that is, prevent delinquent behavior, and to promote healthy psychological functioning, that is, reduce depressive symptoms and enhance students' self-esteem. Youth striving to meet school's prosocial goals and using school-based supports to do so are less likely to engage in delinquent behavior; youth building healthy in-school relationships and using these relationships to cope with stressors and setbacks are more likely to maintain a positive sense of self and to develop effective emotion regulation strategies.

These hypotheses are supported by a small body of empirical evidence. For example, in an analysis examining trajectories of school engagement, Li and Lerner (2013) found that seventh- to 12th-grade students whose emotional engagement decreased over time reported higher levels of depressive symptoms and delinquency, and this link was stronger than for students whose behavioral engagement decreased over time. Similarly, Wang and Peck (2013) found that ninth to 11th graders with low levels of emotional engagement exhibited greater increases in depressive symptoms than peers with higher levels of emotional engagement, even if those peers had lower levels of behavioral or cognitive engagement. Hirschfield and Gasper (2011) demonstrated that both behavioral and emotional engagement with school were associated with lower levels of in- and out-of-school delinquent behavior among early adolescents (11 to 12 years old). Li and colleagues (2011) replicated these findings using a survival analysis of data drawn from fifth through 11th graders. Finally, Wang and Fredricks (2014) reported that youth who decreased in emotional engagement from seventh through 12th grade experienced increases in delinquent behaviors over time in cross-lagged growth models. Relationships between emotional engagement and outcomes were similar to those between behavioral engagement and outcomes, but stronger than those for cognitive engagement.

The hypothesis that emotional engagement may be important for behavioral and psychological outcomes has also been explored in the school connection literature. Emotional engagement combines students' sense of relatedness with school with measures of school liking; as such measures of school connection overlap substantially with measures of emotional engagement (Fredricks, Blumenfeld, Friedel, & Paris, 2005). As expected, this literature has revealed associations between connection and both problem behaviors and psychological functioning, including higher levels of self-esteem (Battistich, Solomon, Watson, & Schaps, 1997; Solomon, Battistich, Watson, Schaps, & Lewis, 2000) and lower levels of depressive symptoms (Markowitz, 2016; Shochet & Smith, 2014) and problem behaviors (McNeely & Falci, 2004; Payne, 2008) across adolescence and among diverse students. Importantly, however, this literature does not typically control for students' behavioral or cognitive engagement. These constructs are likely to be correlated with both school connection and student outcomes; thus the omission of these variables may upwardly bias estimated associations. Moreover, many of the threats to causal inference present in the engagement literature are also present in the school connection literature (Osterman, 2000).

Challenges in Estimating Relationships Between Emotional Engagement and Outcomes

Although a compelling body of evidence suggests that students' emotional engagement with school may influence their' behavioral and psychological outcomes, it remains unclear whether the observed associations reflect causal relationships; without compelling causal evidence, it is unclear how this body of work should be used to inform policy or practice decisions. For example, previous research on both engagement and school connection relies largely on cross-sectional data (Fredricks et al., 2004; Osterman, 2000) and thus is particularly vulnerable to threats to causal inference, such as bidirectionality and confounding omitted variables. In cross-sectional models, it is unclear whether links between emotional engagement and outcomes reflect a pathway from emotional engagement to outcomes or a pathway from outcomes to emotional engagement. Indeed, studies looking at associations between problem behaviors and outcomes and engagement find that students with lower levels of problem behaviors develop stronger engagement with school over time (Loukas, Ripperger-Suhler, & Horton, 2009; Wang & Fredricks, 2014). In order to reduce the likelihood of this interpretation, the present study includes a previous measure of each outcome in each model. This previous measure of each outcome captures unmeasured characteristics that predispose youth to specific behavioral or psychological outcomes; including it in the model accounts for the portion of this predisposition that is correlated with emotional engagement, reducing, though not eliminating, the threat of bidirectionality.

Second, unobserved factors that influence both engagement and outcomes may confound estimated associations. Although nonexperimental designs are essential for studying emotional engagement, a construct that cannot be randomly assigned, such designs are unable to balance levels of unobserved characteristics that may be correlated with both engagement and problem behaviors and psychological functioning. Thus, frequently unmeasured variables, such as parent–child closeness, family characteristics and rearing environment, or academic achievement, could drive both engagement and outcomes and introduce a spurious correlation between them. This is particularly likely to be a problem with respect to unmeasured family-level factors, including genetic characteristics, rearing environment, and social capital. Family-level factors, such as socioeconomic status and parenting and family processes, have been previously linked to problem behavior and psychological functioning and are either conceptually or have been empirically linked with engagement (e.g., Conger & Donnellan, 2007; Mo & Singh, 2008; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Otterpohl & Wild, 2015; Reschly & Christenson, 2012; Steinberg & Silk, 2002; Wang & Eccles, 2012). For example, parents' engagement with their child's school has been linked to both student engagement and outcomes (Skinner & Pitzer, 2012). School surveys rarely capture detailed information about families and family processes, however, and cannot capture whether students are genetically predisposed to emotional engagement or certain levels of behavioral or psychological outcomes (e.g., Spinath & Johnson, 2011), as such family-level confounds are omitted in most studies of engagement.

The present study reduces these threats in several ways. First, it includes a rich set of covariates that have been linked to students' engagement and behavioral and psychological outcomes, including family income, maternal employment, marital status, and education (Leventhal & Brooks-Gunn, 2000; Reschly & Christenson, 2012), students' maternal closeness (Wang & Eccles, 2012; Upadyaya & Salmela-Aro, 2013), and measures of cognitive ability, including standardized test scores and student grades (Li & Lerner, 2011; Wang & Peck, 2013). Second, it uses two modeling strategies designed to address key sources of bias.

The first of these strategies is an econometric sibling fixed-effects model, in which within-family differences in engagement are used to predict within-family differences in outcomes, essentially identifying a within-family "comparison group" for each individual. This strategy has been used in the literatures on divorce and father absence to account for family-level omitted variables (Lahey & D'Onofrio, 2010; Ryan, 2015). Notably, however, because the present sample is not made of identical twins, genetic factors that differ between siblings could confound the association between engagement and outcomes. Thus, sibling models also include a lagged measure of each outcome to account for directionality and the stable child-level factors that predispose youth to a specific level of problem behavior or psychological functioning.

Second, to deal more directly with the threat to causal inference posed by stable individual-level factors that influence both engagement and outcomes, this study uses a first-difference model, which accounts for omitted time-invariant variables—for example, stable personality traits, individual genetics, or family characteristics—by assessing whether changes in engagement are associated with changes in behavioral and psychological outcomes. First-difference models are a special case of a child fixed-effects model in which each child is observed just twice; in these models, stable factors related to engagement and outcomes are "differenced out" and thus do not impact the estimated association. For example, to the extent that the time-invariant features of a student's personality influences emotional engagement and outcomes at both Time 1 and Time 2, the time-invariant *impact* is removed by the difference score. It is important to note, however, that if the impact of stable characteristics *varies* over time, a first-difference model will not necessarily eliminate the entire impact of the characteristic.

Additionally, because the few previous studies that do address these critiques use local samples that cannot be

broadly generalized, this study uses national data in order to generate estimates that can inform policymakers and practitioners seeking to understand the relevance of school engagement for diverse youth. A second national data set is also used to explore whether estimates are replicable. If estimated effect sizes are similar, or the same, across two national data sets, this consistency would further enhance the external validity of the findings and thus provide stronger evidence than if associations emerged in one data set only or if effect sizes were highly variable. Although this analysis is nonexperimental, and therefore cannot provide causal evidence, it aims to improve on the rigor of the current literature and provide replicated, broadly generalizable evidence on the link between emotional engagement and behavioral and psychological outcomes.

Moderation by Age

Beyond identifying whether emotional engagement with school plays a role in shaping students' behavioral and psychological outcomes, it is important to know *when* emotional engagement is most important for students' well-being. Previous research has documented a decline in levels of emotional engagement with school as youth age, due in part to poor fit between the needs of adolescents and their school contexts (Eccles et al., 1993; Skinner, Kindermann, Connell, & Wellborn, 2009; Wang, Brinkworth, & Eccles, 2013). For example, Wang and Eccles (2012) report a decline in all three engagement dimensions from seventh to 11th grade, Anderman (2003) reports a 5% yearly decline in students' belonging in middle school, and Gillen-O'Neel and Fuligni (2013) report a decline in belonging for girls across high school. It is less clear, however, whether there are also declines in the *association* between emotional engagement and outcomes. Research on emotional engagement conducted in high school samples tends to find a statistically significant association between emotional engagement and problem behaviors and psychological functioning (Joyce & Early, 2014; Wang & Eccles, 2011), but it is not clear if effect sizes vary relative to younger students.

It is possible that the role of emotional engagement with school decreases as youth age. As adolescents age and increasingly interact with a variety of contexts, including employment, extracurricular, and other settings, these contexts may influence behavioral and psychological outcomes (Scales, Benson, & Mannes, 2006), reducing the role of emotional engagement with school. During adolescence, youth are developing self-conceptions and identity, peer relationships become particularly powerful, and youth begin independently interacting with a wide range of social institutions (Brown & Larson, 2009; Smetana, Campione-Barr, & Metzger, 2006; Steinberg & Silk, 2002). Rather than being one of two major influences in younger children's lives (e.g., school and family), as youth age school becomes one of a suite of developmental forces. The ascendance of new institutions coupled with a growing sense of identity may reduce the relationship between emotional engagement and students' self-esteem and depressive symptomatology, and the rising influence of peers coupled with greater independence may reduce the relationship between emotional engagement and delinquent behavior.

If emotional engagement with school decreases in both level and importance as students age, resources aimed at enhancing engagement should be targeted at younger children. Conversely, if the importance of emotional engagement remains stable, it may be more important to target resources toward building more supportive schools for older youth, for whom levels of engagement are declining and for whom outcomes such as dropout and delinquency pose a more imminent threat.

Present Study

The present study has two aims. First, it examines whether previously observed associations between emotional engagement with school and behavioral and psychological outcomes are robust to a series of increasingly rigorous modeling strategies designed to diminish major threats to causal inference, and it replicates these models in two national data sets to assess the external validity of the engagement-to-outcomes link and to respond to calls for replication in the social science literature (Chang & Li, 2015; Open Science Collaboration, 2015). The present study hypothesizes that the association between emotional engagement and outcomes will persist across all modeling strategies and that estimated effect sizes will be consistent across data sets. Notably, although these models focus on emotional engagement with school, lagged measures of behavioral and cognitive engagement are included as well. Including lagged measures of these types of engagement accounts for their potential influence on outcomes without overcontrolling for them, given the possibility that emotional engagement with school influences behavioral and cognitive engagement and thereby outcomes (Li & Lerner, 2013; Ryan & Deci, 2009); sensitivity analyses examine simultaneous associations between all engagement dimensions and outcomes.

Second, this study conducts an exploratory analysis examining whether associations between emotional engagement and outcomes change across adolescence. It is hypothesized that as youth age, associations between school engagement and behavioral and psychological outcomes will diminish.

By estimating effect sizes across a series of robust models and exploring the changing role of engagement as youth age, this paper aims to inform policymakers and practitioners hoping to enhance students' nonacademic outcomes by providing both stronger evidence for the relationship between emotional engagement and students' behavioral and psychological outcomes and information as to when resources and programs could most effectively support students' development.

Method

Data

Data were drawn from two national data sets, the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY) and the nationally representative National Longitudinal Study of Adolescent Health (Add Health).

NLSY. The NLSY is a nationally representative, longitudinal survey of youth who were ages 14 to 21 when interviewed in 1979. Beginning in 1986, the NLSY began following the children of the female respondents of the original sample to assess their health, development, and well-being; surveys were conducted with the children of the NLSY respondents biennially from 1986 to 2012. Offspring were asked about their school engagement and behavioral and psychological outcomes in a "child" survey given from ages 10 through 14. The present sample was drawn from the respondents to this survey from all available waves; thus it consists of youth ages 10 to 14 who reported on their engagement with school and outcomes from 1988 to 2012 (N = 11,512; model N varies by analytic strategy). Because NLSY conducts interviews biennially, youth could be interviewed up to three times, although most were interviewed twice. The second of these data points was used as the dependent variable (mean age = 13.04, SD = 1.06), whereas the first was used for lagged observations (mean age = 11.55, SD = 0.76). Because observations were drawn from multiple years and therefore multiple cohorts, all analyses control for both birth year and the year outcomes were assessed. Finally, because the NLSY's child sample draws from offspring of NLSY mothers, the sample is almost entirely made of siblings (n = 10,336 had a sibling in the sample), providing a sizable n for a within-family analysis.

Add Health. Add Health is a study of N = 20,745 youth who were in Grades 7 to 12 in 1994, selected through a multistage, stratified, school-based, cluster sampling design (for a description of the study design, see Bearman, Jones, & Udry, 1997; Harris et al., 2009). These youth were first interviewed in 1994–1995, then a second wave of data was collected in 1996 (n = 14,738; 88.2% response rate, although 12th-grade students in 1994–1995 were excluded from this wave of data collection). Two more waves of data were collected in 2001 and 2008; however, this study primarily uses data drawn from the first two waves. Dependent variables and emotional engagement are drawn from Wave 2, and lagged variables are drawn from Wave 1.

In addition to this data collection, Add Health also selected students to be included in a sibling subsample and surveyed the siblings of this subsample at each wave. Thus, the sibling subsample consists of related sibling pairs living in the same household, including a large number of twins. This subsample makes the Add Health data ideal for conducting within-family analyses. The analytic sample for the present study consisted of youth with full data on Time 2 emotional engagement and outcomes, but not necessarily all covariates, for each modeling strategy, ranging from 3,570 in the sibling subsample to 12,330 in the full sample.

Measures

Emotional Engagement. In the NLSY, emotional engagement with school was measured with seven items drawn from the child-report school rating scale. These items were selected based on both previously published emotional engagement scales (e.g., Li & Lerner, 2011, 2013; Libbey 2004; Wang & Eccles, 2011; Wang & Fredricks, 2014) and conceptual definitions of emotional engagement (e.g., Fredricks et al., 2016; Reschly & Christenson, 2012; Wang & Degol, 2014). Items assess students' perceptions of teachers, liking of school, ease of making friends, and safety. Sample items include "How satisfied are you with your school?" "Most of my classes are boring," and "I don't feel safe at this school" (the latter two are reverse coded). Items were summed to create a scale ranging from 0 to 28, which was standardized. Cronbach's alphas for this scale ranged from .61 to .71, similar to other scales assessing emotional engagement with school (e.g., Li & Lerner, 2011; Wang & Fredricks, 2014).

Emotional engagement with school was measured in the Add Health using six items that assessed perceptions of teachers, liking of school, safety at school, and sense of belonging in school, such as "I am happy in my school," "I feel like a part of my school," and "You feel safe in your school." These items were summed to create a scale ranging from 0 to 24, which was standardized, and yielded Cronbach's alphas of .71 and .73 at Waves 1 and 2, respectively. These items have been used in several previous studies using Add Health (Markowitz, 2016; McNeely & Falci, 2004; Resnick et al., 1997).[1]

A side-by-side comparison of the two scales is presented in Appendix A. Although the scales do not use the same items, each measures the same overarching constructs. Moreover, as noted above, both scales draw at least some items from other published emotional engagement scales (Li & Lerner, 2011, 2013; Wang & Eccles, 2011; Wang & Fredricks, 2014). Although the NLSY has fewer items assessing peer relationships than the Add Health and more items assessing overall liking, if these two scales are both measures of the same construct and include a typical selection of items used to measure engagement, then estimates should be comparable across models. This issue will be addressed more fully in the Discussion.

Cognitive and Behavioral Engagement. Measures of cognitive and behavioral engagement drawn from the time point prior to emotional engagement were included as covariates in all analyses. Measures of cognitive engagement captured

students' academic effort, thoughtfulness, and interest based on conceptual definitions and data availability. In the NLSY, cognitive engagement was measured by summing two items, "My schoolwork requires me to think" and "At this school, a person has the freedom to learn what interests him/her," to create a scale ranging from 2 to 8, which was standardized. In the Add Health, this was measured by summing two items asking respondents how often they have had trouble paying attention in school and completing schoolwork (South, Haynie, & Bose, 2007; Wang & Eccles, 2011) to create a scale ranging from 2 to 10, which was standardized.

Measures of behavioral engagement were constructed to measure participation in school and school-based activities, based on conceptual definitions of engagement (Fredricks, 2011; Fredricks et al., 2004) and availability. In the NLSY a four-level, ordinal measure of the number of days the student skipped school (0, 1, 2, or more than 2 days) was used to measure participation in school. In the Add Health, participation in school was measured with a continuous measure of days of school skipped, and participation in school-based activities was measured with a count of the extracurricular activities a student participated in (South et al., 2007). The behavioral engagement measures used in the Add Health are drawn from the in-school survey, which was collected only at Wave 1. Therefore, these data cannot support analyses that include contemporaneous measures of cognitive and behavioral engagement as they can in the NLSY, an issue that is addressed in supplementary analyses. Moreover, potential implications of using truancy as a measure of behavioral engagement—particularly in models predicting delinquent behavior—are addressed in sensitivity analyses and in the Discussion. Finally, like emotional engagement with school, the measures of cognitive and behavioral engagement are not identical across data sets; implications of this inconsistency are addressed in the Discussion.

Problem Behaviors and Psychological Functioning. Behavioral and psychological outcomes were operationalized as delinquency, depressive symptoms, and self-esteem.

Delinquency. In the NLSY, delinquency was measured with the four items asked at each wave. These items measured participation in fighting, stealing, and serious misbehavior at school. Each item was dichotomized such that 0 indicates no participation in the behavior and 1 indicates that the respondent engaged in the behavior at least once in the past year (e.g., Rowe, Rodgers, & Meseck-Bushey, 1992; Connolly & Beaver, 2014). These indicators were summed and standardized by age, yielding a standardized score ranging from 0 to 1 that reflects level of delinquent behavior relative to same-age peers. In Add Health, delinquency was measured by summing 18 dichotomous items assessing whether the respondent had participated in violent delinquency, theft, and status offenses in the past year (e.g., Markowitz, Ryan, & Marsh, 2015). Indicators for participation at each wave were summed and standardized by age as in the NLSY.

Depressive symptoms. In the NLSY, depressive symptoms were measured using nine items assessing respondents' sadness, listlessness, and melancholy (National Commission on Children, 1990), which has been used extensively in previous research (e.g., Han & Miller, 2009; Meyers & Miller, 2004). Items were summed to create a measure of depressive symptoms ranging from 9 to 27, then standardized; Cronbach's alphas ranged from .60 to .71. In the Add Health, respondents were asked 10 items drawn from the Center for Epidemiologic Studies–Depression Scale (Radloff, 1991), a widely used depressive symptoms scale (e.g., Markowitz, 2016; Shields & Beaver, 2011). Items asked how often in the past week respondents "felt that you could not shake off the blues" or "felt too tired to do things" and were summed to create a measure of depressive symptoms ranging from 0 to 30, then standardized. Cronbach's alphas were above .80 at both waves.

Self-esteem. In the NLSY, self-esteem and scholastic self-esteem were measured using 12 items drawn from the Self-Perception Profile for Children (SPPC; Harter, 1985), which measured respondents' sense of self-esteem and competence at school. The scale was computed by the NLSY (range = 60–240) and was standardized. Individual items are not provided by the NLSY; thus it was not possible to compute Cronbach's alpha in the present sample. However, other studies using the SPPC report high levels of internal validity, $\alpha > .80$ for both global self-esteem and scholastic competence (Granleese & Joseph, 1994; Harter, 2012). In the Add Health, self-esteem was constructed with six items that assessed respondents' agreement with statements such as "I have a lot to be proud of" and has been widely used (e.g., Resnick et al., 1997; Sieving et al., 2001). Items were summed to create a self-esteem scale ranging from 6 to 30, then standardized; Cronbach's alphas were both above .80.

Covariates. In both data sets, a rich set of covariates linked to both outcomes and engagement were chosen based on both theory and availability.

Age. In the NLSY, age was coded using the NLSY-provided age in years of the respondent at the time of each interview. Age was drawn from the year the emotional engagement and dependent variables were drawn (M = 13.04, SD = 1.06). In the Add Health, age was measured using the child's birthdate and interview date at Wave 1 (M = 15.10, SD = 1.64). In the moderation analyses, in which age was interacted with standardized emotional engagement, age variables were centered such that the youngest respondent's

age was recoded to zero to avoid multicollinearity and improve interpretability.

Other covariates. In both data sets, individual-level covariates included child gender, race, grade, closeness to mother, and Peabody Picture Vocabulary Test scores (PPVT; Dunn & Dunn, 1997) as a measure of cognitive skills.[2] At the family level, mother's marital status, education, and employment, as well as a measure of family income, were included. In the NLSY, all covariates were drawn from the year of dependent-variable collection, with the exception of income, which was averaged across child ages 0 to 16. In the Add Health, covariates were drawn from Wave 1, with the exception of PPVT, which was drawn from Wave 3.

A few covariates that were available in only one of the data sets were also included. In the NLSY, an indicator for birth order and a measure of mother's age at child's birth were included, as were measures of math and reading ability (Peabody Individual Achievement Test; Dunn & Markwardt, 1970). To address the presence of multiple cohorts in the NLSY, these analyses also included measures of the respondent's birth year and year of the dependent-variable assessment. In the Add Health, a lagged measure of grade point average (GPA; Wave 1) was also included. To test whether the differences in covariates across the two data sets impacted the comparability of the estimates, analyses that used only identical covariates are reported in Appendix B. These results are nearly identical to the main specification, with no changes in the sign or significance of estimated coefficients and no changes in magnitude greater than 0.01.

Analytic Strategy

Analyses proceeded in two stages. First, associations between emotional engagement and each outcome—depression, delinquency, and self-esteem—were compared across three modeling strategies in two different data sets (formulae presented below). Second, engagement was interacted with age in years (centered such that the youngest age is rescaled to zero) to assess whether associations between engagement and outcomes vary as children age (formulae presented in Appendix C).

First, to address the problem of directionality, an ordinary least squares (OLS) model including a lagged measure of the dependent variable was estimated, shown in Model 1 below. Because key variables are drawn from different waves of data collection, time subscripts are used to clarify the timing of measurement; the dependent variable and emotional engagement are marked with the subscript t to indicate that they were drawn from time t, whereas the lagged outcome and measures of behavioral and cognitive engagement are drawn from the time point prior, $t - 1$.

$$\begin{aligned}\text{Outcome}_{it} = \alpha &+ \beta_1\left(\text{Emotional Engagement}_{it}\right)\\ &+ \beta_2\left(\text{Behavioral Engagement}_{i(t-1)}\right)\\ &+ \beta_3\left(\text{Cognitive Engagement}_{i(t-1)}\right)\\ &+ \beta_4\left(\text{Outcome}_{i(t-1)}\right) + \beta_k\left(\text{Covariates}_i\right)\\ &+ \epsilon_{it}\end{aligned}$$

In this model, outcomes at time t are predicted from emotional engagement with school at time t, measures of behavioral engagement and cognitive engagement and the outcome from time $t - 1$, and a robust set of related covariates. Thus, the coefficient β_1 represents the average relationship between emotional engagement and a given outcome at time t net of previous outcome levels. Put another way, β_1 represents the weighted average of the relationship between emotional engagement and outcomes for individuals who had the same level of delinquent behavior, depressive symptoms, or self-esteem at the previous wave ($t - 1$). In this way, the inclusion of the lagged dependent variable reduces the threat of reverse causality because it removes any time-invariant predisposition toward a given level of outcomes from the measure of engagement.

Second, to address the issue of unmeasured, influential family-level variables, a sibling fixed-effects model was estimated, shown in Model 2.

$$\begin{aligned}\text{Outcome}_{ijt} = \alpha &+ \beta_1\left(\text{Emotional Engagement}_{ijt}\right)\\ &+ \beta_2\left(\text{Behavioral Engagement}_{ij(t-1)}\right)\\ &+ \beta_3\left(\text{Cognitive Engagement}_{ij(t-1)}\right)\\ &+ \beta_4\left(\text{Outcome}_{ij(t-1)}\right)\\ &+ \beta_k\left(\text{Covariates}_{ij}\right) + \gamma_{jt} + \epsilon_{ijt}\end{aligned}$$

In this model, outcomes for student i in family j at time t are predicted from emotional engagement with school at time t, measures of behavioral engagement and cognitive engagement and the outcome drawn from time $t - 1$, and the family-specific error term γ_j. The inclusion of this error term is like including a family-specific intercept, which absorbs any shared omitted family-level variables that influence student outcomes. These include shared rearing environment—parenting style, family investments, family social capital—and the 50% of genetic information that is shared between siblings. Thus, in these models, β_1 represents the association between within-family differences in emotional engagement and within-family differences in behavioral and psychological

outcomes. Importantly, this model also includes a lagged measure of the dependent variable (β_4) to address bidirectionality and between-sibling differences in the predisposition to outcomes.

Third, to account more directly for omitted, stable, child-level influences on outcomes and engagement, a first-difference model was estimated using Model 3 below.

$$\Delta\text{Outcome}_i = \Delta\alpha + \beta_1\left(\Delta\text{Emotional Engagement}_i\right) + \beta_k\left(\Delta\text{Covariates}_i\right) + \Delta\epsilon_i$$

In this model, child-level changes (Δ) in emotional engagement with school are used to predict child-level changes in behavioral and psychological outcomes, where time $t - 1$ is differenced from time t, that is, $t - (t - 1)$. Only time-varying covariates are included in this model (in the Add Health, this includes change in GPA; in the NLSY, this includes change in cognitive and behavioral engagement, parent marital status, parent employment, and family income). By differencing all variables in the equation, this model examines how emotional engagement and outcomes change together over time and removes the stable impact of unobserved, time-invariant child characteristics, such as race, gender, and any stable personality or family factors. Thus in these models, the coefficient β_1 represents the average change in outcomes for a one-unit change in emotional engagement (regardless of previous levels of engagement).

To test the second research question, whether associations between emotional engagement and delinquency, depressive symptoms, and self-esteem vary by student age, all models were repeated with the inclusion of an interaction between emotional engagement (mean centered and standardized) with school and a centered child age variable (see Appendix C).

In both samples, data were multiply imputed to account for missing covariate information only (von Hippel, 2007) using the ICE command in Stata, which is based on a regression-switching protocol using chained equations (Royston, 2007; von Hippel, 2007; White, Royston, & Wood, 2011). Dependent variables were not imputed as imputing dependent variables can lead to excess noise in estimation (von Hippel, 2007; White et al., 2011).[3] Imputation was conducted following conventional guidelines (Graham, 2009; Graham, Olchowski, & Gilreath, 2007), and 15 imputed data sets were generated and coefficients and standard errors were combined using the MIM command. All dependent and independent variables are standardized; thus all coefficients can be interpreted as effect sizes. Additionally, in the Add Health, all full-sample models were weighted using the Add Health–provided Wave 2 survey weights to produce nationally representative estimates based on sampling design and attrition. Finally, because of the large number of siblings in the NLSY, a random-effects estimator that accounts for the clustered nature of the data was used in the OLS and first-difference models.

Results

Descriptive statistics for both samples are provided in Table 1. As expected based on design, youth in the Add Health are older and more advantaged than those in the NLSY. For example, they are more likely to be White and to have married parents, and they come from families that have on average higher income-to-needs ratios. Youth in the Add Health also have higher PPVT scores.

Results from models exploring associations between engagement and behavioral and psychological outcomes are presented in Table 2. Across all data sets, modeling strategies, and dependent variables, emotional engagement with school was statistically significantly beneficially associated with outcomes. Moreover, with the exception of delinquent behavior in the NLSY, emotional engagement with school was consistently the most strongly associated dimension of engagement. As expected, OLS coefficients were larger than both sibling models and first-difference models in all cases. Because statistical significance may not indicate practically significant associations, all coefficients are presented as effect sizes; estimated associations were small to moderate in size, ranging from about 0.10 to 0.20 of a standard deviation.

Delinquency

Associations between emotional engagement with school and delinquent behavior were initially higher in the NLSY than in the Add Health data (in OLS models, $b = -0.20$ and $b = -0.07$, respectively). In the sibling fixed-effects models, NLSY associations reduced but were still statistically significant ($b = -0.18$); however, the association between emotional engagement and delinquency increased slightly in sibling in the Add Health data ($b = -0.12$). In first-difference models, associations remained statistically significant but again decreased in magnitude. Notably, the estimated associations between emotional engagement and delinquency were nearly identical across data sets using first-difference models ($b = -0.09$ and -0.07, respectively).

Depressive Symptoms

Associations between emotional engagement and depressive symptoms were remarkably consistent across data sets and followed expected patterns across models. In both the NLSY and Add Health data, OLS associations between emotional engagement and depressive symptoms were initially −0.18 of a standard deviation. In the sibling fixed-effects models, these coefficients were −0.17 and −0.07, respectively. Notably, the particularly large drop in the estimate for

TABLE 1
Descriptive Statistics by Sample

	NLSY		Add Health	
Variable	*M*	*SD*	*M*	*SD*
Emotional engagement	21.66	3.52	18.55	3.73
Cognitive engagement	6.27	1.50	8.20	1.98
Behavioral engagement–skipped school	0.20	0.63	1.77	6.99
Behavioral engagement–activities			2.31	2.59
Delinquency (DV)	1.17	1.10	3.39	4.90
Delinquency (lag)	1.04	1.05	4.82	5.76
Depressive symptoms (DV)	15.65	3.16	6.56	4.73
Depressive symptoms (lag)	15.86	3.28	6.63	4.70
Self-esteem (DV)	206.70	33.60	25.10	3.50
Self-esteem (lag)	205.37	34.44	24.70	3.56
Scholastic self-esteem (DV)	177.18	41.34		
Scholastic self-esteem (lag)	173.93	42.52		
GPA (lag)			2.79	0.78
PPVT score	91.67	18.62	100.72	14.88
PIAT math score	100.35	14.70		
PIAT reading comprehension score	96.83	13.59		
Child age	13.12	1.29	15.10	1.64
White	0.47		0.73	
Black	0.32		0.16	
Hispanic	0.21		0.01	
Asian			0.04	
Other			0.06	
Female	0.50		0.50	
Grade in school	6.98	1.43	9.07	1.51
Relationship with mother	3.43	0.81	3.29	0.69
Parents married	0.58		0.74	
Parent education	12.56	2.60	0.46	
Parent employed	35.15	22.07	0.56	
INR	2.80	2.43	4.23	7.70
Year at DV	1999	6.24		
Mother's age at youth's birth	25.20	5.91		
First-born	0.43			
Birth year	1986	6.40		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY) and the National Longitudinal Study of Adolescent Health (Add Health). Descriptive statistics are taken from respondents with a valid measure of emotional engagement with school, $N = 7{,}731$ in the NLSY and $N = 13{,}366$ in the Add Health. Measures of behavioral engagement–skipped school are presented here as simple means of the number of days students skipped school as measured in each data set; in regression analyses, these measures are reverse coded such that higher levels indicate more behavioral engagement, that is, less truancy. Grade point average is measured in Add Health using student report of grades in four core classes. In the NLSY, parent employment is a continuous variable that assess the weeks in the prior year a parent was employed (78% of the sample had been employed for at least 1 week); in the Add Health, it is a dummy variable based on parents' response to an item asking if they were employed. In the NLSY, parent education is coded as years of schooling completed by the child's mother; in the Add Health, parent education is a four-level dummy variable with the categories less than high school, high school completion, some college, and college or more. The reported statistic is the proportion of parents with at least a high school degree. Note that because all engagement and dependent variable measures vary across samples, means and standard deviations cannot be directly compared. DV = dependent variable; GPA = grade point average; PPVT = Peabody Picture Vocabulary Test; PIAT = Peabody Individual Achievement Test; INR = Income to Needs Ratio.

the Add Health data is consistent with the large number of twins in those data. Finally, first difference estimates were nearly identical to sibling models, −0.16 and −0.17 in the NLSY and Add Health samples.

Self-Esteem and Scholastic Self-Esteem

In the NLSY, both self-esteem and scholastic self-esteem were statistically significantly associated with engagement. In

TABLE 2
Behavioral and Psychological Outcomes as a Function of School Engagement

	NLSY									Add Health								
Variable	OLS, lagged DV			Sibling FE			First difference			OLS, lagged DV			Sibling FE			First difference		
Delinquency	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
Emotional engagement	−0.20	0.01	**	−0.18	0.02	**	−0.09	0.02	**	−0.07	0.01	**	−0.12	0.02	**	−0.07	0.01	**
Cognitive engagement	0.00	0.01		0.02	0.02		−0.02	0.02		−0.06	0.02	**	−0.04	0.03				
Behavioral engagement–skipped school	0.02	0.01		0.02	0.02		−0.24	0.02	**	0.01	0.01		−0.03	0.02				
Behavioral engagement–activities										0.05	0.02	*	0.00	0.03				
Lagged DV	0.27	0.02	**	0.24	0.02	**				0.53	0.03	**	0.36	0.02	**			
n	7058			7058			4013			12242			3563			11967		
Depressive symptoms																		
Emotional engagement	−0.18	0.01	**	−0.17	0.02	**	−0.16	0.02	**	−0.19	0.01	**	−0.07	0.03	**	−0.17	0.01	**
Cognitive engagement	−0.02	0.01		−0.03	0.02	†	0.01	0.02		−0.03	0.01	*	−0.09	0.03	**			
Behavioral engagement–skipped school	0.01	0.02		0.01	0.02		−0.07	0.02	**	−0.00	0.01		0.02	0.03				
Behavioral engagement–activities										0.02	0.01		0.03	0.03				
Lagged DV	0.22	0.02	**	0.19	0.02	**				0.45	0.01	**	0.22	0.03	**			
n	6,813			6,813			4,018			12,327			3,576			12,047		
Self-esteem																		
Emotional engagement	0.19	0.01	**	0.16	0.02	**	0.13	0.02	**	0.20	0.01	**	0.23	0.02	**	0.18	0.01	**
Cognitive engagement	−0.00	0.01		−0.02	0.02		0.02	0.02		0.04	0.01	**	0.04	0.03				
Behavioral engagement–skipped school	0.00	0.01		0.01	0.02		0.03	0.02		0.01	0.01		0.05	0.02	†			
Behavioral engagement–activities										−0.00	0.01		−0.02	0.02				
Lagged DV	0.30	0.02	**	0.26	0.02	**				0.45	0.01	**	0.35	0.02	**			
n	6,290			6,290			2,430			12,330			3,570			12,047		
Scholastic esteem																		
Emotional engagement	0.15	0.01	**	0.11	0.02	**	0.12	0.02	**									
Cognitive engagement	0.01	0.01		0.01	0.02		−0.02	0.02										
Behavioral engagement–skipped school	0.02	0.02		0.02	0.02		0.05	0.02	*									
Lagged DV	0.35	0.02	**	0.32	0.02	**												
n	6,289			6,289			2,430											

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY) and the National Longitudinal Study of Adolescent Health (Add Health). All dependent and presented independent variables are standardized such that presented coefficients can be interpreted as effect sizes. Covariates included but not shown for both data sets include child age, grade in school, gender, race, closeness to mother, and Peabody Picture Vocabulary Test score; parent marital status, education, and employment; and family income. In the NLSY, additional covariates include mother's age at the child's birth, birth order, year that dependent variable was assessed, Peabody Individual Achievement Test math and reading scores, and birth year. In Add Health, a measure of the previous year's grade point average is also included. Measures of behavioral engagement–skip school are reverse coded in all analyses such that higher numbers indicate fewer days of skipped school (higher behavioral engagement). Add Health regressions are weighted using Add Health sampling weights, GSWGT2. OLS = ordinary least squares; DV = dependent variable; FE = fixed effects.
† $p < .10$. *$p < .05$. **$p < .01$.

TABLE 3

Associations Between Age, Emotional Engagement, and Behavioral and Psychological Outcomes, Add Health Data

	OLS			Sibling FE			First Difference		
Variable	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
Delinquent behavior									
Emotional engagement	−0.16	0.03	**	−0.28	0.06	**	−0.15	0.04	**
Age × Engagement	0.02	0.01	**	0.04	0.01	**	0.02	0.01	*
Lagged DV	0.53	0.03	**	0.36	0.02	**			
Child age, centered	0.01	0.02		−0.04	0.03		−0.04	0.01	**
n	12,242			3,563			12,132		
Depressive symptoms									
Emotional engagement	−0.22	0.03	**	0.04	0.07		−0.26	0.04	**
Age × Engagement	0.01	0.01		−0.02	0.01		0.02	0.01	*
Lagged DV	0.45	0.01	**	0.22	0.03	**			
Child age, centered	0.05	0.02	**	0.08	0.04	†	−0.02	0.01	†
n	12,327			3,576			12,214		
Self-esteem									
Emotional engagement	0.24	0.03	**	0.23	0.06	**	0.27	0.03	**
Age × Engagement	−0.01	0.01		0.00	0.01		−0.02	0.01	**
Lagged DV	0.45	0.01	**	0.35	0.02	**			
Child age, centered	−0.02	0.02		−0.01	0.04		0.02	0.01	*
n	12,330			3,570			12,217		

Note. Data are drawn from the National Longitudinal Study of Adolescent Health (Add Health). All dependent and presented independent variables are standardized such that presented coefficients can be interpreted as effect sizes. Covariates included but not shown include child's grade in school, gender, race, closeness to mother, previous year's grade point average, and Peabody Picture Vocabulary Test score; parent marital status, education, and employment; and family income. Measures of cognitive (engagement in class and homework) and behavioral engagement (school skipping and activities) are also included. Regressions are weighted using Add Health sampling weights, GSWGT2. OLS = ordinary least squares; FE = fixed effects; DV = dependent variable.
† $p < .10$. *$p < .05$. **$p < .01$.

OLS models, a one-standard-deviation increase in emotional engagement with school was associated with a 0.19-standard-deviation increase in self-esteem and a 0.15-standard-deviation increase for scholastic self-esteem. In first-difference models, these associations were reduced to 0.13 and 0.12 of a standard deviation, respectively. In the Add Health sample, however, the association between emotional engagement and self-esteem was similar in OLS ($b = 0.20$), sibling models ($b = 0.23$), and first-difference models ($b = 0.18$).

Moderation by Age

Across both data sets, in nearly all cases there was no age-based differentiation in the association between emotional engagement with school and outcomes (for Add Health results, see Table 3; NLSY tables available upon request). The one exception to this pattern of findings was for delinquent behavior in the Add Health. Specifically, across a variety of age specifications, associations between emotional engagement with school and delinquent behavior decreased over time by 0.02 to 0.04 standard deviations per year ($p < .05$). Additionally, in first-difference models examining depressive symptoms and self-esteem, statistically significant interactions with age emerged such that for each additional year, a change in emotional engagement with school produced a 0.02-standard-deviation smaller change in outcomes ($p < .05$). Notably, this interaction was not significant in OLS or sibling models, suggesting that although levels of engagement are equally important across adolescence for behavioral and psychological outcomes, experiencing *changes* in engagement may become less significant as students age.

These findings were robust to several different specifications of student age, including the addition of higher-order terms, generating a dummy variable indicating that youth were in late adolescence, and estimating the relationship for each age separately.

Timing of Cognitive and Behavioral Engagement Measure

Preferred models included lagged measures of cognitive and behavioral engagement. These constructs were lagged because of theoretical and empirical evidence that emotional engagement with school is associated with cognitive and behavioral engagement (Ryan & Deci, 2009; Li & Lerner, 2013). As noted above, including these lags accounts for the potential influence of these types of engagement on outcomes insofar as cognitive and behavioral engagement are stable across time but does not overcontrol the potential influence of

emotional engagement on behavioral and cognitive engagement. However, it may be that the relationship between emotional engagement and outcomes was artificially inflated based on the absence of contemporaneous measures of cognitive and behavioral engagement. Thus, consistent with best practice in the engagement literature (Wang & Fredricks, 2014), sensitivity analyses were conducted that included measures of emotional, behavioral, and cognitive engagement all drawn from the same time point.

These models were conducted with the NLSY only because, as described above, the Add Health did not include measures of emotional, cognitive, and behavioral engagement at both Wave 1 and Wave 2. The estimated coefficients on emotional engagement in the models including contemporaneous measures of cognitive and behavioral engagement were similar in magnitude to those from the preferred specification (Appendix D). Moreover, across nearly all models, the association between emotional engagement and outcomes remained stronger than the associations between cognitive and behavioral engagement and outcomes. The exception to this pattern was delinquent behavior, for which associations between emotional engagement and delinquency were reduced, and associations between contemporaneous behavioral engagement (truancy) and delinquency were larger than the associations between emotional engagement and delinquency. This pattern of results is consistent with previous evidence that suggests emotional engagement may drive behavioral engagement (Li & Lerner, 2013). However, it is notable that emotional engagement with school retains its relationship with delinquency ($b = -0.16$), even after accounting for contemporaneous truancy.

Discussion

This paper examined the association between emotional engagement with school and students' behavioral and psychological outcomes across a series of increasingly rigorous models, partially addressing several key threats to causal inference present in the existing school engagement literature, including bidirectionality and omitted child- and family-level confounders. Associations persisted across all three modeling strategies; thus, although not casual themselves, findings from the present study are consistent with a causal link between school engagement and outcomes. Moreover, associations were strikingly similar across two large, national data sets, providing evidence for the external validity of the findings and responding to calls for replication in the social science literature. Findings across specifications corroborate the hypothesis that emotional engagement with school is particularly important for behavioral and psychological outcomes (Li & Lerner, 2013; Wang & Fredricks, 2014; Wang & Peck, 2013) and indeed may be a powerful prerequisite for meaningfully participating in the tasks and behaviors schools use to promote healthy development (Eccles & Wigfield, 2002; Ryan & Deci, 2009).

Additionally, there is preliminary evidence that the association between levels of emotional engagement and outcomes diminishes as children age only for delinquent behavior, suggesting that emotional engagement with school is important for youth's psychological well-being across both primary and secondary school. Notably, however, the association between changes in emotional engagement and changes in outcomes decreased as children aged across all outcomes, highlighting the importance of using resources to create broader, systemic changes that promote long-lasting emotional connection rather than for interventions or programs that create short-term boosts in engagement.

Replication Across Data Sets

Associations and effect sizes were remarkably consistent across data sets. Four of the nine estimated associations were within two hundredths of a standard deviation. The exception to this pattern was delinquent behavior; the associations between emotional engagement and delinquency were much larger in the NLSY than in the Add Health data. This difference may have emerged for two reasons. First, the Add Health delinquency scale was substantially richer, including18 items—many of which were serious or violent offenses—as compared to only four in the NLSY. Moreover, the NLSY items included a question that asked about being pulled out of school for delinquent behavior, which specifically links the delinquency scale to in-school behavior and may have inflated associations. Second, the respondents in the Add Health survey were substantially older than in the NLSY. Given the decrease in association between delinquent behavior and emotional engagement as children age, it may be that the older sample of students in the Add Health led to a smaller on average association than in the NLSY, even after accounting for age in the model. Sensitivity analyses supported these hypotheses. First, changing the Add Health delinquency scale to more closely align with the NLSY items inflated the association between emotional engagement and delinquency in the Add Health data. Second, after reducing the Add Health sample to the ages of NLSY respondents, the estimated effect sizes in delinquency models were more similar.

The Primacy of Emotional Engagement

Across nearly all models, emotional engagement was the strongest predictor of outcomes, second only to the lagged outcome measures. The effect size for emotional engagement was typically about one third to three quarters of the size of the estimated effect size for the lagged measure. This finding is consistent with previous literature documenting the importance of relatedness (Ryan & Deci, 2009), students' connection to school (Osterman, 2000), and emotional engagement for students' behavioral and psychological outcomes (Fredricks et al., 2004; Upadyaya & Salmela-Aro,

2013). Emotional engagement was particularly predictive of depressive symptoms and self-esteem, in line with previous research (Li & Lerner, 2013; Wang & Fredricks, 2014; Wang & Peck, 2013). These outcomes may be based on day-to-day emotional experiences—a large proportion of which occur in school—and youth's interpretation of these experiences as well as self-evaluation in relation to success in school. A youth who feels connected to school may be particularly buoyed by positive in-school relationships and academic successes and may be able to draw on these positive experiences to help overcome frustrating or challenging outcomes (Skinner & Pitzer, 2012). Moreover, strong in-school relationships facilitated by emotional engagement may provide opportunities for the modeling and practice of positive emotion regulation strategies (Marroquin, 2011).

Such findings suggest that schools hoping to enhance students' psychological functioning should focus on emotional engagement in particular rather than interventions designed to enhance behavioral engagement indicators (e.g., homework completion, attendance) or students' sense of school's importance. Schools should endeavor to build a sense of community among students and between students and teachers through students' day-to-day interactions within the school (Fredricks, 2011; Jones & Bouffard, 2012; Lawson & Lawson, 2013). For example, school policies designed to provide opportunities for student bonding with teachers, such as teacher looping and homeroom periods, may be beneficial. Classroom activities designed to promote student bonding (e.g., group work, experiential learning) may facilitate peer-to-peer and teacher-student bonding. Additionally, features of the school context, including available extracurricular activities, class and school size, tracking policies, and culture building initiatives, may play a role in creating contexts that promote emotional engagement (Fredricks et al., 2004; Lawson & Lawson, 2013; Osterman, 2000).

Conversely, delinquent behavior may be influenced by a wider variety of outside-of-school factors, such as neighborhood characteristics, out-of-school peers, and increases in unsupervised time (Haynie & Osgood, 2005; Sciandra et al., 2013; Smetana et al., 2006). Even an adolescent who feels connected to school may struggle to avoid delinquent behavior in the face of hours of unsupervised time with peers, high levels of neighborhood disorganization and opportunities to offend, or a neighborhood gang context. Particularly in the Add Health data, in which delinquency included youth participation in status and drug-related offenses, out-of-school factors may account for much of the variation in delinquent behavior.

Variation in the Relationship Between Emotional Engagement and Outcomes by Age

Associations between levels of emotional engagement and delinquency decreased with age, suggesting that as students age, the strength of emotional engagement with school diminishes relative to other factors associated with delinquency. As noted above, delinquent behavior is likely to be associated with a broad range of out-of-school factors, and the importance of these factors relative to the role of schools likely increases as youth age. Previous research has demonstrated the growth in the importance of peers in adolescence (e.g., Brown & Larson, 2009) and highlighted the importance of unsupervised time in delinquent behavior specifically for adolescents (e.g. Weerman, Bernasco, Bruinsma, & Pauwels, 2015), likely diminishing the role of school in preventing delinquency.

The interactions between age and emotional engagement across all three first-difference models, including those for depressive symptoms and self-esteem, in the Add Health data suggest that as youth age, experiencing a change in emotional engagement has a smaller association with outcomes. However, this interaction did not emerge in the NLSY, in which youth ages ranged from 10 to 14, suggesting that this decline occurs mostly in late adolescence. This may be the case for two reasons. First, by late adolescence, the positive relationships and coping strategies youth have already developed may reduce the ability of disruptions in emotional engagement to alter outcomes, both positively and negatively. Second, it may be that other aspects of youth's lives grow in importance as they age, such as work, sports, or out-of-school activities (Eccles, Barber, Stone, & Hunt, 2003; Erol & Orth, 2011; Scales et al., 2006). Experiences and successes in these other contexts may reduce the relative contribution of sudden changes in emotional engagement with school to outcomes. This suggests that although interventions designed to enhance emotional engagement may be most effectively targeted at younger students, policies and programs hoping to leverage engagement to improve the behavioral and psychological outcomes of middle and high school youth need to focus on building school contexts that promote continuously high levels of emotional engagement (Lawson & Lawson, 2013).

Limitations

Although a strength of the study is the examination of associations across two large, national data sets, allowing for both an examination of the role of engagement in promoting behavioral and psychological outcomes among a diverse set of students and the application of new estimation strategies, the use of these two data sources created two measurement issues. First, the alpha values for the emotional engagement scales were somewhat low, ranging from 0.61 to 0.73. These alphas fall into the acceptable range, and items were selected based on previous literature (Li & Lerner, 2011, 2013; Wang & Eccles, 2011; Wang & Fredricks, 2014), but the low internal consistency may indicate a weak measure of emotional engagement, which may have biased downward estimated associations between emotional engagement and outcomes.

Second, the use of two data sources led to differences in the measurement of emotional engagement with school across analyses. Although the scales overlapped substantially (Appendix A), there were differences in number of items and item phrasing. However, insofar as these measures were both correlated with the same overarching construct, then these differences should not bias estimates; that is, if both measures assess the same components of emotional engagement with school, they should be appropriate for comparison. Although this cannot be known, items for the two scales were selected to be similar. Moreover, the consistency across findings is reassuring. It is not clear why findings would be so parallel if the two scales were ultimately measuring different constructs.

Similarly, measures of cognitive and behavioral engagement differed across data sets. Although items were chosen to map onto students' effort, interest, and participation in school, respectively, just a few items met these criteria in each data set. The small number of items in these scales may not encapsulate the constructs of cognitive and behavioral engagement in their entireties and thus may have led to an artificially low association with outcomes in this analysis; as such, these coefficients should be interpreted with caution.

Emotional engagement with school is a product of both student and school characteristics; therefore, the major threat to causal inference is that unobserved student characteristics that are correlated with outcomes may bias associations. Although this study uses several methods to minimize this threat to internal validity, it cannot eliminate such threats; it remains a correlational, rather than causal, analysis. Associations between emotional engagement and outcomes were reduced across models; however, associations did not fully attenuate. Moreover, previous experimental research does support a causal link between engagement and outcomes in an intervention context. For example, in a series of papers, Battistich and colleagues demonstrate that an intervention designed to build caring school communities boosted engagement with school and thereby reduced delinquent behavior and substance use (Battistich, Schaps, & Wilson, 2004; Solomon et al., 2000). Thus, although this analysis is not causal in nature, it does provide evidence supporting a causal relationship.

Conclusions

The present study supports the importance of continuing to research—and enhance through policy and programs—school engagement and, in particular, emotional engagement. This analysis builds on the school engagement (Fredricks et al., 2004), school connection (Osterman, 2000), and experimental literatures (Solomon et al., 2000) by providing rigorous nonexperimental evidence consistent with a causal link between emotional engagement with school and youth behavioral and psychological outcomes as well as evidence that this association persists across adolescence. During adolescence, youth are learning to cultivate healthy relationships and positive self-identity and to become productive members of society. Schools are the fundamental place that society can support youth in these developmental tasks. Educators and policymakers hoping to build schools that will help students succeed must pay attention to how practice and policy shape students' experiences in and engagement with school; researchers hoping to guide these decisions should continue to explore the ways in which schools build emotional engagement, and how policies support or hinder these attempts.

Appendix A

School Engagement Items in the Add Health and NLSY Data Sets

School Engagement	Add Health Items, collected Waves 1 and 2 (1993–1996)	NLSY items, collected from1988 to 2012, data drawn from the year when each respondent was age 10 to 14
Emotional engagement	You feel close to people at your school You feel like you are part of your school	It is easy to make friends
	The teachers at your school treat students fairly How much do you feel teachers care about you?	Most teachers help with personal problems Most teachers know their subjects well
	You are happy to be at your school You feel safe in your school	Most of my classes are boring I don't feel safe at this school You can get away with anything at this school How satisfied are you with your school
Cognitive engagement	How often have you had trouble paying attention in school? How often have you had trouble getting homework completed?	My schoolwork requires me to think At this school, a person has the freedom to learn what interests him/her.
Behavioral engagement	How many times did you skip school for a full day without an excuse? Number of extracurricular activities reported at wave 1 interview	How often did you skip school this/last year without a parent's permission?

Note. Add Health = National Longitudinal Study of Adolescent Health; NLSY = National Longitudinal Survey of Youth.

Appendix B

Delinquency, Depressive Symptoms, and Self-Esteem as a Function of School Engagement, Only Identical Covariates in Each Model

	NLSY									Add Health								
	OLS, Lagged DV			Sibling FE			First Difference			OLS, Lagged DV			Sibling FE			First Difference		
Variable	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
Delinquency																		
Emotional engagement	−0.20	0.01	**	−0.18	0.02	**	−0.12	0.02	**	−0.07	0.01	**	−0.13	0.02	**	−0.07	0.01	**
Cognitive engagement	0.00	0.01		0.02	0.02					−0.06	0.02	**	−0.05	0.03	†			
Behavioral engagement–skip school	0.02	0.02		0.02	0.02					0.01	0.01		−0.03	0.02				
Behavioral engagement–activities																		
Lagged DV	0.28	0.02	**	0.24	0.02	**				0.54	0.03	**	0.35	0.02	**			
n	7,058			7,058			4,013			12,242			3,958			11,967		
Depressive symptoms																		
Emotional engagement	−0.18	0.01	**	−0.17	0.02	**	−0.17	0.02	**	−0.19	0.01	**	−0.07	0.02	**	−0.17	0.01	**
Cognitive engagement	−0.02	0.01	†	−0.03	0.02	†				−0.04	0.01	*	−0.09	0.03	**			
Behavioral engagement–skip school	0.01	0.02		0.01	0.02					0.00	0.01		0.00	0.03				
Behavioral engagement–activities																		
Lagged DV	0.22	0.02	**	0.19	0.02	**				0.45	0.01	**	0.21	0.03	**			
n	6,813			6,813			4,018			12,327			3,975			12,047		
Self-esteem																		
Emotional engagement	0.19	0.01	**	0.17	0.02	**	0.15	0.02	**	0.20	0.01	**	0.23	0.02	**	0.19	0.01	**
Cognitive engagement	−0.01	0.01		−0.02	0.02		*			0.05	0.01	**	0.04	0.03				
Behavioral engagement–skip school	0.01	0.02		0.00	0.02					0.01	0.01		0.03	0.02				
Behavioral engagement–activities																		
Lagged DV	0.30	0.02	**	0.26	0.02	**				0.45	0.01	**	0.36	0.02	**			
n	6,290			6,290			2,430			12,330			3,971			12,047		
Scholastic esteem																		
Emotional engagement	0.16	0.01	**	0.13	0.02	**	0.13	0.02	**									
Cognitive engagement	−0.00	0.01		0.00	0.02													
Behavioral engagement–skip school	0.02	0.02		0.02	0.02													
Lagged DV	0.39	0.02	**	0.36	0.02	**												
n	6,289			6,289			2,430											

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY) and the National Longitudinal Study of Adolescent Health (Add Health). All dependent and presented independent variables are standardized such that presented coefficients can be interpreted as effect sizes. Covariates included but not shown for both data sets include child age, grade in school, gender, race, closeness to mother, and Peabody Picture Vocabulary Test score; parent marital status, education, and employment; and family income. In the NLSY, additional covariates include year that dependent variable was assessed and birth year to account for cohort effects not present in the Add Health data. Measures of behavioral engagement–skip school are reverse coded in all analyses such that higher numbers indicate fewer days of skipped school (higher behavioral engagement). Add Health regressions are weighted using Add Health sampling weights, GSWGT2. OLS = ordinary least squares; DV = dependent variable; FE = fixed effects.

† $p < .10$. * $p < .05$. ** $p < .01$.

Appendix C

Formulae for Moderation by Age Analysis

To test whether associations between emotional engagement and delinquency, depressive symptoms, and self-esteem varied by student age, emotional engagement (standardized such that the mean emotional engagement score is equal to 0, with a standard deviation of 1) was interacted with age in years (centered such that the youngest age is rescaled to zero).

As in the main analysis, the first model estimated was ordinary least squares regression with a lagged dependent variable model, as shown below.

$$\begin{aligned}\text{Outcome}_{it} &= \alpha + \beta_1\left(\text{Emotional Engagement}_{it}\right)\\ &+ \beta_2(\text{Emotional Engagement}_{it} \times \text{age}_{it})\\ &+ \beta_3\left(\text{Behavioral Engagement}_{i(t-1)}\right)\\ &+ \beta_4\left(\text{Cognitive Engagement}_{i(t-1)}\right)\\ &+ \beta_5\left(\text{Outcome}_{i(t-1)}\right) + \beta_k\left(\text{Covariates}_i\right) + \epsilon_{it}\end{aligned}$$

In this model, outcomes at time t are predicted from emotional engagement with school at time t, measures of behavioral engagement and cognitive engagement and the outcome drawn from time $t - 1$, and a robust set of related covariates, including student age at time t. Thus, the coefficient β_1 represents the average relationship between emotional engagement and the outcome for the youngest child in the sample at time t net of previous levels of the outcome; the coefficient β_2 represents the change in the relationship between emotional engagement and the outcome for each subsequent student age.

Second, a sibling fixed-effects model was estimated, shown below.

$$\begin{aligned}\text{Outcome}_{ijt} &= \alpha + \beta_1\left(\text{Emotional Engagement}_{ijt}\right)\\ &+ \beta_2\left(\text{Emotional Engagement}_{ijt} \times \text{age}_{ijt}\right)\\ &+ \beta_3\left(\text{Behavioral Engagement}_{ij(t-1)}\right)\\ &+ \beta_4\left(\text{Cognitive Engagement}_{ij(t-1)}\right)\\ &+ \beta_5\left(\text{Outcome}_{ij(t-1)}\right) + \beta_k\left(\text{Covariates}_{ij}\right) + \gamma_{jt} + \epsilon_{ijt}\end{aligned}$$

In this model, outcomes for student i in family j at time t are predicted from emotional engagement with school at time t, measures of behavioral engagement and cognitive engagement and the outcome from time $t - 1$, and the family-level error term γ_j. In these models, β_1 represents the association between within-family differences in emotional engagement and within-family differences in outcomes estimated for the youngest children in the sample; the coefficient β_2 represents the within-family change in the *relationship* between emotional engagement and the outcome as students age 1 year.

Third, a first-difference, or change, model was estimated as shown below.

$$\begin{aligned}\Delta\text{Outcome}_i &= \Delta\alpha + \beta_1\left(\Delta\text{Emotional Engagement}_i\right)\\ &+ \beta_2\left(\Delta\text{Emotional Engagement}_i \times \text{age}_{it}\right)\\ &+ \beta_k\left(\Delta\text{Covariates}_i\right) + \Delta\epsilon_i\end{aligned}$$

In this model, the coefficient β_1 represents the average change in outcomes (from time $t - 1$ to time t) for a one-unit change in emotional engagement (from time $t - 1$ to time t, regardless of previous levels of engagement) for the youngest students in the sample; β_2 represents how the association between changes in emotional engagement and changes in outcomes changes by each year of student age.

Appendix D

Delinquency, Depressive Symptoms, and Self-Esteem as a Function of Contemporaneous Emotional, Cognitive, and Behavioral Engagement, NLSY

	OLS, Lagged DV			Sibling FE			First Difference		
Variable	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
Delinquency									
Emotional engagement	−0.16	0.01	**	−0.14	0.02	**	−0.09	0.02	**
Cognitive engagement	−0.02	0.01		−0.02	0.02		−0.02	0.02	
Behavioral engagement–skip school	−0.25	0.01	**	−0.25	0.02	**	−0.24	0.02	**
Lagged DV	0.24	0.01	**	0.21	0.02	**			
n	7,058			7,058			4,013		
Depressive symptoms									
Emotional engagement	−0.17	0.01	**	−0.16	0.02	**	−0.16	0.02	**
Cognitive engagement	−0.01	0.01		−0.01	0.02		0.01	0.02	
Behavioral engagement–skip school	−0.06	0.01	**	−0.06	0.02	**	−0.07	0.02	**
Lagged DV	0.22	0.02	**	0.18	0.02	**			
n	6,813			6,813			4,018		
Self-esteem									
Emotional engagement	0.18	0.01	**	0.15	0.02	**	0.13	0.02	**
Cognitive engagement	0.04	0.01	**	0.04	0.02	*	0.02	0.02	
Behavioral engagement–skip school	0.03	0.01	*	0.01	0.02		0.03	0.02	
Lagged DV	0.30	0.02	**	0.26	0.02	**			
n	6,290			6,290			2,430		
Scholastic esteem									
Emotional engagement	0.14	0.01	**	0.10	0.02	**	0.12	0.02	**
Cognitive engagement	0.01	0.01		0.01	0.02		−0.02	0.02	
Behavioral engagement–skip school	0.03	0.01	*	0.04	0.02	*	0.05	0.02	*
Lagged DV	0.36	0.02	**	0.32	0.02	**			
n	6,289			6,289			2,430		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY). All dependent and presented independent variables are standardized such that presented coefficients can be interpreted as effect sizes. Covariates included but not shown include child age, grade in school, gender, race, closeness to mother, Peabody Individual Achievement Test math and reading scores, Peabody Picture Vocabulary Test score, birth order, year that DV was assessed, and birth year; parent marital status, education, and employment; family income; and mother's age at the child's birth. Measures of behavioral engagement—skip school are reverse coded in all analyses such that higher numbers indicate fewer days of skipped school (higher behavioral engagement). OLS = ordinary least squares; DV = dependent variable; FE = fixed effects.
† $p < .10$. *$p < .05$. **$p < .01$.

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Notes

1. These citations typically refer to this scale as measuring school connection; other published work (Johnson, Crosnoe, & Elder, 2001; South, Haynie, & Bose 2007) use a subset of these items as a school attachment scale. This variability in naming is due to the conceptual overlap between emotional engagement and constructs like school connection and attachment (e.g., Fredricks, Blumenfeld, Friedel, & Paris, 2005; Libbey, 2004; Reschly & Christenson, 2012); these constructs overlap with students' sense of relatedness with their school, a core component of emotional engagement.

2. Because gender has been previously linked to both engagement and outcomes, supplementary analyses investigated variation in results across males and females. Findings showed no clear pattern of moderation by gender, so all analyses were conducted on the full sample.

3. Analyses comparing covariate information for the full imputed sample, that is, all observations with no missingness on the independent variable, to the samples restricted to observations with information on each dependent variable revealed no statistically or practically significant differences.

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