THE ROLE OF SCHOOL ENGAGEMENT AND EDUCATIONAL POLICY IN THE DEVELOPMENT OF SOCIO-EMOTIONAL SKILLS

A Dissertation
Submitted to the Faculty of the
Graduate School of Arts and Sciences
of Georgetown University
in partial fulfillment of the requirements for the
degree of Doctor of Philosophy
in Psychology

By

Anna Justine Markowitz, M.P.P.

Washington, DC
April 22, 2016

THE ROLE OF SCHOOL ENGAGEMENT AND EDUCATIONAL POLICY IN THE DEVELOPMENT OF SOCIO-EMOTIONAL SKILLS

Anna Justine Markowitz, M.A., M.P.P.

Thesis Advisor: Rebecca M. Ryan, Ph.D.

ABSTRACT

American public schools have long been the key policy mechanism for enhancing America's human resources and for giving students the skills they need to be successful, contributing citizens in the complex, 21st century economy. Increasingly, these 21st century skills have been defined as not only academic competence but also as social and emotional skills, including the ability to inhibit impulses and delay gratification, to maintain a positive sense of self, to sustain healthy social relationships, and to set and achieve long-term goals -- likely because of their links to both short-term educational success and long-run well-being.

Though evidence suggests that schools are able to enhance students' social and emotional skills, it remains unclear how schools can best improve these important outcomes. This dissertation explores the role of emotional engagement with school, or students' liking of, connection to, and sense of belonging in school, in promoting social and emotional development. The construct of school engagement has been previously associated with social and emotional outcomes, however this research has largely been conducted cross-sectionally with small, local samples, limiting its relevance for policy application. Moreover, no research has examined directly the role of federal education policy in shaping students' engagement. This dissertation fills these gaps by using multiple large, national datasets and several analytic techniques to (1) rigorously asses whether there is a plausibly causal link between emotional engagement with

school and socio-emotional outcomes, defined as delinquent behavior, depressive symptoms, and self-esteem, (2) determine if this relationship varies by student age, (3) determine whether this relationship varies as a function of family income, and (4) explore whether the enactment of No Child Left Behind impacted students' emotional engagement with school.

Findings suggest that the relationship between emotional engagement and socio-emotional outcomes is consistent across outcomes and moderate in size. This association decreases slightly as youth age, but does not vary by family income. However, findings also suggest that the consequential accountability systems enacted under No Child Left Behind eroded students' engagement with school. These findings highlight the importance of students' emotional connection to school, and have important implications for policymakers and educators working to implement the newly-authorized Every Student Succeeds Act.

ACKNOWLEDGEMENTS

My dissertation is little more than the sum of the supports that have been generously given to me along the way. I would like to thank my committee, Dr. Deborah Phillips, Dr. Nora Gordon, and Dr. Amy Claessens for their assistance and encouragement throughout this dissertation, throughout much of my graduate career, and in the search for what comes next. Your insights and critiques were extremely valuable to me, as were your perspectives and advice. I hope for many more discussions in the future. Deborah, I have particularly appreciated your openness to my many questions, your generosity with your time, wisdom, and opportunities, and your ability to step back and reflect on what is important and why we do this work. This, more than anything, I hope to keep with me moving forward.

Thank you to my dissertation funding sources including the Elizabeth Munsterberg Koppitz Child Psychology Graduate Fellowship from the American Psychological Foundation and the Dissertation Funding Award from the Society for Research in Child Development.

Thank you to all of the members of the Parenting and Child Development Lab and the Social Policy and Child Wellbeing Lab—that is, Christina Padilla and Jenna Finch. You have both been wonderful friends and supports through challenging projects, and constantly serve as an inspiration to me. You remind me to continue to ask questions-- and to work more carefully.

I would like to thank the members of the Georgetown Psychology Department for their expertise and encouragement during my time here, and for serving as an amazing example of collaboration and collegiality. Dr. Abby Marsh told me during the first week of graduate school to "never say no" and I couldn't be more grateful for that frank advice. Dr. Jen Woolard and Dr. Rachel Barr, thank you for serving as supportive, active graduate chairs. Rachel, I have immensely enjoyed our mutual eavesdropping, and your words of encouragement have always come at the right moment. Thank you also to my mentor at Boston College, Dr. Rebekah Levine Coley, for your push on to this path and your continued support. Also, to my original psychology mentor, Dr. Paul R. D'Agostino from Gettysburg College: from you I learned that psychology also means questioning myself and my own behavior, for which I am extremely grateful.

I would like to thank all of my friends and colleagues who have been so supportive along the way. In particular, I would like to thank my cohort-mates: Erika Fountain, Kristin Brethel-Haurwitz, Nicole Senft, and Laura Zimmermann. I can't begin to describe or to quantify what your friendship has meant to me over these 5 years. I am not sure I would have made it through the first semester—let alone 5 years—without the 4 of you. Your unwavering support, available ears, good humor, and sneak attack hugs have nourished me at the times I needed it most. Thank you. I'd also like to thank Cristina Novoa, my spirit mermaid and voice of reason, and Natalie Brito who taught me so much by example, and over lunch.

To my friends from college—you have been on this journey with me for longer than anyone. Mo, I cared about and understood psychology best when you were in classes with me, pushing me to ask more, understand better, and apply what we learned to real life. Steph and Drew, the LOMAH simultaneously spurred the most academic and the most absurd conversations I've ever had. It was awesome. Sarah, Muff, Matt, and Jenn your friendship has

been sustaining. Tyng, you've literally put a roof over my head, and been my ultimate pillar of support in DC. There is no way for me to convey my gratitude for what you've done for me—but I do promise to try.

Dr. Anna Johnson, I'll spend the rest of my career attempting to pay you back for the friendship, mentorship, and opportunities you've offered me, and it will still be woefully inadequate. Anna and Anna World Domination: coming to SRCD 2033?

Finally, and most importantly, I'd like to thank my advisor and role model, Dr. Rebecca Ryan. You took a chance on a student who actually said during her interview "I've never really done this before, but I like math." You continued to support me when you realized that our research interests were diverging, and you continued to support me after that when I up and moved to New York City. You have motivated me to work harder, be more precise, take opportunities to grow, and to be more confident in my own potential. You have taught me to not give up, even after the 6th rejection. You have given me so much time, and more than that so much thought. And so, so many tracked changes. You've been patient with my mistakes. You've let me be independent, but never let me feel hopeless or unsupported. You are truly an amazing mentor, and I still can't believe my luck. Thank you.

"Wait there,
patiently,
until the song
that is your life falls into your own cupped hands
and you recognize and greet it.
Only then will you know
how to give your self
to this world
so worthy of rescue."
--Martha Postwiathe, Clearing

To my family, who has supported me from the beginning—thank you. Mom and Dad, you taught me to pursue work that I could believe in. Thank you for encouraging me to find something that would allow me to give myself to the world and for supporting me as that work took me across the country and back. That you are proud of me means everything to me. Dr. Jared Markowitz and Dr. Geoffrey Markowitz, you did this first. I don't know that watching you geniuses go through this made me think it was any more possible for me, but it was inspirational. I will continue to try to be like you two, and I know that it will take me down a good path. Kathryn, you've been a great friend, even better sister, and a continual source of joy for almost 28 years. Thank you for continuing to be those things even when I had a lot of growing up to do.

Finally, Eric-- we're in this together, so I guess this dissertation is half yours. I hope it's worthy. I love you.

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CHAPTER I: INTRODUCTION

Since the publication of "A Nation at Risk" (Gardner, 1983) called attention to issues of educational quality and human capital depletion in the 1980s, the federal role in education has increased. In calling for this increase, advocates have framed educational policymaking as a critical mechanism for enhancing America's human resources, particularly among underachieving, low-income youth. This attention to educational outcomes has only increased in recent years, as schools have been increasingly engulfed in rhetoric calling for "21st century skills" and "education for the information age." This call for 21st century skills goes beyond typical academic preparation and demands that students be socially skilled in challenging contexts, excellent communicators, flexible and adaptive, self-regulating, and responsible (e.g. Trilling & Fadel, 2009). This call has been echoed in a scholarly literature that has increasingly noted the importance of these non-academic, social and emotional (SE) skills in both students' short-term educational success and long-run outcomes, including labor force attachment, mental and physical well-being, and life satisfaction (e.g. Duncan & Magnuson, 2011; Evans & Rosenbaum, 2008; Farkas 2003; 2011; Heckman, Stixrud, & Urzua, 2006; Moffitt et al., 2011). Despite the popular and scholarly attention to non-academic skills, the American education system and educational policy remains tightly focused on academic skill development (Heckman, 2008). For example, the federal education policy, No Child Left Behind (NCLB), which has been in place for the last 14 years, holds schools accountable for student outcomes, but defines these outcomes strictly as reading and mathematics test performance (NCLB, 2001). Nonetheless, schools remain an important context for the development of these non-academic, social and emotional (SE) skills, and a key intervention site—especially for low-income youth.

Particularly as children age, school becomes an increasingly salient developmental context, and challenging interactions with peers, teachers, and academic work can provide students with ample opportunity to practice SE skills such as self-regulation and responsibility, emotional control, and communication (Eccles et al., 1993; Eccles, 1999).

This dissertation considers one particular way by which schools may influence socio-emotional skill development: students' emotional engagement with school. Emotional engagement—a student's emotional liking of, connection to, and sense of belonging within school—has been previously correlated with important behavioral and educational outcomes (e.g. Li & Lerner 2013; McNeely & Falci, 2004; Osterman, 2000; Resnick et al., 1997; Wang & Degol, 2014), and may be causally linked to students' academic and socio-emotional skill development. This dissertation uses multiple national datasets and several analytic techniques to (1) rigorously asses whether there is a plausibly causal link between emotional engagement with school and socio-emotional skills, (2) determine if this relationship varies by student age, (3) determine whether this relationship varies as a function of family income, and (4) explore whether the enactment of No Child Left Behind (NCLB) impacted students' emotional engagement with school. This dissertation will thus inform state and local policymakers as they endeavor to implement the reauthorization of NCLB and practitioners aiming to increase students' SE skills. Preliminary evidence suggests that emotional engagement may be a powerful, though nontraditional, lever for enhancing the social and emotional skills that are critical not only for students' short-term academic achievement but also for their long-term success and stability; as such, understanding the processes by which schools shape these skills, and for whom, is paramount for designing productive policy and planning effective pedagogy.

Social and Emotional Skills

Social and emotional skills (SE skills) can be defined as the interpersonal and self-regulatory capabilities required for adaptive functioning in the social world. These skills allow us to "generate and coordinate flexible, adaptive responses to demands and to generate and capitalize on opportunities in the environment" (Waters & Sroufe, 1983, p. 80). SE skills undergird the ability to modulate and appropriately express emotions; to inhibit impulses, delay gratification, and persist in challenging tasks; and to correctly ascribe the intent and emotion of others. A child with strong SE skills is able to smoothly navigate social situations, even when met with unexpected or frustrating scenarios. It not surprising, therefore, that these skills are fundamentally linked to both short-term educational and long-term behavioral, marital, health, and labor market outcomes. Evidence also suggests that socio-emotional skills underlie cognitive skill growth (e.g. Caprara, Babaranelli, Bandura, & Zimbardo, 2000; Evans & Rosenbaum, 2008; Fletcher & Wolfe, 2012; Jennings & DiPrete, 2012; Ladd, Birch, & Buhs, 1999; Masten et al., 2005, though see Duncan et al., 2007 for evidence suggesting this influence may be more limited); additionally, indicators of socio-emotional health such as work ethic, reliability, and social skills, are also highly predictive of job security and earnings, even when accounting for cognitive ability **(**Borghans, Duckworth, Heckman, & Ter Weel, 2008; Farkas, 2003; Heckman & Rubinstein, 2001; Jencks, 1979; Lleras, 2008). Finally, self-esteem, self-regulation, and social skills are related to mental health outcomes, including anxiety, depression, and substance abuse (Heckman, Stixrud, & Urzua, 2006).

SE skills represent the outcome of a dynamic interplay between several bodily systems (e.g. the hypothalamic-pituitary-adrenal axis, the pre-frontal cortex, sympathetic nervous system), which develop from utero through adolescence (Calkins & Hill, 2009; Kim & Evans,

2007; Lipina & Posner, 2012; McFarland & Hayward, 2014; Noble, Norman, & Farah, 2005; Rothbart, Posner, & Kieras, 2006). During the early years, these regulatory systems are tuned by environmental inputs, and most crucially, through responsive, sensitive interactions with caregivers (Bronfenbrenner, 1979; Rothbart et al., 2006; Shonkoff & Phillips, 2000). Nonetheless, SE skills continue to develop and differentiate through adolescence, which is a key part of their appeal from an intervention perspective (Gestsdottir & Lerner, 2008; Heckman, 2008). While this potential for SE growth through elementary, middle, and even high school presents exciting opportunities for schools to shape development, even more important, perhaps, is that socio-emotional skills may be *more* malleable than their academic, cognitive counterparts among older children (Heckman, 2000), offering hope that schools can influence student outcomes more broadly through their influence on SE development.

Schools and Socio-Emotional Development

School becomes a critical sphere of developmental influence as children age (Eccles, 1999; Minnard, 2002; Osterman, 2000; Roeser, Eccles, & Sameroff, 2000). Youth spend roughly half of their waking hours in school from age 4 onward, and many spend additional time in school-sanctioned activities or with school-based peers. Children begin school with a base level of socio-emotional skills, but schools continue to influence their development through direct instruction, modeling, opportunities for practice, and the reinforcement of desired behavioral outcomes (Becker & Luthar, 2002; Roeser, Eccles, & Sameroff, 2000). In particular, schools are a context imbued with complex interactions with new social partners, providing opportunities for modeling and direct instruction in healthy self-regulatory strategies, and new opportunities to practice self-control and responsibility, which can boost SE skills (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Koole, Van Dillen, & Sheppes, 2011; Marroquin, 2011).

Indeed, just as parental responsivity is crucial for early development of SE skills, the features of and processes within schools that shape student-teacher and student-student interactions should drive students' continued SE skill development. While empirical evaluations of the impact of school features on SE skills are relatively limited—particularly among older children—there have been some demonstrations of the impact of global quality (Altonji & Mansfield, 2011; Card & Kruger, 1992; Deming, Hastings, Kane, & Staiger, 2011), school composition (Billings, Deming, & Rockoff, 2012; Dishion & Tipsord, 2011; Duncan & Magnuson, 2011; Mayer 1991), and class size (Chetty et al., 2011; Dee & West, 2008; 2011; Dynarski, Hyman & Schanzenbach, 2013; Finn, Gerber, & Boyd-Zaharias, 2005; Finn, Pannozzo, & Achilles, 2003) on SE behaviors. In addition, process features such as intervention curricula (Durlak et al., 2011; Jones, Brown, & Aber, 2012) and teacher quality (Jackson, 2012; Jennings & DiPrete, 2010; Merritt et al., 2012; Stipek & Miles, 2008; Wang, Brinkworth, & Eccles, 2013) have also been linked to SE skills and behavioral outcomes.

The Role of School Engagement

Several developmental theories hypothesize that school engagement may serve as the link between school characteristics and students' SE outcomes. School engagement is a multidimensional construct encompassing students' behaviors, thoughts, and emotions about school (Fredricks et al., 2004; Reschly & Christenson, 2012; Wang & Degol, 2014). Behavioral engagement measures school participation and draws on indicators such as extracurricular involvement, attendance, and participation in school-based 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 indicators of school relevance and endorsement of long-run benefits of school. Emotional engagement encompasses

affective responses to school, peers, and teachers, including a sense of belongingness in or connectedness to school.

Many theories suggest that school effects on students' SE skills are mediated through engagement, with particular attention to emotional engagement with school; that is, that features of school quality influence student skills, at least in part, through their impact on students' engagement. For example, stage environment fit theory (Eccles et al., 1993; Wigfield et al., 2006) asserts that the social and emotional climate of a school influences motivation. Motivated students bond with school, participate in school-based activities, and engage in school-promoted behaviors; this engagement generates growth in students' SE skills and abilities and promotes well-being. Similarly, the resilience (Masten, 2001) and developmental asset (Leffert et al., 1997) perspectives suggest that connections to caring adults and institutions, such as teachers in schools, facilitate positive development. Finally, self determination theory (SDT) asserts that students develop optimally when schools meet three basic psychological needs—autonomy, competency, and relatedness. SDT argues that students engage in schools to the extent that schools meet these basic needs, and this engagement produces the acceptance and internalization of the goals, values, and skills promoted by schools (e.g. Deci et al, 1991; Deci & Ryan, 1994; Ryan & Deci, 2009). This internalization leads to student effort and utilization of school-based supports in pursuit of these developmental goals, ultimately enhancing students' SE skills and general well-being. That is, engaged students effortfully practice and develop their social and emotional capabilities; because they care about and participate in school, engaged students strive to regulate their emotions and develop healthy coping mechanisms, they pursue goals and thereby develop planful and regulatory capacities as well as the ability to overcome setbacks, and they pursue their interests and develop a healthy sense of self. Notably, Deci and colleagues

(1991) highlight the importance of connection—a component of emotional engagement—to students' internalizing the values and goals of schools. Indeed, Ryan and Deci (2009) suggest that it is *primarily* connection that drives students to internalize the extrinsic goals of schooling and therefore pursue healthy developmental goals.

Importantly, being engaged with school is not a socio-emotional skill in and of itself; rather it is a mechanism by which students can develop these skills. Indeed, students may participate in, value, and like school for purely extrinsic reasons, not because of their social ability or regulatory capacity. Moreover, schools could engage in strategies to build engagement that would not necessarily target SE skills. For example, schools could enhance engagement by incentivizing participation and attendance through extra credit or awards, planning curricula designed to demonstrate to students the long-run relevance of school, building homeroom periods into the school day to provide opportunities for teachers and students to get to know each other, and by holding school-wide activities designed to build community (e.g. dances, rallies, etc.). Such practices are not targeted towards enhancing SE skills; however, they may lead youth to become engaged with school, leading to the internalization and investment that can ultimately build socio-emotional skills and improve SE skill-based outcomes.

Empirical support for this hypothesized pathway—and for the particular importance of emotional engagement with school—comes from a growing literature associating school engagement with student SE skills and skill-based outcomes (Fredricks et al., 2004; Upadyaya & Salmela-Aro, 2013; Wang & Degol, 2014). For example, Wang and Fredricks (2014) showed that adolescents aged 12 to 17 who experienced declines in behavioral and emotional engagement showed associated increases in substance use and delinquent behaviors over time in cross-lagged growth models. Similarly, Hirschfield and Gasper (2011) demonstrate that

behavioral and emotional engagement with school are associated with lower levels of delinquent behavior both in and out of school among early adolescents (11 to 12 years old). Li and colleagues (2011) replicated these findings using a survival analysis of data drawn from 5th through 11th graders. Li et al. showed that higher levels of emotional and behavioral engagement were associated with a lower risk of involvement in substance use and delinquent behavior. Finally, both Li and Lerner (2013) and Wang and Peck (2013) demonstrate that students characterized by decreasing emotional engagement through middle and high school report higher levels of depressive symptoms and substance use than their peers (Li & Lerner, 2013; Wang & Peck, 2013) and that minimally engaged students are 19 percentage points more likely to drop out than their peers in other engagement trajectories (Wang & Peck, 2013). In both of these studies, emotional engagement was the most important predictor of SE outcomes. Specifically, Li and Lerner (2013) report that decreasing trajectories of emotional engagement are more strongly related to SE outcomes than trajectories of behavioral engagement; Wang and Peck (2013) show that youth with low levels of emotional engagement exhibit greater increases in depressive symptoms than peers who have higher levels of emotional engagement, even if those peers also had lower levels of behavioral or cognitive engagement. Taken together, this literature demonstrates a robust association between components of engagement, and in particular emotional engagement, and SE outcomes across much of adolescence.

Evidence for the particular importance of emotional engagement with school for SE outcomes can also be found in the literature on school connection. School connection is defined as students' sense of belonging within and relatedness to school. It is comprised of a sense of safety, rule fairness, teacher support, and overall belonging (Libbey, 2004; Shochet, Dadds, Ham, & Montague, 2006), and can be thought of as students' sense of being liked, respected,

accepted, cared for, and valued (Goodenow, 1993; Shochet, Smith, Furlong, & Homel, 2011); a definition very similar to that of emotional engagement with school. This literature reveals strong associations between connection and SE outcomes, including effort in school (Battistich et al., 1997; Gillen-O'Neel & Fuligni, 2013; Goodenow, 1993; McNeely, 2005; Wilson, 2004; Solomon, Watson, Battistich, Schaps, & Delucchi, 1996), greater endorsement of prosocial goals, conflict resolution skills, self-esteem, and self-efficacy, (Battistich et al., 1995; Battistich et al., 1997; Solomon et al., 1996; Solomon et al., 2000); lower levels of substance abuse and health risk behaviors (Bond et al., 2007; McNeely & Falci, 2004), lower levels of depressive symptoms (Hamilton, Wekerle, Paglia-Boak, & Mann, 2012; Joyce & Early, 2014; Shochet et al., 2006; Shochet et al., 2011; Shochet & Smith, 2014), and lower levels of problem behaviors (Kuperminic, Leadbeater, Emmons, & Blatt, 1997; Loukas, Ripperger-Suhler, & Horton, 2009; Loukas, Roalson, & Herrera, 2010; McNeely & Falci, 2004; Payne, 2008).

Challenges in Assessing Causality

Though a robust literature connects school engagement to socio-emotional outcomes, there are several reasons why this association may not represent a causal relationship. In general, school engagement reflects how students react to school, and thus is fundamentally a combination of both student and school characteristics. Intuitively, characteristics of the school are likely to either facilitate or impede students' reactions to and relationships within school (Deci et al., 1991; Osterman, 2000; Ryan & Deci, 2000), but students' responses are also contingent upon aspects of personality, genetic and family factors, previous experiences, and other student characteristics.

This relationship between student characteristics and school engagement presents a threat to causal inference for several reasons. First, in cross sectional models, it is unclear whether links

between engagement and outcomes reflect a pathway from engagement to SE skills, or a pathway from SE skills to engagement. Second, unobserved child- and family-level factors that influence both engagement and SE outcomes may confound estimated associations. For example, frequently unmeasured variables, such as student cognitive ability or parent human capital, could be linked to both engagement and SE skills, introducing a spurious correlation between them. Finally, most of the studies that do address these critiques use small, local samples, precluding the generalizability necessary for research on engagement to inform policy and practice more broadly. To address these challenges to causal inference, research on engagement must be conducted in large, diverse samples that are representative of the increasingly non-white, low-income American study body, with rich family-level information and longitudinal student observations.

Moderation by Age and Family Income

If emotional engagement with school is causally linked to students' SE skills, it is important to consider whether this influence varies by key child and family factors. First, it is important to determine when interventions designed to increase engagement would be most effective in enhancing students' SE outcomes. Youths' relationship to school changes dramatically as they age (Eccles, 1999; Eccles et al., 1993; Gillen-O'Neel & Fuligni, 2013; Roeser et al., 2000; Wang et al., 2013); identifying at which age engagement most effectively promotes SE development will help determine appropriate targets for policies and resources.

Second, if emotional engagement with school does enhance SE skills by supporting students' goal formation and pursuit as hypothesized by SDT, this engagement may be particularly important for students who lack this support from other contexts and have low levels of these skills at the outset. Specifically, children and youth who experience economic

disadvantage may be more reliant on school as a source of support than their more affluent peers because of lower levels of support at home, fewer connections to nonfamily institutions, and because they have on average lower levels of SE skills and more detrimental SE skill-based outcomes (e.g. Evans, 2004; Farkas, 2011; Noble, McCandliss, & Farah, 2007; Putnam et al., 2012). Thus, for economically disadvantaged children, emotional engagement with school may be a critical lever for cultivating SE skills, and narrowing income-based gaps in SE functioning, though this possibility has yet to be examined.

Thus, in order for research to best inform practitioners and policymakers hoping to leverage school engagement to improve outcomes for all students, it is important to identify at what ages and under what circumstances interventions to improve engagement may be most effective at enhancing students' SE outcomes.

Education Policy and School Engagement

If school engagement is a viable lever for enhancing students' SE development, it is important to identify whether and how educational policy can shape student engagement. Theoretically, policy-linked changes to the school context should lead to changes in engagement, but it is also possible that educational policy is too distal to create meaningful shifts in engagement. Although previous research suggests that changes in the school context can impact engagement (e.g. Connell & Wellborn, 1991; McNeely et al., 2002; Murray, 2009) links between engagement and educational policy remain largely untested.

If it is possible to influence school engagement through educational policy, it is crucial that policy be used to enhance engagement as a mechanism for promoting students' SE development. Schools are the ideal place to host interventions designed to boost SE skills both because SE skills are malleable among older children and adolescents, for whom school is an

influential context (Becker & Luthar, 2002; Blair & Diamond, 2008; Roeser, Eccles, & Sameroff, 2000), and because federal, state, and local governments have greater policy leverage over the quality and content of schooling than the quality and experience of family life (Rouse & Barrow, 2006). Indeed, America already engages in many educational policy interventions designed to enhance students' skill development, the largest of which is the recently reauthorized federal education policy, the Every Student Succeeds Act (ESSA, 2015), which replaced NCLB.

Currently, school engagement is underemphasized in most state and federal policy initiatives (Cohen et al., 2009; Fredricks et al., 2004; Osterman, 2000; Wang & Degol, 2014), however a growing interest in engagement from policymakers has made understanding the relationship between policy and engagement a pressing concern. Research is needed to inform both when and how to target resources to promote students' engagement, and to identify how previous policy solutions have impacted this critical construct. For example, ESSA includes—for the first time—language identifying school engagement as a key indicator of school success, but retains the strong commitments to yearly testing and accountability of its predecessor. The goal of increasing engagement is potentially in conflict with the law's accountability focus; for example, many commentators in the 1990s and early 2000s (Deci et al., 1991; Osterman, 2000) asserted that accountability provisions, particularly those tied to sanctions as in NCLB, could undermine students' connection to, enjoyment of, and engagement in school (Deci et al., 1991; Jones et al., 2003; Meier & Wood, 2004; Nichols & Berliner, 2008; Osterman, 2000). This critique did not diminish throughout NCLB's tenure (e.g. Ravitch, 2013), despite evidence that NCLB did enhance students' mathematics achievement (e.g. Dee & Jacob, 2011; Wong, Cook, & Steiner, 2015), and some evidence that students reported no change in their enjoyment of

school (Reback, Rockoff, & Schwartz, 2014), and that teachers reported beneficial impacts on absenteeism, tardiness, and apathy (Dee & Jacob, 2011).

Despite the importance of this concern, research has yet to identify whether educational policy in general can influence student engagement, and whether NCLB specifically impacted student engagement, a substantial gap given the potential for this construct to impact important short and long term outcomes for youth. Moreover, given that the reauthorization of NCLB continues to focus on testing and accountability—despite attention to engagement—identifying whether NCLB impacted engagement is an important direction for research, and a key question for policymakers and practitioners hoping to most effectively implement ESSA.

Present Study

Three key themes emerge from this introduction. First, there exists a strong relationship between emotional engagement with school and students' SE outcomes, although the literature on this relationship does not uniformly address key threats to causal inference. For this reason, applications for policy and practice are currently limited. Second, research has yet to examine whether school engagement is differentially impactful by students' age or family income, limiting our understanding of both how engagement influences development, and how to most efficiently target resources to improve student outcomes. Finally, it remains unknown how education policy, and in particular the consequential accountability measures of No Child Left Behind, influences student engagement. In order to best inform state and local policymakers as they implement the provisions of ESSA, both those similar to NCLB and the new opportunities to measure and respond to student engagement, research must understand how NCLB influenced engagement.

This dissertation addresses these gaps in the literature on school engagement with the goal of understanding the role of emotional engagement with school and educational policy in the development of socio-emotional skills. It has four aims. First, I use two national datasets, the National Longitudinal Study of Adolescent Health and the Maternal and Child Supplement to the National Longitudinal Survey of Youth, and three analytic strategies to (1) assess whether there is a plausibly causal relationship between emotional engagement with school and students' socio-emotional outcomes. By exploring whether the relationship between engagement and SE outcomes persists across models that account for endogeneity, family-level omitted variables, and time-invariant omitted variables, and whether these relationships are similar across datasets, this aim reduces threats to causal inference, and can make a stronger, more generalizable claim as to the causal relationship between engagement and SE outcomes. Second (2), this dissertation explores whether the relationship between emotional engagement with school and SE outcomes varies by student age. By identifying the ages at which engagement is most predictive of SE skills, policymakers and practitioners can most effectively target educational resources. Third (3), it examines whether the relationship between emotional engagement and SE skills varies by family income to assess whether policies to enhance engagement among low-income students could reduce income-based gaps in students' skills (e.g. Duncan & Magnuson, 2011; Farkas, 2011). Finally, to directly examine the relationship between school engagement and relevant educational policy, this dissertation (4) explores whether the enactment of No Child Left Behind impacted students' emotional engagement with school. Results from each of these inquires will add to our understanding of school contributions to skills that drive long-term educational, labor-market, and well-being outcomes.

CHAPTER II: ASSOCIATIONS BETWEEN EMOTIONAL ENGAGEMENT WITH SCHOOL AND SOCIO-EMOTIONAL OUTCOMES ACROSS ADOLESCENCE

This chapter has been submitted as Markowitz, A.J. (under review at *Child Development*). Associations between emotional engagement with school and socio-emotional outcomes across adolescence.

There is a growing interest among researchers, policymakers, and practitioners in the relationship between school experiences and students' socio-emotional (SE) skills. These skills, which include the ability to regulate emotions, maintain a positive sense of self, and navigate social interactions, are fundamentally linked to both short-term educational success and long-run labor market, health, and well-being outcomes (Borghans, Duckworth, Heckman, & Ter Weel, 2008; Farkas, 2003; 2011; Heckman, 2008; Heckman, Stixrud, & Urzua, 2006). One school mechanism that may influence SE skills is emotional engagement with school, defined as students' sense of connection to and liking of school, because a large literature has associated emotional engagement with SE outcomes (e.g. Li & Lerner 2013; Osterman, 2000; Ryan & Deci, 2009; Wang & Degol, 2014; Wang & Fredricks, 2014; Wang & Peck, 2013). Two important questions must be answered, however, before using this literature to motivate policy or practice. First, it is unclear whether these associations represent causal relationships. For example, it is plausible that SE skills facilitate school engagement, rather than vice versa, or that family characteristics simultaneously influence both engagement and SE outcomes, threats that have not been consistently addressed in the extant literature. Second, it is not clear for whom engagement matters most in terms of SE skills, particularly 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 to minimize the influence of threats to causal inference and

explore the replicability of estimated associations. These strategies include using lagged dependent variables to address directionality, and sibling comparisons and first difference specifications to control for important unmeasured family and child characteristics. Second, to best inform policymakers about the optimal timing of engagement programs, analyses assess whether the central relationship between school engagement and SE outcomes changes as children age. Given the importance of students' SE skills in the achievement of both short- and long-run educational goals, identifying whether and when engagement with school exerts a consistent, meaningful influence on SE skills are key questions for both policymakers and practitioners hoping to build long-term success for students.

School Engagement

School engagement is a multidimensional construct encompassing students' behaviors, emotions, and thoughts about school (Fredricks et al., 2004; Reschly & Christenson, 2012; Wang & Degol, 2014). Behavioral engagement measures school participation; cognitive engagement reflects mental investment in school and belief in the long-run benefits of education; emotional engagement encompasses affective responses to school, peers, and teachers, and a sense of connection to school. Although operational definitions of engagement vary across studies, these definitions reflect the broadest consensus within the developmental and education literatures (Fredricks et al., 2004; Reschly & Christenson, 2012; Wang & Degol, 2014). Notably, these three dimensions are correlated, but distinct. For example, it is possible that a student is pushed by his or her parent to participate in school through perfect attendance and extracurricular involvement, but that the student does not enjoy or feel bonded to school. Similarly, it is possible that a student have a strong understanding of the importance of school in the long-run, and may see school as highly relevant for their future life, but they may choose not to participate broadly

in the social life of the school, or feel that they enjoy or belong at school. Indeed, previous research has demonstrated that the dimensions of engagement are correlated, but variably across studies, and often moderately so, typically ranging between 0.10 and 0.40, though occasionally with correlations as large as 0.50 (e.g. Li & Lerner, 2011; Wang & Eccles, 2011; 2012; Wang & Peck, 2013; in the present study, correlations among cognitive, behavioral, and emotional engagement range from 0.10 to 0.30).

School engagement is hypothesized to mediate links between school features and SE outcomes according to several developmental theories, and these theories in particular highlight the importance of emotional engagement with school. Specifically, stage environment fit theory (Eccles et al., 1993; Wigfield et al., 2006) asserts that the social and emotional climate of a school influences students' emotional connection to school and thereby student motivation, which is acted out through behavioral and cognitive engagement. Motivated students participate in school-based activities and engage in school-promoted behaviors; this engagement generates growth in students' SE skills and abilities and promotes well-being. Similarly, self determination theory (SDT, Deci et al, 1991; Deci & Ryan, 1994; Ryan & Deci, 2009) hypothesizes that student development is optimized when students are connected to, or emotionally engaged with school. Specifically, it argues that students behaviorally and cognitively engage in schools to the extent that schools meets students' need for emotional connection, and this combination of emotional, behavioral, and cognitive engagement promotes internalization of the goals, values, and skills promoted by schools (e.g. Deci et al, 1991; Deci & Ryan, 1994; Ryan & Deci, 2009). This internalization leads to student effort and utilization of school-based supports in pursuit of these developmental goals, ultimately enhancing students' SE skills and general well-being. Notably, the pathway hypothesized by Ryan and Deci (2009) suggests that it is *primarily*

connection that drives students to internalize the extrinsic goals of schooling. As in stage environment fit theory, in SDT engagement is the driver of student outcomes. These hypotheses have been supported in myriad studies examining associations between emotional engagement with school and SE outcomes (Fredricks et al., 2004; Osterman, 2000; Upadyaya & Salmela-Aro, 2013; Wang & Degol, 2014), and in the closely associated literature on school connection and school belonging (Battistich et al., 1997; Libbey, 2004; McNeely, 2005; Osterman, 2000; Shochet et al., 2006). These associations hold across adolescence, and among diverse racial and ethnic groups, demonstrating a robust association between emotional engagement with school and outcomes tightly linked to SE functioning across much of adolescence.

Challenges in Assessing Causality

Although a compelling body of evidence suggests that students' engagement with school influences socio-emotional development, it remains unclear whether the observed associations reflect causal relationships. Because the school engagement literature relies heavily on cross sectional data with limited covariates (Fredricks et al., 2004), estimates of the relationship between school engagement and socio-emotional functioning are particularly vulnerable to threats to causal inference such as bidirectionality and confounding omitted variables. For example, in cross sectional models, it is unclear whether links between engagement and outcomes reflect a pathway from engagement to SE skills, or a pathway from SE skills to engagement. Indeed, several studies looking at associations between SE outcomes and school engagement find that students with stronger SE skills develop stronger engagement with school over time (e.g. Loukas et al., 2009; Wang & Fredricks, 2014). In order to rule out this interpretation, the present study uses a previous measure of the dependent variable as a predictor in each equation. Essentially, this lagged measure of the dependent variable represents

unmeasured characteristics that predispose youth to a specific level of SE skills; including it as a predictor accounts for the portion of this predisposition that is correlated with emotional engagement with school, attenuating the threat of bidirectionality.

Second, unobserved factors that influence both engagement and SE outcomes may confound estimated associations. Although non-experimental designs are essential for studying school engagement, such designs are unable to balance levels of unmeasured, unobserved characteristics that may be correlated with both engagement and SE outcomes. Thus, frequently unmeasured but likely relevant variables, such as parent-child closeness, family rearing environment, previous academic achievement, or parent human capital could drive both school engagement and SE skills, introducing a spurious correlation between them and overstating the role of emotional engagement with school in SE development. For example, it may be that children with exceptional emotion regulation skills are both more likely to bond to school and less likely to exhibit depressive symptoms. If this is the case, children with high levels of emotional engagement with school will exhibit low levels of depressive symptoms because of their regulatory skills; indeed, this association would be observed regardless of any relationship between engagement and depression. This is particularly likely to be a problem in the case of unmeasured family-level factors, including genetic characteristics. School surveys often do not capture detailed information about families, and certainly cannot capture whether students are genetically predisposed to engage with school and have strong SE skills; as such these threats to causal inference are present in nearly all current studies of school engagement. To address this threat, the present study uses a sibling fixed effects model, in which within family differences in engagement are used to predict within family differences in SE outcomes, essentially identifying a within-family comparison group for each individual. This strategy is widely used in the

literatures on divorce and father absence to account for family-level omitted variables (e.g. Lahey & D'Onofrio, 2010; Ellis, Schlomer, Tilley, & Butler, 2012; Ryan, 2015), as well as the broader social science literature examining the effects of teenage parenthood on child outcomes (e.g. Geronimus et al., 1994) and the effects of Head Start (Currie & Thomas, 1995; Garces, Thomas, & Currie, 2002). Notably, however, this sample is not made of identical twins. Thus, child-level factors that differ by siblings (i.e., personality) could still confound the association between engagement and SE outcomes. Thus, these models also include the lagged dependent variable, as above, to account for directionality and the stable child-level factors that predispose youth to a specific level of SE skills.

Finally, to deal more directly with the threat to causal inference posed by stable individual-level factors that influence both engagement and SE outcomes, this study also uses a first difference model, which accounts for omitted time-invariant factors, such as stable personality traits, by assessing whether changes in engagement are associated with changes in SE outcomes. By examining changes in each of these variables, stable factors related to engagement and SE skills do not impact the estimated association.

Finally, because the few previous studies that address some of these critiques use local samples (e.g. Wang & Eccles, 2011; Wang & Fredricks, 2014), this study uses national data in order to generate estimates that can inform policymakers seeking to understand the relevance of school engagement for diverse youth. A second national dataset is also used to explore whether estimates are replicable. If estimated effect sizes are similar, or the same, across two national datasets, this consistency would provide stronger evidence of a causal effect than if associations emerged in one dataset only, or if effect sizes were highly variable.

Moderation by Age

Beyond identifying whether emotional engagement with school plays a particularly strong role in social and emotional development, it is important to know *when* developmentally emotional engagement is most, and least, correlated with students' well-being. Previous literature has documented that average levels of school engagement tend to decrease throughout middle and high school (Gillen-O'Neel & Fuligni, 2013; Eccles et al., 1993; Wang, Brinkworth, & Eccles, 2013; Wang & Eccles, 2011) as schools struggle to meet the developmental needs of adolescents (Eccles, 1999; Eccles et al., 1993; Roeser et al., 2000). It is less clear, however, whether there are also declines in the *association* between engagement and SE outcomes. It could be that the importance of engagement is maintained as youth age, even as average levels of engagement decline. The SDT framework highlights the universality of the need to connect with and feel successful in our social contexts (Deci et al., 1991; Ryan, 1995; Ryan & Deci, 2000), suggesting that engagement may be relevant for youth even as they continue to age. However, research on interventions with students more generally highlights the greater malleability of young children (e.g. Heckman, 2000; 2008), and the relative difficulty of influencing youth as they reach middle and high school. Moreover, even if a sense of connection and engagement is important throughout the life course (Putnam, Fredrick, & Snellman, 2012; Ryan 1995; Ryan & Deci, 2000), the rapidly expanding social world of adolescents may provide this sense of engagement in other domains. Specifically, if a young child's life is generally encompassed by home and school contexts, the importance of the school context is likely to be large; for an adolescent who may now have home, school, peer, work, and extracurricular contexts, the relative importance of feeling engaged in school may diminish.

Thus, the present study hypothesizes that the influence of school engagement on social and emotional skills will diminish as students age. If emotional engagement with school decreases in both level and *importance* over time, resources and policies 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 among older youth, for whom levels of engagement are declining and for whom dropout and delinquency pose a more imminent threat. Research has yet to address this important question.

Present Study

In sum, the present study has two aims. First, I use national data to examine whether previously observed associations between emotional engagement with school and socio-emotional outcomes are robust to a series of increasingly rigorous strategies designed to address the major threats to causal inference. Moreover, this study uses two national datasets to assess the replicability of the engagement to SE skills link. Notably, although these models focus on emotional engagement with school, lagged measures of behavioral and cognitive engagement are included in all models as covariates, in line with best practice in the developmental literature (e.g. Fredricks et al., 2004). Because of the links between cognitive, behavioral, and emotional engagement, leaving out measures of behavioral and cognitive engagement may under-specify the model, and overstate the association between emotional engagement and student outcomes. Including lagged measures accounts for the potential influence of these types of engagement on outcomes, but does not over-control the potential influence of emotional engagement as a contemporaneous *driver* of behavioral and cognitive engagement (e.g. Ryan et al., 2009; Li & Lerner, 2013; Wang & Degol, 2014); however, sensitivity analyses examine associations between engagement dimensions and SE outcomes simultaneously.

Second, this study explores whether associations between engagement and SE skills diminish over the course of adolescence. In doing so, this paper aims to inform policy makers and practitioners hoping to build students' socio-emotional skills both by providing stronger causal evidence for the relationship between school engagement and SE outcomes and information as to when resources and programs could most effectively support students' development.

Method

Data

Data were drawn from two national datasets, 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 survey of youth who were ages 14 to 21 when interviewed in 1979 and who were re-interviewed annually until 1994, and biennially thereafter. Beginning in 1986, the NLSY began following the children of the female NLSY respondents to assess their health, development, and overall well-being, with the most recent available data collected in 2012. Offspring were asked about their school engagement and SE skills in a "child" survey through age 14. The present sample was drawn from the respondents to the child survey from all available waves, thus it consists of youth aged 10-14 who were asked and reported on their engagement with school and SE skills from 1986-2012 (N= 11,512 total; model sample size varies by analytic strategy). Though the NLSY does not include school-level data, it is one of very few diverse, national datasets that contain longitudinal measures of student engagement and socio-emotional outcomes. Analyses are limited to youth who provided at least two data points for engagement and SE skills between ages 10 and 14. The second of these data

points for a given child is used as their main dependent variable (mean age= 13.04, *sd*= 1.06), while the first is used for lagged observations (mean age= 11.55, *sd*= 0.76). Notably, observations were drawn from multiple years and therefore multiple cohorts. To account for this variability all analyses control for both birth year and year at the time of the measurement of the dependent variable (see Covariates below). Finally, because the NLSY sample was created by sampling the offspring from a collection of mothers, the sample is almost entirely made of siblings (*N*=10,336 had a sibling in the sample), providing a sizable subsample for a within-family analysis.

Add Health. Add Health is a study of 20,745 youth who were in grades 7-12 in 1994-95, selected through a multistage, stratified, school-based, cluster sampling design (see Harris et al., 2009; Bearman et al., 1997 for a description of the study design). The second wave of data was collected during the 1995-96 school year (*n*=14,738, 88.2% response rate), excluding 12th graders from wave one. Within this larger design, Add Health also generated a specific sibling oversample. This sample consists of related pairs living in the same household, including a large number of twins. This large sibling 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 school engagement and socio-emotional outcomes, but not necessarily all covariates, for each modeling strategy, ranging from about 3,570 in sibling subsample models to 12,330 in the full sample.

Measures

Emotional engagement with school. In the NLSY, emotional engagement with school was measured with 7 items assessing students' perceptions of teachers, liking of school, ease of making friends, and sense of safety in school. Sample items include "how satisfied are you with

your school," "it is easy to make friends," and "I don't feel safe at this school" (reverse coded). These items were summed to create a scale ranging from 0-28. In each year of data collection the Cronbach's alphas for this scale ranged from 0.61 to 0.71, in line with other scales assessing emotional engagement with school (e.g. Li & Lerner, 2011).

Emotional engagement with school was measured in the Add Health at both wave 1 and wave 2 using 6 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 0-24, and yielded a Cronbach's alphas of 0.75 and 0.77 at waves 1 and 2, respectively. These scales have been used in several previous studies using Add Health (e.g. McNeely, Nonnemaker, & Blum, 2002; McNeely & Falci, 2004; Resnick et al., 1997).

A side-by-side comparison of the two scales is presented in Table 1. Though the scales do not use the same items, each measures the same elements of emotional engagement, as noted above. Moreover, both scales draw at least some items from other published emotional engagement scales (e.g. Li & Lerner, 2011; 2013; Wang & Eccles, 2011; Wang & Fredricks, 2014). While 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, these differences should not muddy interpretations. Specifically, if both scales are correlated with the true emotional engagement construct, though each scale includes measurement error, their estimates should be comparable. These differences would be problematic if the two scales ultimately capture different underlying phenomenon, however this is not empirically testable. This issue will be addressed more fully in the Discussion.

Socio-emotional outcomes. Socio-emotional skills were operationalized using measures of depressive symptoms, self-esteem, and delinquency. These variables were selected because previous literature suggests that externalizing behavior problems, internalizing behavior problems, and low self-esteem are three critical socio-emotional outcomes with regard to academic achievement, educational attainment, and labor market outcomes (Borghans et al., 2008; Duncan & Magnuson, 2011; Fletcher & Wolfe, 2012; Heckman et al., 2006). As noted above, in the Add Health, all dependent variables were taken from wave 2, and all lagged measures were taken from wave 1. In the NLSY, all dependent variables were drawn from the latest available youth report, and lagged variables were taken from the nearest earlier report (typically 2 years prior).

Delinquency. In the NLSY, delinquency was measured with the 4 delinquency-related 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. These indicators were summed and normed by age, yielding a standardized score that reflects level of delinquent behavior relative to same age peers. In the NLSY, the mean child age at delinquency assessment was 13.11 (*sd*= 1.12).

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. Because Add Health respondents spanned the entirety of adolescence, after summing indicators for participation at each wave, scales were summed and normed as in the NLSY. In the Add Health, the mean age at delinquency assessment was 16.06 (*sd*= 1.58).

Depressive symptoms. In the NLSY, depressive symptoms were measured biannually using 9 items assessing respondents' sadness, listlessness, and melancholy (National Commission on Children, 1999). Items were summed to create a measure of depressive symptoms, Cronbach's alphas ranged from 0.60 to 0.71. In the NLSY, the mean child age at depressive symptoms assessment was 13.13 (*sd*= 1.11).

In the Add Health, respondents were asked 10 items drawn from the Center for Epidemiologic Studies Depression Scale (CESD, Radloff, 1991), a widely used scale to measure depressive symptoms. Items addressed 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 scale measure depressive symptoms. Cronbach's alphas were above 0.80 at both time points. In the Add Health, the mean age at depressive symptoms assessment was 16.06 (*sd*= 1.58). Because the CESD scale also provides clinical cutoffs, models predicting clinical levels of depression were estimated in the Add Health data only, using a dummy variable coded such that 1 indicates levels of depressive symptoms consistent with clinical depression (≥ 16), and 0 indicates no presence of clinical depression.

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 worth and competence at school. The full scales were computed and normed by the NLSY; the mean child age at self-esteem assessment was 13.34 (*sd*= 0.90).

In the Add Health, self-esteem was constructed with 6 items measured at both waves 1 and 2, which assessed respondents' agreement with statements such as "I have a lot to be proud

of." Cronbach's alphas at both waves were above 0.80. In the Add Health, the mean age at self-esteem assessment was 16.06 (*sd*= 1.58).

Covariates. In both datasets, a rich set of covariates linked to both SE skills and engagement were chosen based on both theory and the availability of information in each dataset.

Age. In the NLSY, age was coded using the NLSY provided child age variable, which corresponds to the respondent's age in years at the time of interview at each wave. Age was drawn from the year the emotional engagement and dependent variables were drawn (overall *m*=13.04, *sd*= 1.06). In the Add Health, age was created using the child's birthdate and interview date at wave 1 (*m*= 15.10 *sd*= 1.64). In the moderated analyses, in which age was interacted with emotional engagement, age variables in both datasets were recoded such that the youngest respondent's age was zero.

Cognitive and behavioral engagement. Measures of cognitive and behavioral engagement drawn from the wave prior to the measurement of emotional engagement were included as covariates in all analyses, to account for shared correlations between engagement subtypes and SE outcomes. Measures of cognitive engagement were constructed to capture students' academic effort, thoughtfulness, and interest based on what was available in each dataset. Thus, in the NLSY, cognitive engagement was measured using two items, "my schoolwork requires me to think" and "at this school, a person has the freedom to learn what interests him/her;" in the Add Health, this was measured with two items asking respondents how often they have trouble paying attention in school and completing schoolwork (South, Haynie, & Bose, 2007).

Measures of behavioral engagement captured participation in school and school-based activities, again based on what was available in each dataset. Thus, in the NLSY an ordinal measure of truancy was used. In the Add Health, a measure of truancy was used as well as a continuous measure of extracurricular participation (South et al., 2007). The behavioral engagement measures used in the Add Health are drawn from the in-school survey, and thus are 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, as with emotional engagement with school, the measures of cognitive and behavioral engagement are not identical across datasets. Again, the implications of this potential source of error are addressed in the Discussion.

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

A few covariates that were available in only one of the datasets were also included. In the NLSY, an indicator for birth order and a measure of mother's age at the child's birth were

included. 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 GPA (from wave 1) was also included. To test whether the differences in covariates across the two datasets impacted the comparability of the estimates, analyses that used only identical covariates were conducted.

Analytic Strategy

Analyses proceeded in two stages. First, associations between emotional engagement and three different SE outcomes—depression, delinquency, and self-esteem—were compared across three modeling strategies in two different datasets. Second, engagement was interacted with age in years (coded such that the youngest age is rescaled to zero), to assess whether associations between engagement and SE outcomes vary as children age.

First, to address the problem of directionality, an OLS model including a lagged measure of the dependent variable was estimated, as shown in model 1 below.

$$SE\ Outcome_{it} = \alpha + \beta_1(Emotional\ Engagement_{it}) + \beta_2\big(Behavioral\ Engagement_{i(t-1)}\big) + \beta_3\big(Cognitive\ Engagement_{i(t-1)}\big) + \beta_4(SE\ Outcome_{i(t-1)}) + \beta_k(Covariates_i) + \epsilon_i$$

In this model, SE outcomes at time *t* are predicted from emotional engagement with school at time *t*; measures of behavioral engagement, cognitive engagement, and the SE 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 the SE outcome at time *t* net of previous levels of SE functioning. Put another way, β_1 represents the weighted average of the relationship between emotional engagement and SE outcomes for individuals who had the same level of SE functioning at the previous wave (*t-1*). In this way, the inclusion of the lagged dependent

variable addresses the threat of reverse causality because it removes any time-invariant predisposition towards a given level of SE skills 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 below.

$$SE\ Outcome_{ijt} = \alpha + \beta_1(Emotional\ Engagement_{ijt}) + \beta_2(Behavioral\ Engagement_{ij(t-1)}) + \beta_3(Cognitive\ Engagement_{ij(t-1)}) + \beta_4(SE\ Outcome_{i(t-1)}) + \beta_k(Covariates_{ij}) + \epsilon_i + \gamma_j$$

In this model, SE outcomes for student *i* in family *j* at time *t* are predicted from emotional engagement with school at time *t* and measures of behavioral engagement, cognitive engagement, the SE outcome from time *t-1*, and the family-level error term γ_j. The inclusion of this error term is like including a family-specific intercept, accounting for the omitted family-level variables that influence SE outcomes that are shared among siblings. These include shared rearing environment and the 50% of genetic information that is shared between siblings (e.g. Lahey & D'Onofrio, 2010; Ryan, 2015). Thus, in these models β_1 represents the association between within-family differences in emotional engagement and within-family differences in SE outcomes. Importantly, this model also includes a lagged measure of the dependent variable (β_4), to account for directionality and between-sibling differences in the predisposition to SE skills.

Third, to account more directly for omitted, stable, child-level influences on SE skills and engagement a first difference, or change model, was estimated in model 3, shown below.

$$SE\ Outcome_{it} - SE\ Outcome_{i(t-1)} = \alpha + \beta_1(Emotional\ Engagement_{it} - Emotional\ Engagement_{i(t-1)}) + \beta_k(\Delta Covariates_i) + \epsilon_i$$

In this model, child-level changes in emotional engagement with school are used to predict child-level changes in SE outcomes. Thus, the dependent variable is constructed by subtracting SE outcomes at time *t-1* from SE outcomes at time *t*; this is predicted from the identically constructed difference in emotional engagement (*t-(t-1))* and all time varying covariates (in the Add Health, this is only a change in GPA; in the NLSY this includes change in cognitive and behavioral engagement, parent marital status, parent employment, and family income). By creating these change scores, the model examines how emotional engagement and SE outcomes change together over time. They also remove the impact of unobserved, time-invariant child characteristics such as race, gender, and constant family or personality factors. Thus in these models the coefficient β_1 represents the average change in SE 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 SE outcomes vary by student age, all three models were repeated with the inclusion of an interaction between emotional engagement with school and a centered child age variable. This interaction term can be interpreted as the change in the association between emotional engagement and SE outcomes for each year a student ages.

In both samples, data were multiply imputed to account for missing covariate information only (e.g. 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). Following conventional guidelines (e.g. Graham, 2009), 15 imputed datasets were generated and coefficients and standard errors were combined using the MIM command. Additionally, in the Add Health, all full sample models were weighted using the Add Health

provided wave 2 survey weights to account for the clustered nature of the sample and to produce nationally representative estimates based on sampling design and attrition.

Results

Descriptive statistics for both samples are provided in Table 2. As expected based on the design, youth in the Add Health are older than those in the NLSY. The youth in the Add Health are also more advantaged than the youth in the NLSY sample. 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. Notably, because engagement and dependent variable measures vary across samples, means and standard deviations cannot be directly compared.

Results from models exploring unmoderated associations between engagement and SE outcomes are presented in Table 3. Across all datasets, modeling strategies, and dependent variables, emotional engagement with school was significantly and beneficially associated with socio-emotional outcomes. Moreover, with the exception of delinquent behavior in the NLSY, emotional engagement with school was consistently the most influential dimension of engagement. As expected, the strength of the associations between engagement and SE outcomes decreased as the models accounted for family-linked and then time invariant confounds. OLS coefficients were larger than both sibling models and first difference models in all cases. Because all engagement and SE outcomes were standardized, estimated coefficients can be interpreted as standardized effect sizes, which range from about 0.10 to 0.20 of standard deviation. As noted above, these analyses were replicated in models that used only identical covariates across the two datasets. Results from these models were nearly identical to the main

specification (see Table 4), with no changes in the sign or significance of key coefficients, and no changes in magnitude greater than 0.01.

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= -0.08, respectively, both p< 0.01). As anticipated, in the sibling fixed effects models that account for family level omitted variables, NLSY associations reduced but were still statistically significant (b= -0.18, p< 0.01); however the association between emotional engagement and delinquency increased slightly in sibling in the Add Health data (b= -0.13, p< 0.01). In first difference models, which account for time-invariant omitted variables, associations remained statistically significant, but again decreased in magnitude. Notably, the estimated associations between emotional engagement and delinquency were nearly identical across datasets using first difference models (b= -0.09 and -0.08, respectively, both p< 0.01).

Depressive Symptoms and Depression

Associations between emotional engagement and depressive symptoms were remarkably consistent across datasets, and followed expected patterns across models. In the NLSY data, OLS associations between emotional engagement and depressive symptoms were initially -0.19 of a standard deviation (p< 0.01), and -0.20 in the Add Health (p< 0.01). The addition of sibling fixed effects reduced these coefficients to -0.17 and -0.06, respectively (both p< 0.01). Notably, the particularly large drop in the estimate for the Add Health data is consistent with the large number of twins in those data. Finally, first difference models showed nearly identical estimates to sibling models, -0.16 and -0.18 in the NLSY and Add Health samples (both p< 0.01).

Results were similar in the Add Health models predicting depression, coded using the CESD-provided clinical cutoff (see Table 5). Specifically, there was a statistically significant, negative association between emotional engagement with school and clinical levels of depressive symptoms across all three model types, and the association decreased slightly across all three model types (linear probability models, panel 1). Logistic regression models were also conducted for the OLS lagged DV and sibling fixed effects specifications and are presented in panel 2. Results from these models suggest that compared to students with mean levels of emotional engagement, students with emotional engagement that is 1 standard deviation higher are 63% as likely to experience depression in OLS models; within families, siblings with engagement that is 1 standard deviation higher are 70% as likely to experience depression.

Self-Esteem and Scholastic Self-Esteem

In the NLSY, both self-esteem and scholastic self-esteem showed the expected pattern of decrease in association across models. In 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 0.16 standard deviation increase for scholastic self-esteem (both $p< 0.01$). In first difference models, these associations were reduced to 0.13 and 0.12, respectively (both $p< 0.01$). In the Add Health sample, however, the association between emotional engagement and self-esteem was similar in OLS ($b= 0.22$, $p< 0.01$) and sibling models ($b= 0.26$, $p< 0.01$), and this association attenuated only slightly in first difference models (to $b= 0.20$, $p< 0.01$).

Moderation by Age

Table 6 displays the mean levels of emotional engagement with school by student age in the Add Health data. As expected, the bivariate relationship between age and emotional engagement was statistically significant and negative ($p< 0.01$), in line with previous research

(e.g. Gillen-O'Neel & Fuligni, 2013; Eccles et al., 1993; Wang, Brinkworth, & Eccles, 2013; Wang & Eccles, 2011). Across both datasets, in nearly all cases there was little age-based differentiation in the association between levels of emotional engagement with school and SE outcomes (for Add Health results, see Table 7; for NLSY results, see Table 8). There were two exceptions to this pattern of findings. First, 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 (all $p< 0.05$) in the Add Health data only. Second, there was a consistent relationship between changes in engagement and SE outcomes, again in the Add Health data only. Specifically, in addition to the delinquency model, first difference models examining depressive symptoms and self-esteem revealed statistically significant interactions with age such that for each additional year, a change in emotional engagement with school produced a 0.02 standard deviations smaller change in outcomes (both $p< 0.05$). Notably, however, this interaction was not significant in OLS or sibling models for depressive symptoms or self-esteem, suggesting that while levels of engagement are equally important across adolescence for SE development, experiencing *changes* in engagement may become less significant as students age; that is, interventions designed to quickly boost engagement or shocks that decrease engagement may be less strongly associated with SE outcomes among high school youth.

Sensitivity Tests

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. Additionally, specific

sensitivity tests addressed concerns regarding conflating measures of school quality with emotional engagement and the timing of cognitive and behavioral engagement measures.

School quality versus emotional engagement. Conceptually, school engagement mediates the association between school quality and student outcomes. However, school quality and school engagement are separate constructs, thus it is important to ensure that any measure of engagement reflects only student perceptions of school quality, rather than a measure of quality itself. If a measure of engagement did include items that instead measured school quality, associations between engagement and outcomes could be inflated by the addition of a quality measure. In the present study, both the NLSY and Add Health measures include an item where students report on how safe they feel in their schools. Though this item does reflect the students' response to the school environment, more so than the rest of the scale this item may also reflect school quality. Thus, a sensitivity test was conducted in which this item was removed from the emotional engagement scale. Results are presented in Table 9, and are nearly identical to the main models. Of the 21 estimates, only 4 are different from the models presented in Table 3, and these differences are all less than 0.02 of a standard deviation in magnitude. This suggests that the inclusion of the school safety item does not substantially inflate estimated associations.

To further address this concern, Add Health lagged dependent variable and sibling fixed effects models were run with the inclusion of several indicators of school quality, drawn from wave 1. These models were run in the Add Health only because the NLSY did not include school level data; first difference models were not used because school level covariates were only collected at wave 1. School level covariates included: an Add Health created, three-level measure of school size; average class size; proportion of new teachers in the school; proportion of teachers with a master's degree in the school; a dummy variable indicating whether or not the

school has a parent organization; an dummy variable indicating whether the school was public versus private; a three-level measure of school urbanicity; and a dummy indicating whether or not the school was a high school (as compared to a K-8, K-12, or middle school). Results are presented in Table 10, and demonstrate that the inclusion of school level covariates does not change findings from the preferred models (Table 3). Only one estimated coefficient changes in magnitude, and this change is less than 0.01 of a standard deviation, suggesting that the measure of emotional engagement in the Add Health was not inflated by the omission of these measures of school quality.

Timing of cognitive and behavioral engagement measures. Preferred models include lagged measures of cognitive and behavioral engagement. These constructs are lagged because of theoretical and empirical evidence that emotional engagement with school influences cognitive and behavioral engagement (Ryan et al., 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, or influenced by past engagement or school policy, but does not over-control the potential influence of emotional engagement on behavioral and cognitive engagement. However, consistent with best practice in the engagement literature (Wang & Fredricks, 2014), sensitivity analyses were also conducted to explore the contemporaneous associations between engagement dimensions and SE outcomes.

These models were conducted with the NLSY only because, as described above, the Add Health did not include contemporaneous measures of emotional, cognitive, and behavioral engagement at both wave 1 and wave 2. Estimated associations between emotional engagement and SE outcomes remain largely unchanged in magnitude, and in almost all cases remain more

strongly associated with SE outcomes than cognitive or behavioral engagement (see Table 11). The exception to this pattern is delinquent behavior, in which associations between emotional engagement and delinquency are reduced, and associations between behavioral engagement (truancy) and delinquency are larger than the associations between emotional engagement and delinquency. This pattern of results suggests that emotional engagement influences behavioral engagement with school, as measured by truancy, which in turn influences delinquency, but that emotional engagement with school impacts delinquent behavior directly even after accounting for contemporaneous truancy.

Discussion

This chapter examined the association between emotional engagement with school and socio-emotional outcomes across a series of increasingly robust models. Findings are consistent with a causal link between school engagement and SE outcomes and suggest that continued exploration of this construct is warranted. Moreover, findings across preferred specifications and sensitivity analyses corroborate the particular importance of emotional engagement with school for social and emotional development (Ryan & Deci, 2009; Li & Lerner, 2011; Wang & Fredricks, 2014; Wang & Peck, 2013). Additionally, there is preliminary evidence that the association between levels of school engagement and outcomes is consistent as children age for depressive symptoms and self-esteem, suggesting that emotional engagement with school is important for youth's emotional well-being across middle and high school.

Associations and effect sizes were remarkably consistent across datasets, with the exception of delinquency, for which they were much larger in the NLSY than in the Add Health data. This discrepancy may have occurred 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 4 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 (Table 7), 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. Specifically associations between emotional engagement with school and delinquency were larger in the Add Health when the sample was restricted to youth who were the same age as the NLSY respondents and the delinquency measure was more closely aligned with the NLSY (see Table 12).

Across nearly all models emotional engagement was the strongest predictor of SE outcomes, second only to previous measures of SE functioning. Emotional engagement was particularly predictive of depressive symptoms and self-esteem, in line with previous research (Li & Lerner, 2011; Wang & Fredricks, 2014; Wang & Peck, 2013). These SE 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. Moreover, strong in-school relationships facilitated by emotional engagement may provide opportunities for the modeling and practice of positive emotion regulation strategies (e.g. Marroquin, 2011). These findings suggest that in-

school interventions that target SE skills through building a sense of community among students and between students and teachers may be particularly effective (e.g. Jones & Bouffard, 2012).

Conversely, delinquent behavior may be influenced by a wider variety of outside-of-school influences, such as neighborhoods characteristics, out-of-school peers, and increases in unsupervised time (e.g. Haynie & Osgood, 2005; Leventhal & Brooks-Gunn, 2000; Sampson, Morenoff, & Gannon-Rowley, 2002; Sciandra et al., 2009; Sun, Triplett, & Gainey, 2004). Even an adolescent who feels connected to his or her school may struggle to avoid delinquent behavior in the face of hours of unsupervised time with rowdy peers, high levels of neighborhood disorganization and opportunities to offend, or a neighborhood gang context. Particularly in the Add Health data where delinquency was richly defined, including youth participation in status and drug-related offenses, out-of-school influences may account for much of the variation in delinquent behavior.

Associations between levels of emotional engagement and socio-emotional outcomes decreased with age for delinquency, suggesting that as students age the strength of emotional engagement with school diminishes relative to other factors associated with delinquency. Moreover, 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 SE outcomes. However, this interaction did not emerge in the NLSY (Table 8), in which youth ages ranged from 10 to 14 suggesting that this decline occurs mostly later in adolescence. This may be the case for two reasons. First, by late adolescence, the SE skills youth have already developed may reduce the impact of disruptions in emotional engagement on SE outcomes, both positive and negative. Second, it may be that other aspects of youths' lives grow

in importance as they age. For example, in older adolescence youth may begin to work, develop athletic skills, or take leadership roles in other contexts that provide access to new peers, new non-family adults, and new opportunities for success outside the school context (e.g. Eccles et al., 2003; Erol & Orth, 2011; Scales, Benson, & Mannes, 2006). Thus, although overall levels of engagement with school remain important, experiences and successes in these other contexts may reduce the relative contribution of sudden changes in emotional engagement with school to SE outcomes. This suggests that while interventions designed to enhance emotional engagement may be most effectively targeted at younger students, it is still important for youth to be able to engage with their schools as they age and transition from middle to high school in mid adolescence.

Limitations

Though a strength of this analysis is the examination of associations across two datasets, the use of two data sources led to differences in the measurement of the key independent variable, emotional engagement with school, across analyses. Although there was substantial overlap between the two scales (see Table 1), differences in number of items and item phrasing remained. However, insofar as these measures were both correlated with the same overarching construct, these differences should not bias analyses. Although we cannot observe this overlap, 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 tapped different constructs.

Similarly, measures of cognitive and behavioral engagement differed across datasets and both offered limited measures of these constructs (Table 1). Though items were chosen to map onto students' interest and participation in school, respectively, just a few items met these criteria

in each dataset. The small number of items in these scales may have led to an artificially low association with the SE skills in this analysis, and 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 or school characteristics correlated with SE outcomes may bias associations. More specifically, this chapter is concerned with asking whether the same child, from the same family would have different outcomes if she or he had attended a different school. Although this study used several methods to answer this question, it remains an observational, as compared to an experimental, study, and subject to threats from time varying characteristics that could not be accounted for in the estimated models. Associations between emotional engagement and SE outcomes were reduced as models more stringently accounted for unobserved student characteristics, first by analyzing associations within family and second by using change models; however, associations did not fully attenuate. Taken together, these models suggest that any remaining omitted confounds would need to be both time variant and uncorrelated with family-level factors. Moreover, previous experimental research does support a causal link between engagement and SE 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 improved SE outcomes including reduced delinquent behavior and substance use (e.g. Battistich et al., 2004; Solomon et al., 2000). However, there should be continued efforts to reduce bias in these estimates, particularly in models that include more time points and more explicitly control for school characteristics.

Finally, in these data there is no direct measure of SE skills, such as a measure of emotion regulation or delay of gratification. Rather SE outcomes are used as proxies for the skills that typically undergird them. Emotional engagement with school could change these outcomes without changing the underlying skills by controlling student experiences and behavior externally; if so, these analyses would overstate the long-term benefits of emotional engagement with school.

Conclusions

The present study supports the importance of continuing to research – and enhance through intervention – school engagement, and in particular emotional engagement with school. This analysis builds on the school engagement (Fredricks et al., 2004; Wang & Degol, 2014), school connection (Osterman, 2000), and experimental literatures (Battistich et al., 2004; Solomon et al., 2000), and provides evidence consistent with a causal link between emotional engagement with school and socio-emotional skill development. Socio-emotional skills are fundamental to the short- and long-term success of the 21st century student. If it is possible to use public schools to enhance students SE functioning, interventions designed to enhance engagement could be a particularly impactful way to improve the SE outcomes of youth who are disconnected and disadvantaged in other contexts, and to close income-based gaps in SE outcomes. Given that the modal public school student is low-income (NCES, 2014) and that these students could benefit most from interventions to boost SE skills, identifying whether this potentially causal relationship holds among these students is the next key question that must be answered in order to understand more fully whether school-based engagement interventions can be an effective and efficient policy tool for enhancing students' 21st century social and emotional skills.

Table 1

School Engagement Items in the Add Health and NLSY Datasets

Add Health items, collected waves 1 & 2 (1994-1996)	NLSY items, collected from1988-2012, data drawn from the year when each respondent was age10-14
Emotional Engagement	*Emotional engagement*
You feel close to people at your school	It is easy to make friends
You feel like you are part of your school	
The teachers at your school treat students fairly	Most teachers help with personal problems
How much do you feel teachers care about you?	Most teachers know their subjects well
You are happy to be at your school	Most of my classes are boring
You feel safe in your school	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	*Cognitive engagement*
How often have you had trouble paying attention in school?	My schoolwork requires me to think
How often have you had trouble getting homework completed?	At this school, a person has the freedom to learn what interests him/her.
Behavioral engagement	*Behavioral engagement*
How many times did you skip school for a full day without an excuse?	How often did you skip school this/last year without a parent's permission?
Number of extracurricular activities reported at wave 1 interview	

Table 2

Descriptive Statistics by Sample

	NLSY		Add Health	
	m	*sd*	*m*	*sd*
Emotional engagement	21.65	3.52	16.13	4.26
Cognitive engagement (lagged)	6.20	1.43	8.20	1.98
Behavioral engage- truancy (lagged)	0.18	0.60	1.77	6.99
Behavioral engage- activities (lagged)			2.31	2.59
Delinquency (DV)	1.17	1.10	3.39	4.90
Delinquency (lagged)	1.01	1.05	4.82	5.76
Depressive symptoms (DV)	15.63	3.16	6.56	4.73
Depressive symptoms (lagged)	15.84	3.25	6.63	4.70
Self-esteem (DV)	206.86	33.51	25.10	3.50
Self-esteem (lagged)	206.03	34.94	24.70	3.56
Scholastic self-esteem (DV)	177.19	41.33		
Scholastic self-esteem (lagged)	174.16	42.90		
GPA (lag)			2.79	0.78
PPVT score	91.86	18.55	100.72	14.88
Child age	13.04	1.16	15.10	1.64
White	0.47		0.73	
Black	0.31		0.16	
Hispanic	0.22		0.01	
Asian			0.04	
Other			0.06	
Female	0.50		0.50	
Grade in school	6.91	1.30	9.07	1.51
Relationship with mother	3.43	0.81	3.29	0.69
Parents married	0.55		0.74	
Parent education	12.62	2.59	0.46	
Parent employed	35.39	22.00	0.56	
INR	2.82	2.50	4.23	7.70
Year at DV	1999	6.09		
Mother's age at youth’s birth	25.44	5.76		
First born	0.41			
Birth year	1986	6.11		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth and the National Longitudinal Study of Adolescent Health. Descriptive statistics are take from respondents with a valid measure of emotional engagement with school, *N*= 7,302 in the NLSY and *N*= 13,366 in the Add Health. GPA is measured in Add Health using student report of grades in 4 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 one 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 4-leve dummy variable with less than high school, high school completion, some college, and college or more categories. The reported statistic is the proportion of parents with at least a high school degree.

Table 3

Socio-Emotional Outcomes as a Function of School Engagement

	NLSY									Add Health								
	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 engage	-0.20	0.01	**	-0.18	0.02	**	-0.09	0.02	**	-0.08	0.01	**	-0.13	0.02	**	-0.08	0.01	**
Lagged covariates																		
Cognitive engage	-0.00	0.01		0.01	0.02		-0.02	0.02		-0.05	0.02	**	-0.04	0.03				
Behavioral- skip sch	0.02	0.02		0.02	0.02		-0.26	0.02	**	0.01	0.01		-0.04	0.02				
Behavioral- activities										0.06	0.02	*	0.00	0.03				
Lagged DV	0.27	0.02	**	0.23	0.02	**				0.53	0.03	**	0.37	0.02	**			
N	6636			6636			3818			12242			3563			11967		
Depressive Sympt.	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.19	0.01	**	-0.17	0.02	**	-0.16	0.02	**	-0.20	0.01	**	-0.06	0.03	*	-0.18	0.01	**
Lagged covariates																		
Cognitive engage	-0.02	0.01		-0.02	0.02		0.01	0.02		-0.03	0.02	+	-0.09	0.03	**			
Behavioral- skip sch	0.02	0.02		0.01	0.02		-0.07	0.02	**	-0.01	0.01		0.03	0.03				
Behavioral- activities										0.01	0.01		0.04	0.03				
Lagged DV	0.22	0.02	**	0.18	0.02	**				0.45	0.01	**	0.23	0.03	**			
N	6512			6512			3937			12327			3576			12047		

Table 3, continued

	NLSY									Add Health								
	OLS, Lagged DV			Sibling FE			First Difference			OLS, Lagged DV			Sibling FE			First Difference		
Self-Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	0.19	0.01	**	0.18	0.02	**	0.13	0.02	**	0.22	0.01	**	0.26	0.02	**	0.20	0.02	**
Lagged covariates																		
Cognitive engage	-0.00	0.01		-0.01	0.02		0.02	0.02		0.04	0.01	**	0.03	0.03				
Behavioral- skip sch	0.01	0.02		0.01	0.02		0.04	0.02	+	0.02	0.01		0.05	0.02	*			
Behavioral- activities										-0.00	0.01		-0.03	0.03				
Lagged DV	0.31	0.02	**	0.28	0.02	**				0.45	0.01	**	0.35	0.02	**			
N	6064			6064			2384			12330			3570			12047		
Scholastic Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*									
Emotional engage	0.16	0.01	**	0.13	0.02	**	0.12	0.02	**									
Lagged covariates																		
Cognitive engage	0.00	0.01		0.01	0.02		-0.02	0.02										
Behavioral- skip sch	0.02	0.02		0.02	0.02		0.05	0.02	*									
Lagged DV	0.39	0.02	**	0.35	0.02	**												
N	6043			6043			2384											

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth and the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown for both datasets include: child age, grade in school, gender, race, closeness to mother, and PPVT 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, and birth year. In Add Health, a measure of the previous year's GPA is also included. Measures of cognitive and behavioral engagement are lagged and standardized. Add Health regressions are weighted using Add Health sampling weights, GSWGT2. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 4

Socio-Emotional Outcomes 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		
Delinquency	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.20	0.01	**	-0.18	0.02	**	-0.12	0.02	**	-0.08	0.01	**	-0.14	0.02	**	-0.08	0.01	**
Lagged covariates																		
Cognitive engage	-0.00	0.01		0.01	0.02					-0.06	0.02	**	-0.04	0.03	+			
Behavioral- skip sch	0.02	0.02		0.02	0.02					0.01	0.01		-0.04	0.02				
Behavioral- activities																		
Lagged DV	0.28	0.02	**	0.23	0.02	**				0.54	0.03	**	0.37	0.02	**			
N	6636			6636			3818			12242			3958			11967		
Depressive Sympt.	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.19	0.01	**	-0.17	0.02	**	-0.17	0.02	**	-0.20	0.01	**	-0.06	0.03	*	-0.18	0.01	**
Lagged covariates																		
Cognitive engage	-0.02	0.01		-0.03	0.02					-0.04	0.02	*	-0.08	0.03	**			
Behavioral- skip sch	0.02	0.02		0.02	0.02					-0.00	0.01		0.02	0.03				
Behavioral- activities																		
Lagged DV	0.22	0.02	**	0.19	0.02	**				0.45	0.01	**	0.23	0.03	**			
N	6512			6512			3937			12327			3975			12047		

Table 4, continued

	NLSY									Add Health								
	OLS, Lagged DV			Sibling FE			First Difference			OLS, Lagged DV			Sibling FE			First Difference		
Self-Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	0.19	0.01	**	0.18	0.02	**	0.15	0.02	**	0.22	0.01	**	0.26	0.02	**	0.20	0.02	**
Lagged covariates																		
Cognitive engage	-0.00	0.01		-0.01	0.02					0.04	0.01	**	0.04	0.03				
Behavioral- skip sch	0.01	0.02		0.01	0.02					0.02	0.01		0.05	0.02	*			
Behavioral- activities																		
Lagged DV	0.31	0.02	**	0.28	0.02	**				0.45	0.01	**	0.35	0.02	**			
N	6064			6064			2384			12330			3971			12047		
Scholastic Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*									
Emotional engage	0.16	0.01	**	0.13	0.02	**	0.13	0.02	**									
Lagged covariates																		
Cognitive engage	0.00	0.01		0.01	0.02													
Behavioral- skip sch	0.02	0.02		0.02	0.02													
Lagged DV	0.39	0.02	**	0.35	0.02	**												
N	6043			6043			2384											

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth and the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown for both datasets include: child age, grade in school, gender, race, closeness to mother, and PPVT 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 cognitive and behavioral engagement are lagged and standardized. Add Health regressions are weighted using Add Health sampling weights, GSWGT2. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 5

Associations between Emotional Engagement and the Clinical Cutoff for Depression in the CESD, Add Health Data

	Depression – Linear Probability Models								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.06	0.01	**	-0.06	0.20	**	-0.05	0.01	**
Lagged covariates									
Cognitive engage	-0.02	0.01	**	-0.02	0.01				
Behavioral- skip sch	-0.00	0.01		-0.02	0.01				
Behavioral- activities	0.00	0.01		0.02	0.01				
Lagged DV	0.34	0.02	**	0.29	0.02	**			

	Depression – Logit Models					
	OLS			Sibling FE		
	b	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.45	0.04	**	-0.35	0.10	**
Lagged covariates						
Cognitive engage	-0.14	0.05	**	-0.13	0.11	
Behavioral- skip sch	-0.04	0.04		-0.13	0.09	
Behavioral- activities	-0.00	0.05		0.10	0.011	
Lagged DV	1.72	0.08	**	1.54	0.19	**

Note. Data are drawn from the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown include: grade in school, gender, race, closeness to mother, previous year's GPA, and PPVT score; parent marital status, education, and employment, and family income. Lagged measures of cognitive (engagement in class and homework) and behavioral engagement (school skipping and activities) are also included and standardized. Covariates in first difference model include change in GPA. OLS and first difference regressions are weighted using Add Health sampling weights, GSWGT2. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 6

Bivariate Associations between Emotional Engagement with School and Age

	Emotional Engagement
Student Age	*m (sd)*
12	16.69 (3.92)
13	16.85 (4.01)
14	15.94 (4.52)
15	15.77 (4.17)
16	15.92 (4.22)
17	16.09 (4.32)
18	16.18 (4.25)

Note. Data are drawn from the National Longitudinal Study of Adolescent Health.

Table 7

Associations between Age, Emotional Engagement, and Socio-Emotional Outcomes, Add Health Data

	Delinquent Behavior								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional Engage	-0.18	0.03	**	-0.31	0.06	**	-0.16	0.04	**
Age x Engagement	0.02	0.01	**	0.04	0.01	**	0.02	0.01	*
Lagged DV	0.53	0.03	**	0.37	0.02	**			
Child age, centered	0.01	0.02		-0.03	0.04		-0.04	0.01	**
N	12242			3563			12132		
	Depressive Symptoms								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional Engage	-0.22	0.03	**	0.03	0.07		-0.29	0.04	**
Age x Engagement	0.01	0.01		-0.02	0.01		0.03	0.01	**
Lagged DV	0.45	0.01	**	0.23	0.03	**			
Child age, centered	0.05	0.02	**	0.07	0.04	+	-0.01	0.01	+
N	12327			3576			12214		
	Self-Esteem								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional Engage	0.25	0.03	**	0.25	0.06	**	0.28	0.03	**
Age x 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	-0.01	0.02		-0.02	0.04		0.02	0.01	+
N	12330			3570			12217		

Note. Data are drawn from the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown include: grade in school, gender, race, closeness to mother, previous year's GPA, and PPVT score; parent marital status, education, and employment, and family income. Lagged 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. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 8

Associations between Age, Emotional Engagement, and Socio-Emotional Outcomes, NLSY Data

	Delinquent Behavior								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional Engage	-0.27	0.14	+	-0.12	0.20		-0.14	0.09	
Age x Engagement	0.00	0.01		-0.00	0.01		0.00	0.02	
Lagged DV	0.27	0.02	**	0.23	0.02	**			
Child age, centered	-0.06	0.03		-0.12	0.05	*	0.00	0.02	
N	6636			6636			3818		
	Depressive Symptoms								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional Engage	-0.08	0.14		-0.30	0.20		0.03	0.11	
Age x Engagement	-0.00	0.01		0.01	0.01		-0.05	0.02	+
Lagged DV	0.22	0.02	**	0.18	0.02	**			
Child age, centered	0.12	0.03	**	0.14	0.05	**	0.03	0.02	
N	6512			6512			3937		
	Self-Esteem								
	OLS			Sibling FE			First Difference		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional Engage (std)	0.18	0.18		0.01	0.25		0.07	0.14	
Age x Engagement	0.00	0.01		0.01	0.02		0.02	0.03	
Lagged DV (std)	0.31	0.02	**	0.28	0.02	**			
Child age, centered	-0.02	0.04		0.01	0.05		-0.02	0.03	
N	6064			6064			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Study of Youth. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown include: grade in school, gender, race, birth order, closeness to mother, and PPVT score; parent marital status, education, and employment, mother's age at first birth, and family income; and year of birth and year of dependent variable measurement. Lagged measures of cognitive (engagement in class and homework) and behavioral engagement (school skipping) are also included. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 9

Socio-Emotional Outcomes as a Function of School Engagement, Item Assessing Perceptions of Safety Removed

	NLSY									Add Health								
	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 engage	-0.20	0.01	**	-0.18	0.02	**	-0.09	0.02	**	-0.08	0.01	**	-0.13	0.02	**	-0.08	0.01	**
Lagged covariates																		
Cognitive engage	-0.00	0.01		0.01	0.02		-0.02	0.02		-0.05	0.02	**	-0.03	0.03				
Behavioral- skip sch	0.02	0.02		0.02	0.02		-0.26	0.02	**	0.01	0.01		-0.04	0.02				
Behavioral- activities										0.06	0.02	*	0.00	0.03				
Lagged DV	0.28	0.02	**	0.23	0.02	**				0.53	0.03	**	0.37	0.02	**			
N	6666			6666			3826			12242			3563			11967		
Depressive Sympt.	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.18	0.01	**	-0.17	0.02	**	-0.16	0.02	**	-0.19	0.01	**	-0.06	0.03	*	-0.16	0.01	**
Lagged covariates																		
Cognitive engage	-0.02	0.01		-0.02	0.02		0.01	0.02		-0.03	0.02	+	-0.09	0.03	**			
Behavioral- skip sch	0.02	0.02		0.02	0.02		-0.07	0.02	**	-0.01	0.01		0.03	0.03				
Behavioral- activities										0.01	0.01		0.04	0.03				
Lagged DV	0.22	0.01	**	0.18	0.02	**				0.45	0.01	**	0.23	0.03	**			
N	6546			6546			3949			12327			3576			12047		

Table 9, continued

	NLSY									Add Health								
	OLS, Lagged DV			Sibling FE			First Difference			OLS, Lagged DV			Sibling FE			First Difference		
Self-Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	0.19	0.01	**	0.17	0.02	**	0.13	0.02	**	0.22	0.01	**	0.26	0.02	**	0.20	0.01	**
Lagged covariates																		
Cognitive engage	-0.00	0.01		-0.01	0.02		0.02	0.02		0.04	0.01	**	0.03	0.03				
Behavioral- skip sch	0.01	0.02		0.01	0.02		0.04	0.02		0.02	0.01		0.05	0.02	*			
Behavioral- activities										-0.00	0.01		-0.03	0.03				
Lagged DV	0.31	0.02	**	0.28	0.02	**				0.45	0.01	**	0.35	0.02	**			
N	6064			6064			2391			12330			3570			12047		
Scholastic Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*									
Emotional engage	0.16	0.01	**	0.13	0.02	**	0.12	0.02	**									
Lagged covariates																		
Cognitive engage	0.00	0.01		0.01	0.02		-0.02	0.02										
Behavioral- skip sch	0.02	0.02		0.02	0.02		0.05	0.02	*									
Lagged DV	0.39	0.02	**	0.35	0.02	**												
N	6063			6063			2391											

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth and the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown for both datasets include: child age, grade in school, gender, race, closeness to mother, and PPVT 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, and birth year. In Add Health, a measure of the previous year's GPA is also included. Measures of cognitive and behavioral engagement are lagged and standardized. Add Health regressions are weighted using Add Health sampling weights, GSWGT2. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 10

Socio-Emotional Outcomes as a Function of School Engagement with the Inclusion of School-Level Covariates, Add Health Data Only

	Delinquency					
	OLS			Sibling FE		
	b	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.09	0.01	**	-0.13	0.02	**
Lagged covariates						
Cognitive engage	-0.06	0.02	**	-0.03	0.03	
Behavioral- skip sch	0.01	0.01		-0.04	0.02	+
Behavioral- activities	0.05	0.02	*	0.01	0.02	
Lagged DV	0.53	0.03	**	0.37	0.02	**
	Depressive Symptoms					
	OLS			Sibling FE		
	b	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.20	0.01	**	-0.06	0.03	*
Lagged covariates						
Cognitive engage	-0.02	0.01	+	-0.10	0.03	**
Behavioral- skip sch	-0.00	0.01		0.03	0.03	
Behavioral- activities	0.01	0.01		0.03	0.03	
Lagged DV	0.45	0.01	**	0.23	0.03	**
	Self Esteem					
	OLS			Sibling FE		
	b	*se*	*p*	*b*	*se*	*p*
Emotional engage	0.22	0.01	**	0.26	0.02	**
Lagged covariates						
Cognitive engage	0.04	0.01	**	0.03	0.03	
Behavioral- skip sch	0.02	0.01		0.05	0.02	*
Behavioral- activities	-0.00	0.01		-0.03	0.03	
Lagged DV	0.44	0.01	**	0.35	0.02	**

Note. Data are drawn from the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. School level covariates included but not show include: school size, average class size, proportion of new teachers in the school, proportion of teachers with a master's degree in the school, whether or not the school has a parent organization, an indicator for public versus private school type, a three-level measure of school urbanicity, and a dummy indicating whether or not the school was a high school (as compared to a K-8, K-12, or middle school). Family and student level covariates included but not shown include:

grade in school, gender, race, closeness to mother, previous year's GPA, and PPVT score; parent marital status, education, and employment, and family income. Lagged measures of cognitive (engagement in class and homework) and behavioral engagement (school skipping and activities) are also included and standardized. Covariates in first difference model include change in GPA. OLS and first difference regressions are weighted using Add Health sampling weights, GSWGT2. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 11

Socio-Emotional Outcomes as a Function of Contemporaneous Emotional, Cognitive, and Behavioral Engagement

	NLSY								
	OLS, Lagged DV			Sibling FE			First Difference		
Delinquency	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.16	0.01	**	-0.14	0.02	**	-0.09	0.02	**
Cognitive engage	-0.01	0.01		-0.02	0.02		-0.02	0.02	
Behavioral- skip sch	-0.25	0.01	**	-0.26	0.02	**	-0.26	0.02	**
Lagged DV	0.24	0.02	**	0.21	0.02	**			
N	6636			6636			3818		
Depressive Sympt.	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.18	0.01	**	-0.16	0.02	**	-0.16	0.02	**
Cognitive engage	-0.02	0.01		-0.02	0.02		0.01	0.02	
Behavioral- skip sch	-0.06	0.01	**	-0.06	0.02	**	-0.07	0.02	**
Lagged DV	0.22	0.02	**	0.18	0.02	**			
N	6512			6512			3937		
Self-Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	0.18	0.01	**	0.16	0.02	**	0.13	0.02	**
Cognitive engage	0.03	0.01	*	0.03	0.02	+	0.02	0.02	
Behavioral- skip sch	0.03	0.01	*	0.02	0.02		0.04	0.02	+
Lagged DV	0.31	0.02	**	0.28	0.02	**			
N	6064			6064			2384		
Scholastic Esteem	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	0.16	0.01	**	0.12	0.02	**	0.12	0.02	**
Cognitive engage	-0.01	0.01		0.01	0.02		-0.02	0.02	
Behavioral- skip sch	0.04	0.01	**	0.05	0.02	**	0.05	0.02	*
Lagged DV	0.39	0.02	**	0.35	0.02	**			
N	6043			6043			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included by not shown for bot datasets include: child age, grade in school, gender, race, closeness to mother, and PPVT score; birth order, year that DV was assessed, and birth year; parent marital status, education, and employment, and family income; and mother's age at the child's birth. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Table 12

Associations between Emotional Engagement, and Socio-Emotional Outcomes in the Add Health Data, Age Restricted to Match the NLSY Sample, Using an Analogous Measures of Delinquency to the NLSY

	Original Add Health Scale									Add Health Data using NLSY Scale and Ages								
	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 engage	-0.08	0.01	**	-0.13	0.02	**	-0.08	0.01	**	-0.12	0.02	**	-0.18	0.04	**	-0.08	0.02	**
Lagged covariates																		
Cognitive engage	-0.05	0.02	**	-0.04	0.03					-0.07	0.02	**	-0.02	0.05				
Behavioral- skip sch	0.01	0.01		-0.04	0.02					0.05	0.03	+	0.03	0.08				
Behavioral- activities	0.06	0.02	*	0.00	0.03													
Lagged DV	0.53	0.03	**	0.37	0.02	**				0.40	0.02	**	0.27	0.05	**			
N	12242	3563		11967						6719			3563			6680		

Note. Data are drawn from the National Longitudinal Study of Adolescent Health. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Covariates included but not shown include: grade in school, gender, race, closeness to mother, previous year's GPA, and PPVT score; parent marital status, education, and employment, and family income. Lagged measures of cognitive (engagement in class and homework) and behavioral engagement (school skipping and activities) are also included and standardized. Regressions are weighted using Add Health sampling weights, GSWGT2. ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

CHAPTER III: ASSOCIATIONS BETWEEN EMOTIONAL ENGAGEMENT WITH SCHOOL AND SOCIO-EMOTIONAL OUTCOMES: MODERATION BY FAMILY INCOME

The analyses presented in chapter two are consistent with a causal link between emotional engagement with school and socio-emotional (SE) outcomes in late childhood and adolescence, suggesting that interventions designed to increase emotional engagement may enhance students' SE outcomes. Such interventions may be particularly important for low-income youth. Like the well-documented income-based gap in academic outcomes (e.g. Reardon, 2011), there also exists an income-based disparity in students' SE outcomes (e.g. Evans, 2004; Evans & Rosenbaum, 2008; Duncan & Magnuson, 2011; Farkas 2003; 2011; McLoyd, 1998; Noble et al., 2005; Noble et al., 2007). This gap is in turn associated with important long-run outcomes, including educational attainment, labor market attachment and wages, and mental and physical well-being (e.g. Duncan & Magnuson, 2011; Farkas 2003; 2011; Heckman, 2008; Moffitt et al., 2011). Thus, if interventions to increase emotional engagement with school can enhance low-income students' SE skills, they could also improve low-income students' long-run outcomes across these important dimensions.

Schools are a particularly promising place to provide interventions designed to increase the SE skills of low-income youth, both because schools are already accepted sites for intervention in child development and because public schools serve a tremendous number of low-income youth. For example, in 2013, 51% of public school children were eligible for the means-tested free and reduced lunch program (NCES, 2014). Moreover, previous research has suggested that low-income youth experience lower levels of engagement than their more affluent peers (e.g. Anderman, 2002; Battistich et al., 1995; Daly et al., 2009; Putnam, Frederick, & Snellman, 2012; Woolley & Bowen, 2007), suggesting that there is room to improve low-income

students' engagement and, potentially, their SE skills. However, to determine if increasing emotional engagement with school could improve low-income students' SE skills, and potentially narrow the income-based gap in students' SE outcomes, research must first identify whether the relationship between emotional engagement and SE outcomes applies to low-income youth. Put another way, it is possible that previously estimated associations between engagement and SE outcomes may reflect associations that exist *only* for moderate- or high income-youth; before investing in interventions designed to enhance SE outcomes by enhancing engagement, it is crucial to identify whether or not this association exists among the low-income youth who make up the majority of American public school students. The present study addresses this question using data drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth and the three modeling strategies introduced in chapter two. Specifically, by adding an interaction between emotional engagement and family income to the previously estimated models, this analysis estimates the difference in the relationship between emotional engagement and SE outcomes for low- versus high-income students. If analyses reveal that the relationship between emotional engagement and SE outcomes is equivalent, or perhaps even larger, for low- versus high-income youth, interventions to increase the school engagement of low-income youth could be promoted as a strategy for narrowing income-based SE skills gaps and a potentially efficient way to increase the SE outcomes of public school students in general.

Family Income and Socio-Emotional Skills

Low-income youth have on average lower levels of SE functioning than their higher-income peers across a variety of domains. Healthy development requires consistent, responsive parenting in a stable environment, contextual strengths that can be undermined by the experience of poverty, leading to broad impacts on children's SE skill development in the short and long

term (e.g. Brooks-Gunn & Duncan, 1997; Dearing, Berry, & Zaslow, 2006; Duncan, Kalil, & Ziol-Guest, 2010; Evans & English, 2002; Lamy, 2012; McLoyd, 1998). For example, Evans and colleagues report that low-income youth display higher levels of psychological distress, as well as weaker self-regulation (Evans & English, 2002; Evans & Rosenbaum, 2008). Similarly, several studies document income gradients in internalizing and externalizing behavior problems, as well as learning-related regulatory behaviors, using large national datasets (e.g. Brooks-Gunn & Duncan, 1997; Duncan & Magnuson, 2011; Farkas, 2011; Fletcher & Wolfe, 2012; McLoyd, 1998).

These income-based disparities in SE skills exist at school entry (e.g. Fletcher and Wolfe, 2012) and persist through middle and high school (e.g. Duncan & Magnuson, 2011; Farkas, 2011), suggesting that on average schools do not narrow this gap. Nonetheless, schools provide a potentially effective context for altering the outcomes of low-income students. Federal, state, and local governments have greater policy leverage over the quality and content of schooling than the quality and experience of family life (Rouse & Barrow, 2006), and schools remain a place where challenging interactions with peers, teachers, and academic work provide ample opportunity to practice SE skills such as emotion regulation and self-control (Eccles et al., 1993; Eccles, 1999). By fostering positive, rehabilitative relationships, and building students' engagement, schools can serve as a context that reinforces positive norms, and instills socio-emotional skills in students struggling with these capabilities at school entry.

Family Income, School Engagement, and Socio-Emotional Skills

School engagement may be a particularly potent way for schools to improve the SE outcomes of low-income youth. As discussed in chapters one and two, self-determination theory (SDT, Deci et al, 1991; Deci & Ryan, 1994; Ryan & Deci, 2009) highlights the importance of

students' sense of emotional engagement with school, hypothesizing that students cognitively and behaviorally engage with school to the extent that schools meet students' need to feel emotionally connected. SDT asserts that this sense of connection promotes the internalization of the goals, values, and skills promoted by schools (e.g. Deci et al, 1991; Deci & Ryan, 1994; Ryan & Deci, 2009), leading to student effort and utilization of school-based supports, ultimately enhancing students' SE skills and outcomes. Notably, however, Deci and Ryan argue that this healthy developmental process can exist in any context that offers students the opportunity to feel connected: this developmental process needs to occur, but it does not need to be school that provides it. For upper-income youth, who are on average more highly connected than their low-income peers (e.g. through membership in clubs, sports, or other activities, and connections to nonfamily institutions such as religious or community organizations; Putnam, Frederick, & Snellman, 2012) school may be one of many healthy developmental contexts; for low-income youth, school may provide a singular context for emotional engagement leading to SE skill development because it provides otherwise missing supports (Evans, 2004; Putnam et al., 2012).

Thus, low-income children who experience lower levels of engagement across multiple domains than their high-income peers may be more reliant on and receptive to school as a source of support; moreover, because of initially lower levels of SE skills, low-income students may have more room for growth and thus may demonstrate a stronger response to emotional engagement with school in terms of SE skills. Though this hypothesis has not been directly tested, triangulation of related evidence suggests that emotional engagement, and particularly the connection component of emotional engagement, may serve as a protective factor for low-income students. For example, in a cross sectional study of middle and high school students, Hopson and Lee (2011) demonstrated that perceptions of positive school climate can mitigate the

impact of poverty on problem behaviors—truancy, missing homework, arguments with teachers and peers, and suspensions. Notably, however, Hopson and Lee operationalize perceptions of school climate with "statements pertaining to their perceptions of the quality of their school, their feelings of connectedness to school, and their relationships with adults at school" (p. 2224, Hopson & Lee, 2011). Loukas et al. (2010) showed that high levels of connection to school can decrease the conduct problems of students with negative family relationships and low levels of self-regulation more so than for students without these risk factors. Finally, Kuperminic et al. (1997) showed that cross sectional relationships between students' perceptions of school—measured with items assessing students' sense of the schools' fairness, safety, relationships between students and teachers, and achievement emphasis—and problem behavior were stronger among African Americans and students from single parent households. Though these studies do not specifically address differential relationships between emotional engagement and SE skills based on family income, they are consistent with the hypothesis that emotional engagement may be more beneficial for low-income youth.

Finally, it is important to note that low-income youth have on average lower levels of school engagement (e.g. Anderman, 2002; Battistich et al., 1995; Daly et al., 2009; Woolley & Bowen, 2007), and tend to attend lower quality schools along dimensions related to engagement (e.g. disciplinary climate, teacher quality; Daly, Buchanan, Dasch, Eichen, & Lenhart, 2010). Thus, even if links between emotional engagement and SE skills and outcomes are equivalent across income groups, currently low-income youth in America are less able to benefit from engagement than their high-income peers. Taken together this suggests that there may be an opportunity to leverage emotional engagement to improve the SE skills and outcomes of these vulnerable youth.

Present Study

To test the hypothesis that emotional engagement with school is equivalent or perhaps even more beneficial for low-income youth versus their higher-income peers, the present study estimates the differential relationship between emotional engagement with school and SE outcomes for children from low-, moderate-, and high-income families using three modeling strategies in a large, national dataset. To address the challenges to causal inference outlined in chapters one and two, these relationships are again explored in three rigorous models targeting specific threats to causal inference: a lagged dependent variable model, a sibling fixed effects model, and a first difference model. In doing so, the present analysis aims to inform efforts to improve the short- and long-run SE skills and outcomes of low-income youth.

Method

Data and Sample

Data were drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY). The NLSY data were created by sampling the children of the female respondents to the original National Longitudinal Survey of Youth in 1979, and are thus national in scope and drawn from several age cohorts, spanning 1988 through 2012 (see chapter two for more information). Notably, because of the multi-generational nature of the sample, the data on family income in the NLSY are remarkably high quality. Mothers reported on the family's total income biennially over the course of the child's lifetime, making these data ideal for the present analysis. As in chapter two, the sample consists of children who reported on their emotional engagement and SE outcomes twice across the years of data collection, with *Ns* ranging from 2,384 to 6,636 depending on modeling strategy and dependent variable.

Measures

Emotional engagement with school. As in chapter two, the NLSY measure of emotional engagement with school included 7 items assessing teachers' involvement with students, students' liking of school, and perceptions of safety, and had an acceptable Cronbach's alpha (0.61 to 0.71 across the years of data collection, in line with other scales assessing emotional engagement, e.g. Li & Lerner, 2011).

Family income. Family income was measured using mother's report on total net family income at each survey year during the child's lifetime. The total net family income measure includes income from wages, salary and tips; unemployment or disability compensation; business income; child support or alimony; government cash and in-kind benefits; parental support; and income from interests, dividends, and rent. This net family income measure includes income from a partner only if the mother was married to the partner.

The income measure used in the present study is a three level categorical variable that was constructed in several steps. First, measures of family income were pulled from the child's first year of life through age 16. Next, these values were converted into income-to-needs ratios (INR) based on family size and the federal poverty guidelines corresponding to the year in which the income was earned. Third, an average of the INR values across the child's lifetime was calculated for all families that had at least 3 valid measures of family income (this average INR was imputed for all families with less than 3 income reports). Finally, this variable was trichotomized into low-, moderate-, and high-income groups. Families were categorized as low-income if their average INR was less than or equal to 200% of the federal poverty line (FPL); families were categorized as moderate-income if their average INR was between 200 and 300 percent of the FPL; and families were categorized as high-income if their average INR was

greater than 300% of the FPL. These cutoffs were chosen because 200% of the FPL is a common cutoff for means-tested social services receipt, however sensitivity to the choice of income cutoffs was explored in models presented below (see Sensitivity to Income Cutoffs).

Socio-emotional outcomes. As in chapter two, socio-emotional outcomes were operationalized using measures of delinquent behavior, depressive symptoms, and self-esteem. Delinquency was measured using 4 items assessing participation in fighting, stealing, and serious misbehavior in school, summed and normed by age. Depressive symptoms were assessed using 9 items assessing respondents' sadness, listlessness, and melancholy (National Commission on Children, 1999), and the scale had an acceptable Cronbach's alpha (0.60 to 0.71 across the years of data collection). Finally, self-esteem was measured using the Self-Perception Profile for Children (SPPC, Harter, 1985).

Covariates. Covariates were identical to those used in chapter two, and included measures of behavioral and cognitive engagement, the child's closeness to his or her mother, a measure of the student's cognitive ability (Peabody Picture Vocabulary Test, PPVT; Dunn & Dunn, 1997), and demographic information.

Analytic Strategy

The present analysis repeated the modeling strategies from chapter two—the lagged dependent variable (DV), sibling fixed effects, and first difference models—with the inclusion of an interaction between the three-level family income variable and emotional engagement. The inclusion of these interaction terms tests the differential relationship between emotional engagement and SE outcomes for each income group.

For example, β_1 in Model 1 below estimates the relationship between emotional engagement and SE outcomes for high-income youth (the omitted group); β_2 estimates the

difference in that relationship for low-income (as compared to high-income) youth; and β_3 estimates the difference in that relationship for moderate-income (as compared to high-income) youth.

$$SE\ Outcome_{it} = \alpha + \beta_1(Emotional\ Engagement_{it}) + \beta_2(Low\ Inc \times Emo\ Engagement_{it}) + \beta_3(Mod\ Inc \times Emo\ Engagement_{it}) + \beta_4(SE\ Outcome_{i(t-1)}) + \beta_k(Covariates_i) + \epsilon_i$$

This same strategy—adding interactions between emotional engagement and indicators for low and moderate family income—can be used in the first difference model. However, for the sibling fixed effects models a slightly different strategy must be used. As described in chapter two, sibling fixed effects models rely on within-family variation to generate the key estimates of interest, harnessing within-family deviations from a family level mean. Because family income does not vary within a family, it is not possible to estimate a within-family relationship between income and SE outcomes, and thus not possible to conduct an analysis with a traditional interaction term. Thus, I instead calculate the within-family relationship between emotional engagement and SE outcomes separately for low-, moderate-, and high-income families, and conduct a Wald test to test whether the relationships are equivalent. Thus, I repeat Model 2 below for each income group (e.g. separately for low-, moderate-, and high-income families), and compare the β_1 terms across specifications.

$$SE\ Outcome_{ijt} = \beta_1\big(Emotional\ Engagement_{ijt}\big) + \beta_2(SE\ Outcome_{i(t-1)}) + \beta_k\big(Covariates_{ij}\big) + \epsilon_i + \gamma_j$$

As in chapter two, data were multiply imputed to account for missing covariate information (e.g. Von Hippel, 2007) using the ICE command in Stata (Royston, 2007; Von Hippel, 2007; White, Royston, & Wood, 2011). Fifteen imputed datasets were generated (Graham, 2009) and coefficients and standard errors were combined using the MIM command in Stata.

Results

Bivariate Associations

Descriptive statistics by income group are provided in Table 13. As expected, youth from low-income families had lower levels of both emotional and behavioral engagement; compared to high-income youth, low-income youth had emotional engagement scores that were 0.24 of a standard deviation lower. Unexpectedly, the relationship between family income and cognitive engagement went in the opposite direction: high-income youth had lower levels of cognitive engagement than low-income youth. This may be because the items used to measure cognitive engagement focused on students' evaluation of both the difficulty of course content and their enjoyment of it, rather than measures of self-directed learning.

Bivariate relationships between family income and SE outcomes were as expected, with low-income youth reporting engaging in more delinquent behavior, higher levels of depressive symptoms, and lower levels of self-esteem. Finally, associations between covariates and family income were as expected. In general, youth from low-income families were born to younger mothers, with lower levels of education, who were less likely to be married.

Multivariate Associations

Multivariate associations between emotional engagement and SE outcomes by family income are presented in Table 14. Panel 1 displays the results from the OLS lagged DV models,

panel 2 displays the results from the sibling fixed effects models, and panel 3 displays the results from the first difference models. Consistent with chapter two, across all three dependent variables and all modeling strategies there is a statistically significant, beneficial relationship between emotional engagement and SE outcomes. However, there is not strong evidence that this relationship varies by family income. Figures 1, 2, and 3 present the associations between emotional engagement and SE outcomes for each income group separately for each modeling strategy, demonstrating the similarity of effect sizes across groups.

Delinquency

The size of the relationship between emotional engagement with school and delinquency was consistent across income groups across all three modeling strategies. In panel one, the OLS lagged DV model, the relationship between delinquency and engagement did not differ for low-income and high-income youth (b= 0.03, $p > 0.05$) or for moderate-income as opposed to low-income youth (b= 0.03, $p > 0.05$). In panel 2, the coefficients estimating the relationship separately for each income group were not statistically different from each other ($p > 0.05$). This pattern was repeated in the first difference models shown in panel 3; the differential relationship for both low- and moderate-income youth as compared to high-income youth was equal to just -0.02 of a standard deviation, both $p > 0.05$.

Depressive Symptoms

The pattern of results was similar for depressive symptoms, with a few key exceptions. Though no relationships between engagement and depressive symptoms were statistically significantly different by income group at conventional levels, two estimates did reach trend level of significance. Specifically, in both the lagged DV and sibling fixed effects models, there was a trend level interaction such that engagement was more beneficial for high-income than

low-income youth (b= 0.05 in the lagged DV model and b= 0.08 in the sibling fixed effect model, both p< 0.10). Given the large sample size and moderate effect size, however, these results should be interpreted with caution. In the first difference models the differential relationship was not statistically significant for low- or moderate-income youth (both b= -0.04, p > 0.10).

Self-Esteem

The pattern of results for self-esteem again did not provide strong evidence for a differential relationship by income. In the lagged DV models, the interactions between both low-income and emotional engagement and moderate-income and engagement were small and non-significant (b= -0.03 and -0.02, respectively, both p > 0.05). In the sibling fixed effects models, there was a trend level difference (p< 0.10) in the coefficients such that high-income youth benefitted more from emotional engagement than moderate-income youth (though neither group was significantly different from low-income youth), but again given the large sample and small effect size, this difference should be interpreted with caution. Finally, there was again no statistically significant difference in the relationship between engagement and self-esteem across income groups in the first difference model.

Sensitivity to Income Cutoffs

To ensure that the present findings were not artifacts of the way income was coded, the previous analyses were repeated in models using varying income specifications. The consistent relationship between engagement and SE outcomes across income groups was largely replicated in analyses that compared poor (INR< 100% FPL) and non-poor families (Table 15), used a linear measure of income (Table 16), compared low-income and all other families (Table 17), and analyses that defined low-income as INR < 185% of the FPL (Table 18). Across all

specifications, no evidence emerged that the relationship between engagement and delinquency and self-esteem is moderated by family income. However, as in the main analyses, there was some suggestion that the relationship between emotional engagement and depressive symptoms is stronger for higher-income youth. The interaction between low-income and engagement was positive and trend level in OLS models contrasting poor versus non-poor families (Table 15), and OLS models contrasting low-income versus not low-income families (Tables 17 and 18). Moreover, this relationship was conventionally significant in sibling fixed effects models contrasting low-income versus not low-income families (Tables 17 and 18). However, given the lack of consistency across income specifications and models, this relationship should be interpreted with caution. Finally, analyses were also conducted exploring the impact of both concurrent income and early family income; that is, emotional engagement was interacted with income indicators created from measures of family income taken (1) contemporaneously with the measurement of the dependent variable and (2) averaged across the first five years of life. Consistent with the presented models, there were no consistent, conventionally statistically significant interactions between family income and emotional engagement in these analyses.

Discussion

This analysis explored whether the relationship between emotional engagement with school and SE outcomes varied by family income. Results ran contrary to the hypothesis that engagement would be more beneficial for low-income youth. Instead, results suggest that the relationship between emotional engagement and outcomes does not vary by family income, despite meaningful differences in the levels of emotional engagement across income groups. Nonetheless, these findings suggest that it is equally important that low-income students feel emotionally engaged with their schools as their moderate- and high-income peers in order to

foster healthy social and emotional development, suggesting that interventions designed to enhance engagement can be effective at boosting SE outcomes in predominantly low-income American public schools.

Emotional engagement may be equally important for students across all income groups because of the universal importance of feeling connected. Self determination theory asserts that all youth need emotional connection and relatedness to develop healthy goals and optimal psychological functioning (Deci et al., 1991; Deci & Ryan, 1994; Ryan & Deci, 2009); this universality is supported by a large literature demonstrating the importance of connection to school and emotional engagement with school across diverse samples (e.g. Fredricks et al., 2004; Osterman, 2000). If the need to belong is universal, as suggested by Deci and Ryan, it may be that the extent to which a school fulfills this need, as measured by emotional engagement, is equally important across all youth, regardless of family income. Specifically, though high-income youth may be more engaged in other domains (e.g. Putnam et al., 2012), schools represent the bulk of students' experiences, particularly in early- and mid-adolescence, and in many cases represents the fundamental task of school-aged children.

These findings hint at the possibility that school engagement may be a relevant lever for addressing income-based disparities in SE outcomes. Though low-income youth benefitted equally from engagement, they reported levels of engagement that were nearly a quarter of a standard deviation below those of their upper income peers. This suggests that targeted interventions designed to equalize engagement among low- and high-income youth—that is, interventions designed to raise engagement specifically among low-income youth—could narrow income-based gaps in SE outcomes by narrowing income-based gaps in engagement. While the

present analysis cannot assert this for certain, this possibility should be explored more directly in future research.

Enhancing Engagement among Low-Income Youth

This analysis suggests that raising low-income students' engagement scores to the levels of their upper-income peers could be an effective strategy for enhancing their short- and long-run SE outcomes. Notably, although the engagement gaps are large in standard deviation units in the present data (0.24 of a standard deviation), they were not large in absolute terms (See Table 13); for example, the mean level of emotional engagement for high-income youth was 22.14, and for low-income youth this value was 21.30. These small differences suggest that closing income-based gaps in emotional engagement may relatively easy. However, a closer examination of the distributions based on income reveal that although the engagement distribution is highly negatively skewed for high-income youth, this distribution is much more normal for low-income youth, with a far greater proportion having truly low levels of engagement (see Figures 4 and 5). For example, while more than 15% of low-income youth report levels of engagement equivalent to answering half of the items negatively (e.g. on the bottom half of the Likert scale), just 9% of high-income youth do so. As expected, this difference is exacerbated for children even further down the income distribution (e.g. INR < 100% FPL).

This pattern has important implications. First, this negatively skewed pattern may be indicative of ceiling effects, such that the engagement scores of high-income youth may be truncated. Though findings did not change with the use of robust standard errors, which account for nonidentically distributed error terms, this truncation may hide important variability among high-income youth and deflate differences in engagement between low- and high-income youth. However, it is also possible that this pattern reflects the true underlying distribution of school

quality. On average, high-income youth attend higher quality, more responsive schools, with a greater proportion of highly qualified teachers than their low-income peers (e.g. Boyd, Lankford, Loeb, Ronfeldt, & Wyckoff, 2011; McLoyd, 1998; Evans, 2004; Darling-Hammond, 2013; Phillips & Chin, 2004; Solomon & Battistich, 1996). These features may contribute to the high levels of engagement for high-income youth, as well as the particularly low levels of engagement among low-income youth. Indeed, prior work by McNeely and colleagues (2002) suggests that students in small schools with more tolerant discipline policies and higher quality classroom management tend to have higher levels of engagement—school features correlated with family income. This pattern thus suggests that future research should seek to identify additional features of schools linked to engagement, educational practices linked to these features, and the ways in which school, district, state, and federal policies shape schools to impact engagement levels.

Limitations and Future Directions

First, as in chapter two, though the present analyses uses several rigorous modeling strategies, the findings remain correlational, and may be subject to omitted variables. For example, these models cannot account for time varying child characteristics including peer networks and engagement across other contexts.

Second, family income is difficult to measure accurately. A strength of using the NLSY for this analysis is the repeated, parent-reported assessment of family income, however 15% of the sample was missing income information altogether. These values were imputed in the present analysis. Additionally, the NLSY's measure of total net family income does not include income from a non-married partner. This may underestimate the incomes of youth living in families with non-married parents, which should disproportionately impact low-income youth (see Table 13). If there was a differential relationship between engagement and SE outcomes by family income,

the inclusion of higher-income youth in the low-income group may have attenuated associations. However, that our findings did not change with alterations to the income cutoff suggests that this is not a substantial concern.

Finally, emotional engagement with school still may be more beneficial for youth with lower levels of SE skills than their higher skilled peers, as hypothesized earlier. While on average low-income youth do have lower levels of SE skills (e.g. Duncan & Magnuson, 2011; Farkas, 2011; Reardon, 2011), the hypothesis that emotional engagement is more tightly linked to SE skills among low-skill youth was not directly tested in the present analysis. Because low-skill youth are at particular risk for sub-optimal long-run outcomes, it remains of interest whether or not emotional engagement can be particularly effective in boosting their SE skills. Future research should explore this possibility directly.

Conclusions

These results highlight the importance of emotional engagement with school for the socio-emotional outcomes of all youth. Educators and policymakers hoping to build schools that will prepare students to 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. Chapter four will explicitly explore this question by asking if and how a recent, major federal education policy—No Child Left Behind—impacted students' engagement.

Table 13

Descriptive Statistics by Family Income Level

	Low-Income		Moderate-Income		High-Income		
	m	*sd*	*m*	*Sd*	*m*	*sd*	
Engagement							
Emotional	21.30	3.52	21.61	3.55	22.14	3.44	**
Cognitive	6.34	1.51	6.27	1.48	6.20	1.47	**
Behavioral	-0.16	0.56	-0.08	0.41	-0.09	0.46	**
Income-to-Needs	1.24	0.47	2.47	0.29	5.11	3.00	**
Socio-Emotional Outcomes							
Delinquency	1.48	1.36	1.21	1.21	1.03	1.06	**
Depressive Symptoms	15.99	3.19	15.66	3.19	15.14	3.03	**
Self-Esteem	202.88	36.06	207.52	32.37	211.55	30.09	**
Child Covariates							
Female	48.22		49.31		49.16		
White	32.47		55.26		70.10		**
Black	43.15		23.17		15.02		**
Hispanic	24.38		21.57		14.88		**
Age	13.07	1.21	13.01	1.18	12.97	1.11	**
Grade in school	6.81	1.34	6.90	1.31	6.98	1.23	*
Average PPVT	84.86	18.23	93.57	16.72	99.64	16.95	**
Closeness to mother	3.43	0.87	3.41	0.82	3.45	0.76	
First born	35.04		43.90		48.45		**
Birth year	1985	5.88	1986	5.93	1989	6.13	**
Year at DV	1998	5.86	1999	5.94	2002	6.14	**
Family Covariates							
Maternal education	11.42	2.22	12.63	2.13	14.15	2.49	**
Mother never married	21.86		7.63		3.64		**
Mother is married	40.90		65.02		78.28		**
Other marital status	37.24		27.34		18.08		**
Weeks employed	28.73	23.21	40.08	19.40	40.82	19.64	**
Age at child's birth	23.75	5.58	24.69	5.55	28.04	5.63	**
Proportion of sample	43.63		24.33		32.04		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. Low-income families are defined as those that have a lifetime average income to needs (INR) of

200% or less, moderate-income families have an INR 200%< INR≤300%, and high-income families have an INR> 300%. + p< 0.10, * p < 0.05, ** p < 0.01

Table 14

Associations between emotional engagement with school and socio-emotional outcomes by family income level.

	Model 1, OLS Lagged DV								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.23	0.02	**	-0.21	0.02	**	0.21	0.02	**
Emo engage × low inc	0.03	0.03		0.05	0.03	+	-0.03	0.03	
Emo engage × mod inc	0.03	0.04		0.01	0.04		-0.02	0.04	
Covariates									
Lagged cog engage	0.00	0.01		-0.02	0.01		0.00	0.01	
Lagged beh engage	0.02	0.02		0.02	0.02		0.01	0.02	
Lagged DV	0.27	0.02	**	0.22	0.02	**	0.31	0.02	**
Low-income	-0.01	0.04		0.10	0.04	*	-0.01	0.04	
Mod-income	-0.02	0.04		0.05	0.04		-0.02	0.04	
N	6636			6512			6064		
	Model 2, Sibling Fixed Effects								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emo engage × low inc	-0.16[a]	0.02	**	-0.14[a]	0.03	**	0.16[a]	0.03	**
Emo engage × mod inc	-0.22[a]	0.04	**	-0.19[a]	0.04	**	0.13[a]	0.04	**
Emo engage × upper inc	-0.21[a]	0.04	**	-0.23[a]	0.04	**	0.23[a]	0.04	**
Covariates									
Lagged cog engage	0.01	0.02		-0.02	0.02		-0.01	0.02	
Lagged beh engage	0.02	0.02		0.01	0.02		0.01	0.02	
Lagged DV	0.23	0.02	**	0.18	0.02	**	0.28	0.02	**
N	6636			6512			6064		
	Model 3, First Difference Models								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Diff emo engage	-0.08	0.03	*	-0.13	0.03	**	0.11	0.04	*
Diff emo engage × low inc	-0.02	0.04		-0.04	0.04		0.04	0.05	
Diff emo engage × mod inc	-0.02	0.05		-0.04	0.05		-0.01	0.06	
Covariates									
Diff cog engage	-0.02	0.02		0.01	0.02		0.02	0.02	
Diff beh engage	-0.26	0.02	**	-0.07	0.02	**	0.04	0.02	
N	3818			3937			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. All displayed independent and dependent variables are standardized such that coefficients can be

interpreted as effect sizes. Subscripts in Model 2 indicate whether or not estimates are statistically significantly different from each other at the $p< 0.05$ level. In all models, the influence of emotional engagement with school is compared for low-income families (families who have a lifetime average income- to-needs (INR) of 200% or less), moderate-income families (200%< INR≤300%), and high-income families (INR> 300%). + $p< 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 15

Associations between Emotional Engagement with School and Socio-Emotional Outcomes by Family Income Level, Income Coded as Poor versus Non-Poor

	Model 1, OLS Lagged DV								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.20	0.01	**	-0.20	0.01	**	0.19	0.01	**
Emo engage × poor	-0.02	0.04		0.06	0.04	+	-0.01	0.04	
Covariates									
Lagged cog engage	0.00	0.01		-0.02	0.01		0.00	0.01	
Lagged beh engage	0.02	0.02		0.02	0.02		0.01	0.02	
Lagged DV	0.27	0.02	**	0.22	0.02	**	0.31	0.02	**
Poor	-0.02	0.05		0.05	0.05		-0.04	0.05	
N	6636			6512			6064		
	Model 2, Sibling Fixed Effects								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emo engage × poor	-0.19[a]	0.04	**	-0.12[a]	0.04	**	0.15[a]	0.04	**
Emo engage × non-poor	-0.18[a]	0.02	**	-0.18[a]	0.02	**	0.18[a]	0.02	**
Covariates									
Lagged cog engage	0.01	0.02		-0.02	0.02		-0.01	0.02	
Lagged beh engage	0.02	0.02		0.01	0.02		0.01	0.02	
Lagged DV	0.23	0.02	**	0.18	0.02	**	0.28	0.02	**
N	6636			6512			6064		
	Model 3, First Difference Models								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Diff emo engage	-0.09	0.02	**	-0.16	0.02	**	0.13	0.02	**
Diff emo engage × poor	-0.02	0.05		0.01	0.06		0.00	0.07	
Covariates									
Diff cog engage	-0.02	0.02		0.01	0.02		0.02	0.02	
Diff beh engage	-0.26	0.02	**	-0.07	0.02	**	0.04	0.02	+
N	3818			3937			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. Subscripts in Model 2 indicate whether or not estimates are statistically significantly different from each other at the $p < 0.05$ level. In all models, the influence of emotional engagement with school is compared for poor families (families who have a lifetime average income-to-needs (INR) of 100% or less) versus non-poor families. Coefficients represent standardized betas. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 16

Associations between Emotional Engagement with School and Socio-Emotional Outcomes by Family Income Level, Income Measured Linearly as an Income-to-Needs Ratio

	Model 1, OLS Lagged DV								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.20	0.02	**	-0.17	0.02	**	0.19	0.02	**
Emo engage × INR	0.00	0.01		-0.01	0.00		0.00	0.01	
Covariates									
Lagged cog engage	0.00	0.01		-0.02	0.01		0.00	0.01	
Lagged beh engage	0.02	0.02		0.02	0.02		0.01	0.02	
Lagged DV	0.27	0.02	**	0.22	0.02	**	0.31	0.02	**
Income-to-Needs	0.00	0.01		0.00	0.01		0.00	0.01	
N	6636			6512			6064		
	Model 2, First Difference Models								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Diff emo engage	-0.11	0.02	**	-0.18	0.02	**	0.16	0.03	**
Diff emo engage × INR	0.01	0.01		0.01	0.01		-0.01	0.01	
Covariates									
Diff cog engage	-0.02	0.02		0.01	0.02		0.02	0.02	
Diff beh engage	-0.26	0.02	**	-0.07	0.02	**	0.03	0.02	
N	3818			3937			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. + $p< 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 17

Associations between Emotional Engagement with School and Socio-Emotional Outcomes by Family Income Level, Income Coded Dichotomously Low-Income (< 200% FPL) versus Non-Low-Income

	Model 1, OLS Lagged DV								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.21	0.02	**	-0.21	0.02	**	0.20	0.02	**
Emo engage × low inc	0.02	0.02		0.05	0.03	+	-0.02	0.03	
Covariates									
Lagged cog engage	0.00	0.01		-0.02	0.01		0.00	0.01	
Lagged beh engage	0.02	0.02		0.02	0.02		0.01	0.02	
Lagged DV	0.27	0.02	**	0.22	0.02	**	0.31	0.02	**
Low-income	0.00	0.03		0.07	0.03	*	0.00	0.04	
N	6636			6512			6064		
	Model 2, Sibling Fixed Effects								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emo engage × low inc	-0.16[a]	0.02	**	-0.14[a]	0.03	**	0.16[a]	0.02	**
Emo engage × non low inc	-0.20[a]	0.03	**	-0.21[b]	0.03	**	0.19[a]	0.03	**
Covariates									
Lagged cog engage	0.01	0.02		-0.02	0.02		-0.01	0.02	
Lagged beh engage	0.02	0.02		0.01	0.02		0.01	0.02	
Lagged DV	0.23	0.02	**	0.18	0.02	**	0.28	0.02	**
N	6636			6512			6064		
	Model 3, First Difference Models								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Diff emo engage	-0.09	0.02	**	-0.15	0.02	**	0.11	0.03	**
Diff emo engage × low inc	-0.01	0.03		-0.02	0.03		0.04	0.05	
Covariates									
Diff cog engage	-0.02	0.02		0.01	0.02		0.02	0.02	
Diff beh engage	-0.26	0.02	**	-0.07	0.02	**	0.04	0.02	
N	3818			3937			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. Subscripts in Model 2 indicate whether or not estimates are statistically significantly different from each other at the $p < 0.05$ level. In all models, the influence of emotional engagement with school is compared for low-income families (families who have a lifetime average income-to-needs (INR) of 200% or less), compared to all others. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 18

Associations between Emotional Engagement with School and Socio-Emotional Outcomes by Family Income Level, Income Coded Dichotomously Low-Income (< 185% FPL) versus Non-Low-Income

	Model 1, OLS Lagged DV								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emotional engage	-0.21	0.02	**	-0.21	0.02	**	0.20	0.02	**
Emo engage × low inc	0.02	0.02		0.05	0.03	+	-0.02	0.03	
Covariates									
Lagged cog engage	0.00	0.01		-0.02	0.01		0.00	0.01	
Lagged beh engage	0.02	0.02		0.02	0.02		0.01	0.02	
Lagged DV	0.27	0.02	**	0.22	0.02	**	0.31	0.02	**
Low-income	0.00	0.04		0.08	0.04	*	-0.01	0.04	
N	6636			6512			6064		
	Model 2, Sibling Fixed Effects								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Emo engage × low inc	-0.16[a]	0.02	**	-0.13[a]	0.03	**	0.16[a]	0.03	**
Emo engage × non low inc	-0.20[a]	0.02	**	-0.21[b]	0.02	**	0.19[a]	0.02	**
Covariates									
Lagged cog engage	0.01	0.02		-0.02	0.02		-0.01	0.02	
Lagged beh engage	0.02	0.02		0.01	0.02		0.01	0.02	
Lagged DV	0.23	0.02	**	0.18	0.02	**	0.28	0.02	**
N	6636			6512			6064		
	Model 3, First Difference Models								
	Delinquency			Depressive Sympt.			Self-Esteem		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Diff emo engage	-0.09	0.02	**	-0.15	0.02	**	0.11	0.03	**
Diff emo engage × low inc	0.00	0.03		-0.02	0.04		0.04	0.04	
Covariates									
Diff cog engage	-0.02	0.02		0.01	0.02		0.02	0.02	
Diff beh engage	-0.26	0.02	**	-0.07	0.02	**	0.04	0.02	
N	3818			3937			2384		

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. Subscripts in Model 2 indicate whether or not estimates are statistically significantly different from each other at the $p< 0.05$ level. In all models, the influence of emotional engagement with school is compared for low-income families (families who have a lifetime average income-to-needs (INR) of 185% or less), compared to all others. All displayed independent and dependent variables are standardized such that coefficients can be interpreted as effect sizes. + $p< 0.10$, * $p < 0.05$, ** $p < 0.01$

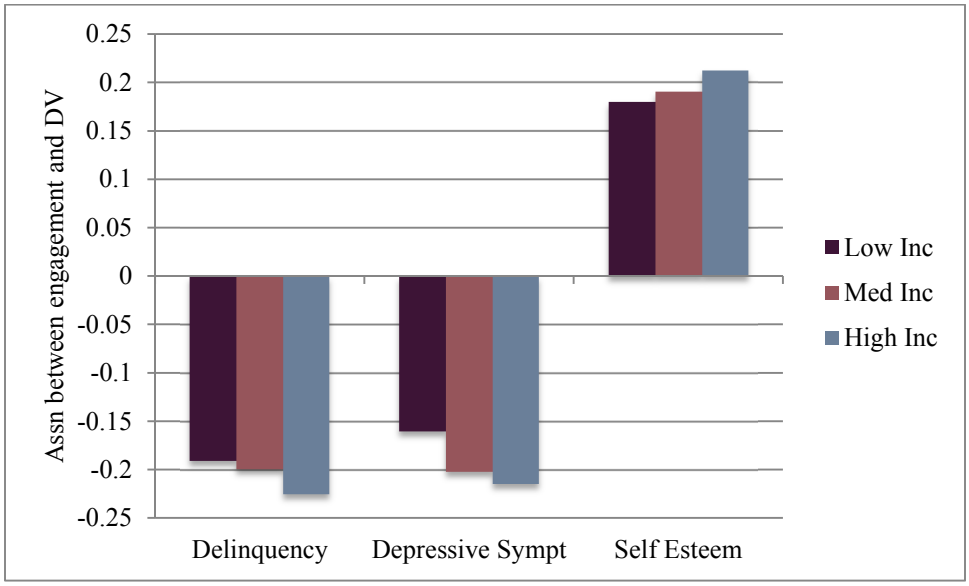

Figure 1. Associations between Emotional Engagement and Socio-Emotional Outcomes, OLS Lagged DV Models.

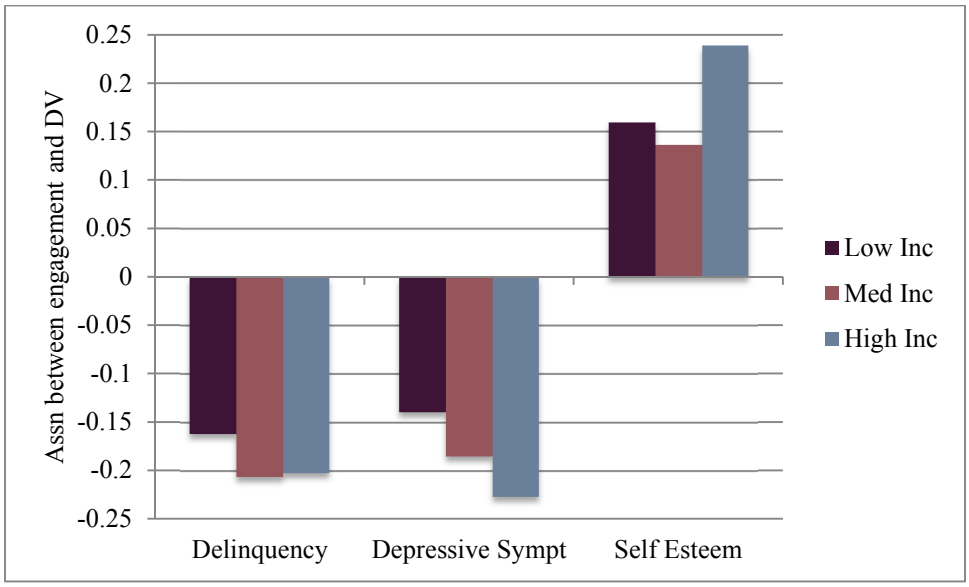

Figure 2. Associations between Emotional Engagement and Socio-Emotional Outcomes, Sibling Fixed Effects Models.

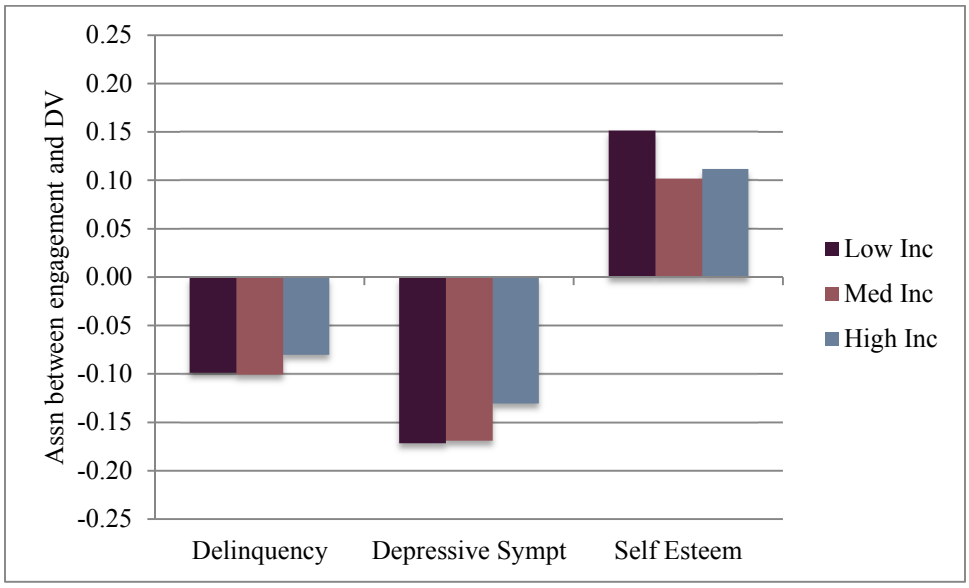

Figure 3. Associations between Emotional Engagement and Socio-Emotional Outcomes, First Difference Models.

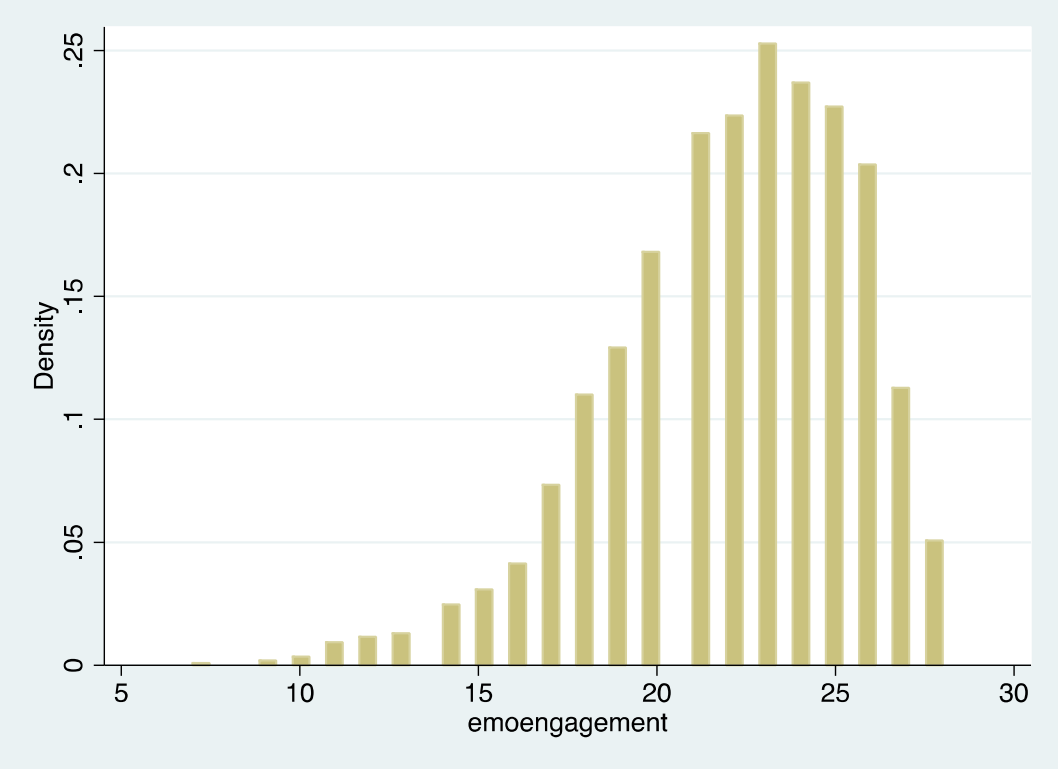

Figure 4. Histogram of Emotional Engagement Scores for Youth in Families at or Above 300% of the Federal Poverty Line.

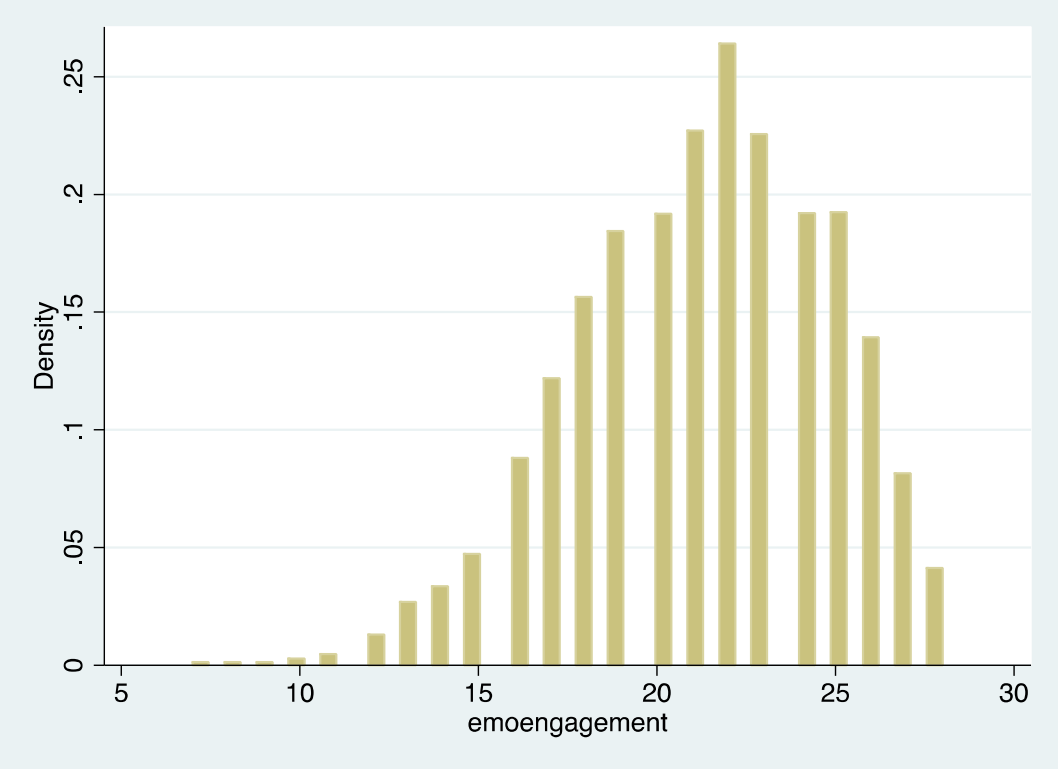

Figure 5. Histogram of Emotional Engagement Scores for Youth in Families at or Below 200% of the Federal Poverty Line.

CHAPTER IV: CHANGES IN SCHOOL ENGAGEMENT AS A FUNCTION OF NO CHILD LEFT BEHIND: A COMPARATIVE INTERRUPTED TIME SERIES ANALYSIS

As noted in earlier chapters, a robust literature links students' school engagement to a host of positive educational and behavioral outcomes (e.g. Fredricks, Blumenfeld, & Paris, 2004; Upadyaya & Salmela-Aro, 2013; Wang & Degol, 2014). The preceding analyses demonstrate, moreover, that links between students' engagement and SE outcomes are plausibly causal. Despite these links, school engagement has historically been underemphasized in many state and federal policy initiatives (Cohen, McCabe, Michelli, & Pickeral, 2009; Fredricks et al., 2004; Osterman, 2000; Wang & Fredricks, 2014), including the recently reauthorized federal education policy No Child Left Behind (NCLB). Indeed, educational scholars initially criticized NCLB as likely to diminish students' engagement (e.g. Deci, Vallerand, Pelletier, & Ryan, 1991; Osterman, 2000), and popular media routinely claimed that NCLB turned students into "test taking robots" (e.g. Kirp, 2015). Perhaps for this reason, the recent reauthorization of NCLB, the Every Student Succeeds Act (ESSA, 2015), asks states—for the first time—to include measures of students' engagement with school as an indicator of school success. However, ESSA also retains much of the strong commitment to yearly testing and consequential accountability of its predecessor, precisely the provisions that most concerned some researchers. Despite these critiques, no research has examined whether NCLB impacted students' reported engagement with school using a counterfactual condition.

The present study draws on methodological innovations from research examining links between NCLB and academic outcomes (Dee & Jacob, 2011; Wong, Cook, & Steiner, 2009; 2015) to investigate the link between NCLB and student engagement. This question remains particularly important as states begin to implement ESSA and may modify the testing and

accountability procedures put into place by NCLB. Given the host of student outcomes associated with school engagement, clarifying its relationship with NCLB is key to ensuring that ESSA is an effective replacement.

School Features and School Engagement

School engagement—behavioral, cognitive, and emotional—has been linked to diverse academic and socio-emotional outcomes, including effort in school and academic achievement (Anderman, 2003; Appelton, Christenson, & Furlong, 2008; Goodenow, 1993; McNeely, 2005; Thompson et al., 2006; Wang & Holcombe, 2010), school completion (e.g. Appelton et al., 2008; Archambault, Janosz, Marizot, & Pagani, 2009; Wang & Peck, 2013), and reductions in substance use, delinquent behavior, suspensions, (Hirschfield & Gasper, 2011; Li et al., 2011; Li & Lerner, 2013; McNeely, 2005; Wang & Fredricks, 2014; Wang & Peck, 2013), and depressive symptoms (Li & Lerner, 2013; Wang & Peck, 2013). Research indicates that although engagement is driven in part by student characteristics, features of schools also influence students' engagement, suggesting that school engagement can be altered by educational policy. Indeed, previous experimental and observational research has demonstrated school-level variability in student engagement and identified features of schools linked to students' engagement (e.g. Anderman, 2002; Payne, 2008; Battistich et al., 1995; Koth et al. 2008; McNeely et al., 2002; Wang & Holcombe, 2010). For example, Solomon, Battistich, and colleagues report that an intervention designed to improve the socio-emotional climate of a school by promoting cooperative learning, developmentally-informed discipline policies, and prosocial behavior increased students' engagement with school (Battistich et al., 1997; Solomon et al., 1996). Similarly, McNeely and colleagues (2002) report students exhibit higher levels of engagement with more responsive discipline policies, better classroom management, and fewer

students. Using the same data, McNeely and Falci (2004) demonstrated that the beneficial influence of emotional engagement with school was largely driven by students' reported relationships with their teachers. Taken together these studies highlight the role schools play in promoting students' engagement. In particular, they suggest that schools that respond to students' needs and interests, discipline students' in developmentally appropriate ways, build positive relationships between students and school personnel, and focus on promoting a positive social and emotional milieu are most effective in promoting students' engagement.

School Engagement and No Child Left Behind

Despite evidence suggesting that school engagement is both important for student development and influenced by the school context, school engagement is not targeted in most state and federal policy initiatives (Cohen et al., 2009; Fredricks et al., 2004; Osterman, 2000; Wang & Fredricks, 2014), including No Child Left Behind. Signed into law in January of 2002 and effective through 2015, NCLB required that all public school children in states that accepted federal dollars become proficient in math and reading by 2014. It held schools accountable to this goal by testing whether schools made Adequate Yearly Progress (AYP), as determined by the state, towards 100 percent proficiency each year. Schools administered a state-created standards-based assessment each spring, and schools that failed to meet AYP were required by law to take specific corrective actions, including informing parents of schools' AYP status, offering students the opportunity to transfer to schools meeting AYP, and offering supplemental services. Sanctions became increasingly stringent if schools continued to fail, culminating in a complete restructuring and re-staffing of the school.

NCLB emerged from a growing accountability movement in education that had several critics in the 1990s and early 2000s. Specifically, scholars asserted that strong accountability

provisions, particularly those tied to sanctions as in NCLB, were likely to interfere with student engagement through several mechanisms (e.g. Deci et al., 1991; Osterman, 2000). First, consequential accountability policies could incentivize teachers to focus exclusively on tested material, rather than on different, related content that may be of interest to students. Second, teachers may teach this content in ways that reduce student interaction and stifle critical thinking, such as lecture-based and test-preparation pedagogies more specifically tied to how questions are asked on the high-stakes assessments. Third, a focus on test material may incentivize teachers to spend less time getting to know students in order to maximize instructional time. Finally, the stress engendered by strict accountability may reduce teacher responsivity and increase negative mood. Teachers may be more likely to view and react to disruptions as threatening to their job security, rather than as normative youth behavior. This stress and frustration would reduce teachers' ability to connect with students, decreasing students emotional bond with school and ultimately their engagement (Deci et al., 1991; Osterman, 2000).

It is also possible, however, that NCLB had a positive impact on students' engagement. Students may have responded favorably to the heightened focus on academics and higher academic expectations. High academic expectations may communicate to students that they are important and valued by their teachers, potentially enhancing emotional engagement with school. For example, literature exploring the impact of academic press, the term used to describe school climates that emphasize academic excellence (Goddard, Sweetland, & Hoy, 2000), suggests that an academic focus facilitates bonding with school, a key component of emotional engagement with school (Ma, 2003). Similarly, Dee and Jacob (2011, described in more detail below) report a positive NCLB effect on teachers' report that absenteeism, tardiness, and apathy are not a problem in their school, providing some evidence that teachers perceived enhanced indicators of

behavioral engagement post-NCLB. Additionally, individual academic achievement is one of the strongest predictors of student engagement. Previous work examining the relationship between strong accountability policies and academic achievement has found a positive relationship between accountability and academic achievement (Carnoy & Loeb, 2002; Jacob, 2005; Hanushek & Raymond, 2005). Insofar as NCLB was able to enhance student achievement, as has been demonstrated in several evaluations (Dee & Jacob, 2011; Wong, Cook, & Steiner, 2009; 2015), it may have also boosted their engagement.

Prior work examining NCLB impacts has not been able to adjudicate among these hypotheses. Because of the national scope of the law, it is difficult to identify an appropriate comparison group, and evaluations of the law have been few. Only one national analysis has examined whether NCLB impacted students' enjoyment of learning. Reback and colleagues (2014) used a national sample of 5th graders in the 2003-2004 school year to demonstrate that accountability pressure from NCLB, operationalized as whether or not students' schools were close to the AYP margin, does not adversely effect students' enjoyment of math and reading as reported by students. This study stands in contrast to a larger body of local, qualitative work that asserts that NCLB, and in particular the testing and accountability components, have reduced students' enjoyment of and engagement in school (e.g. Jones, Jones, & Hargrove, 2003; Meier & Wood, 2004; Nichols & Berliner, 2007; 2008), though this literature often cannot include counterfactual conditions, and does not account for variability in NCLB's implementation.

Research on proposed mechanisms is also inconclusive. The most rigorous designs used to assess NCLB have exclusively examined student achievement. These studies provide strong evidence that NCLB enhanced student mathematics achievement but little evidence that NCLB improved reading achievement (Dee & Jacob, 2011; Wong et al., 2009; 2015). However,

scholars have also used teacher and administrator surveys, teacher interviews, and classroom observations to provide evidence that NCLB reduced teacher autonomy, motivation, and morale (e.g. Cochran-Smith & Lytle, 2006; Finnegan & Gross, 2007; Jones, Jones, & Hargrove, 2003); reduced time spent on non-tested content and subjects (e.g. Darling-Hammond, 2007; Griffith & Scharmann, 2008; Jones, Jones, & Hargrove, 2003; McMurrer, 2007; Pederson, 2007); promoted the use of lecture based and test preparation pedagogies (Au, 2007; Diamond, 2007); and reduced the overall level of instructional support in classrooms (Plank & Condliffe, 2013). Again, most of these studies were local in scope (though McMurrer, 2007 and Pederson, 2007 use national data) and thus may not speak to the national impact of NCLB.

In sum, the current literature cannot identify whether NCLB has impacted students' engagement with school, a substantial gap given the potential for this construct to impact important short- and long-term outcomes for youth. Moreover, the literature on the broader impact of NCLB remains contentious, and does not permit a strong hypothesis regarding the impact of the law on students' school engagement. It may be that NCLB's strict accountability and singular focus on high-stakes test performance reduced student engagement with school, as widely hypothesized; however, it may also be that the academic focus brought on by high stakes testing and consequential accountability encouraged schools to attend more closely to students' needs as learners, ultimately facilitating both academic achievement and student engagement.

Estimating NCLB Impacts

Much of the debate over NCLB has been fueled, in part, by the difficulty of evaluating a complex federal program that simultaneously impacted every public school in the nation; therefore relatively few studies have evaluated the overall impact of NCLB. Moreover, evidence suggests that NCLB's deference to states in terms of curriculum standards, test development, and

accountability schedules has resulted in uneven implementation across states, with some states only loosely implementing NCLB (Davidson et al., 2013; Steifel, Schwartz, & Chellman, 2007), or postponing their implementation altogether (e.g. "backloading" AYP targets, Chudowski & Chudowski, 2008). Indeed, Davidson et al. (2013) demonstrate that AYP failure rates varied from 1% to 80% across states. Taken together, the lack of a clear comparison group and the wide variety in treatment implementation has limited research examining NCLB impacts.

The most rigorous evaluations of NCLB to date have addressed these challenges by estimating counterfactual interrupted time series (CITS) models (e.g. Dee & Jacob, 2011; Lee, 2006; Wong, et al., 2009; 2015). CITS models build on a traditional interrupted time series (ITS) model, in which the dependent variable of interest (e.g. engagement) is plotted over time. If there is an interruption, or change in the time trend, after the introduction of the law (e.g. NCLB's introduction in 2002), this change could be due to the influence of the policy. This interruption could occur immediately, and would appear as a sudden change in the height of the line; or, it could occur cumulatively, appearing as a change in the slope of the trajectory after the introduction of the law (e.g. after 2002). In an ITS model, however, unmeasured third variables are likely to influence the time trend, and may be correlated with the introduction of the law, resulting in a biased estimate. In a CITS model, a comparison group is introduced that should be influenced by any potential confounds, but is not influenced by the treatment of interest. If there is a change in the *relationship* between the treatment and comparison groups after the introduction of NCLB, this is interpreted as the result of the policy. If the change in the comparison group after the introduction of the policy accurately reflects what would have happened to the treatment group, this differential change can be interpreted as a causal effect; if

there are systematic differences between the treatment and comparison group that vary over time, then the estimate may still be biased.

Three previous studies have used a CITS design to explore the impact of NCLB on academic achievement. These studies took advantage of between state differences in NCLB's implementation by creating synthetic comparison groups, or groups of states that were subject to the broader American policy and educational context in the years before and after NCLB's enactment in 2002, but were arguably not impacted by NCLB itself. For example, Lee (2006) and Dee and Jacob (2011) contrasted states with and without consequential accountability policies prior to the implementation of NCLB. These authors took advantage of the 30 states that had implemented some form of consequential accountability in the 1990s, prior to NCLB (see Table 19). These authors reasoned that the thrust of NCLB was the introduction of federally mandated negative consequences for poorly performing schools; if states already applied consequences to failing schools, then NCLB should have a much smaller impact on these states. Put another way, if consequential accountability does impact student engagement, this impact should be larger after 2002 in states experiencing consequential accountability for the first time. Thus, this contrast estimates specifically the impact of the introduction of consequential accountability on student outcomes. This impact could occur immediately, as a in a change in the intercept for treated states, or as a change in the post-NCLB slope for the treated as compared to comparison group relative to their pre-treatment slopes.

Similarly, Wong and colleagues contrasted states that implemented NCLB with varying levels of rigor. They identified these states by contrasting proficiency rates on state tests with the National Assessment of Educational Progress (NAEP) assessments to demonstrate substantial variation in the difficulty of states' assessments. Specifically, states with high standards were

defined as those with more similar pass rates on the state-created achievement tests as compared to NAEP. States that have high pass rates on state-created tests relative to NAEP were classified as low standards states, whereas states that had similar pass rates on their state-created tests and the NAEP exam (and thus much lower pass rates overall) were classified as high-standards states. These differences in proficiency standards resulted in differential AYP failure rates, sanction-determined corrective actions, and ultimately school restructuring (Wong et al., 2009). Indeed, Wong et al. demonstrated that states in the high standards group were more likely to institute new curriculum, solicit outside expert advice, replace school staff, and extend the school day. Based on these observed differences, Wong et al. conducted a CITS analysis comparing states with small differences between NAEP and state achievement test proficiency rates (high implementing states, treatment group) and states with large differences between NAEP and state achievement tests (low implementing states, comparison group). This contrast estimates the impact of the full suite of NCLB reforms, rather than consequential accountability only, though it likely underestimates the true impact of NCLB given that all states did implement NCLB to some extent. As with the timing of consequential accountability contrast, the high standards – low standards contrast could impact student engagement immediately, as a discrete shift in engagement in the first post-NCLB time point (2004), or could instead reflect cumulative changes, as a differential change in the post-NCLB engagement trajectories for high versus low standards states.

Present Study

The present study replicates these contrasts, along with a comparison of public and private school students, to estimate the association between the implementation of NCLB and students' engagement with school. By using three contrasts—the public versus private contrast,

the high versus low standards contrast (Wong et al., 2009; 2015), and the consequential accountability contrast (Dee & Jacob, 2011)—the present study is able to compare the mechanisms by which NCLB impacted student outcomes. Specifically, although the high versus low standards contrast from Wong and colleagues (2009; 2015) examines the full scope of NCLB, the Dee and Jacob (2011) consequential accountability contrast is only able to examine the NCLB impact derived from the addition of accountability measures. By comparing these contrasts, the present study aims to identify whether NCLB as a whole impacted engagement, and specifically what role consequential accountability had in changing students' engagement in the post-NCLB era. The present study will thus inform states as they being to implement ESSA, and may choose to alter their current accountability systems. Given the myriad, diverse student outcomes associated with school engagement, estimating the relationship between NCLB and student engagement is an important step in making ESSA an effective reauthorization.

Method

Data and Sample

Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth (NLSY), as in chapters two and three. The NLSY is the only large, national dataset with a measure of engagement drawn from several years both before and after the implementation of No Child Left Behind; thus it is the only existing dataset that can support the present analysis. The NLSY sample is used as a repeated cross section in this study. Thus it consists of all youth aged 10 to 14 who completed the engagement scales from 1988 to 2010. The total unique student level *N* is 11,512 across states and years; each year, the student N ranges from 458 to 1635. Because some students provided more than one observation between ages 10 and 14, the total sample size is 13,644.

Notably, though this sample is national in scope, it is not nationally representative. There are three main implications of this sampling feature that are important for this analysis. First, while all states are represented, samples are non-random within states and families sort into states for unknown reasons, thus within state samples are likely not representative of all students in a given state. Second, sample sizes are variable across states, with some states represented by a very small number of observations. Finally, sample sizes are time sensitive. Specifically, because all mothers of students in the sample span only 6 years in age, there are fewer observations in the later years of the time series as mothers become older (mothers are on average 52 years old in 2010).

To address these sampling issues, the present study includes a first stage in the analysis. In this first stage, I regress all observations on demographic characteristics– gender, age, race, and first-born status – and use the residuals from this regression and students' engagement scores. In this way, I remove the influence of these demographic characteristics from students' scores, and thus equate the states and years in these background attributes. Moreover, all regressions are weighted by the number of individual observations contributing to each state-year or type-year observation (see Analytic Strategy below). Additionally, several sensitivity tests are performed. These tests vary the requirements for inclusion in the sample and assess how robust the conclusions are across inclusion rules, and test the findings sensitivity to weighting. Specifically, the minimum number of individuals contributing to each state year observation is varied so as to increase the reliability of the individual state observations, unweighted analyses are presented such that each state contributes equally to the estimates, and the sample is reduced such that each individual contributes just one observation. These sensitivity analyses demonstrate that in general the findings are robust to tests of these sampling factors.

Measures

Student engagement. The child supplement to the NLSY includes demographic information, as well as 10 items assessing students' emotional, cognitive, and behavioral engagement with school (Cronbach's $\alpha = 0.70$) that are in line with those of other scales assessing engagement with school (e.g. Li & Lerner, 2011). In the NLSY, emotional engagement with school was measured with 7 items assessing teachers' involvement with students, students' liking of school, ease of making friends, and perceptions of safety, which map on to items used in the widely used scale from the National Longitudinal Study of Adolescent Health (e.g. Joyce & Early, 2014; McNeely & Falci, 2004; Resnick et al., 1997). Sample items include "how satisfied are you with your school," "most teachers help with personal problems," "it is easy to make friends," and "I don't feel safe at this school" (reverse coded). Cognitive engagement was measured using two items that indicated interest in classroom content: "my schoolwork requires me to think" and "at this school, a person has the freedom to learn what interests him/her." Finally, an ordinal measure of truancy was used as a proxy for behavioral engagement (for a full list, see Table 20). These 10 items were summed to create an engagement scale ranging from 0-37. This scale includes items similar to those in other published work assessing school engagement (e.g. Chase et al., 2014; McNeely & Falci, 2004; Resnick et al., 1997; Wang & Eccles, 2011), though are by no means identical. In particular, measures of behavioral and cognitive engagement are based on a very small number of items; thus a sensitivity test is conducted using only the emotional engagement items, and implications for the present study are addressed in the Discussion below.

Demographic information. Demographic information was used to identify youth's NCLB treatment status, and in first stage models (discussed above). To identify youth's NCLB

treatment status, the NLSY included information on students' state of residence at each year of data collection, and maternal report of whether their child was enrolled in public, private, religious, or home school. This item was recoded into a dummy variable where "1" indicates enrollment in public school, zero otherwise.

First stage models included a small set of covariates that have been previously linked to students' academic performance, including an indicator for child gender ("1" if the child was a female, zero otherwise), child age at the time of assessment (in years), a series of dummy variables indicating child race (Black and Hispanic, with White as the omitted category), and a dummy variable indicating whether or not the child was a first born.

Covariates. Recall that estimates from CITS models may be biased if there are systematic differences between the treatment and comparison group that vary over time. State level covariates are used to account for time-varying, state-level factors that may impact students' engagement, but are not the result of NCLB. By including these covariates, I ensure that any covariation between unrelated state level factors, the treatment and comparison groups, and the introduction of NCLB do not bias the estimated NCLB effect. Thus, in models that harness between-state variation, state-level student-teacher ratio and state level poverty rate are included. These covariates were drawn from the Common Core of Data and the Bureau of Labor Statistics, respectively.

Analytic Strategy

Overview. As noted above, the present study exploited variability in NCLB implementation to assess NCLB impacts on engagement using a counterfactual interrupted time series (CITS) design. In a CITS specification, regression lines are fit separately for each group (treated and untreated) by time period (before and after NCLB, that is 1988 to 2002 and 2004 to

2010). If the treatment and comparison time trends change in *different* ways after the introduction of NCLB (e.g. a differential change in either the height of the line or the slope compared to the pre-NCLB trend), this change is consistent with an NCLB-based impact on school engagement. It is important to look at the combined influence of immediate and cumulative changes particularly because the changes of NCLB were cumulative by design: schools worked towards a long-term goal and were increasingly exposed to the potential for sanctions. As such, NCLB theoretically could have both immediate (intercept, or height of the line) effects, and cumulative (slope) effects.

Three contrasts were used to explore associations between NCLB and school engagement. The first contrast compares public schools to private schools, which largely do not receive Title 1 dollars and therefore were not subject to NCLB. In this contrast, an NCLB effect would be observed if there was a change in the post-NCLB (e.g. 2004-2010) engagement trajectory relative to that of private schools. By comparing public and private schools, the overall impact of NCLB is tested, but this contrast does not allow for state variability in NCLB's implementation.

The second contrast replicates the high versus low standards contrast (HS/LS) introduced by Wong, Cook, and Steiner (2009). As discussed above, Wong et al. capitalize on state variability in the implementation of NCLB to create high, medium, and low standards groups (see Table 21), based on differences between NAEP pass rates and state-created test pass rates. High standards states had more difficult states exams, and thus had on average more schools failing AYP and took more NCLB-mandated corrective actions. Conversely, low standards states had easier state-created achievement tests, and thus had a low proportion of schools failing AYP and took fewer corrective actions (Wong et al., 2009). In this way, schools in low standards

states faced lower accountability pressure than those in high standards states, and, because of the lack of corrective actions, essentially implemented NCLB less strongly. In this contrast an NCLB effect would be observed if the post-NCLB change in the high standards states was more extreme than the change in the low standards states. Because the high standards states are distinguishable from the low standards states in terms of both difficulty of tests and AYP schedules, both post-NCLB intercept (differential changes in the level of engagement from 2002 to 2004) and slope (differential changes in the 2004 through 2010 slopes) changes could be observed. As noted above, this contrast tests the full suite of NCLB-based reforms, but likely understates the true impact of NCLB because the comparison group is made of states that at least partially implemented NCLB.

The third contrast is based on the timing of consequential accountability. This specification replicates the dichotomous Dee and Jacob (2011) specification, comparing states that had some form of consequential accountability prior to NCLB with those that did not implement consequential accountability until the passing of NCLB. In this contrast the treated group experienced consequential accountability for the first time with NCLB, and all others are treated as comparison observations. This contrast explores the impact of consequential accountability as mandated by NCLB, rather than the full suite of NCLB-based reforms. As noted above, this contrast is predicated on the idea that changes after NCLB's implementation will be larger in states that had not previously experienced consequential accountability. Put another way, NCLB-based changes in the school context will be larger in states with no prior experiences with consequential accountability. These changes may be immediate (intercept, 2004) changes or cumulative (slope, 2004-2010) changes as sanctions based on accountability accumulate.

Just as in the high versus low standards contrast, these changes are estimated based on differential post-NCLB changes for the treatment as compared to the comparison group, making the assumption that the *relationship* between each group's trajectory would have remained the same in the absence of NCLB's enactment. Unlike the high versus low standards contrast, however, this contrast is predicated on the idea that prior consequential accountability is similar to an early implementation of NCLB, thus pre-treatment time trends in the comparison group may be of interest. However, it is important to note that the variability in the content and timing of state consequential accountability policies makes the interpretation of the pre-treatment time trend difficult (see Table 19). Specifically, while some states had consequential accountability in place as early as 2002, many comparison group states did not instate consequential accountability until 1998, these policies were incredibly diverse (e.g. Fuhrman, 1999); moreover, no state consequential accountability policy was identical to consequential accountability as enacted under NCLB (Goertz & Duffy, 2001). Thus, while the transition to consequential accountability prior to NCLB should result in minimized NCLB effects as schools and districts in these states have had time to adjust to consequential accountability systems, it is important to note that this analysis explores the role of consequential accountability as enacted under NCLB in 2002 compared to alternative consequential accountability structures. Thus, like the HS/LS contrast, it is likely to somewhat underestimate the impact of NCLB, because states that had prior consequential accountability should still be experiencing NCLB-based changes in their consequential accountability systems.

Nonetheless, states that experienced prior consequential accountability should be less reactive to NCLB's consequential accountability provisions for a few reasons. First, for teachers and schools who have been under the threat of sanctions before and not experienced strong,

deleterious consequences, the threat of sanctions, including those under the new NCLB system, may seem less immediate or less concerning, and thus may not generate substantial change in classroom practices. Second, it is possible that the impact of consequential accountability on engagement has already been exhausted in states that previously enacted consequential accountability. Many changes to schools or classrooms based on consequential accountability systems may have already occurred, reducing the effects of new accountability systems. If this is the case, then the new NCLB consequential accountability should not impact the comparison states. However, this raises the original question: were there pre-2002 consequential accountability impacts in comparison states?

To explore this question, a sensitivity test is conducted in which the heterogeneity in the comparison group is explicitly modeled by coding the treatment indicator as the number of years a state did *not* have consequential accountability (Dee & Jacob, 2011). These models more flexibly estimate the impact of each additional year of consequential accountability, as well as the NCLB effect. Findings are similar (see Sensitivity Analyses section below), however because of the small number of observations available in the present data, the dichotomous indicator (treatment states are those without prior consequential accountability, comparison are those with prior consequential accountability) remains the preferred specification.

Models. To estimate the public versus private school contrast, I estimate a model that takes the following form:

$$Y_{st} = \beta_0 + \beta_1(year) + \beta_2(public) + \beta_3(post\_NCLB) + \beta_4(year \times public) + \beta_5(post\_NCLB \times year) + \beta_6(post\_NCLB \times public) + \beta_7(year \times post\_NCLB \times public)$$

In this model, Y_{st} represents school type-year school engagement means. β_6 represents the change in intercept after the introduction of NCLB for public as compared to private schools; β_7 represents the differential slope change. Thus, the immediate NCLB effect is estimated by $\beta_6 + \beta_7$, and the effect of NCLB in 2010 (the last year of data in this analysis) is estimated by $\beta_6 + (\beta_7 \times 8)$.

To estimate the high versus low standards contrast, I estimate a model that takes the following form:

$$Y_{st} = \beta_0 + \beta_1(post\_NCLB) + \beta_2(year \times post\_NCLB) + \beta_3(year \times high\_standards) + \beta_4(year \times medium\_standards) + \beta_5(post\_NCLB \times high\_standards) + \beta_6(post\_NCLB \times medium\_standards) + \beta_7(year \times post\_NCLB \times high\_standards) + \beta_8(year \times post\_NCLB \times medium\_standards) + \beta_9(student\_teacher\_ratio) + \beta_{10}(state\_poverty) + \gamma_t + \delta_s$$

In this model, Y_{st} represents state-year school engagement means. β_5 represents the change in intercept after the introduction of NCLB for high standards as opposed to low standards states; β_7 represents the differential slope change. Thus, the immediate NCLB effect is estimated by $\beta_5 + \beta_7$, and the effect of NCLB in 2010 (the last year of data in this analysis) is estimated by $\beta_5 + (\beta_7 \times 8)$. Note that this model estimates separate slopes and intercepts for the low, medium, and high standards states, high versus low standards contrasts are presented in the text, following Wong et al. (2015). This specification also includes state and year fixed effects, δ_s and γ_t respectively.

Finally, to estimate the timing of consequential accountability contrast, I estimate a model that takes the following form:

$$Y_{st} = \beta_0 + \beta_1(year) + \beta_2(post\_NCLB) + \beta_3(years\_since\_NCLB) + \beta_4(year \times no\_prior\_CA) + \beta_5(post\_NCLB \times no\_prior\_CA) + \beta_6(no\_prior\_CA \times years\_since\_NCLB) + \beta_7(student\_teacher\_ratio) + \beta_8(state\_poverty) + \delta_s$$

In this model, Y_{st} represents state-year school engagement means. β_5 represents the change in intercept after the introduction of NCLB for states without prior consequential accountability as opposed to those who already had consequential accountability; β_6 represents the differential slope change. Thus, the immediate NCLB effect is estimated by $\beta_5 + \beta_6$, and the effect of NCLB in 2010 (the last year of data in this analysis) is estimated by $\beta_5 + (\beta_6 \times 8)$. This specification also includes state fixed effects, δ_s.

Pre-processing, weighting, and standard errors. As noted above, these analyses used data drawn from the non-nationally representative NLSY in contrast to other CITS based research designs. Pre-processing and weighting strategies were used to address this data limitation. First, to create the state-year (or type-year) means that served as the dependent variable all (*N*= 13,644) school engagement scores were regressed on the demographic variables gender, race, age, and the dummy variable for firstborn. Residuals for each observation were captured, and the mean of these residuals was used as the state-year (and type-year) observations. Second, all analyses were weighted based on the number of observations that contributed to each state-year (or type-year) observation. Thus, states with larger numbers of constituent individual observations contributed more to the estimated NCLB effects than states with relatively small numbers of individual observations. Sensitivity checks were conducted to explore whether results were sensitive to the use of these weights, or to a strategy that instead dropped state-year observations made up of a small number of observations. Finally, standard errors were adjusted to account for possible auto-correlation using STATA's CLUSTER option by state.

Results

Table 22 reports findings from the public versus private, high versus low standards, and timing of consequential accountability contrasts. Each panel presents the differential intercept and differential slope for the contrast, as well as the estimated impact of NCLB immediately (in 2004), in 2007, and in 2010. The first row, the intercept shift, presents the estimated change in school engagement for the treated group at the first time point after the introduction of NCLB (in 2004) relative to the comparison group (e.g. for public versus private school students, high standards versus low standards states, and states with no prior consequential accountability versus states who had prior consequential accountability). Thus, it does not represent the absolute change in engagement from 2002 to 2004, but rather how different this change was for the treatment versus comparison group. The second row in each panel provides an estimate of the differential slope after the introduction of NCLB. This term represents the difference in the engagement trajectory of the treatment versus comparison group from 2004 to 2010, thus a negative slope can be interpreted as a decreasing trajectory relative to the comparison group and a positive slope can be interpreted as an increasing trajectory relative to the comparison group. The last three rows represent the estimated NCLB effect in 2004, 2007, and 2010 using the estimates from the CITS model, calculated as described above.

Panel one displays the estimates for the public versus private school contrasts. This model revealed a positive intercept shift for public school students relative to private school students (b= 0.74, p= 0.16), but a negative, near zero slope term (b=-0.03, p= 0.75). Neither of these estimates reached statistical significance, however, suggesting that across all states NCLB was not associated with changes in engagement for public school students relative to private school students (see Figure 6).

Panel two displays CITS results for the high versus low standards contrast. This panel reveals statistically significant intercept and slope terms, such that immediately following the introduction of NCLB students in high standards states reported an increase in engagement that was on average 0.95 points higher than students in low standards states (0.23 of a standard deviation, $p= 0.03$). However, the slope term was also statistically significant and negative ($b= -0.23$, $p< 0.05$), suggesting that this initial boost decreased over time by roughly 0.06 of a standard deviation each year. Thus by 2010, the NCLB effect was negative (see Figure 7), and roughly a fifth of a standard deviation in size ($p= 0.18$).

Panel three displays the differential intercept and slope for states who adopted consequential accountability for the first time with the implementation of NCLB as compared to states who adopted consequential accountability prior to NCLB. A different pattern emerged for this contrast. Specifically, this panel reveals no statistically significant difference in post-NCLB intercepts ($b= 0.43$, $p= 0.24$), but a statistically significant negative slope term ($b= -0.21$, $p< 0.05$) for the treatment relative to control states, equivalent to -0.05 of a standard deviation each year. Thus, these models suggest that although there was no immediate difference in the engagement levels of students in states that adopted consequential accountability measures for the first time with the introduction of NCLB and students in states that had already implemented consequential accountability, the average level of student engagement in states who implemented consequential accountability for the first time with the passage of NCLB decreased relative to students in states that had previously adopted consequential accountability. By 2010, the NCLB impact on students' engagement in states that adopted consequential accountability as mandated by NCLB for the first time in 2002 was 0.30 of a standard deviation lower than the impact for students in states that had previously adopted consequential accountability ($p< 0.05$, see Figure

8). This pattern suggests that either states that had experienced consequential accountability prior to NCLB had already fully experienced the impact of consequential accountability and were no longer experiencing consequential accountability-based changes in engagement, or that consequential accountability as enacted under NCLB was qualitatively different than previous consequential accountability systems, and more deleterious for engagement; these possibilities are discussed in the Sensitivity Analyses and Discussion sections below.

In sum, the main analyses suggest that the NCLB impact on students' engagement depends on which NCLB mechanism formed the basis of the contrast. While the public versus private school contrast revealed no NCLB effect, the standards-based contrast revealed a positive, but decreasing, NCLB effect on students' engagement over time, and the contrast based on the introduction of consequential accountability yielded an increasingly negative impact over time.

Sensitivity Analyses

Sensitivity tests were conducted to explore the impact of sample limitations on the present findings. As noted above, a limitation of the NLSY data is that although it is national in scope, it is not nationally representative. Specifically, some states are represented by a very limited number of observations (see Table 23 for contrast-year Ns). States with a small number of observations may not accurately reflect state level engagement, introducing error into the models. The preferred specification used pre-processed, weighted data to account for this limitation, however sensitivity analyses were also conducted in which states with a small number of observations were removed from the sample entirely to test the robustness of the findings to sampling.

Results from these analyses are presented in Table 24. These analyses suggest that the pattern of results is largely consistent across the alterations to the sample, with some small changes in the magnitude of the effect sizes. The exceptions to this consistency occurred in models reduced to states with thirty or more observations. Specifically, there is a positive, though small and nonsignificant estimated NCLB effect in 2007 in the high versus low standards contrast, and a reversal of the direction of the estimated effect for the timing of consequential accountability contrast. The reduction to states with 30 or more observations led to a state N of just 18 with a total of 124 state-year observations in the HS/LS contrast, and a state N of 19, with a total of 135 state-year observations across the 1988-2010 time period in the timing of consequential accountability contrast. This small sample size in conjunction with the consistency across all other sample reduction analyses suggests that the reduction to under half of the states is likely what altered the results.

The main analyses weighted analyses by the number of observations contributing to each state year data point in order to increase the weight of more precise data points. However, it is also possible that by weighting the data in this way, large states over-contribute to the estimate. If NCLB based processes differ in large versus small states, this weighting strategy could lead to incorrect estimates. Table 25 presents weighted versus unweighted analyses. As expected, these analyses revealed estimates identical in pattern to the weighted models, and of similar magnitude, but with larger standard errors in the unweighted models, in which imprecise data points are weighted equally with more precise data points.

Recall that the structure of the NLSY data allows the same individual to contribute multiple data points to the analysis. For example, although the unique student *N* is equal to 11,512, there were over 13,000 engagement scores in the first stage model. Table 26 presents

analyses in which only the latest observation for each student is retained, such that no individual contributes more than one engagement score to the analysis. These findings are largely the same as the main analyses, with the exception of a larger intercept term in the high versus low standards contrast resulting in a non-negative NCLB effect over time, despite a negative slope of similar magnitude as in the full sample. Given that fewer than 500 students contributed to both pre- and post-NCLB time trends, this difference is likely due to the lack of precision engendered by losing nearly 2,000 observations. This loss of observations is particularly likely to matter for the high versus low standards contrast, in which the contrast of interest focuses on a quarter of the states, rather than about half the states as in the timing of consequential accountability contrast, or on all public school students, as in the public versus private contrast. As expected, the loss of power does alter the estimates for the other two contrasts more minimally.

Finally, to assess the incremental impact of introducing some type of consequential accountability system prior to NCLB, the timing of consequential accountability contrast was run with the treatment indicator coded as number of years a state did *not* have consequential accountability. By using a continuous measure of consequential accountability in addition to the NCLB-specific consequential accountability indicator (e.g. consequential accountability implemented after 2002), this analysis is able to compare the impact of consequential accountability prior to NCLB to the impact of NCLB-introduced consequential accountability. In these models, the coefficient on the treatment × year variable represents the incremental impact of waiting to implement consequential accountability for an additional year on student engagement; the coefficient on the treatment × NCLB variable represents the impact of implementing NCLB-mandated consequential accountability in 2002; and the coefficient on the treatment × year × NCLB variable represents the impact of NCLB-based consequential

accountability in the years following NCLB. Results from this model are presented in Table 27. First, results from the model estimating the NCLB impact in 2007 for a state that did not have prior consequential accountability as compared to a state that implemented consequential accountability in 1997 are quite similar to what was estimated in the dichotomous specification (b= -0.62 in the dichotomous specification, b= -0.55 in the continuous specification). Second, the estimated coefficient on the interaction between treatment and year (e.g. the impact of waiting to implement consequential accountability for comparison states) is small and nonsignificant (b= 0.001, p< 0.76). The coefficient on the interaction between treatment and post-NCLB is positive (b= 0.13, p< 0.01). This coefficient indicates the benefit of waiting to introduce consequential accountability until 2002. Taken together these findings suggest both that consequential accountability was largely not associated with engagement in the comparison states prior to 2002, and that consequential accountability as implemented under NCLB was more strongly related to engagement than pre-NCLB consequential accountability provisions. This finding suggests that the consequential accountability provisions enacted under NCLB *specifically* may have been more detrimental to students' engagement than previous iterations of consequential accountability and that states that had experienced prior consequential accountability were less impacted by NCLB in terms of engagement, a pattern that will be examined more fully in the Discussion.

Discussion

Prior to the introduction of No Child Left Behind, educational scholars voiced concern that consequential accountability policies would erode students' engagement with school and

undermine students' academic achievement and social skill development (e.g. Deci et al., 1991; Osterman, 2000), a concern that was continually voiced throughout NCLB's tenure (Jones et al., 2003; Kirp, 2015; Meier & Wood, 2004; Nichols & Berliner, 2007; 2008). However, this concern clashed with literatures associating academic press with engagement (Ma, 2003), demonstrating a positive association between NCLB and mathematics achievement (Dee & Jacob, 2011; Wong et al., 2009; 2015), and suggesting that NCLB did not detrimentally impact students' enjoyment of school (Reback et al., 2014) or teachers' perceptions of behavioral engagement (Dee & Jacob, 2011). The present study examined directly whether NCLB impacted students' school engagement using a counterfactual interrupted time series design, the most rigorous design that has been used to date to assess NCLB.

In line with previous research, this study highlights between-state variability in NCLB's implementation and impacts (e.g. Chudowski & Chudowski, 2008; Davidson et al., 2013; Steifel, Schwartz, & Chellman, 2007; Wong et al., 2009), and also provides evidence that the components of NCLB may have had differential impacts on students' engagement with school. Specifically, although the broadest comparison—the public versus private comparison, which contrasted all public school students across the nation to all private school students, and thus included an incredibly diverse set of NCLB implementations—revealed no statistically significant NCLB effect, contrasts harnessing between-state variability in the law's implementation did reveal significant associations. For states that implemented NCLB with high standards, defined as difficult achievement tests, high proficiency cutoffs, and a front-loaded AYP schedule (Wong et al., 2009; 2015), there was a moderate, immediate increase in school engagement relative to the low-standards states (roughly 0.18 of a standard deviation in 2004). However, this benefit eroded over time; student engagement in these states decreased relative to

states that had easier achievement tests and lower proficiency cutoffs through 2010. Such a pattern suggests that the early changes related to NCLB in the high standards states, such as increasing the number of highly qualified teachers, instituting new curricula, seeking outside advice, and extending the school day (U.S. Department of Education, 2007; Wong et al., 2009), enhanced students engagement with school, but that these changes did not sustain engagement over time. Instead, after 2004 students in states that implemented NCLB at a high level demonstrated a decrease in engagement relative to those that did not. By 2007, the estimated NCLB impact was negative, and by the end of the time series (2010), the estimated effect was equal to -0.22 of a standard deviation.

Results from the model based on the timing of consequential accountability (Dee & Jacob, 2011) suggest that this relative decrease in engagement may be due to the impact of accountability pressure in schools. By contrasting states that had consequential accountability policies prior to NCLB with those who experienced consequential accountability for the first time at NCLB's adoption, this model was able to capture the impact of the accountability provisions of NCLB alone, rather than the full provisions of the law (p. 427, Dee & Jacob, 2011). These models reveal a statistically significant *decrease* in school engagement in states experiencing consequential accountability for the first time after NCLB's enactment relative to states that had previous consequential accountability policies, such that by 2010 the impact of NCLB was equal to -0.30 of a standard deviation.

Taken together, these findings suggest that accountability pressure as implemented under NCLB may have eroded school engagement, consistent with previously conducted local studies demonstrating decreases in student engagement in response to high stakes testing and accountability systems in the wake of NCLB (e.g. Jones et al., 2003; Nichols & Berliner, 2007).

The present study suggests that future work should continue to examine the relationship between NCLB and other student outcomes, particularly those strongly linked to engagement, including delinquent behavior, suspensions, depressive symptoms and school completion (e.g. Appelton et al., 2008; Archambault, et al., 2009; Hirschfield & Gasper, 2011; Li et al., 2011; Li & Lerner, 2013; McNeely, 2005; Wang & Peck, 2013). Though NCLB has been associated with improved mathematics performance, it is important to understand the full scope of the law's impact in order to use NCLB to inform future educational policy.

It is also notable, however, that for states that chose to enact NCLB with high standards there was a small to moderate immediate boost in student engagement. NCLB was a complex, multifaceted law that impacted students' experiences in diverse ways. This evidence suggests that some of NCLB's provisions did promote student engagement, however, it cannot identify whether students benefited from states' changes to highly qualified teacher provisions, curricular standards, professional development systems, extended school days, required supplemental academic assistance or other levers.

Additionally, that the introduction of consequential accountability under NCLB seemed to be more detrimental for students' engagement than prior instantiations of consequential accountability (e.g. Table 27) is also relevant. Prior to NCLB, consequential accountability systems were created at the state level and were more diverse and flexible than under NCLB, were designed with state budgetary constraints in mind, and put a strong emphasis on improvement plans and the use of incentives as well as sanctions (e.g. Fuhrman, 1999; Goertz & Duffy, 2001). These more tailored plans may have not eroded student engagement because they were less stressful for teachers and administrators, involved the provision of assistance from state education agencies, and may have led to less school failure than NCLB's consequential

accountability. Moreover, it is plausible that the widespread concern over the law among teachers' unions and in the public discourse (e.g. Gerson, 2007; Kirp, 2015; Ravitch, 2010; Saad, 2012) may have heightened teacher and administrator sensitivity to accountability pressure under NCLB, particularly in states that had no previous experience with consequential accountability systems to reassure them. Educators in states without prior consequential accountability would have been surrounded by rhetoric denouncing NCLB and asserting that consequential accountability reduces autonomy in the classroom and leads to job loss, with no previous experience of consequential accountability to contradict such doomsday opinions. Indeed, several studies have demonstrated that on average teachers reported lower levels of motivation and morale after NCLB (e.g. Cochran-Smith & Lytle, 2006; Finnegan & Gross, 2007; Jones et al., 2003), though these studies do not contrast teachers in states with and without prior consequential accountability. Thus, it may have been that NCLB's accountability provisions, combined with the national conversation around NCLB, were particularly detrimental for engagement because of their influence on teachers, but that teachers who had previously experienced non-NCLB consequential accountability systems, this influence was weaker.

Finally, it is important to interpret these findings in light of previous work highlighting the benefits of NCLB for academic achievement (Dee & Jacob, 2011; Wong et al., 2009; 2015), and evidence indicating that NCLB did not have negative impacts on students' enjoyment of school (Reback et al., 2014), or teachers' perceptions of students' behavioral engagement (Dee & Jacob, 2011). These previous studies did not assess students' own report of engagement, nor did they assess students' emotional and cognitive engagement, which may account for the diverging findings. Moreover, it is possible that NCLB had varying impacts on the dimensions of engagement. For example, NCLB may have enhanced behavioral engagement but decreased

emotional engagement. Indeed, many of the early NCLB-based changes—extended instructional time, tailored curricula, and specific skill-based assessments—would be consistent with climates of academic press which put a strong focus on students' behavior engagement and academic outcomes (Goddard et al., 2000). Notably, such changes were school responses to student performance on high stakes tests, and thus were fundamentally school-based changes as a result of consequential accountability. Devising accountability systems that maintain this motivation for positive academic change while minimizing teacher anxiety and disengaging pedagogical shifts—school features that are more strongly linked to emotional engagement—should be a key goal for researchers, policymakers, and practitioners moving forward.

Indeed, with the introduction of the Every Student Succeeds Act (ESSA), and the excitement among educators at the end of NCLB (e.g. Walker, 2015; Weingarten, 2015), states may be able to use NCLB as a base to transition back to more tailored, supportive consequential accountability systems, and reduce some of the anxiety in schools and among educators, potentially restoring student engagement without eliminating the beneficial academic emphasis introduced by NCLB. The present study, as well as the earlier chapters of this dissertation, suggests that it is critical that practitioners and policymakers take advantage of this opportunity, and that research continues to identify key policy levers for building student engagement.

Limitations

Though this study uses national data, a rigorous analysis strategy, and several robustness checks, it has important limitations. First, the data are not nationally representative. Thus, it is possible that the reported findings are an artifact of individual characteristics of the youth who

represent each state, rather than an NCLB effect. This concern is somewhat mitigated by using students' residual scores, which removed the influence of characteristics such as race and gender, and the findings' robustness to weighting and sample selection strategies. Moreover, the lack of precision in each individual state's data point should increase error in the models, rather than introduce bias. Nonetheless, this feature of the data is an important limitation, and suggests that future research should corroborate these findings.

Similarly, it is important to highlight again the high level of variability in the implementation of NCLB between states but also *within* states. More specifically, local education agencies may have been more or less active—in terms of supports or sanctions—even within states that were coded at the state level as high or low standards. Given the non-representative nature of the sample, if students were disproportionately drawn from local levels that contrasted with the state-level high or low standards code, estimates would be biased towards zero. That is, if students were disproportionately coded as high standards when they were actually drawn from a low-implementing district, this should attenuate any estimated NCLB-based impact. The sample limitations of the present data preclude a test that disentangles district level NCLB implementation effects, however this is an important future direction for research because it could more clearly identify the features of NCLB's implementation that were most strongly linked to engagement, both positively and negatively.

Second, the school engagement scale underweights behavioral and cognitive engagement relative to emotional engagement. Thus, this analysis may represent NCLB impacts on emotional engagement with school more so than the other engagement dimensions. It is possible that NCLB may have differentially impacted each dimension of engagement. To the extent that emotional engagement was more impacted that cognitive or behavioral engagement, this analysis

could overstate NCLB effects on overall engagement; however, if NCLB had greater impacts on cognitive or behavioral engagement, this analysis would understate NCLB effects on engagement. To examine this possibility, the analysis was conducted using only the 7 emotional engagement items. Results from these models were very similar to the full 10-item scale, but were smaller in magnitude for the high versus low standards contrast and the consequential accountability contrast (see Table 28). For example, in the full 10 item models, the NCLB effect in 2004 for the high versus low standards contrast was equal to about 0.12 of a SD, but using only the emotional engagement items this boost was equal to about 0.06 of a standard deviation. Similarly, in the timing of consequential accountability contrast, by 2010 the NCLB impact in the analysis with the full 10 items was equal to -0.30 of a standard deviation, but when using only the emotional engagement items the NCLB by 2010 was -0.22 of a standard deviation. This pattern suggests that although much of the relationship between NCLB's enactment and engagement was driven by emotional engagement in these data, cognitive and behavioral engagement do contribute to the observed association. As such, these models likely underestimate the relationship between NCLB's enactment and school engagement.

Third, the limited scope of the present data precludes subgroup analyses. It is likely that NCLB's impacts vary based on important student and school characteristics, such as student age, school proportion of free and reduced lunch, and other indicators, however the present analysis cannot disentangle such subgroup differences. For example, the present analysis combines responses from 10 to 14 year old students, and as such averages engagement impacts across elementary and middle schools. Previous research has highlighted important differences between these contexts, particularly with regards to developmental supports for student engagement (e.g. Eccles, 1999; Eccles et al., 1993). As such, these estimates may mask differences in student

responses to NCLB in elementary versus middle schools. Future research should continue to disentangle how different student subgroups respond to accountability policy.

Conclusions and Implications

No Child Left Behind ushered in a new era of accountability in the American educational system. Though NCLB enhanced students' mathematics achievement, in line with the major goal of the legislation, the present study suggests that some of the features of NCLB's implementation may have had unintended consequences on students' engagement with school. Though the Every Student Succeeds Act changes many of NCLB's provisions, the core focus on accountability as a way to improve student achievement remains. As state and local policymakers work to implement ESSA, they have the opportunity to make substantial changes to their testing and accountability systems. The present analysis suggests that it is important that states do so. The pattern of decreased student engagement in the years following NCLB was consistent across analyses and suggests that students' reacted negatively to some of the accountability-linked changes in their schools. Insofar as engagement is vital to students' growth and development, states and districts must ensure that systems of accountability preserve the features of schools that facilitate student engagement. Future research should continue to identify what features of schools are associated with engagement, and how the educational policy context helps or hinders schools in their efforts to build relationships with students and support their development.

Table 19

States with Consequential Accountability Prior to NCLB

Early Implementers, Baseline Specification	
States	Year
IL	1992
WI	1993
TX	1994
IN, KS, KY	1995
NC, NV, OK	1996
AL, RI, WV	1997
DE, MA, MI, NM, NY, VA	1998
AR, CA, CT, FL, LA, MD, SC	1999
VT, GA, OR, TN	2000
AK	2001

Note. Source Dee & Jacob (2011).

Table 20

Engagement Items in the NLSY Data

Emotional engagement
It is easy to make friends
Most teachers help with personal problems
Most of my classes are boring
I don't feel safe at this school
Most teachers know their subjects well
You can get away with anything at this school
How satisfied are you with your school
Cognitive engagement
My schoolwork requires me to think
At this school, a person has the freedom to learn what interests him/her.
Behavioral engagement
Truancy: students do not report skipped school in the past year

Table 21

States by NCLB Implementation Standards and Timing of Consequential Accountability

State	High Std.	Low Std.	NCLB CA	Prior CA
AK				x
AL				x
AR	x			x
AZ	x		x	
CA	x			x
CO		x	x	
CT		x		x
DC	x		x	
DE				x
FL				x
GA		x		x
HI	x		x	
IA			x	
ID			x	
IL				x
IN				x
KS				x
KY	x			x
LA				x
MA	x			x
MD				x
ME	x		x	
MI				x
MN		x	x	
MO	x		x	
MS			x	
MT			x	
NC		x		x
ND			x	
NE		x	x	
NH		x	x	
NJ			x	
NM				x
NV				x
NY	--	--		x
OH			x	
OK				x

Table 21, continued

State	High Std.	Low Std.	NCLB CA	Prior CA
OR				x
PA			x	
RI	x			x
SC	x			x
SD			x	
TN		x		x
TX		x		x
UT			x	
VA		x		x
VT	--	--		x
WA	x		x	
WI		x		x
WV				x
WY	x		x	

Note. Sources: Wong, Cook, & Steiner's (2009) classification of states into low and high standards implementers of NCLB and Dee & Jacob's (2011) classification of early and late adopters of consequential accountability. VT and NY not included in high and low standards analyses.

Table 22

Associations between NCLB Adoption and School Engagement from 1988-2010

	Engagement Scores		
Public vs. Private Schools	*b*	*se*	*p*
Intercept shift for public vs. private schools	0.74	0.51	0.16
Slope change for public vs. private schools	-0.03	0.09	0.75
2004 NCLB impact for public vs. private schools	0.68	0.49	0.18
2007 NCLB impact for public vs. private schools	0.59	0.58	0.33
2010 NCLB impact for public vs. private schools	0.50	0.77	0.52
High vs. Low Standards States	*b*	*se*	*p*
Intercept shift for HS vs. LS states	0.95	0.43	0.03
Slope change for HS vs. LS states	-0.23	0.11	0.04
2004 NCLB impact for high vs. low standards states	0.49	0.32	0.14
2007 NCLB impact for high vs. low standards states	-0.21	0.41	0.61
2010 NCLB impact for high vs. low standards states	-0.91	0.68	0.18
Consequential Accountability (CA) in 2002 vs. Earlier	*b*	*se*	*p*
Intercept shift for on time vs. early CA states	0.43	0.36	0.24
Slope change for on time vs. early CA states	-0.21	0.09	0.02
2004 NCLB impact for on time vs. early CA adopters	0.01	0.30	0.98
2007 NCLB impact for on time vs. early CA adopters	-0.62	0.38	0.11
2010 NCLB impact for on time vs. early CA adopters	-1.24	0.57	0.04

Note. Data are drawn from the Maternal and Child Supplement to the NLSY. Models using high and low standards and timing of accountability include state level student-teacher ratio and proportion of families in poverty. Total *N*= 500, state *N*= 49 in the standards contrast, *N*= 24 in public versus private contrast, and total *N*= 519, state *N*= 51 in the consequential accountability (CA) contrast. All models are weighted by the number of individual observations used to generate each state-year (or type-year) observation. The standard deviation for the residualized student level engagement scores is equal to 4.11 in the public/private contrast, 4.12 in the HS/LS contrast, and 4.11 in the CA contrast.

Table 23

Number of Observations by State and Year, Student Engagement

	Public vs. Private		Wong et al. (2015)			Dee and Jacob (2011)	
Year	Treatment	Comparison	HS	MS	LS	Treatment	Comparison
1988	692	26	172	286	219	173	542
1990	1017	44	239	422	312	232	787
1992	1584	51	397	618	484	354	1232
1994	1467	93	372	556	486	344	1129
1996	1446	121	368	553	477	353	1098
1998	1349	146	350	515	422	329	1024
2000	1076	127	259	425	339	285	792
2002	1220	147	286	493	378	321	900
2004	966	140	223	405	277	236	731
2006	732	102	169	301	223	172	561
2008	552	88	131	220	168	136	416
2010	399	59	99	151	125	100	301

Note. Data are drawn from the Maternal and Child Supplement to the National Longitudinal Survey of Youth. FIPS codes represent the 50 states including DC. The Wong et al. (2015) column represents the high versus low standards contrast, where HS indicates a high standards state, MS indicates medium, and LS indicates low. The Dee and Jacob (2011) column represents the timing of consequential accountability contrast, where treatment states are states in which consequential accountability begins with adoption of NCLB, and comparison states are states that had prior consequential accountability. NY and VT are omitted from the high versus low standards contrast because they cannot be categorized as high, medium, or low standards.

Table 24

Associations between NCLB Adoption and Student Engagement from 1988-2010, Reducing to States with a Greater Number of Observations

	High versus Low Standards States Contrast														
	Drop States w < 10 obs			Drop States w < 15 obs			Drop States w < 20 obs			Drop States w < 25 obs			Drop States w < 30 obs		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Intercept Δ	0.26	0.60	0.67	0.35	0.56	0.54	0.69	0.52	0.20	0.95	0.48	0.06	1.50	0.40	0.00
Slope Δ	-0.16	0.10	0.12	-0.11	0.10	0.29	-0.17	0.10	0.10	-0.22	0.09	0.02	-0.28	0.07	0.00
NCLB Impact															
2004	-0.06	0.47	0.89	0.13	0.43	0.77	0.34	0.39	0.38	0.51	0.35	0.17	0.94	0.30	0.01
2007	-0.54	0.40	0.19	-0.21	0.39	0.59	-0.17	0.35	0.63	-0.16	0.29	0.58	0.10	0.26	0.71
2010	-1.02	0.54	0.07	-0.55	0.56	0.34	-0.69	0.53	0.21	-0.83	0.43	0.07	-0.74	0.36	0.05
N	316			259			203			160			124		
State N	34			31			28			22			18		
	Early versus On-Time Adoption of Consequential Accountability														
	Drop States w < 10 obs			Drop States w < 15 obs			Drop States w < 20 obs			Drop States w < 25 obs			Drop States w < 30 obs		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Intercept Δ	0.14	0.53	0.80	0.30	0.52	0.56	1.01	0.51	0.06	0.90	0.60	0.15	-0.51	0.81	0.53
Slope Δ	-0.17	0.09	0.06	-0.20	0.08	0.02	-0.37	0.10	0.00	-0.41	0.10	0.00	0.34	0.21	0.12
NCLB Impact															
2004	-0.20	0.43	0.65	-0.10	0.41	0.81	0.27	0.37	0.47	0.07	0.44	0.87	0.17	0.43	0.70
2007	-0.71	0.39	0.08	-0.70	0.34	0.05	-0.83	0.31	0.01	-1.17	0.28	0.00	1.18	0.35	0.00
2010	-1.22	0.49	0.02	-1.31	0.43	0.01	-1.94	0.49	0.00	-2.41	0.37	0.00	2.20	0.91	0.03
N	328			271			215			172			135		
State N	35			32			29			23			19		

Note. Data are drawn from the Maternal and Child Supplement to the NLSY. All models include state level student-teacher ratio and proportion of families in poverty. All models are weighted by the number of individual observations used to generate each state-year (or type-year) observation.

Table 25

Associations between NCLB Adoption and Student Engagement from 1988-2010, Weighted versus Unweighted Models

	Public vs. Private						High vs. Low Standards						Timing of Consequential Acct.					
	Weighted			Unweighted			Weighted			Unweighted			Weighted			Unweighted		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Intercept Δ	0.74	0.51	0.16	0.65	0.57	0.27	0.95	0.43	0.03	1.94	0.64	0.00	0.43	0.36	0.24	0.18	0.74	0.81
Slope Δ	-0.03	0.09	0.75	-0.04	0.09	0.62	-0.23	0.11	0.04	-0.25	0.12	0.05	-0.21	0.09	0.02	-0.10	0.12	0.44
NCLB impact																		
2004	0.68	0.49	0.18	0.61	0.54	0.28	0.49	0.32	0.14	1.69	0.63	0.01	0.01	0.30	0.98	0.09	0.66	0.90
2007	0.59	0.58	0.33	0.43	0.56	0.45	-0.21	0.41	0.61	0.71	0.78	0.37	-0.62	0.38	0.11	-0.30	0.58	0.61
2010	0.50	0.77	0.52	0.30	0.70	0.67	-0.91	0.68	0.18	-0.03	1.04	0.98	-1.24	0.57	0.04	-0.59	0.76	0.44

Note. Data are drawn from the Maternal and Child Supplement to the NLSY. High vs. Low Standards and Timing of Consequential Accountability models include state level student-teacher ratio and proportion of families in poverty.

Table 26

Associations between NCLB Adoption and Student Engagement from 1988-2010, Sample Reduced to Students Observed at One Time Point Only

	Public vs. Private						High vs. Low Standards						Timing of Consequential Acct.					
	Full Sample			Reduced Sample			Full Sample			Reduced Sample			Full Sample			Reduced Sample		
	b	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*	*b*	*se*	*p*
Intercept Δ	0.74	0.51	0.16	1.12	0.60	0.08	0.95	0.43	0.03	1.54	0.51	0.00	0.43	0.36	0.24	0.47	0.38	0.23
Slope Δ	-0.03	0.09	0.75	-0.13	0.09	0.17	-0.23	0.11	0.04	-0.14	0.12	0.23	-0.21	0.09	0.02	-0.18	0.09	0.05
NCLB impact																		
2004	0.68	0.49	0.18	0.85	0.51	0.12	0.49	0.32	0.14	1.26	0.42	0.00	0.01	0.30	0.98	0.10	0.32	0.75
2007	0.59	0.58	0.33	0.46	0.50	0.37	-0.21	0.41	0.61	0.84	0.50	0.10	-0.62	0.38	0.11	-0.44	0.38	0.25
2010	0.50	0.77	0.52	0.06	0.62	0.93	-0.91	0.68	0.18	0.42	0.75	0.58	-1.24	0.57	0.04	-0.98	0.57	0.09

Note. Data are drawn from the Maternal and Child Supplement to the NLSY. High vs. Low Standards and Timing of Consequential Accountability models include state level student-teacher ratio and proportion of families in poverty.

Table 27

Associations between NCLB Adoption and School Engagement from 1988-2010, Continuous Measure of Consequential Accountability

Timing of Consequential Accountability (CA)	Engagement Scores		
	b	*se*	*p*
Year, centered at 2002	-0.03	0.03	0.40
Post- NCLB	-1.22	0.36	0.00
Years since NCLB	0.47	0.08	0.00
Treatment * year	0.00	0.00	0.76
Treatment * NCLB	0.13	0.04	0.00
Treatment * years since NCLB	-0.04	0.01	0.00
2007 NCLB impact relative to a state that implemented CA in 1997	-0.55	0.25	0.03

Table 28

Associations between NCLB Adoption and Engagement from 1988-2010, Full Engagement Scale Contrasted

	Full Engagement Scale				Emotional Engagement Scores			
Public vs. Private Schools	*b*	*se*	*p*	*sd*	*b*	*se*	*p*	*sd*
Intercept shift for public vs. private schools	0.74	0.51	0.16	0.18	0.57	0.47	0.24	0.17
Slope change for public vs. private schools	-0.03	0.09	0.75	-0.01	-0.04	0.08	0.63	-0.01
2004 NCLB impact for public vs. private schools	0.68	0.49	0.18	0.17	0.49	0.46	0.31	0.14
2007 NCLB impact for public vs. private schools	0.59	0.58	0.33	0.14	0.36	0.56	0.52	0.10
2010 NCLB impact for public vs. private schools	0.50	0.77	0.52	0.22	0.24	0.73	0.75	0.07
High vs. Low Standards States	*b*	*se*	*p*	*sd*	*b*	*se*	*p*	*sd*
Intercept shift for HS vs. LS states	0.95	0.43	0.03	0.23	0.50	0.33	0.14	0.15
Slope change for HS vs. LS states	-0.23	0.11	0.04	-0.06	-0.14	0.07	0.04	-0.04
2004 NCLB impact for high vs. low standards states	0.49	0.32	0.14	0.12	0.22	0.28	0.42	0.06
2007 NCLB impact for high vs. low standards states	-0.21	0.41	0.61	-0.05	-0.19	0.29	0.51	-0.06
2010 NCLB impact for high vs. low standards states	-0.91	0.68	0.18	-0.22	-0.61	0.42	0.15	-0.18
Consequential Accountability (CA) in 2002 vs. Earlier	*b*	*se*	*p*	*sd*	*b*	*se*	*p*	*sd*
Intercept shift for on time vs. early CA states	0.43	0.36	0.24	0.10	0.06	0.30	0.83	0.02
Slope change for on time vs. early CA states	-0.21	0.09	0.02	-0.05	-0.10	0.06	0.11	-0.03
2004 NCLB impact for on time vs. early CA adopters	0.01	0.30	0.98	0.00	-0.14	0.25	0.57	-0.04
2007 NCLB impact for on time vs. early CA adopters	-0.62	0.38	0.11	-0.15	-0.46	0.28	0.11	-0.13
2010 NCLB impact for on time vs. early CA adopters	-1.24	0.57	0.04	-0.30	-0.77	0.41	0.07	-0.22

Note. Data are drawn from the Maternal and Child Supplement to the NLSY. Models using high and low standards and timing of accountability include state level student-teacher ratio and proportion of families in poverty. Total *N*= 499, state *N*= 49 in the standards contrast, *N*= 24 in public versus private contrast, and total *N*= 518, state *N*= 51 in the consequential accountability contrast. All models are weighted by the number of individual observations used to generate each state-year (or type-year) observation. The "sd" column reports the beta estimates in standard deviation units.

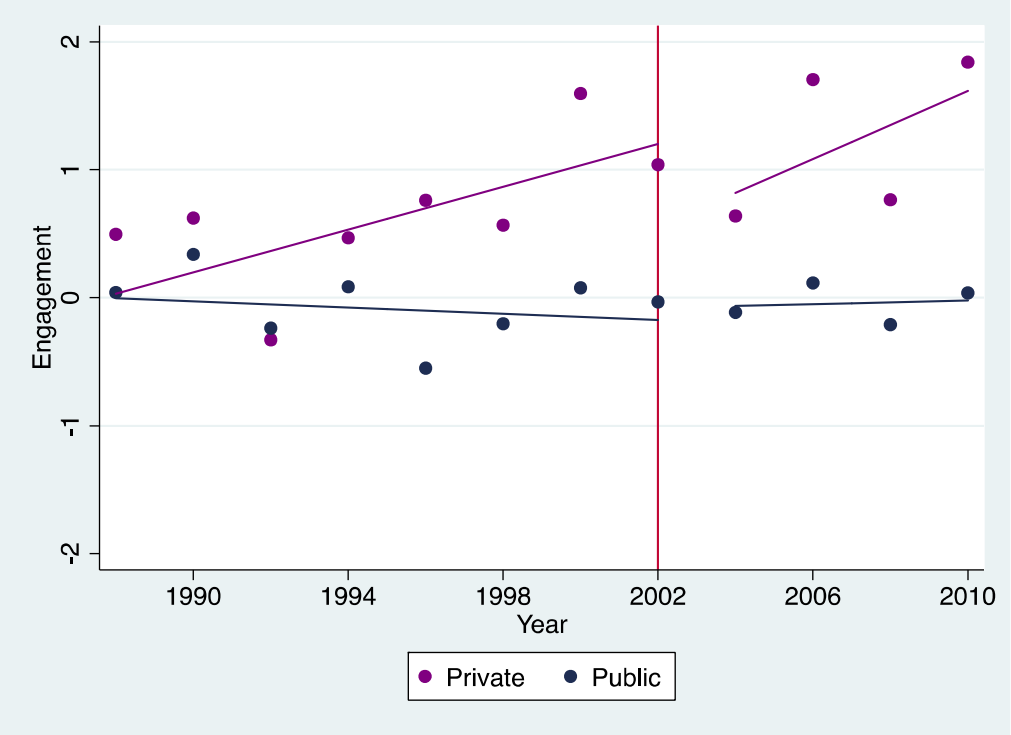

Figure 6. School Engagement in Public and Private Schools from 1988 through 2010.

Figure 7. School Engagement in High and Low Standards States from 1988 through 2010.

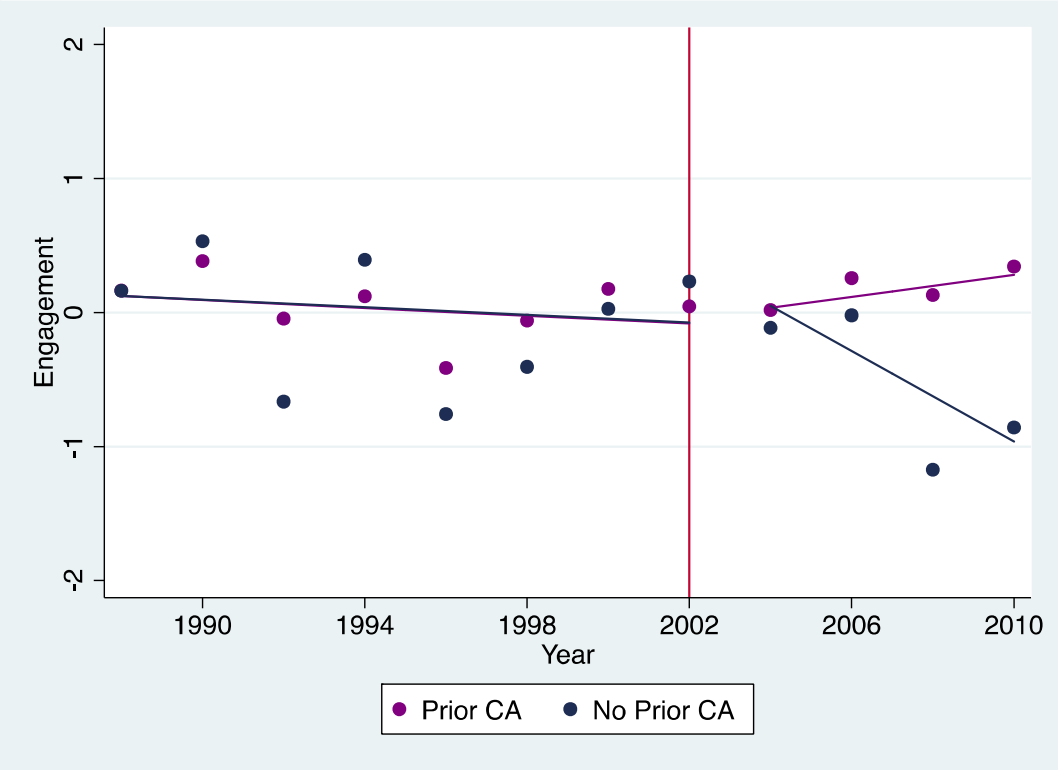

Figure 8. School Engagement in States with and without Consequential Accountability (CA) Policies Prior to No Child Left Behind from 1988 through 2010.

CHAPTER V: GENERAL DISCUSSION

Overview

This dissertation examined the role of school engagement and educational policy in the development of students' social and emotional outcomes. These outcomes are representative of key competencies students need to be successful in the 21st century, including self- and emotion-regulation, inhibition, and a healthy sense of self. Specifically, these studies assessed whether the relationship between emotional engagement with school and three key SE outcomes, delinquent behavior, depressive symptoms, and self-esteem, persisted in models designed to account for important threats to validity; whether the relationship varies by student age and family income; and whether educational policy can influence students' engagement. These questions extend the previous literature by applying a rigorous econometric framework to previously estimated associations between engagement and SE outcomes, testing whether the association varied by key developmental and policy constructs, and identifying for the first time whether No Child Left Behind, a federal education policy, substantively impacted students' engagement with school.

Linking Emotional Engagement to Socio-Emotional Outcomes

Across all models linking emotional engagement to student SE skills, a statistically significant, beneficial association emerged with effect sizes ranging from roughly a tenth to a fifth of a standard deviation. These associations varied slightly by student age such that the relationship between engagement and delinquency was weaker among older students (by roughly 0.02 of a standard deviation per year), and that older students were less impacted by changes in engagement across all outcomes (again, by roughly 0.02 of a standard deviation per year). There

was little to no evidence that these associations varied by family income, despite substantial differences in the distribution of emotional engagement by family income.

Taken together, this collection of studies suggests that how children and teens feel about their school is important for their social and emotional development. Emotionally engaged students—that is, students who like their schools, feel accepted in school, and feel that school is full of teachers and peers they can turn to—are on average less delinquent, less depressed, and happier with themselves and their abilities than their peers who are emotionally disengaged with their schools. Moreover, children and youth who feel an increase in this engagement show a corresponding boost in beneficial outcomes. This relationship is not limited to young children, rich children, or poor children. It is meaningful in size and robust to modeling strategies that specifically target key threats to validity.

These conclusions fall in line with both a body of psychological literature that highlights the importance of development in context (Bronfenbrenner, 1979; Eccles et al., 1993; Ford & Lerner, 1992; Lerner & Castellino, 2002) and a body of educational research that highlights the role of schools specifically in the full range of children's developmental outcomes (Deci et al., 1991; Deci & Ryan, 1994; Eccles et al., 1993; Fredricks et al., 2004; Osterman, 2000; Roeser et al., 2000; Ryan & Deci, 2009). Moreover, it echoes a broader literature on human motivation that highlights the role that feeling connected and emotionally bonded, particularly to nonfamily adults, plays in optimal development (Deci et al., 1991; Deci & Ryan, 1994; Masten, 2001; Osterman, 2000; Ryan et al., 2009; Scales et al., 2006).

These literatures and the present set of analyses assert that by being responsive to students' needs and concerns, emotionally and intellectually, schools have the opportunity to

shape students' outcomes not just academically, but across a wide variety of outcomes across the life course, including their labor market success, physical health, and overall well-being (e.g. Farkas, 2003; 2011; Heckman et al., 2006; Heckman, 2008; Moffitt et al., 2011). Moreover, given the current income-based gap in this engagement, this analysis suggests if schools can increase engagement specifically for low-income youth, they may be able to improve these key outcomes for traditionally disadvantaged youth who on average struggle to succeed in the 21st century economy.

Previous research has suggested that schools *can* enhance engagement through school-level policies that shape the disciplinary climate, classroom culture, and opportunities for students' to identify and connect with teachers and personnel (see Fredricks et al., 2004). For example, research from McNeely and colleagues, using the Add Health data from the present study, linked school-level engagement to more lenient disciplinary policies (e.g. the absences of zero-tolerance or "three-strikes" policies), school size, and student report of classroom climate. These findings align with conceptual work highlighting the importance of students feeling autonomous and responded to (e.g. Deci & Ryan, 1994; Ryan & Deci, 2009), other observational studies (e.g. Whitlock, 2006), and interventions that have successfully built engagement through the use of cooperative learning, collaborative student-teacher classroom governance, and developmentally appropriate discipline (e.g. The Child Development Project, Battistich et al., 1997; 2004; Solomon et al., 1996). Additionally, McNeely and colleagues also reported that students' relationships with their teachers seems to be the most important aspect of emotional engagement for key developmental outcomes (e.g. substance use, delinquent behavior, suspensions, GPA, McNeely & Falci, 2004; McNeely, 2005), consistent with a large literature linking student-teacher relationships to student engagement, academic achievement, and socio-

emotional functioning (e.g. Connell & Wellborn, 1991; Murray, 2009; Roeser, Midgley, & Urdan, 1996; Roorda, Koomen, Spilt, & Oort, 2011; Woolley & Bowen, 2007). Taken together, this literature suggests that schools that have more responsive discipline policies, classrooms that build student leadership and choice, and teachers that build caring, responsive relationships with students are most successful at building student engagement.

Linking Education Policy and School Engagement

Perhaps because of the importance of responsivity in the classroom and student-teacher relationships in building students' engagement with school, the final question of this dissertation found that the enactment of No Child Left Behind was associated with decreases in engagement over time specifically related to the experience of consequential accountability. In the contrast based on state standards—that is, how rigorously states enacted NCLB—there was an small-to-moderate, statistically significant initial boost in engagement (roughly 0.18 of a standard deviation in 2004) followed by a decreasing trajectory over time such that the impact of NCLB was negative by 2007. However, in the contrast based on consequential accountability there was only a post-enactment dip in students' engagement (in both contrasts this decrease was equivalent to roughly 0.06 of a standard deviation per year). One way to interpret this pattern is that early changes made by the states—the development of streamlined standards, curricula, and tests, providing support teams to struggling schools, and increasing instructional time (U.S. Department of Education, 2007)—boosted engagement, but that over time the narrowing of curricula, reduction of instructional support and autonomy in the classroom, and increased teacher anxiety (e.g. Au, 2007; Cochran-Smith & Lytle, 2006; Darling-Hammond, 2007; Diamond, 2007; Griffith & Scharmann, 2008; Finnegan & Gross, 2007; Jones et al., 2003; McMurrer, 2007; Pederson, 2007; Plank & Condliffe, 2013) diminished students' engagement

with school. Importantly, these findings should be interpreted in light of results from chapter two demonstrating significant links between engagement and SE outcomes. NCLB was associated with not only lower levels of engagement by 2007, but also with a decreasing trajectory of engagement in the post-NCLB period. If low levels of engagement are associated with less desirable SE outcomes, and decreases in engagement are associated with decreases in outcomes, as was demonstrated in chapter two, the present study suggests that NCLB may have negatively influenced students' SE development during this time period, though this hypothesis was not directly tested in this present study. Indeed, exploring the relationship between NCLB and students' SE outcomes directly is an important direction for future research.

The pattern of findings in this analysis is also important for several additional reasons. First, despite the negative association between No Child Left Behind and students' engagement, it is meaningful that these analyses demonstrated for the first time that more distal educational policy—e.g. state and federal—does have the power to shape students' engagement. Insofar as educational policy has previously focused nearly exclusively on academic achievement, it is possible that simply shifting policy to attend more explicitly to engagement may enhance students' engagement, and thereby SE outcomes. Moreover, although educational research has identified successful interventions (e.g. Battistich et al., 1997; 2004; Solomon et al., 1996), and teacher, classroom, and school influences on engagement (e.g. Connell & Wellborn, 1991; Fredricks et al., 2004; McNeely et al., 2002; Murray, 2009), it is less clear how to make those changes on a broad scale. Indeed, scale up of interventions designed to boost SE outcomes is notoriously difficult (e.g. Elias, Zins, Graczyk, & Weissberg, 2003; Jones & Bouffard, 2012). This analysis suggests that state and federal policies may be able to change classrooms in ways

that meaningfully shape students' engagement, SE skills, and SE outcomes, and highlights a new and exciting pathway for research and policy alike.

In this vein, the new federal education law, the Every Student Succeeds Act (ESSA), asks states for the first time to measure and enhance engagement, while simultaneously requiring states to maintain systems of consequential accountability. Though this analysis finds that consequential accountability was associated with diminished engagement, it is important to note that this need not be the case. For example, the pre-NCLB trajectory of states with consequential accountability policies was not negative, suggesting that some consequential accountability policies do not have the same negative association with engagement. Specifically, in a sensitivity test that estimated the impact of each additional year without consequential accountability; large dips in engagement were seen only after the introduction of NCLB's accountability system. NCLB's consequential accountability system was criticized as an unfunded mandate with harsh penalties, particularly by influential educational groups such as teachers' unions. Moreover, sanctions under NCLB could result in dramatic changes to schools including the removal of personnel with little support offered to struggling schools prior to closing, and many schools felt these sanctions to be inescapable. Indeed, as early as 2006 29% of schools were classified as failing under NCLB, and this percentage rose to 48% by 2011 (Usher, 2012).

Conversely, pre-NCLB accountability systems were more diverse, state-run, and largely involved the publishing of test scores and the introduction of committees to improve the school (e.g. Fuhrman, 1999; Goertz & Duffy, 2001). In their analysis, Dee and Jacob coded states as experiencing consequential accountability if states' policies included some kind of consequence; they did not assess if or how often states enforced such consequences, how similar states' consequences were to those under NCLB, or how states determined whether schools were

failing. Indeed, no state had a consequential accountability system identical to that of NCLB prior to the law's enactment (Goertz & Duffy, 2001). Thus, it may be that though consequential accountability under NCLB was problematic for engagement, this does not have to be the case for consequential accountability overall. Indeed, the authorization of ESSA and the return to more individual state consequential accountability systems offers an opportunity for policymakers to shape consequential accountability in response to concerns from schools and teachers, and for researchers to harness this variation to explore the impact of different aspects of accountability on students' engagement and SE outcomes.

In order for consequential accountability systems to be effective, these systems need to maintain the sense of urgency engendered by NCLB's consequential accountability, but also create motivation and excitement among teachers rather than anxiety and paralysis. In order for this to be the case, consequential accountability systems need to set reasonable goals for teachers that focus on growth, local education agencies must have the funding necessary to implement accountability provisions successfully, and policies need to focus on supporting the development of skills in teachers that are aligned to the challenges of the 21st century classroom. Policy can be used to provide mechanisms by which teachers can gain or improve upon these skills at every level. For example, accreditation at schools of education could require that students training to be teachers take courses in classroom management, with a specific focus on the aspects of management most linked to engagement (e.g. clear expectations, consistency, and student participation in classroom decisions). Current definitions of high quality professional development—one way that schools can show they are improving—are somewhat vague. Professional development dollars could be targeted specifically to known, high quality professional development programs that focus on coaching and long-term skill building, rather

than one-time sessions. Finally, mandated improvement plans for struggling schools could explore team teaching or looping models (i.e., when teachers teach the same set of students two years in a row) to build support for teachers and more opportunities for teacher-student bonding.

Leveraging Solutions from Outside the K-12 Classroom

Lastly, it is important to note that much of the overall variation in school engagement is at child level. For example, in the Add Health data, only twelve percent of the total variation in engagement emerged between schools; the rest was within school at the child level. It is worth noting that students in schools do have different experiences due to the individual teachers and peer networks they interact with daily, however, overall the proportion of variation within schools suggests that student factors heavily influence engagement. For example, engagement covaries with prior student achievement and SE skills, and with indicators of socio-economic status and family functioning. These relationships suggest that educators and policymakers hoping to build student engagement must ask what factors, from an early age, lead children to participate in and bond with school. Specifically, it is possible that policies targeted at creating high quality early childhood experiences and increasing school readiness and early academic achievement may also be solutions for both closing gaps in engagement and increasing overall levels of student engagement. For example, research has linked early and school-aged experiences of food insecurity to both early academic and socio-emotional abilities (Alaimo, Olson, & Frongillo, 2001; Belsky et al., 2010; Jyoti, Frongillo, & Jones, 2005), as well as approaches to learning, a construct that measures students' initiative and eagerness to learn (Johnson & Markowitz, under review). Additionally, experiences of food insecurity among school-aged children have been linked to their engagement (Ashiabi, 2005). Such findings suggest that food support policy could both shape students' early classroom behaviors, and

thereby later engagement, and support students' engagement directly in the school-aged years, though this hypothesis is yet untested.

Similarly, studies of early care and education contexts report that high quality early care and pre-k settings are linked with improved student academic, socio-emotional, and executive function skills (e.g. Gormley, Gayer, Phillips, & Dawson, 2005; Gormley, Phillips, Newmark, Welti & Adelstein, 2011; Weiland & Yoshikawa, 2013). It is thus possible that high quality early education experiences can enhance long run student engagement. These hypotheses have not yet been explored empirically, but given the importance of engagement for student outcomes, and the current political attention on universal pre-k and other early care experiences, identifying the relationships between early childhood experiences, early educational and social policies, and later engagement is a valuable next step for research.

Future Research

This chapter has highlighted several key directions for future research on the relationships among student engagement, educational policy, and socio-emotional outcomes. Future educational research needs to identify what features of schools enhance students' engagement, ways to build quality student-teacher relationships, and the ways in which educational policy alters school contexts and thereby engagement. Though previous literature has broadly demonstrated that school and classroom features predict student engagement (and thereby academic and SE outcomes), it remains unclear how educators and policymakers can effectively institute these changes in schools. Indeed, this dissertation identifies the first quantitative link between a federal policy and students' engagement, suggesting that research must redouble efforts to consider how policy levers—even those targeted at other student outcomes—impact school contexts and student experiences. Future research linking school

features and educational policies to SE outcomes through engagement could help illuminate steps forward for schools, districts, and states.

Likewise, researchers should continue to improve measures of school engagement. In order for measures of engagement to best inform school policy and practice, researchers, practitioners, and policymakers must feel confident in the validity and reliability of the assessment of engagement. The school engagement literature contains a vast array of measures constructed from a wide variety of items; moreover, at times it is difficult to disentangle a measure of engagement from a desired school outcome (Betts, 2012; Stefansson, Gestsdottir, Geldhof, Skulason; & Lerner, 2015). For example, while behavioral engagement is commonly measured using an indicator for attendance, conceptually attendance is a desired outcome of engagement. Similarly, although engagement is theoretically a driver of academic achievement, measuring engagement as homework participation, for example, may overstate the relationship. Indeed, although emotional engagement is conceptually a driver of SE outcomes, measure of emotional engagement that tap too closely onto how students feel about *themselves* (e.g. items assessing "fitting in" that may capture students' negative self-evaluations) may overstate relationships between engagement and outcomes such as self-esteem and depressive symptoms. Thus continuing to improve engagement measures—and strategies for modeling the dimensions of engagement simultaneously—is an important future direction for clarifying the relationship between engagement and outcomes.

The measure of engagement used in the present study was based on both a review of common items from the previous literature and the availability of items in the NLSY and Add Health datasets. Both scales presented adequate reliability and captured the key components of emotional engagement: the sense of bonding with and connection to school. However, future

research should attempt to incorporate additional reporters, particularly through the use of observational measures, use a broader number of items to tap these key constructs, and allow for a wider range of responses. For example, items tapping identification with school (Voelkl, 1996; 1997; 2012) as part of the sense of belonging, and exploring belonging and connection across different aspects of school life (e.g. in different classes, in extracurricular activities, addressing peers versus teachers more explicitly) may help researchers deepen their exploration of both how engagement links to student outcomes, and how to build engagement through school practice.

Additionally, it is important to ask what aspects of early experience may be linked to engagement in school later on. It is likely that early education and other social policies may shape engagement through changes in students' approach to school at an early age. This conclusion discussed two plausible areas for future research, food insecurity and early care and education, based on evidence that these experiences impact students' early abilities and their relationship to school. However, much more work remains to be done to decisively link these other policy approaches to later engagement.

Conclusions

American children spend roughly half of their waking hours in school. For many children school is a place where they learn to navigate relationships, approach challenges, and make decisions—solidifying the socio-emotional skills that will dramatically shape the lives they are able lead in the future. This dissertation adds rigor to a body of evidence asserting that students' emotional connection to and liking of school matters for emotion regulation, inhibition of delinquent behavior, and sense of self. These kinds of outcomes are undoubtedly important for all of America's children, and this dissertation suggests that engagement is an equally powerful developmental force for youth from all socio-economic backgrounds. That engagement is

equally valuable for all youth suggests that the income-based discrepancy in the experience of engagement should be a key target for educators and policy makers hoping to improve the academic and socio-emotional skills of low-income youth.

Public schools need to prepare students for the complex, interconnected 21st century economy they will be entering, and thus need to provide avenues to support social and emotional development. This dissertation filled an important gap in the literature by estimating for the first time how No Child Left Behind impacted students' engagement. Results suggest that policies that narrowly focus on enhancing academic skills may undermine engagement and, in doing so, undermine students' socio-emotional development. The recently passed Every Student Succeeds Act replaces No Child Left Behind's myopic focus on academic achievement and encourages states to use indicators of engagement and non-academic outcomes as markers of school success. This dissertation suggests that it is crucial that states and schools take this opportunity to help prepare students for the future by considering social and emotional development as a goal equivalent in importance to academic achievement. Researchers must support schools as they work to create contexts that support youth development, and federal and local policy must continue to work to ensure that America's children attend schools with the appropriate resources to facilitate both student engagement and the development of socio-emotional skills. Schools that meet this goal will truly be able to create 21st century opportunities for all of their students.

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