LONGITUDINAL TRAJECTORIES OF STUDENT ENGAGEMENT:

PREDICTING HIGH SCHOOL GRADUATION AND COLLEGE ATTENDANCE

by

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(Under the Direction of Amy L. Reschly)

ABSTRACT

Research suggests student engagement is significantly related to a variety of outcomes including academic achievement and positive psychosocial development. Additional information is needed to more thoroughly understand engagement for all students throughout the developmental life course. The purpose of this study was to examine trajectories of engagement with two cohorts of students ($N = 22{,}066$) beginning in the sixth grade through high school (i.e., dropout, on-time completion) and postsecondary (i.e., immediate postsecondary enrollment, persistence through two semesters) outcomes. Growth mixture modeling revealed seven distinct trajectories of student engagement. Engagement trajectories were associated with important academic outcomes in expected ways; most students demonstrated high and stable levels of engagement and were more likely to complete high school on-time and immediately attend and persist through postsecondary school; students in low and variable engagement trajectory groups were more likely to drop out of high school. Findings have implications for interventions and school policy.

INDEX WORDS: student engagement, academic achievement, longitudinal research, engagement trajectories

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INTRODUCTION

<u>Significance of Student Engagement</u>

The construct of student engagement holds important implications for education

practices, policies, and reform. Research on student engagement suggests engagement is

significantly related to academic achievement (Christenson, Reschly & Wylie, 2012), high

school graduation (Christenson et al., 2012; Finn & Rock, 1997; Lovelace, Reschly, & Appleton,

2017), and postsecondary enrollment and persistence (Finn, 2006; Fraysier, Reschly, &

Appleton, 2018). In addition to academics, student engagement is a driving force for positive

psychosocial development in youth (Eccles & Wang, 2012; Skinner & Pitzer, 2012). Skinner and

Pitzer (2012) characterized student engagement as creating a "pathway to learning, long-term

achievement, and eventual academic success" (p. 23-24). Throughout schooling, student

engagement bolsters resilience (Finn & Zimmer, 2012) and is associated with lower-risk health

and sexual behaviors (Griffiths, Lilles, Furlong, & Sidhwa, 2012). Engagement is also related to

effort, commitment, and persistence (Finn & Zimmer, 2012; Klem & Connell, 2004; National

Research Council and the Institute of Medicine [NRC], 2004).

Conversely, lack of engagement with school is associated with poorer attendance, less

learning and effort, lower sense of belonging with school, and counterproductive behavior (Finn

& Zimmer, 2012; NRC, 2004). Furthermore, low student engagement is predictive of high

school dropout (Finn, 1989; Finn & Rock, 1997), an enduring problem in the United States

(U.S.). Although American graduation rates nationally have steadily improved (MacFarland et

al., 2018), discrepancies exist among different racial-ethnic and socioeconomic groups across the U.S. (Chapman, Laird, Ifill, & Kewal Ramani, 2012; Yettick & Lloyd, 2015), with enormous costs to society and our future economic growth (Sum, Khatiwada, & McLaughlin, 2009). Moreover, the U.S. is losing ground with respect to college attainment; the U.S. ranks 12th among developed nations for young people with university-level degrees (The Organisation for Economic Cooperation and Development, 2014). This is a noted concern, considering estimates indicate 74% of jobs will require postsecondary education by the year 2020 (Carnevale, Smith, & Strohl, 2013; Kuczera & Field, 2014).

As a result of its malleable nature, engagement is a critical area to target for dropout prevention and promotion of successful student growth. Rosenthal (1998) summarized demographic risk-factors associated with higher rates of dropout, including low socioeconomic status (SES), minority group status, male gender, living in urban areas, experiencing a high number of stressors, and having less social support. Unfortunately, these risk-factors are either inherent traits or are very difficult to address with school-based interventions (Reschly & Christenson, 2012). In contrast to demographic risk variables, there are alterable variables related to engagement which are amenable to intervention and are directly related to success in school (Christenson, 2008; Reschly & Christenson, 2012).

One useful distinction among the dozens of variables related to dropout and completion is found between demographic and functional risk (Christenson, 2008). Functional risk variables are those that are alterable (i.e., amenable to intervention) and directly relate to success in school, such as attendance, disciplinary referrals, and homework completion. Functional risk variables also differentiate those who are in need of intervention within demographically at-risk groups (Christenson, 2008). A study by Finn and Rock (1997) assessed student engagement in

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underrepresented and low SES groups of students in 8th, 10th, and 12th grade. Using self-reported grades, test scores at the 40th percentile, and dropout status, students were classified into three groups: successful school completers labeled as the "resilient" group, school completers with poorer academic outcomes labeled as the "non-resilient" group, and non-completers labeled as "dropouts." When controlling for student background and other psychological factors (i.e., self-reported self-esteem and locus of control in 10th grade), the groups significantly differed in levels of engagement in expected directions. Higher levels of engagement were associated with the "resilient" group and lower levels of engagement with the "dropout" group. Similarly, Reschly and Christenson (2006) found engagement in 8th grade predicted dropout and school completion in a high-risk group of students with disabilities when controlling for academic achievement, grade retention, and SES. Overall, the "consequences of becoming disengaged from school are extremely serious, particularly for adolescents from urban and poor high schools who might not get the 'second chances' afforded to those who are more economically privileged" (NRC, 2004, p. *ix*). Clearly, identifying students with functional risk factors such as a lack of engagement with school might facilitate targeted interventions to those most in need, even within demographically at-risk groups.

Although student engagement is frequently viewed through a dropout prevention lens, it is important to note educators should not simply focus on preventing negative outcomes; our goal should also be to promote positive outcomes for all students (Reschly, 2017, 2018), demonstrating a parallel between student engagement and positive psychology (i.e., shifting the focus of psychology from just examining pathology to also include studies of valued subjective experiences such as resilience and flourishing; Seligman & Csikszentmihalyi, 2000). By examining student engagement, we aim to help students develop the skills, attitudes, and

behaviors that promote competence, achievement, and on-time high school graduation. In turn, these outcomes will facilitate students' postsecondary enrollment, successful employment, and productive citizenry (Reschly & Christenson, 2012; Reschly, Pohl, Christenson, & Appleton, 2017).

<center>Models of Student Engagement</center>

Dropping out or successfully graduating from high school on-time are not isolated events; research has identified for each developmental pathways to school completion and dropout from early childhood (Evans & DiBenedetto, 1990; Garnier, Stein, & Jacobs, 1997). These trajectories also coincide with developmental processes of engagement, and disengagement, across levels of schooling. In a seminal article, Finn (1989) described the processes of engagement and disengagement leading to high school graduation and dropout, respectively. In his Participation-Identification model of student engagement, behaviors which bring about emotional connections with school are reinforcing; engaging with school activities leads to better academic outcomes, which, in turn, reinforces a students' identification with school. Alternatively, physically withdrawing from school leads to worse academic outcomes, promoting a cycle of dis-identification with school (i.e., a lack of an emotional connection), and eventual culmination in dropout.

Although Finn's (1989) two-factor model is comprised of behavioral and affective components, most scholars currently conceptualize engagement with at least three factors: behavioral, affective, and cognitive (Fredricks, Blumenfeld, & Paris, 2004). There is overall agreement in the multidimensional nature of student engagement (Fredricks et al., 2004) but there is a lack of consensus on how many factors contribute to engagement and how these factors are operationalized (Reschly & Christenson, 2012). For example, Christenson and colleagues'

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(Appleton, Christenson, Kim, & Reschly, 2006) conceptualization of engagement bifurcated behavioral engagement into behavioral and academic engagement to more clearly align intervention strategies with engagement subtypes. Broadly, cognitive engagement refers to student beliefs about the value of school, the ability to self-regulate, and goal-setting. Affective engagement refers to sense of belonging with school and relationships with teachers and peers. Behavioral engagement is comprised of indicators such as student attendance, disciplinary incidents, and participation in school and class. Either encompassed within behavioral engagement or independent, academic engagement is composed of indicators such as grades, assignment completion, and credits earned towards graduation. In this model of engagement, cognitive and affective engagement are considered high-inference, requiring students' own self-report. Conversely, behavioral and academic engagement are typically drawn from data readily available in school records. Many scholars also support cognitive and affective engagement preceding and thus mediating behavioral and academic engagement, which makes these types of engagement especially important for assessment and intervention (Reschly & Christenson, 2006, 2012).

Other models of student engagement arose out of the motivation literature. Skinner and colleagues' (Skinner, Furrer, Marchand, & Kindermann, 2008; Skinner, Kindermann, & Furrer, 2009) engagement model was developed from the self-system model of motivational development (SSMMD; Connell & Wellborn, 1991; Deci & Ryan, 1985). The SSMMD includes four higher order constructs: context, self, action, and outcomes. In examining student engagement, context relates to the qualities of the teacher and classroom climate. This context develops students' self-perceptions, such as feelings of relatedness, competence, and autonomy, which in turn influence engagement or disengagement. In supportive classrooms, students

develop positive self-perceptions, leading to greater engagement; unsupportive classrooms cause poorer self-perceptions and thus disaffection (Pekrun, Goetz, Titz, & Perry, 2002; Skinner et al., 2008). Using this underlying motivational theory, Skinner and colleagues' (2008, 2009) engagement model is composed of engagement and disaffection (i.e., negative engagement) with behavioral and emotional dimensions in the classroom. Behavioral engagement includes action initiation, effort, and persistence, while behavioral disaffection is demonstrated through passivity, withdrawal, and inattention. Emotional engagement contains emotions such as enthusiasm, interest, and enjoyment, and emotional disaffection is displayed as boredom, disinterest, and frustration. Those who endorse this perspective view engagement as the active involvement in a task with motivation as the underlying psychological processes driving engagement (Appleton, Christenson, & Furlong, 2008).

Also drawn from the motivation literature, Martin's (2007) conceptualization of engagement integrated many seminal motivational theories identified by Pintrich (2003), including self-efficacy and expectancy value theory, attribution theory and control, goal orientation and self-regulation, and need achievement and self-worth motivation theory. The Motivation and Engagement Wheel (Martin, 2007) was created to bridge the gap between motivation theory and practice and involves four higher-order factors of engagement: adaptive and impeding/maladaptive cognition and adaptive and maladaptive behavior. These four dimensions of engagement are operationalized by 11 lower-order factors. Adaptive cognition includes valuing school, self-efficacy, and mastery orientation. Adaptive behaviors consist of persistence, planning, and task management. Impeding or maladaptive cognition includes anxiety, avoidance of failure, and a sense of lacking control. Finally, maladaptive behaviors are self-handicapping and disengaging. This model operates within the Sequence x Space Learning

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Map (Martin, 2012), where the sequence of motivation, to engagement, then academic achievement is affected by factors within the student and school. Moreover, the climate of the classroom and school and the individual student influence one another. From this perspective, engagement and motivation are both considered significant constructs that warrant further research (Martin, 2007).

From different theoretical backgrounds and perspectives, there are meaningful similarities across these models of engagement. Each model proposes, at minimum, both behavioral and affective components of engagement. Although the exact number of components and what these are comprised of differs, there is agreement in the multidimensional nature of engagement. Each model emphasizes the role of context in the process of student engagement. Both internal and external factors influence students' engagement, such as relationships with peers and teachers and classroom and school climates. Notwithstanding these similarities, our study, from the dropout prevention and intervention framework, utilizes the four-component model of engagement proposed by Christenson and colleagues (Appleton et al., 2006, 2008).

<u>Longitudinal Data and Student Engagement</u>

Overall, research suggests engagement declines as students progress from elementary to high school (Appleton & Reschly, 2018; NRC, 2004; Wigfield & Eccles, 2000; Wylie & Hodgen, 2012). However, even within this general trend of decline, there are patterns with differing levels of stability and fluidity which might be affected by certain contexts or transitions (Janosz, Archambault, Morizot, & Pagani, 2008; Wylie & Hodgen, 2012). Longitudinal studies demonstrate how various aspects of engagement develop over time and how they influence one another (Christenson et al., 2012). They also facilitate prediction of which students might be at-risk for dropping out of high school, inform decisions regarding intervention and policy, and

provide valuable information on the development of student engagement across the span of schooling (Janosz, 2012).

Generally, there are two different methodological approaches when handling longitudinal data (Laursen & Hoff, 2006; Rhodes, 2014). Variable-centered approaches concern the relations among variables and the relative contributions predictor variables make to outcomes (e.g., correlation, analysis of variance, etc.). Person-centered approaches identify groups of individuals who share attributes and concern differences in patterns of development (e.g., cluster and latent class analyses). One statistical approach to longitudinal data that combines variable- and person-centered approaches is growth mixture modeling. Growth mixture modeling allows for an examination of relationships among individuals by grouping individuals based on shared characteristics into qualitatively different groups (Jung & Wickrama, 2008; Ram & Grimm, 2009). Furthermore, growth mixture modeling analysis can examine how engagement changes over time, how engagement relates to important outcomes (e.g., academic achievement), and if there are groups of individuals with similar patterns of engagement that change over time while controlling for context variables (e.g., demographic characteristics).

Variable-Centered Studies of Student Engagement

The majority of longitudinal studies of student engagement are variable-centered, assessing the relationship between students' engagement and academic outcomes (e.g., high school dropout). Generally, variable-centered studies have found higher levels of student engagement predict greater academic achievement in both general (Lovelace, Reschly, Appleton, & Lutz, 2014; Lovelace et al., 2017) and at-risk (Finn & Rock, 1997; Reschly & Christenson, 2006) student populations. Student engagement and academic outcomes have been examined as school completion and achievement in high school (Balfanz, Herzog, & Iver, 2007; Lovelace et

al., 2017) and enrollment, persistence (Fraysier et al., 2018), and completion (Finn, 2006) of postsecondary schooling. The majority of longitudinal variable-centered studies examining dropout utilize variations of logistic regressions to estimate how well student engagement predicts academic achievement, including multiple (e.g., Lovelace et al., 2014), stepwise (Reschly & Christenson, 2006), multivariate (Balfanz et al., 2007), or multilevel (Lovelace et al., 2017) logistic regressions.

<u>Person-Centered Studies of Student Engagement</u>

Person-centered approaches to longitudinal data are relatively recent in the literature and have become more common within the past five years. Three studies have been published utilizing latent class or profile analyses to examine longitudinal student engagement data. First, Wang and Peck (2013) used data from the Maryland Adolescent Development in Context Study to examine the behavioral, emotional, and cognitive engagement of three waves of students (9th grade, 11th grade, and the first year of postsecondary schooling). Their measure of student engagement was adapted from three different scales, utilizing four or five items from each scale (the Behavioral Participation scale: Elliott, Huizinga, & Menard, 1989; the School Identification scale: Gottfredson, 1984; and the Self-Regulated Learning scale: Pintrich, 2000). Using latent profile analysis, the researchers (Wang & Peck, 2013) found the majority of the sample demonstrated consistently high, medium, or low engagement, indicating a connection between engagement subtypes. Interestingly, the group identified as emotionally disengaged was considered high performing by teachers, but they exhibited the highest risk of mental health problems (defined as the presence of self-reported depressive symptoms within the past two weeks). The cognitively disengaged group had better mental health than the emotionally disengaged group but performed worse academically. The minimally engaged group had the

highest dropout rate, and the researchers concluded that a combination of all three types of

engagement contributes to postsecondary attendance.

In another person-centered study, Lawson and Masyn (2015) used relevant items from

the 2002-2012 Educational Longitudinal Study to assess the engagement of high school students

from over 600 public high schools in the U.S. This study examined three waves of data for 10th

graders, 12th graders, and postsecondary students to identify sub-profiles of engagement using

latent class analysis. Lawson and Masyn found six sub-profiles they described as academic

initiative (8% of the sample), academic investment (34%), low effort/low efficacy (23%),

boredom (10%), ambivalence (12%), and dis-identification (12%) groups. These profiles were

identified based on students' beliefs about the future, academic enjoyment, academic efficacy,

school investment, ambivalence towards school, and feelings of alienation. Students in the

academic initiative and academic investment groups were more likely to graduate on-time from

high school and enroll in postsecondary education, while students in the dis-identification group

were more likely fail to graduate high school on-time. The researchers concluded that sub-

profiles of student engagement in high school could be used to facilitate the identification of

students at-risk of dropping out and the tailoring of specific interventions to particular

engagement subgroups.

In addition to student engagement, Salmela-Aro, Moeller, Schneider, Spicer, and

Lavonen (2016) assessed high school students' feelings of school burnout using data from the

EAGER study in both the U.S. and Finland. The Schoolwork & Engagement Inventory (Salmela-

Aro & Upadaya, 2012) assessed student energy at school, their absorption in classwork, and

whether they perceived schoolwork as meaningful. The School Burnout Inventory (Salmela-Aro

et al., 2009) assessed burnout, defined as exhaustion with school, cynicism towards school, and

feelings of inadequacy. The researchers (Salmela-Aro et al., 2016) found that engagement and burnout were negatively correlated. In addition, they identified four profiles with latent profile analysis: engaged, engaged-exhausted, moderately or at-risk for burn out, and burned out. Students in the engaged-exhausted group experienced high engagement and high burnout simultaneously, which was associated with poorer mental health outcomes like depression.

Combined Variable- and Person-Centered Studies of Student Engagement

With advances in statistical analyses, combined variable- and person-centered approaches are increasingly present in the literature. As previously stated, these studies most frequently use variations of growth mixture modeling to conduct analyses. Janosz and colleagues (2008) used the New Approaches New Solutions longitudinal data set from 2002 to 2005, which surveyed students from 69 low SES middle and high schools in Quebec. Engagement was measured on affective (defined as enjoyment and interest in school), cognitive (readiness to learn), and behavioral (attendance and compliance) dimensions based on self-report items. The researchers created an engagement index using these self-report items to be able to examine one engagement data point for students over time. Using growth mixture modeling, the researchers found seven distinct trajectories of school engagement with 12- to 16-year-old students. Most students fell within three stable trajectories with moderate to high levels of school engagement. The other four trajectories were described as unstable and contained the majority of dropouts (i.e., transitory increasing, transitory decreasing, increasing, and decreasing trajectories), suggesting that engagement variability in any direction was associated with problematic outcomes.

Li and Lerner (2011) utilized data from the 4H Study of Positive Youth Development in the U.S. to examine the behavioral and emotional engagement of 5th through 8th graders. Behavioral engagement was assessed via four items from the Profiles of Student Life scale

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(Leffert et al., 1998), which asked students about their attendance, homework completion, and preparedness with materials. Emotional engagement was assessed with three items which asked students to report how much they care about school, and how much other students and teachers care about them (Li & Lerner, 2011). The researchers also examined the relationship of student engagement with SES, delinquency, substance use, grades, and depression. Semiparametric mixture modeling revealed four distinct trajectories for both behavioral and emotional engagement: behavioral engagement trajectories were described as transitory decreasing, decreasing, moderate-stable, and high-stable, while identified emotional engagement trajectories included decreasing, moderate, high with a decrease, and highest. The researchers also found that boys, students of color, and students from less advantaged families tended to fall within the lower engagement groups for both behavioral and emotional engagement. Other research similarly suggests that students from low SES backgrounds and males report lower engagement than their higher SES and female peers (Fan & Williams, 2010). Positive engagement pathways were also associated with better grades, less depression, and less delinquency and substance use (Li & Lerner, 2011).

In another study, Wylie and Hodgen (2012) used ten self-report items in the data set from the Competent Learners study in New Zealand to assess the behavioral, affective, and cognitive engagement of 10-, 12-, 14-, and 16-year-olds. To identify engagement trajectories, the researchers divided the scores for each year into quartile groups, and then categorized and regrouped the patterns into engagement trajectories. They found five trajectories of student engagement: always high, variable or increasing, moderately high on average, moderately low or decreasing, and always low. Higher engagement trajectories were associated with positive outcomes such as greater levels of motivation and enjoyment of reading, whereas the lower

engagement trajectories correlated with higher rates of bullying and risky behavior, greater friction in relationships with parents, less participation in extracurricular activities, and less enrollment in post-secondary education.

Finally, Archambault and Dupéré (2017) examined the behavioral, affective, and cognitive engagement of 3rd through 6th grade students in Quebec. They used data from a longitudinal study based on four cohorts of students from seven elementary schools. The researchers examined engagement within the context of a particular subject (language arts) and used a validated measure of student engagement with nine items (School Engagement Dimensions Scale; Archambault & Vandenbossche-Makombo, 2013). Trajectories of student engagement were identified using multiple-process growth mixture modeling (Archambault & Dupéré, 2017). Similar to the previously described studies, most students exhibited high and stable trajectories of engagement, but a significant minority (i.e., about one-third of the sample) had lower and changing levels of engagement. The researchers also found students in the lower and variable engagement trajectories were more likely to be boys, to be perceived by teachers as less engaged, exhibit learning and behavior problems, and have less positive relationships with teachers.

Summary of Longitudinal Studies of Student Engagement

Altogether, longitudinal studies of student engagement indicate varied trajectories and profiles of engagement are present within groups of students across different age groups and countries. The majority of students exhibit high, stable levels of engagement, and these students are more likely to graduate high school on-time and enroll in postsecondary education. As expected, low and unstable trajectories of engagement are associated with poorer academic outcomes such as high school dropout. These studies also reveal that students who are male,

racial minorities, and/or from low SES backgrounds are more likely to demonstrate low levels of engagement. This aligns with studies that examine achievement and graduation outcomes relative to student demographics which indicate that students who are male, English Language Learners (ELL), from lower SES backgrounds, and from black or Hispanic racial-ethnic groups on average have lower high school graduation (McFarland et al., 2018; McFarland, Cui, & Stark, 2018) and postsecondary attendance (McFarland et al., 2018) rates.

These longitudinal studies differ not only regarding data analyses, but also with the chosen theoretical framework of student engagement and number of engagement components examined. Some studies examined engagement holistically, combining engagement subtypes (e.g., Archambault & Dupéré, 2017; Janosz et al., 2008; Wylie & Hodgen, 2012), while others examined outcomes in relation to engagement subtypes separately (e.g., Li & Lerner, 2011; Wang & Peck, 2013). In addition, self-report of students was used to assess various aspects of engagement, but many different rating scales were utilized. When studies examined postsecondary outcomes, this included postsecondary enrollment (Wylie & Hodgen, 2012; Lawson & Masyn, 2015) but did not include postsecondary persistence or graduation. Longitudinal studies of student engagement exist for elementary, middle, and high school students, but only some examine engagement across transitions and none examine engagement across the entirety of schooling.

Despite these advances in our understanding of student engagement, much is still unknown about specific trajectories and profiles of engagement over time. For example, there is a need for longitudinal studies to apply a comprehensive measure of student engagement designed for longitudinal data (Reschly & Christenson, 2012; Wylie & Hodgen, 2012). In addition, given the connection between early school experiences and distal outcomes,

longitudinal research on student engagement needs to be extended from early elementary school to postsecondary enrollment, persistence, and completion. More research is warranted on the potentially varying influences of cognitive, affective, behavioral, and academic dimensions of student engagement, and how these different aspects of engagement develop over time and influence one another (Christenson et al., 2012; Janosz, 2012; Reschly & Christenson, 2012). Another area warranting additional study is uncovering how and which students engage and how engagement is affected by transitions (e.g., from middle school to high school; Janosz, 2012). Finally, further research on the subtypes of engagement should also focus on individualizing interventions based on students' profiles of engagement (Fredricks, Ye, Wang, & Brauer, in press; Wang & Peck, 2013).

<div align="center">Purpose of the Study</div>

The purpose of this study was to identify trajectories of student engagement across middle and high school and analyze how they relate to significant academic outcomes (i.e., high school dropout, on-time high school graduation, postsecondary enrollment, and postsecondary persistence). On-time graduation refers to completing high school within four years. In addition, postsecondary enrollment refers to pursuing any education after high school, including trade schools, two-year programs, and four-year programs immediately after high school. Postsecondary persistence refers to students continuing their education for two consecutive semesters after enrolling. This study expands on the findings of previous variable- and person-centered longitudinal studies of student engagement by utilizing a standardized measure of student engagement designed for longitudinal data and extending engagement trajectories from middle school to postsecondary persistence.

CHAPTER TWO

METHOD

Participants and Procedure

Participants in this study (N = 22,066) were middle and high school students from a large

and diverse school district in the Southeastern U.S. Cohort 1 (n = 10,934 students) began 6th

grade in 2009 and Cohort 2 (n = 11,132) began 6th grade in 2010. Analyses included information

from students through 6th grade to 9th grade. If students graduated from high school on-time and

immediately enrolled in postsecondary education, this would occur in 2016 for Cohort 1 and

2017 for Cohort 2. Descriptive statistics for Cohort 1 and 2 are provided in Table 2.1. Students

who transferred out of the district were removed from the analysis and students who transferred

in were added.

Data were not utilized from 10th through 12th grade due to the higher rates of missingness

for self-report ratings. In addition, studies indicate data from 9th grade can accurately predict 50-

75% of students who will go on to drop out of high school (Everyone Graduates Center, 2010a,

2010b, 2010c). Another common phenomenon, referred to as the "9th grade bulge, 10th grade

dip" (National High School Center, 2007), indicates many students who are retained in 9th grade

drop out by 10th grade. The severity of disengagement and academic problems after 9th grade

also requires more intensive intervention.

Student engagement questionnaires were administered fall and spring each year by school

faculty. In addition to cognitive and affective engagement assessed via self-report, a rich dataset

of demographic variables associated with student outcomes, including behavioral (e.g.,

disciplinary incidents, attendance) and academic (e.g., credits earned) engagement indicators and

extensive student achievement data (e.g., annual performance on standardized achievement tests, high school GPA) were accessed through school records.

<div align="center">Measures</div>

Affective and Cognitive Engagement

The current study utilized the Student Engagement Instrument (SEI; Appleton et al., 2006, 2008), a standardized self-report, paper-and-pencil questionnaire. The SEI was designed for use with middle and high school students. For research purposes, the SEI contains 33-items and measures cognitive and affective student engagement with five factors. Factors within cognitive engagement include Control and Relevance of Schoolwork and Future Aspirations and Goals, and factors within affective engagement include Teacher–Student Relationships, Peer Support for Learning, and Family Support for Learning. Participants responded on a 5-point scale, indicating their level of agreement to items from Strongly Disagree (1) to Strongly Agree (5). Responses were summed for each of the five factors.

Higher scores on the SEI indicate greater student engagement and are associated with better rates of attendance, positive behavior, and academic achievement (Appleton et al., 2006; Lovelace et al., 2014; Reschly, Betts, & Appleton, 2014). Previous research indicates the internal consistency estimates for the SEI are acceptable, ranging between .76 to .88 (Appleton et al., 2006). Studies also demonstrate the construct validity of the SEI across grades and genders, reinforcing the five-factor structure of cognitive and affective engagement for middle and high school students (Betts, Appleton, Reschly, Christenson, & Huebner, 2010; Reschly et al., 2014). Reschly and colleagues (2014) also found the SEI demonstrated adequate construct validity compared to the Motivation Engagement Scale (MES; Martin, 2007), another measure of student

engagement. Furthermore, the SEI demonstrates measurement invariance across grades 6 through 12 and gender (Betts et al., 2010).

The SEI has acceptable longitudinal characteristics and evidence of concurrent and predictive validity. Lovelace (2013) assessed the longitudinal characteristics of the SEI using analyses of mean-level change, which indicated steady decreases in scores over time, similar to other findings that student engagement declines throughout the span of schooling (e.g., NRC, 2004; Appleton & Reschly, 2018). In addition to this normative trajectory of student engagement, analyses of reliable change indicated that non-normative trajectories are also likely to occur (Lovelace, 2013). That is, some students will demonstrate increases or decreases in engagement over time that are atypical. To assess concurrent validity, Lovelace and colleagues (2014) examined the association between SEI scores and Early Warning Indicators such as behavioral disengagement (i.e., students were labelled as behaviorally engaged or disengaged based on attendance and suspensions), disability status (i.e., lower-risk specific learning impairment versus higher-risk emotional-behavioral disorder), and math and reading achievement. For nearly all the relationships examined, lower SEI scores were associated with behavioral disengagement, higher-risk disability status, and lower math and reading achievement, with most effect sizes falling in the educationally significant range (Cohen's $d >$ .25), demonstrating adequate concurrent validity. Lovelace and colleagues (2017) also found lower scores on the SEI adequately identified dropouts and reflected an increase in the odds of dropping out. Studies examining the predictive validity of the SEI have found after controlling for demographic characteristics, self-ratings on the SEI in the 8th (Pearson, 2014) and 9th (Lovelace et al., 2014; Lovelace, et al., 2017) grades consistently predicted dropout and on-time

graduation. The SEI also predicts college attendance and persistence across high school (Fraysier et al., 2018).

<u>Behavioral and Academic Engagement</u>

Both behavioral and academic engagement were assessed via indices developed by school personnel utilizing school records. Behavioral engagement was conceptualized as the combination of students' attendance rates (i.e., days attended divided by days enrolled, multiplied by 100) and students' discipline index (i.e., a locally developed measure that assesses the frequency, average severity, and maximum severity of students' disciplinary incidents; Appleton, King, Reschly, & Long, 2018). Academic engagement was assessed using an index designed for the purposes of this study based on students' within-school-year core GPA adjusted for prior achievement. Academic engagement was represented as students' course performance in core classes (e.g., mathematics, language arts, etc.) within a single year that was not explained by academic achievement. This index was calculated by treating the average z-score on students' prior year standardized test scores as a covariate in our logistic regression analyses (see below).

<u>Engagement Index</u>

These measures of student engagement were combined into a single engagement index to allow for the measurement of change in a single value across time, similar to the Janosz et al. (2008) study previously described. Unlike Janosz and colleagues, we used a combination of self-report and school record data to create this index. To ensure that a variables' inclusion in the index maximized the unique variability each variable explained, we assessed each engagement variables' correlation with the academic outcomes of interest (e.g., high school dropout) and the engagement variables' correlations with one another. We used partial least squares regression analyses to decide which variables to include in our engagement index. The variable needed to

uniquely explain at least 1% of the variance in one of our academic outcomes to be included. The final combination of variables utilized in the engagement index were the Future Goals and Aspirations component of the SEI for cognitive engagement, the Teacher-Student Relationships and Family Support for Learning components of the SEI for affective engagement, attendance and discipline for behavioral engagement, and students' within-school-year core GPA adjusted for prior achievement for academic engagement. The final engagement index was a sum of the recombined components weighted by the percent of unique variation they each explained, scaled from 1 to 5 (with higher values indicating stronger engagement).

Outcome variables

We examined four academic outcomes in our analyses: high school dropout, on-time high school graduation (within four years), immediate postsecondary enrollment (including trade schools, two-year programs, and four-year programs), and postsecondary persistence (two consecutive semesters of attendance). Eleven percent of the total sample dropped out of high school and 81% graduated on-time within four years. In comparison, the four-year graduation rate for the state of Georgia in 2016 was 79.2% and in 2017 was 80.6% (Georgia Department of Education, 2016, 2017). Postsecondary enrollment and persistence through the first year of college was garnered from the National Student Clearinghouse (NSC), a nonprofit organization that collects all students' postsecondary enrollment and degree attainment data for loan purposes. The NSC has data on 96% of students enrolled in postsecondary institutions in the U.S. In our sample, 50% of students immediately enrolled in post-secondary institutions, and 42% persisted into the second year.

<u>Data Analyses</u>

We modeled the trajectories of student engagement using group-based trajectory modeling (Nagin & Odgers, 2010) in R. Group-based trajectory modeling is a variant of growth mixture modeling that is useful for applied purposes, does not assume unknowable things about latent characteristics, and allowed for the placement of students into groups that follow similar trajectories. The large sample size allowed for stable estimates of trajectories and associated academic outcomes. The analysis began with one group, with additional groups added until the model was uninterpretable. Groups had to include at least 2% of the population to be utilized in our model. Changes in the Bayesian Information Criterion model were monitored to determine if adding more groups resulted in better model fit. To balance what groups were worth distinguishing and differences based on our academic outcomes of interest, the decision-making for the model was based on statistically oriented criteria proposed by Nagin (2005). This included ensuring that the proportions of students falling into each group matched the estimated probabilities of group membership, the average posterior probability of group membership fell above the minimum threshold of 0.7, the odds of correct classification were above the minimum threshold of 5, and there were reasonably tight confidence intervals around the trajectory groups.

Demographic information including sex, ethnicity, free or reduced lunch status, ELL status, and students with disabilities (SWD) status and prior achievement (using the average z-score on students' standardized test scores) were treated as covariates in our logistic regression analysis. This procedure allowed for control of important context variables when modeling the effects of group trajectory membership and student outcomes. This process ensured meaningful differences were identified in academic outcomes based on engagement trajectories rather than other student characteristics. As previously described, other studies have documented the

relationship between at-risk demographic factors (e.g., lower SES, racial minorities) and lower levels of engagement (Fan & Williams, 2010; Li & Lerner, 2011).

Small data missingness for variables within-year (less than 12% of SEI data and 5.4% of prior year achievement data) were imputed using bagged tree model imputation through the caret package in R (Kuhn, 2016). "Bagged" refers to bootstrap aggregation, or methods that combine bootstrapping with regression analyses. "Tree" refers to modeling with decision trees. Thus, within bagged tree imputation, missing data values are predicted using a decision tree model. Multiple tree models are run on simulated datasets, which are then averaged into an ensemble model that is used for the final prediction of missing values. As the data allowed students to transfer in or drop out of the school district, some students in the sample were not enrolled at certain time points of the observation window. Between-year missingness decreased from Year 1 to Year 4. Students missing ranged from 3% to 17% of the data throughout the four years and was not imputed because the trajectory modeling analysis could work with missing data.

Table 2.1

Description of participants- sample sizes and percentages

	Sample Size	**Percentage**
Total	22,066	100.0
Female	10,809	49.0
Male	11,257	51.0
Race/Ethnicity		
Asian	2,474	11.2
Black	6,590	30.0
Hispanic	4,952	22.4
Multiracial	797	3.6
Native American	65	0.3
White	7,188	32.6
Other Demographics		
Free/Reduced Price Lunch Eligible	10,941	49.6
English Language Learner	1,939	8.8
Special Education	2,570	11.7
Academic Outcomes		
Dropped Out of High School	2,518	11.4
Graduated High School On-Time	17,939	81.3
Immediate Transition to Postsecondary	11,071	50.2
Persistence for Two Semesters of Postsecondary	9,377	42.5

CHAPTER THREE

RESULTS

Group-Based Trajectory Modeling Analysis

The analysis identified seven distinct trajectories of student engagement: High Stable, Rebounding, Moderate Increasing, Sudden Decline, Moderate Stable, High Declining, and Moderate Declining (see Figure 3.1). Table 3.1 shares the number and percentage of students within each engagement trajectory. Table 3.2 contains information about the percentage of students who dropped out of high school, completed high school on-time, immediately enrolled in postsecondary education, and persisted with two semesters of postsecondary education within each engagement trajectory.

The Moderate Declining group was characterized by initially moderate levels of engagement that steadily decreased from 6th through 9th grade. This group consisted of about 2% of the total sample but accounted for 80% of dropouts and had the worst outcomes for on-time high school graduation and postsecondary attendance and persistence. The High Declining group which started off high in engagement in 6th grade with steady decline throughout middle school into high school also had poor academic outcomes, with about 46% dropping out of high school and 38% graduating on-time. Moderate Stable engagement was characterized by moderate but consistent engagement over time and was associated with fairly even odds of dropping out (40%) or graduating on-time (44%). The Sudden Decline group exhibited high engagement throughout middle school with engagement dropping in 9th grade, likely indicating they struggled with the transition to high school. This group maintained better academic outcomes than the declining and

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moderate groups of engagement, with about 64% of students graduating high school on-time and 25% immediately enrolling in postsecondary education. The Moderate Increasing (with steady improvements in engagement throughout the observation window) and Rebounding (with higher engagement in 6th and 9th grade than 7th and 8th grade) groups also were more likely to have positive academic outcomes. The Moderate Increasing group had 72% of students graduate on-time and 31% immediately enroll in postsecondary school. The Rebounding group had 76% of students graduate on-time and 37% enroll in postsecondary school. Finally, the High Stable engagement group accounted for 70% of the sample and consisted of the lowest dropout rates (4%) and highest on-time graduation (91%), postsecondary attendance (61%), and persistence (53%) rates.

<div align="center">Logistic Regression Analysis</div>

Results from the logistic regression indicated that, when controlling for important student characteristics, the identified engagement trajectories significantly predicted meaningful differences in academic outcomes. The odds ratios for the effect size estimates allowed us to compare the academic outcome rates for each engagement trajectory group to the High Stable majority (i.e., the High Stable engagement group served as the baseline) while holding the covariates (i.e., demographic variables like gender and race) constant. The engagement trajectories were both statistically and practically significant, with meaningful differences in outcomes as suggested by the lack of overlap with the 95% confidence intervals between groups. Effects were stronger for high school dropout and on-time graduation outcomes than college attendance and persistence outcomes, which was likely the result of measuring engagement from 6th to 9th grade rather than throughout high school. That is, the stronger effect was likely related to the recency in which the data were collected relative to the academic outcomes of interest.

Table 3.1

Student engagement trajectories- sample sizes and percentages

Engagement Trajectory Group		Sample Size	**Percentage**
1	Moderate Declining	478	2.2
2	High Declining	857	3.9
3	Moderate Stable	797	3.6
4	Sudden Decline	2,038	9.2
5	Moderate Increasing	843	3.8
6	Rebounding	1,404	6.4
7	High Stable	15,658	71.0

Table 3.2

Student engagement trajectories- associated academic outcome percentages

| Engagement Trajectory Group		Dropped Out of High School	Graduated High School On-Time	Immediate Transition to Postsecondary	Persistence for Two Semesters of Postsecondary
1	Moderate Declining	80.1	9.2	2.7	1.9
2	High Declining	47.5	37.5	9.5	5.8
3	Moderate Stable	39.9	44.3	13.6	9.3
4	Sudden Decline	22.5	64.6	25.3	18.2
5	Moderate Increasing	16.1	71.6	30.7	23.1
6	Rebounding	13.2	76.3	36.5	27.8
7	High Stable	4.0	90.9	61.2	52.9
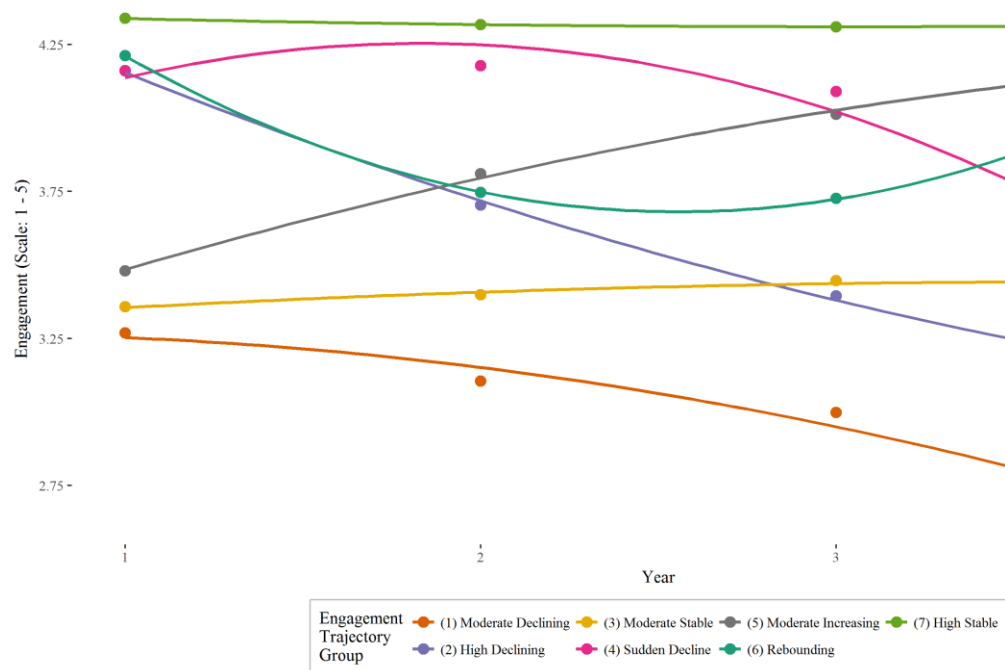
Figure 3.1. Student engagement trajectories from sixth (Year 1) through ninth (Year 4) grade

CHAPTER FOUR

DISCUSSION

Student engagement is a significant area of interest for educational psychology researchers and practitioners. Studies of student engagement have revealed its positive relationships with academic achievement (Christenson et al., 2012; Finn, 2006), psychosocial development (Eccles & Wang, 2012; Skinner & Pitzer, 2012), and resilience (Finn & Zimmer, 2012; NRC, 2004). Not only is student engagement directly related to success in school, it is a functional risk factor that is amenable to intervention (Christenson, 2008; Reschly & Christenson, 2006, 2012), unlike many other demographic risk-factors associated with poor academic outcomes.

One important aspect of student engagement in need of further study is the developmental processes of engagement across schooling; previous research has identified developmental pathways from early childhood to academic outcomes (Evans & DiBenedetto, 1990; Garnier, Stein, & Jacobs, 1997). Within a general trend of decline of engagement over time (Appleton & Reschly, 2018; NRC, 2004), longitudinal studies of student engagement have found varied trajectories spanning across elementary (Archambault & Dupéré, 2017), middle (Li & Lerner, 2011), and high school (Janosz et al., 2008; Wylie & Hodgen, 2012). The purpose of this study was to identify trajectories of student engagement across middle and high school and analyze their relationship with high school dropout, on-time graduation, and postsecondary enrollment and persistence using growth mixture modeling.

Although the majority of students in this study belonged to a high and stable engagement trajectory, the rest of the students fit better within variable and low trajectories of engagement.

These findings suggest there are interpretable subtypes of engagement trajectories that tell a meaningful story about how engagement changed in different ways for students throughout 6th to 9th grade. These trends were associated with high school dropout, on-time graduation, immediate postsecondary enrollment, and postsecondary persistence for two semesters in expected ways; higher and more stable engagement trajectories were associated with better academic outcomes while lower and variable engagement levels were associated with poorer outcomes. Students within the lowest trajectory of engagement demonstrated the worst academic outcomes.

Results from this study fit with other longitudinal studies of student engagement which have identified multiple trajectories and profiles of student engagement. Furthermore, we consistently find that most students follow relatively high and stable trajectories, and that some students begin at similar points of engagement but experience notable variation in pathways (Janosz et al., 2008; Archambault & Dupéré, 2017). These variations are associated with differences in academic outcome probabilities. Like previous studies, students with higher and more stable engagement levels were more likely to graduate from high school on-time (Janosz et al., 2008; Wylie & Hodgen, 2012) and pursue postsecondary education (Lawson & Masyn, 2015) in our study.

Janosz and colleagues' (2008) study was the most similar to the current study, both in terms of statistical method used to identify trajectories (i.e., growth mixture modeling) and age range. Compared to their study, engagement trajectories in this study were more stable and gradual, although Janosz et al. used a similar approach of calculating a single index of engagement to measure over time. These differences in our trajectories may be due to Janosz et al. only using survey data while we utilized both self-report and school data in our engagement indices, or decision-making differences across studies. For example, group trajectories in this

study had a threshold of a minimum of 2% of the population, while Janosz and colleagues did

not have a similar criteria for their trajectories.

<center>Implications</center>

This study used a large, diverse sample to further our theoretical understanding of student

engagement trajectories, extending from middle school to postsecondary outcomes. More

specifically, this study is the first to not only consider postsecondary enrollment but also

persistence for two semesters. As previously stated, the percentage of jobs requiring

postsecondary education is increasing (Carnevale et al., 2013; Kuczera & Field, 2014).

Unfortunately, many students who enroll in postsecondary education drop out; within this study,

50.2% of the sample immediately enrolled in postsecondary education, but 42.5% persisted

through the first two semesters. Moreover, the 6-year graduation rate of students seeking a

bachelor's degree at a 4-year institution is about 60% (U.S. Department of Education, 2017).

These findings also suggest implications for intervention identification and screening

purposes. Early Warnings Systems (EWS) are used by schools to identify students at-risk of

negative academic outcomes (e.g., dropout). Reliable, evidence-based variables used in these

systems have demonstrated their predictive power in previous studies, including attendance,

behavior, and course performance (Balfanz et al., 2007), leading to the increasing

implementation of EWS in school districts across the U.S. (Balfanz & Byrnes, in press).

Including measures of student engagement within an EWS might improve screening of students

at-risk of negative achievement outcomes. Implementing targeted interventions to students

identified with low levels of engagement in 6th grade might change their trajectory and promote

academic success over time. Within an EWS, screening for at-risk engagement levels should be

assessed at multiple time points as results from this study indicate students with high engagement

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at one grade level might experience decreases in engagement by the next. Measuring engagement each year throughout schooling would help schools identify these patterns of engagement over time to provide intervention when indicated by students' self-report of poor engagement.

Although it is difficult for teachers to differentiate instruction for every individual student, identifying larger groups of students in need of intervention based on engagement profiles could facilitate this process. Person-centered approaches, in particular, hold implications for identifying which interventions might be most effective given a student's profile of engagement based behavioral, cognitive, and emotional indicators. Fredricks and colleagues (in press), for example, discussed three common profiles of student engagement identified in studies using person-centered analyses: emotional disengagement, behavioral disengagement, and emotional and cognitive disengagement. A student with an emotional disengagement profile may be more likely to benefit from addressing issues related to school climate, peer relationships, and mental health, whereas a student with a behavioral disengagement profile might benefit from behavioral supports and classroom management strategies (Fredricks et al., in press).

<u>Limitations and Future Directions</u>

Some limitations to this study warrant consideration. First, this study's engagement trajectories included information from when students were in 6th through 9th grade based on the limited self-report data available after 10th grade. Such data would provide even further insight into developmental trajectories of engagement throughout high school. This study also examined the meta-construct of engagement and combined measures of subtypes of engagement into one index. Other research has supported the finding that engagement subtypes appear to be connected for most students, but some students experience varied levels of engagement depending on the subtype examined (Li & Lerner, 2011; Wang & Peck, 2013). Furthermore, this study controlled

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for demographic characteristics such as race and gender as covariates within the analyses. Examining the group characteristics of these trajectories might be of theoretical interest in another study. This study also did not consider students who pursued alternatives to high school diplomas (e.g., General Education Development [GED] certificates) or students who delayed attending postsecondary schooling.

This study also identifies multiple areas in need of future research. Although we extended our trajectories of student engagement from middle school to postsecondary outcomes, it would be beneficial to extend longitudinal studies from elementary to postsecondary school. Most studies focus on a few grade levels within middle and/or high school. Examining trajectories from elementary to postsecondary school would improve our theoretical understanding of engagement, development, and the effects of transitions on engagement (Janosz, 2012). Such research would also facilitate early identification and intervention based on engagement profiles. Additionally, although we examined postsecondary enrollment and persistence, further longitudinal studies could benefit from extending their engagement trajectories to successful postsecondary completion or dropout.

Another key area that warrants further study is examining engagement and disaffection, as research suggests these may be separate constructs rather than high and low ends along a single continuum (Reschly & Christenson, 2012; see theories by Skinner et al., 2008, 2009). This study only examined the engagement piece; other person-centric studies have examined aspects of disaffection (such as burnout in Salmela-Aro et al., 2016 or dis-identification in Lawson & Masyn, 2015), but disaffection and engagement have not been examined together with growth mixture modeling longitudinal studies. Examining both engagement and disaffection would

reveal if there are normative and atypical trajectories of disaffection similar to engagement, and if trajectories of engagement and disaffection tend to correlate in expected ways.

Finally, further examination of profiles of student engagement can increase the ability to provide targeted interventions to at-risk students (Fredricks et al., in press; Wang & Peck, 2013). Within engagement trajectories, there may be important differences with group characteristics which could be further examined through person-centered approaches. Experimental research examining the effects of engagement interventions tailored to students' profiles of student engagement would provide beneficial information for school intervention and policy. Furthermore, qualitative analyses may provide interesting insights into the characteristics of individuals within engagement trajectories to identify why and when engagement changes for these students. Insight into these changes might also help us understand nonnormative engagement pathways and why, for example, some students within the high and stable engagement still dropout of high school and students with low and variable engagement successfully enroll and persist in postsecondary school.

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