STUDENT ENGAGEMENT AND DISAFFECTION: PREDICTING MIDDLE SCHOOL EARLY WARNING INDICATORS

by

CHRISTOPHER ANTHONY PINZONE

(Under the Direction of Amy L. Reschly)

ABSTRACT

The present study was designed to determine whether elementary students' ratings of student engagement and disaffection in fourth and fifth grade using a person-centered approach was predictive of their likelihood to have one or more school dropout indicators (i.e., significant attendance issues, discipline offenses, or course failure of Language Arts or Mathematics) by middle school (grade 6). Student self-report Likert-type ratings were collected from 6,164 students over 4 time points. Following exploratory latent class analysis recommendations and model building, a six-class model was interpreted for each time point. Significant associations with class membership for academic course failure were found. However, different classes were determined across grade levels, changes in class membership, and many significant residual covariances were observed that suggest there may be developmental differences across timepoints or from one school year to the next. Limitations and future directions are described.

INDEX WORDS: student engagement, disaffection, early warning systems, latent class analysis, school completion, academic achievement

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DEDICATION

For my mother, who would have been proud of my direction and accomplishments in life thus far.

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CHAPTER 1

INTRODUCTION

Linking Engagement, Well-being, and Outcomes Across the Lifespan

Economists, social scientists, and public health workers and organizations across the world have looked toward well-being as a worthwhile stand-alone outcome of interest which may be most usefully related to an individual's proximal outcomes (e.g., employment, physical and mental health, family status, criminality) not only at adulthood, but across the life-span (Diener, 2000; Huebner et al., 2004; Layard, Clark, Cornaglia, Powdthavee, & Vernoit, 2014; World Health Organization, 2014). According to data from the longest longitudinal cohort study ever conducted, the British Cohort Study (1970), these economic, social, and personal proximal outcomes in adulthood are most powerfully predicted by the adult's current emotional well-being, their childhood emotional well-being, and their level of childhood pro-social behavior (Layard et al., 2014). Concurrently, medical health development research has acknowledged that biological factors relationally interact with social, psychological, and environmental factors in determining short- and long-term health outcomes (Garner et al., 2012; Halfon, Larson, & Slusser, 2013). Within economics research, parent-child, mentor-child, and parent-teacher-child relationships are treated as interactive systems which determine child learning and outcomes (Heckman & Mosso, 2014). Therefore, it is not only the early childhood context which matters significantly in determining outcomes, but on-going interactions from physical, social, emotional well-being across contexts within the life course.

One major context in which families, communities, and policy-makers can work together to provide opportunities which maximize the social and emotional skills for children is the public school setting. Consistent with the findings inferred from Layard et al. (2014), intervention research conducted in schools demonstrates that behavioral and non-cognitive (i.e., non-IQ and non-academic achievement) skill development (e.g., cognitive-behavioral therapy, individualized academic interventions, comprehensive early education programs) produce lasting outcomes and high return on investment for disadvantaged youth when compared to interventions designed only to target cognitive abilities or only to target academic abilities (Cook et al., 2014; Heckman & Kautz, 2013). Of the interventions investigated, those which were designed to target early to late childhood have stronger research results than adolescent programs. Some of the difficulties identified in conducting research with adolescents include fewer long-term evaluations, shorter follow-ups, and difficulty of implementation (Heckman & Kautz, 2013). Additional issues to consider regarding adolescent intervention implementation is the widening achievement gap trajectory, transitions to different school contexts (e.g., moving from elementary to middle school), developmental changes across school contexts (e.g., developing from childhood to adolescence to adulthood), and the lack of comparable measures across these transitions and developmental periods. These achievement gap trajectories can be observed through differences in school completion, post-secondary enrollment, and inequality across ethnicity and socioeconomic status, with non-White children disproportionately living in poverty and attending schools with the highest dropout rates (Alliance for Excellent Education, 2013; Kena et al., 2014).

Achievement score gaps between Black and White students by age 13, as measured by the National Assessment of Educational Progress (NAEP), are 0.62 standard deviations (SD) in reading and 0.80 SD in math. These differences arise by the time students are transitioning to high school, highlighting the need to intervene before trajectories widen. Achievement score gaps are even more pronounced when analyzing scores across stratifications of income inequality, suggesting systemic, environmental, and opportunistic factors may explain much of the variance in scores (Cook et al., 2014; Reardon, 2011). These students, whom we conceptualize as being on a trajectory where they are falling further and further behind in school, not only fall behind academically but also in the development of non-academic social and emotional skills which are our strongest predictors of deleterious outcomes (e.g., criminality, unemployment, health problems; Christenson et al., 2001; Cook et al., 2014; Rauscher, 2010; Wirt, 2004).

Although it can be argued that achievement gaps become too wide by adolescence and that the research is strongest for early childhood, an alternative explanation is that schools are increasingly expected to focus on delivering high-quality academic instruction during adolescence rather than continuing to build non-academic skills beyond childhood. Furthermore, recent meta-analyses exploring the connection between teacher-student relationships, student engagement, and academic outcomes have found that positive teacher-student relationships have a stronger and more direct effect on academic outcomes in adolescence (Roorda, Jak, Zee, Oort, & Koomen, 2017; Roorda, Koomen, Spilt, & Oort, 2011). Consistent with this perspective, the strongest intervention effects are found for those programs which combine academic and non-academic interventions, especially when those interventions are implemented across contexts (Christenson & Reschly, 2010; Cook et al., 2014). With the proper measurement tools, there is an opportunity for longitudinal research to be conducted from early childhood through adolescence, combining academic and non-academic indicators, to determine a route of intervention for these widening student achievement gaps.

Recent shifts in focus toward early intervention, systems, and measures intended for prevention rather than remediation of difficulties, and the increasing role of family and community in education, are consistent with a life-course perspective. Studies of the relationship of early intervention and differences in long-term outcomes such as increased high school completion, lower rates of violence and arrests, and increased number of completed years of education have been well documented (Reynolds, Temple, Robertson, & Mann, 2001; Schweinhart, Barnes, Weikart, Barnett, & Epstein, 1993; Temple, Reynolds, & Miedel, 2000). However, not all programs designed to promote school completion demonstrate positive evidence for staying in, progressing through, and completing school (see Table 1.1). They are often comprised of different targets for intervention, with little to no identification of which components are believed to mediate intervention effects (Kennelly & Monrad, 2007; Reschly, 2019). Therefore, there is a need to understand the characteristics of, and relationships between, the theoretical constructs and intervention methods which lead to positive change for our outcomes of interest and substantial benefit from the alignment of philosophy, theory, and program design to improve student outcomes (Lerner et al., 2014).

Similar to Csikszentmihalyi and Seligman’s (2000) call for positive psychology to compliment the historical emphasis of psychopathology in mental health systems, educational legislation such as No Child Left Behind (NCLB, 2001), the Education Sciences Reform Act (ESRA, 2002), and the reauthorization of the Individuals With Disabilities Education Act (IDEA, 2004) has shifted the focus from problem remediation to problem prevention through indirect service delivery models such as response-to-intervention (Lemons, Fuchs, Gilbert, &

Fuchs, 2014; Harlacher & Siler, 2011). Furthermore, many school districts across the country are developing early warning systems which address data and indicators associated with dropping out of school such as poor attendance, failing grades, and unsatisfactory behavioral occurrences (Department of Education, 2016; Heppen & Therriault, 2008; Neild, Balfanz, & Herzog, 2007). Best practices suggested for developing early warning systems extend far beyond academic indicators, identifying factors such as transitional periods, school climate, socioeconomic factors that disperse expert teachers, integration with students' families, and individualized social services, among others (Kennelly & Monrad, 2007). This furthers the argument that students are individuals who are influenced by a range of contexts and factors, each of which relationally interact when determining not only their educational outcomes, but future health, economic, and social outcomes as well.

There is considerable overlap between student engagement and perceived quality of life indicators when considering their goals and scope within an educational context. Perceived quality of life (QoL) indicators, which can include internal factors such as subjective well-being (SWB), hold promise for prevention, direct service, and consultation services through a positive developmental framework (Huebner, 2004). Along with relatively external indicators, such as longitudinal mathematics achievement, longitudinal measures of student engagement have emerged as being the most sensitive and specific internal predictor of whether a student will stay in school (Bowers, Sprott, & Taff, 2013; Reschly & Christenson, 2012). Beyond school dropout and completion, student engagement indicators can work relationally with QoL indicators to help inform prevention and intervention services and may function reciprocally to provide positive outcomes of interest to educators and families alike (Lewis et al., 2011). More research is needed to understand the reciprocal relationship between SWB and student engagement in age groups prior to and beyond adolescence on student outcomes (Heffner & Antaramian, 2015). Family QoL indicators can help determine what level of home and community assistance the school may be able to provide, especially considering those families who have children with developmental disabilities (Brown, MacAdam-Crisp, Wang, & Iarocci, 2006). Together, perceived QoL and student engagement can function to create a more comprehensive picture of student, family, school, and community needs, provide information and targets for research-based intervention, and develop a positive focus on human development throughout the life course.

The following chapters of this dissertation will summarize the epistemological, ontological, theoretical, and practical lines of research which have informed the construction of research questions through the research review in Chapter 2. Chapter 3 will present the measures selected and collected, the methods by which their data are to be analyzed, and hypotheses generated according to the logic from the research review. The results of the study will be presented and interpreted in Chapter 4. To conclude, Chapter 5 will highlight limitations, pathways and opportunities for future research, and the potential implications of the findings when considering the information synthesized from the previous chapters.

Table 1.1. WWC Ratings of Dropout Prevention Programs. Reschly (2019), *Dropout prevention and student engagement*, in A. Reschly, S.L. Christenson, and A. Pohl (Eds.). Evidence-based Practical Student Engagement Interventions: Promoting Students' Academic, Behavioral, Cognitive, and Affective Engagement at School. Manuscript in preparation. Springer.

Name	**Program Effectiveness**		
	Staying in School	**Progressing in School**	**Completing School**
Accelerated Middle Schools	Potentially Positive	Positive Effects	- Or no discernable effects
ACT Aspire	N/A	N/A	N/A
ALAS: Achievement for Latinos Through Academic Success	Potentially Positive	Potentially Positive	--

Belief Academy	N/A	N/A	N/A
Career Academies	No Discernible Effects	No Discernible effects	Potentially Positive Effects
Check & Connect	Positive Effects	Potentially Positive Effects	No discernible effects
Coca-Cola Valued Youth Program	N/A	N/A	N/A
Credit Recovery Programs	N/A	N/A	N/A
Communities in Schools			
Dual Enrollment Programs	Potentially Positive		Positive Effects
Financial Incentives for Teen Parents to Stay in School	Potentially Positive	No Discernible Effects	No Discernible Effects
First Things First	No Discernible Effects	--	--
Green Dot Public Schools		Potentially Positive	
High School Puente Program	N/A	N/A	N/A
High School Redirection	Mixed Effects	Potentially Positive	No Discernible Effects
I Have a Dream	N/A	N/A	N/A
Job Corps	--	No Discernible effects	Potentially positive effects
JOBSTART	--	--	Potentially Positive Effects
Middle College High School	No Discernible Effects	--	No Discernible Effects
National Guard Youth Challenge Corps	--	--	Potentially Positive Effects
New Century High Schools	N/A	N/A	N/A
New Chance	--	--	Potentially Positive Effects
Project COFFEE	N/A	N/A	N/A
Project GRAD		No Discernible Effects	No Discernible Effects
Quantum Opportunity Program		No Discernible Effects	No Discernible Effects
Summer Training and Education Program (STEP)	No Discernible Effects	No Discernible Effects	
Talent Development High Schools	--	Potentially Positive Effects	--
Talent Development Middle Grades Program	N/A	N/A	N/A
Talent Search	--	--	Potentially Positive

Twelve Together	Potentially Positive	No Discernible effects	--
Wyman Teen Outreach Program	N/A	N/A	N/A
Youth Corps			
YouthBuild	N/A	N/A	N/A

CHAPTER 2

LITERATURE REVIEW

Relational-Developmental-Systems Meta-Theory

The latest trends of developmental science recognize that individuals cannot be separated from their context but are instead comprised of mutually influential relationships between individuals and their context (Overton & Lerner, 2014). According to the Relational-Developmental-Systems (RDS) metamodel, fostering positive child development in an educational system requires an understanding not only of the child but of the multiple systems in which children are spending their time (i.e., with family, in school, with friends, and in communities) and cannot be fully understood when separated (Gestsdottir & Lerner, 2008; Lerner & Overton, 2008). The RDS metamodel is comprised of the ideas proposed by many prominent developmental scholars including the importance of a relational, organism-context unit of analysis (e.g., individual ←→context relations), adaptive developmental regulations (e.g., the engagement of mutually beneficial processes for a family, a school, or a community), and temporality as a means for understanding plasticity in development (Elder, 1980, 1998; Lerner & Overton, 2008; Overton & Ennis, 2006). Therefore, rather than focusing on controlling and manipulating phenomena, developmental science encourages researchers to describe, explain, and optimize change across the lifespan (Baltes, 1987; Baltes, Lindenburger, & Staudinger, 2006; Lerner, Johnson, & Buckingham, 2015; Lerner & Overton; 2008).

The RDS metamodel is defined as a midrange meta-theory under the broader worldview of Relationism. This worldview counters the Cartesian-Split-Mechanistic worldview that contains many mid-range meta-theories of its own, many of which have dominated the scientific landscape over the last century (Overton, 2013). The assumptions which underlie the Cartesian-Split-Mechanistic worldview consist of a fixed, stable, and unchanging reality that preserves itself no matter the context (Overton, 2013). Modern behavioral genetic and epigenetic research demonstrates that genes and environments often do not behave due to additive or causal mechanisms, as population genetics (i.e., reductionist or split-mechanist models) suggest, but rather as a dynamic network of relationships that respond to internal (e.g., as a part of gene networks) and external (e.g., environmental epigenetic processes such as methylation or copy number variants) factors relationally (Charney, 2012). The positive effects of Relationism as a worldview is its ability to move beyond the dualistic framing of problems (e.g., gene vs. environment, nature vs. nurture, culture vs. person) to instead provide inclusive concepts which reflect and prioritize change (Overton, 2013).

The implications of the RDS paradigm extend far beyond a single discipline or field, but rather provide important information for problem-solving and problem-framing within scientific disciplines. As described by Garner et al., (2012, p. 225), “developmental, behavioral, educational, and family problems in childhood can have both lifelong and intergenerational effects.” According to contemporary RDS scholars, their ideas should encourage and generate developmental research which leads to evidence-based practices and policies designed to promote human development (Lerner et al., 2015). Empirical studies which apply the RDS metamodel to the integration of ecological assets (e.g., leadership opportunities, adult-youth relationships) of youth programs with the internal strengths of adolescents in those programs (e.g., student engagement, positive future expectations) are shown to foster positive youth development, reinforcing the argument of the need to align theoretical models with program design (Eccles & Gootman, 2002; Lerner et al., 2014).

The Dual-Factor Model of Mental Health

The dual-factor model of mental health, an alternative to the problem- or pathology-focused model, does not poise positive subjective well-being (SWB) and psychopathology (PTH) as extremes of a single continuum (Antaramian, Huebner, Hills, & Valois, 2010). Instead, this model conceptualizes distress and well-being factors as distinct but relationally integrated, rather than dichotomous (Greenspoon & Saklofske, 2001; Suldo & Shaffer, 2008). The model proposed by Greenspoon and Saklofske (2001) sorted elementary school students into four groups: positive mental health (high SWB, low PTH), vulnerable (low SWB, low PTH), symptomatic but content (high SWB, high PTH) and troubled (low SWB, high PTH). While being an important step toward holism and away from a split-mechanistic perspective, there are few studies which empirically test a dual-factor model and, among school-aged individuals, they have been primarily studied in adolescence (Antaramian et al., 2010; Suldo & Shaffer, 2008; Suldo, Thalji-Raitano, Kiefer, & Ferron, 2016; Wilkinson & Walford, 1998). Evidence for the dual-factor model has been most recently extended into middle adolescence, providing support for the model across all school-aged populations (Suldo et al., 2016). Additionally, the relationship between PTH and SWB has been explored in dual-factor model studies; however, there is a relative paucity of studies which empirically explore whether SWB uniquely predicts outcomes over other malleable positive psychological indicators (e.g., student engagement, positive coping) or if there is incremental predictive utility for collecting additional or alternative indicators with elementary-aged students over commonly used data such as attendance, discipline referrals, and achievement scores.

Methods and Measurement in Dual Factor Model Studies

Despite a limited number of empirical studies, the dual-factor model of mental health has undergone factor analytic procedures and relationships have been explored between different combinations of levels of SWB and psychopathology with other predictors of interest. Using the Multidimensional Students' Life Satisfaction Scale (MSLSS; Huebner, 1994) and the Behavior Assessment Scale for Children Self-Report and Teacher-Report scales (BASC; Reynolds & Kamphaus, 1992), Greenspoon and Saklofske (2001) created four groups from 407 children in grades 3-6 attending schools in western Canada. These groups were based on a matrix of high or low scores on SWB measures and high or low scores on psychopathology measures (see Figure 2.1). When analyzing group differences across related measures (i.e., interpersonal relationships, self-concept, locus of control), significant differences were found across the four groups with regard to these predictor variables. Children with high SWB had more positive scores on internal measures of self-appraisal whether they had high levels of psychopathology or not. Without explicitly testing a dual-factor model of mental health, these group differences would not have reached significance despite being theoretically related to both well-being and psychopathology (Antaramian et al., 2010; Greenspoon & Saklofske, 2001).

Expanding the preliminary work on the dual-factor model, Suldo and Shaffer (2008) applied the model to middle school students in the southeastern United States between 10 and 16 years of age. In this study, SWB measures consisted of life satisfaction using the Students' Life Satisfaction Scale (SLSS; Huebner, 1991), positive and negative affect as measured by the Positive and Negative Affect Schedule for Children (PANAS-C; Laurent et al., 1999), and measures of psychopathology using the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). It is important to note that groups 1-4 follow a different labeling scheme than in the previous dual-factor model study (see Figure 2.2). Students with high psychopathology and low SWB, which comprised 17% of the sample, had significantly worse outcomes with regard to educational functioning, social adjustment, and physical health than the other three groups (Antaramian et al., 2010; Suldo & Shaffer, 2008). Furthermore, in the absence of psychopathology (i.e., Group 1 and Group 2), high levels of SWB predicted fewer absences and higher reading achievement, motivation, and self-perceptions (Suldo & Shaffer, 2008). The results from this dual-factor model study suggest that there are a considerable number of students with low positive psychological ratings and low psychopathological ratings (i.e., Group 2, 13%) who are not typically identified under the traditional psychopathological model but may benefit from intervention services.

The study conducted by Antaramian et al. (2010) was the first to explore the dual-factor model of mental health with additional measures of student engagement. For their study, student engagement followed the widely accepted multi-dimensional model consisting of behavioral, cognitive, and affective engagement (Fredricks, Blumenfeld, & Paris, 2004). Their study sample consisted of archival data collected from 764 7^{th} and 8^{th} grade students. SWB measures consisted of life satisfaction ratings measured using the SLSS and positive and negative affect ratings from the PANAS-C. Psychopathology was measured using the Self-Report Coping Scale (SRCS; Causey & Dubow, 1992). Student engagement measures consisted of the Behavioral Engagement subscale of the School Engagement Scale (SES; Fredricks et al., 2005) for behavioral engagement, the School Satisfaction subscale of the MSLSS for emotional engagement (Huebner, 1994), and the Future Goals and Aspirations subscale of the Student Engagement Instrument (SEI; Appleton, Christenson, Kim, & Reschly, 2006) for cognitive engagement. Three additional subscales from the SEI, Family Support for Learning, Teacher-

Student Relationships, and Peer Support for Learning were also administered as measures of environmental context.

The four groups described in this study followed the same labeling heuristic as organized by Suldo and Shaffer (2008; see Figure 2.2). Similar to Suldo and Shaffer's (2008) study, the largest group were those students who are considered to be experiencing positive well-being and low levels of psychopathology. Again, there were a considerable number of vulnerable students (i.e., low SWB and low PTH) which may not be captured under the traditional psychopathological model for detecting at-risk students. Effect sizes for the differences in level of student engagement across behavioral, emotional, and cognitive engagement measures between the positive mental health (i.e., high SWB and low PTH) and vulnerable groups were between .08 and 1.2, indicating large effects for mental health status and levels of student engagement. The symptomatic but content group (i.e., high SWB and high PTH) also reported higher levels of student engagement than the troubled adolescent group (i.e., low SWB and high PTH) with effect sizes ranging from .45 to .71 (Antaramian et al., 2010). Groups with high SWB (i.e., Group 1 and Group 3) reported higher mean scores on the Teacher-Student Relationship, Peer Support for Learning, and Family Support for Learning subscales of the SEI, with the authors of the study suggesting further research to be done into the causal relationships between the environmental support captured by the SEI and academic grades (Antaramian et al., 2010).

In addition to divergent validity concerns being addressed across the various dual-factor model studies, and that different measures have been used to represent the same construct, different methods of statistical analysis have been explored as well (Antaramian et al., 2010; Greenspoon & Saklofske, 2001; Lyons, Huebner, Hills, & Shinkareva, 2012; Suldo & Shaffer, 2008; Wilkinson & Walford; 1998). Beginning with Wilkinson and Walford (1998), findings which were established in the adult research literature of well-being and distress comprising two separable factors were explored using factor analysis in an adolescent population. Greenspoon and Saklofske (2001) explored this finding with elementary-aged students, testing an exploratory model of the dual-factor model hypothesis consisting of four separable groups using discriminant function analyses (DFAs). With the most recent studies reviewed, research questions were explored using multivariate analysis of covariance (Antaramian et al., 2010; Suldo & Shaffer, 2008). A study intending to explore the validity of group and predictor discrimination showed using multinomial logistic regression analysis that all four groups could be sorted above chance levels (Lyons et al., 2012). Furthermore, vulnerable and troubled groups can be significantly distinguished by differences in levels of parent social support, a relatively malleable indicator for potential intervention compared to indicators such as personality or experiencing stressful life events (Lyons et al., 2012). These different approaches further demonstrate the utility and appropriateness of a dual-factor model conceptualization for mental health.

Differentiation of Mental Health Groups

Three strategies have emerged for determining the four group categories for the dual-factor model. In Greenspoon & Saklofske's (2001) analysis of the four mental health groups, DFAs were performed using median, t-score, and percentile splits. Additionally, multiple sub-scales of the SWB and PTH and the self- and teacher-reports of the BASC were explored. Using the stepwise entry method and independent samples t-tests, predictor variables were entered to determine their discriminative power under two different group models to identify the two non-unidimensional groups (i.e., Group 3 and Group 4). When discriminating between groups 1, 2, and 3, measures predicted 47.5% above chance, the vulnerable group often missed in other mental health model conceptualizations. Different characteristics separated the vulnerable group and the systematic but content group. The vulnerable group was most like the positive mental health group on emotionality and interpersonal relations, but these indicators were the only differences between the positive mental health group and the symptomatic but content group.

For the studies conducted by Suldo and Shaffer (2008) and Suldo et al. (2016), the four groups were sorted using percentile rank cutoffs after standardizing and summing scores for life satisfaction and positive affect, then subtracting standardized negative affect scores. As composites of SWB have no published norms in the current literature, decision points were constructed based on the proportion of students that were sorted between high and low psychopathology, a raw composite score corresponding to the 30^{th} percentile. Analyses were extended beyond purely categorizing into four mental health groups, as two-tailed probabilities and Z-ratios were calculated to test the demographic representation of each group in relation to the total sample. Across groups, samples closely represented the makeup of the total sample except for the positive mental health group who had a higher number of students who were high SES or those students with married parents.

For the Antaramian et al. (2010) and Lyons et al. (2012) studies, groups were sorted as being high on SWB with T-scores over 40 and high on PTH with T-scores over 60 (i.e., corresponding to one standard deviation below, or one standard deviation above as dichotomous cutoff score). The Lyons et al. (2012) study used multinomial logistic regression under maximum likelihood estimation to test the odds ratios of predictors which explained group membership under the sorting criteria used by Antaramian et al. (2010). This study also tested the classification accuracy of the groups using leave-one-out cross-validation, a technique which obtains predicted probabilities from the omitted (N-1) observation. Then, each observation's predicted group was compared to its observed group with significance tested against a bootstrapped dataset. Under this dataset and using these procedures, the model operated 30.2% above chance at group prediction (*p*<.05). Importantly, consistent with exploratory studies, the factors which differentiate the vulnerable and symptomatic but content groups differ, holding promise to better target intervention services (Greenspoon & Saklofske, 2001; Lyons et al., 2012).

The dual-factor model, despite varied measurement, samples, and methods of group identification, has provided valuable evidence for the usefulness of conceptualizing SWB and PTH as two separate continua. The four groups replicated across studies, identified a subset of students which would not have been identified but may benefit from intervention, and identified performances on measures that meaningfully differentiate groups which can assist in intervention planning. It will be important to determine further how such information can be used to prevent, predict, and intervene with student difficulties. It is likely that measures other than SWB and PTH may already be collected by schools as a part of their routine collection or there may be information already collected closely tied to student functioning within the school environment. One challenge in using additional or alternative data that may be scaled or scored differently than measures used for the dual-factor model will be identifying a measurement model that can combine heterogenous scales, response types, and response patterns.

Person-Centered Approaches

There are alternative approaches to the methods applied to differentiate mental health groups according to the studies reviewed for the dual-factor model. Categorization of individuals by their patterns of responding, also called person-centered approaches, are an alternative to variable centered models (e.g., factor analysis, cut score applications, etc.) which assume that groups respond identically to set of variables (Masyn, 2013). In person-centered approaches, rather than estimating the effects of the variables, the individuals are viewed as the unit of analysis (Bauer & Shanahan, 2007). Compared to general and generalized linear models, these approaches measure nonlinear interactions that are thought to be closer representations to theoretical developmental systems (Bauer & Shanahan, 2007). The downfalls for using these approaches, particularly for longitudinal data, is that model building and interpretation is often confusing and subjective (Ryoo, Wang, Swearer, Hull, & Shi, 2018).

The differences between person-centered and variable-centered approaches do not mean they are mutually exclusive. Instead, relevant and valuable information can be obtained by combining these approaches or by using different approaches depending on the research questions posed (Howard & Hoffman, 2017). Person-centered approaches give up some of the simplicity and parsimony of the parameters generated by variable-centered approaches in favor of increased specificity about respondents within the model (Howard & Hoffman, 2017).

Latent Class Analysis

Latent class analysis (LCA) is a person-centered, finite mixture modeling approach that describes heterogeneity, or differences, through the response patterns from individuals for a set of items (Masyn, 2013). LCA attempts to divide observations so the groups comprise individuals unrelated or uncorrelated with one another in their responding to produce a discrete latent variable from the data rather than from being fit to a parametric form (Oberski, 2016). Rather than providing information about the real, or actual, representations of individuals in the population, LCA should instead be considered a useful way to represent differences across dimensions that are included in the model (Lanza & Rhoades, 2013). There are several reasons why a researcher may select a mixture modeling approach like LCA. Mixture models may be used if it is suspected that a model might function differently for different people, if you want to reduce a larger set of variables down to smaller groups, or if you want to model nonlinear effects (e.g., extreme responders) that would not be able to be modeled using factor analytic or other linear approaches (Oberski, 2016). LCA can be useful for intervention research where interventions or treatments are individualized (e.g., individualized MTSS or special education interventions within school settings) and may demonstrate moderating relationships for treatment effects without the higher likelihood of Type I error rates found in the studies that employ traditional moderator methodologies (Lanza & Rhoades, 2013).

Student Engagement, Disaffection, and Person-centered or Hybrid Analyses

A study performed by Lawson and Masyn (2015) used LCA to determine student engagement dispositions among a nationally representative population of high school students. In this study, six distinct engagement dispositions arose from indicators of school and academic investment, disidentification, and future beliefs among others. The six dispositions found in this study were an Academic Initiative profile, an Academic Investment profile, a Low Effort/Efficacy profile, a Boredom profile, an Ambivalence profile, and a Disidentification profile. While most students clustered in the Academic Investment profile (33%), there were a fair amount of students identified within the Low Effort/Efficacy (23%) profile, the Disidentification profile (11.8%), the Ambivalence profile (12.5%), and the Boredom profile (10%). Each of these risk profiles were significantly less likely to enroll in 4-year post-secondary schools.

Two studies used latent profile analysis (LPA) to measure student engagement. Wang and Peck (2013) studied behavioral, emotional, and cognitive engagement from different self-report Likert-type measures that were used as continuous variables for high school students into their postsecondary status using LPA. A 5-profile solution of Highly Engaged, Moderately

Engaged, Minimally Engaged, Emotionally Disengaged, and Cognitively Disengaged best fit their data. Some unexpected relationships were found regarding associations with GPA and high school dropout, with moderately engaged students being at greater risk for dropout than emotionally or cognitively disengaged students. Students who were minimally engaged had the highest likelihood for dropout. Salmela-Aro, Moeller, Schneider, Spicer, and Lavonen (2016) studied high school students' engagement and burnout from the United States and Finland using LPA. The US sample was comprised of a 9th through 12th grade students, while the Finnish sample contained 9th and 10th grade students. This study also took the approach of transforming Likert-type item scores into continuous variables for use in LPA, using mean scores after using the proportion of maximum scaling (POMS) method (Little, 2013) to transform scores to be scaled between 0 and 1 rather than be standardized. They found four profiles across samples, though US students were less engaged and more burned out than Finnish students. The four profiles are Engaged, Engaged-Exhausted, Moderately Burned Out, Burned Out.

Several studies use hybrid models, such as growth mixture modeling to explore student engagement. Janosz, Archambault, Morizot, and Pagani (2008) used growth mixture modeling to determine trajectories of 7th to 11th grade Canadian students' behavioral, cognitive, and affective engagement from a longitudinal dataset. They found a normative trajectory that comprised half of the sample along with six other groups that either had rapid increases or decreases in engagement. Those groups that decreased in engagement rapidly were more likely to drop out of school. Male students were more likely to follow the unstable, decreasing trajectory than girls were in this sample. Li and Lerner (2011) used semiparametric mixture modeling to identify patterns of behavioral and emotional school engagement from a sample of 5th to 8th grade students. Similar to the findings from the Janosz et al. (2008) study, rapid decline trajectories and low engagement trajectories were associated with lower grades and an increased likelihood for substance abuse, depression, and deliquency. Gender, ethnicity, and socioeconomic status all contributed in different ways to different engagement trajectories suggesting that other factors may play a role in determining engagement trajectories. Archambault and Dupéré (2017) used multiple-process growth mixture modeling for behavioral, affective, and cognitive engagement in 3rd through 6th grade Canadian students and their teachers. Five distinct trajectories emerged from this model including Stable High, Stable Moderate, Transitory Inclining, Transitory Declining, Constantly Declining. Students who were in low or irregular patterns of engagement were more likely to be boys, those who have academic risk, and those perceived by their teachers as having less behavioral competence. However, the authors note that there were strengths unique to each group that may present different targets for intervention.

Malleable Indicators, Developmental Plasticity, Prevention and Intervention Services

A major concern shared across developmental researchers and with educational practitioners and policymakers is the need to affect change through the prospect of plasticity. For the purposes of this study, plasticity is described as whether "specific, theoretically predicted relations between the individual and context optimize the likelihood of human development." (p. 247, Lerner & Overton, 2008). Preventive intervention research can then be framed as the "true experiments in modifying the course of development" that provide understanding into the processes which produce maladaptive developmental outcomes (Cicchetti & Hinshaw, 2002, p.667-668). Educational researchers and policymakers who focus on the problem of linking academic assessment to intervention are in line with developmental scientists who are interested in assessing and researching those indicators that can modify the course of development (i.e., malleable indicators). This point is reflected in legislation, policy statements of professional organizations, and by researchers, representing a point of unity for prevention and intervention services across domains (Anderson, 2006; Fuchs & Fuchs, 2006; IDEIA, 2004; Little & Little, 2014; NASP, 2009; NCLB, 2001; Sattler, 2008).

Regarding educational context and policies, the frameworks through which interventions are typically introduced and delivered are through response-to-intervention (RtI), multi-tiered systems of support (MTSS), or instructional decision making (IDM) services. These service models rely on progress monitoring and universal screening to facilitate evidence-based or data-driven prediction and decision making when delivering prevention and intervention services (Harlacher & Siler, 2011; Kamphaus, 2010). Although progress monitoring is typically used for academic concerns, it has also been extended to behavior and mental health concerns within schools for those also looking to link assessment to intervention in social and emotional domains (Fitzpatrick, 2012; Goodman, McKay, & DePhilippis, 2013; Gresham, Cook, Collins, & Rasethwane, 2010; Merrell, 2010). Determining which indicators are most useful for universal screening is an important step for developing measures for the progress monitoring of social and emotional malleable indicators.

With the recent re-authorization of the Elementary and Secondary Education Act, now called the Every Student Succeeds Act (ESSA; Pub.L. 114-95), school psychologists are in a place to help improve student and school outcomes through school-based mental health support (NASP, 2016). Under this legislation, funding will be made available for comprehensive or targeted school support and improvement in schools that have graduation rates below 67% and with subgroups who consistently underperform. These schools must construct a plan, allocate resources, and assign specialized personnel to help identify and intervene with students most at-risk for school failure. According to Bowers et al. (2012), longitudinal student engagement has arisen as one of the most sensitive and specific indicators of student risk for school dropout. Additionally, funding for Title I, Title II, and Title IV may be allocated to, among other things, improve school community partnerships. Research-based student engagement interventions, such as Check & Connect, focus not only on the student level, but with family-school and student-contextual factors through a mentoring relationship embedded in the educational environment (Christenson & Reschly, 2010). Student engagement has a strong research base for systems-wide identification and intervention as ESSA begins to be implemented in struggling schools.

Student Engagement

Models of student engagement and developmental science have been intertwined for several decades beginning with Finn's (1989) seminal Participation-Identification model of student engagement. Under Finn's model, student engagement is concerned with mostly malleable social and behavioral indicators which culminate in the formation of an affective bond between students and school. The Participation-Identification model recognizes contextual (e.g., early life experiences, social factors, after-school experiences) factors which contribute to the process of engaging or disengaging with school (Finn, 1989; Finn & Zimmer, 2012). Understanding student engagement as a long-term developmental process has allowed researchers to predict school completion, learning difficulties, behavior problems, and other important outcomes of interest as early as elementary school (Alexander, Entwisle, & Horsey, 1997; Barrington & Hendricks, 1989; Bowers et al., 2012; Reschly & Christenson, 2012; Schoeneberger, 2012).

Although considered to be the crucial indicator in understanding school dropout and completion, student engagement research has demonstrated utility for the construct far beyond that scope (see Christenson, Reschly, & Wylie, 2012 for a complete review). The ongoing developmental processes captured by student engagement measures have been associated with successful postsecondary outcomes, employment outcomes, and numerous personal and social QoL outcomes (Feldman & Matjasko, 2005; Finn, 2006; Griffiths, Lillies, Furlong, & Sidhwa, 2012; Li & Lerner, 2011; Yazzie-Mintz & McCormick, 2012). Although there are many different conceptualizations of student engagement, most recognize the complex nature of the construct and consider factors preceding and extending beyond the school environment (Rumberger & Rotermund, 2012). As such, student engagement researchers tend to prefer multidimensional theoretical frameworks which often comprise affective, behavioral, and cognitive subtypes engagement (see Fredricks et al., 2004 for a complete review). Appleton and colleagues (2006) further differentiated between low- and high-inference forms of engagement. Low inference indicators are readily available in school records (e.g., attendance, homework completion, disciplinary incidents) whereas high inference subtypes (e.g., cognitive and affective engagement) require student self-report.

The relationship between student engagement and mental health adds further evidence to its utility beyond the scope of school dropout and completion. Examples of mental health outcomes associated with subtypes of student engagement are numerous (see Reschly, Pohl, Christenson, & Appleton, 2017). Variables which have been identified to represent academic, behavioral, cognitive, and affective indicators serve as protective or risk factors when they are present or not present, respectively. As risk factors of engagement subtypes often precede the development of psychopathology, drug use, aggression, and are predictive indicators of school dropout, they may be more sensitive indicators of school difficulty than a model which uses psychopathology for identification. Indicators of student engagement have also been shown to be protective above status risk factors, which may include psychopathology status (Connell et al., 1994). For these reasons, student engagement can be useful in prediction, intervention, and reform efforts (Appleton et al., 2006; Fredricks et al., 2004; National Research Council, 2001, 2011; Reschly & Christenson, 2012; Reschly et al., 2017).

Conceptual Issues: Continua and Conceptualization of Student Engagement

Particular conceptual issues within the student engagement literature which are relevant to this review include whether engagement and disaffection represent one continuum of engagement (i.e., high scores indicate engagement and low scores indicate disaffection) or are better understood as separate continua (i.e., low student engagement scores indicate low engagement and low disaffection scores represent low disaffection) and what the role, scope, and function of engagement and disaffection is in the schools (Reschly & Christenson, 2012). To understand these differences from the student engagement research tradition described previously, summarization of these works will be attempted but may fall short of the breadth and depth of the theoretical underpinnings which guide their work. It is highly recommended to read these authors in more depth for a more comprehensive understanding of their research tradition.

In line with the conceptual haziness attributed to the student engagement literature by engagement researchers, school disaffection suffers from a similar and related problem (Reschly & Christenson, 2012). Using a characterization from the personality literature (Block, 2000), Reschly and Christenson (2012) described *jingle* as the use of the same term when discussing different concepts and *jangle* as the same concept described using different terms. For example, school disaffection may also be known as school disengagement, but school disengagement may only be defined to consist of academic and behavioral indicators while school disaffection often includes cognitive and affective indicators (Henry, Knight, & Thornberry, 2012; Skinner, Kindermann, & Furrer, 2008). Extending that conceptual haziness further, school disaffection can be described from different theoretical frameworks, under different units of analysis, under different continua, and using different measures (Christenson et al., 2012; Skinner, Furrer, Marchand, & Kindermann, 2008).

Although previously conceptualized as a single continuum, with high scores of student engagement signaling a student engaged with school and low scores of engagement signaling a disengaged or disaffected student, researchers studying disaffection have suggested that student disaffection can be better represented as a separable continuum from student engagement (Skinner et al., 2008). Consistent with the logic underlying the dual-factor model of mental health, these researchers argued that it is possible for students to demonstrate highly engaged behaviors while simultaneously demonstrating highly disaffected behaviors (e.g., a student capable with academics, but struggles with peer relationships and demands in the school context) and thus measure each as separable continua (Martin, 2007; Skinner et al., 2008). These students which are highly engaged but also disaffected may have different outcomes, warrant different models for detection under current warning or flagging systems (i.e., a dual-factor conceptualization), and require different strategies for assigning intervention services to alter their life-course trajectories.

Purpose of the Present Study

The dual-factor model of mental health aims to improve upon the unidimensional conceptualization of well-being and distress for child and adolescent mental health and improve intervention services for vulnerable populations who would not be identified under the current model (Antaramian et al., 2010; Greenspoon & Saklofske, 2001; Lyons et al., 2012; Suldo & Shaffer, 2008). To date, the dual-factor model of mental health has been tested with elementary-aged students in Canadian samples but no studies have tested the model with elementary-aged students elsewhere (Greenspoon & Saklofske, 2001). The model has been tested among adolescent samples in the United States with findings similar to those explored in the original study (Antaramian et al., 2010; Lyons et al., 2012; Suldo & Shaffer, 2008; Suldo et al., 2016). Application of the dual-factor perspective have also not been tested with indicators more closely related and sensitive to the school environment like student engagement. Student engagement factors, which are relevant to educators and families due to their relevance to the educational environment for all students and strong correlations with student achievement, may function more sensitively as a warning system and point of intervention for school mental health systems due to that relevance (Finn & Zimmer, 2012; National Research Council & Institute of Medicine, 2004).

It is possible that separate continua for student engagement and student disaffection may detect vulnerable and previously undetected students at risk for school difficulty like those found with the dual factor conceptualization for mental health. Student engagement may contribute to better prediction and discrimination for vulnerable and troubled groups especially when considering academic outcomes as an outcome of interest, as student engagement is a facilitator of academic achievement (Appleton, Christenson, & Furlong, 2008; Fredricks et al., 2004). Furthermore, student disaffection may prove a more useful indicator than psychopathology in discriminating which students are most vulnerable to negative academic outcomes as it is more directly related to observable behaviors and performance in the school context.

To date, there have been no studies documenting the relationships between the elementary version of the Student Engagement Instrument (SEI-E) and any measures of school disaffection using person-centered approaches such as mixture modeling or latent class analysis. One present study explores the factor structure of the piloted disaffection items, but no studies have yet been conducted which explore these student disaffection items with student outcomes (Reschly, Pinzone, Appleton, & Parker, manuscript in preparation). It will be important to understand whether alternative approaches (i.e., person-centered approaches such as LCA or hybrid approaches) produce interpretable results and if they contribute meaningful information for understanding students' engagement and disaffection with school, as well their relationship to student outcomes.

(1) Can latent class analysis of student engagement and student disaffection ratings with elementary school students provide an identifiable model with interpretable classes?
   a. Will there be unexpected classes that may benefit from intervention services that were likely to be missed given other methods of analysis, similar to Greenspoon and Saklofske's (2001) dual-factor model?
   b. Will classes be able to replicate across time points?
   c. Will there be changes in class membership over time?

(2) If classes can be interpreted, do they differ in prediction of previously validated indicators of on- or off-track status for sixth grade?
   a. Does this interpretation change from fall to spring administrations or from fourth to fifth grade?
   b. Are longitudinal measures necessary for determining risk and for understanding class membership?

Figure 2.1 – Dual Factor Matrix for Greenspoon and Saklofske (2001). Proportions of the sample are listed in parentheses. The DFA analyses for groups 1, 2, and 3 were run separately from groups 1, 2, and 4 which resulted in different sample sizes.

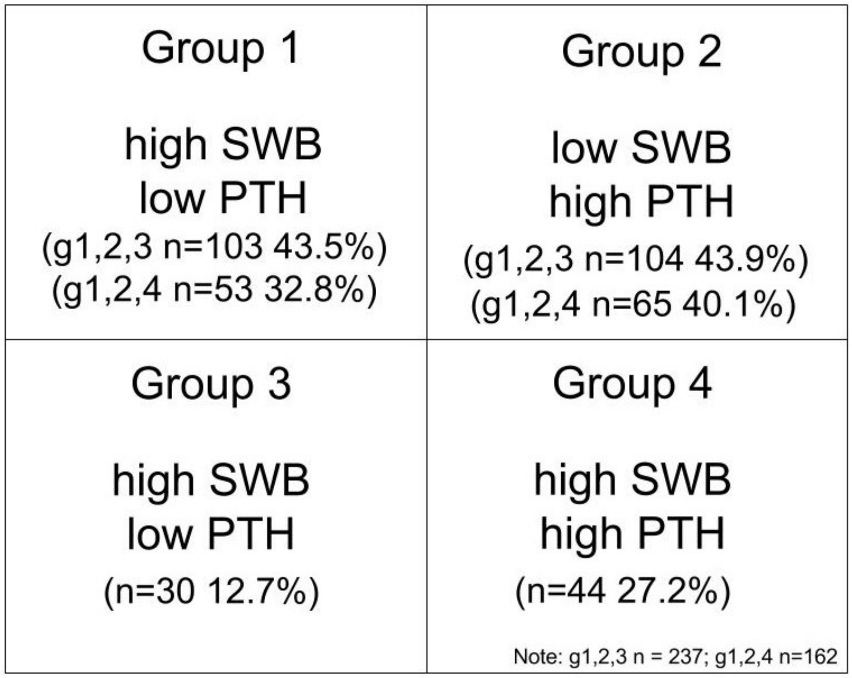
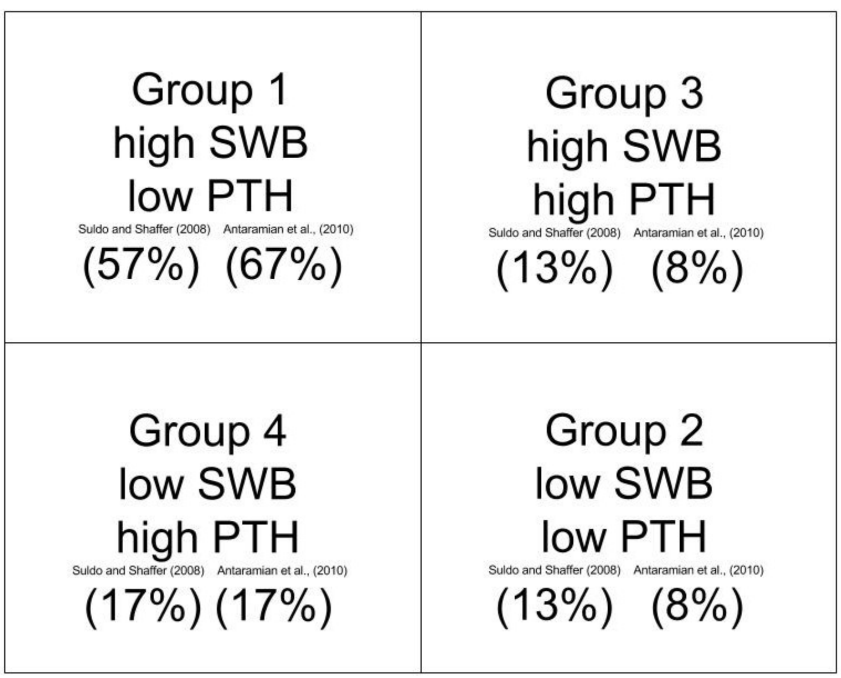


Figure 2.2 – Dual Factor Matrix for Suldo and Shaffer (2008) and Antaramian et al., (2010). Proportions of the sample for each group are listed by study in parentheses.



CHAPTER 3

METHODS

Participants

Participants were drawn from a dataset of third through fifth graders from Gwinnett County Public Schools (GCPS). GCPS is a large school district which serves over 170,000 students, with continuing yearly enrollment growth (GCPS Fact Sheet, 2016). The school district is situated in the metro area of Atlanta, GA with 139 schools (80 elementary, 29 middle schools, 21 high schools, 9 alternative education schools) within its boundaries. Relative to many other school districts, the individuals within the GCPS boundaries are diverse regarding ethnicity (28.6% African American, 25.3% Hispanic, 10.3% Asian, 3.8% Multiracial, and 0.4% Native American), socioeconomic status (57.4% economically disadvantaged), and those individuals receiving special program services (12.6% students with disabilities) per 2010 census data and 2014-2015 district level data (Governor's Office of Student Achievement, 2016).

Data were piloted in elementary schools across the district across a period of three years, with an increasing number of elementary schools opting in to administer the survey data over the course of three years. Administrations were collected in the fall and spring of each year. Due to differences in the number of schools, and therefore number of students, participating over each year, only fourth and fifth grade students were considered for analysis (n=16,481). Duplicate values were removed from the analysis (n=5). Students who were missing demographic data were removed from the analysis (4,190 cases removed, n=12,298). Demographic data are unknown for the deidentified student data that are missing demographic information.

Measures

Student Engagement Instrument – Elementary Version. The Student Engagement Instrument – Elementary Version (SEI-E; Carter, Reschly, Lovelace, Appleton, & Thompson, 2012) is a downward extension of the Student Engagement Instrument (SEI; Appleton et al., 2006). The SEI has been examined as a 33- and 35-item instrument, representing aspects of students' cognitive and affective engagement. Research has identified six factors of the SEI (Appleton et al., 2006). Cognitive engagement includes 3 factors: Control and Relevance of School Work (CRSW), Future Aspirations and Goals (FGA), and Extrinsic Motivation (EM). Affective engagement includes Teacher-Student Relationships (TSR), Family Support for Learning (FSL), and Peer and Student Support (PSS). In applied settings, many schools elect to administer the 35-item version of the survey due to the perceived importance of the Extrinsic Motivation factor; however, for research purposes, this factor is typically left off due to concerns regarding the reverse coding and small number of items (n=2) in the factor (e.g., Betts et al., 2012; Lovelace, Reschly, Appleton, & Lutz, 2014; Reschly, Betts, & Appleton, 2014). The SEI was originally a 4-point Likert-type scale but subsequently was expanded to a 5-point scale, introducing a middle point (*1=strongly disagree, 3=in the middle, 5=strongly agree*) that is now used on the SEI, SEI-E and other versions of the instrument. The factor structure of the SEI has been confirmed in several studies and samples (Appleton et al., 2006; Betts, 2012; Lovelace et al., 2014; Reschly, Betts, & Appleton, 2014). Furthermore, SEI scores are associated, as expected, with variables of interest such as attendance, behavior and achievement (Betts et al., 2010; Reschly et al., 2014), and there is evidence of measurement invariance across grades 6-12 (Betts et al., 2010). Convergent and divergent validity evidence has been found with another measure of engagement and motivation (Reschly et al., 2014) and the SEI is predictive of high school dropout and on-time graduation (Lovelace et al., 2014; Lovelace, Reschly & Appleton, 2017) and college attendance and persistence (Fraysier, Reschly, & Appleton, 2019).

The SEI-E was first piloted with a diverse group of students in grades 3-5. Item wording and content was revised for developmental appropriateness (Carter et al., 2012). Following the development logic of the original SEI, the SEI-E was examined first with EFA and then with CFA. Results indicated a 4-factor model functioned best in this sample. The four factors retained were TSR, PSS, FGA, and FSL, leaving off the CRSW factor. Items which loaded on the CRSW factor were theorized to represent a qualitative difference in the construct of student engagement for elementary-aged students (Carter et al., 2012). The SEI-E is comprised of 24 items following the removal of the CRSW factor. Cronbach's alpha for the four factors ranged from .639 (FGA) to .820 (PSS). Small significant correlations were found between FGA and attendance, and TSL, PSS, and FGA and office disciplinary referrals. A follow-up study again confirmed the 4-factor model of the SEI-E, found evidence of measurement invariance across gender and free or reduced lunch status, and correlations, in expected directions, with disciplinary incidents (Carter, 2013).

Student disaffection pilot items. Based on prominent theories of engagement (Martin, 2007; Skinner et al., 2008), the results of a study that examined the convergent and divergent validity of the SEI with another measure of engagement and motivation (Motivation-Engagement Scale, Martin 2007), and consideration of the dual mental health model and it applicability to student engagement (Reschly & Christenson, 2012), an additional set of items (n=9) were piloted with the SEI-E to measure disaffection and to compare students' self-reports of behavioral engagement with more objective data collected by schools (Reschly et al., 2019). The disaffection items were subjected to EFA and CFA; 4 items were retained as measures of disaffection. Items which comprise this factor consist of cognitive (e.g., "I don't understand why I get the grades I do.") and affective (e.g., "I feel nervous when I am at school") indicators of student disaffection with school. Consistent with information conceptualized for student engagement measures, these data are relatively high inference compared to indicators which are observable to others (e,g., attendance, behavioral incidents). It has been noted that low inference observation and data tend to be less accurate for measuring and understanding individual perceptions (Turner & Meyer, 2000). It is likely that collecting low and high inference data, and understanding their relationship, can allow more accurate measurement of latent variables such as student engagement and student disaffection.

Discipline index and behavioral data. Behavioral data were represented by a Discipline Index (DI) consistent with the work of Appleton et al. (2019). Under this approach, behavior dispositions are created following three behavioral indicators (frequency, maximum severity, and average severity) with scores ranging from 1 to 6. ISS and OSS period days, bus suspension days, and rates of incidents per day are calculated which can add to the initial value rating of severity from 1 to 6, though the value may never exceed 6. These values were normed and conflated into three-level categorical outcomes, with 0 representing no behavioral risk, 1 representing approaching risk (e.g., 4 or more ISS days, not satisfactory on teacher summative conduct grade, between 50-75th percentile rank on DI), and 2 representing at-risk (e.g., 1 or more OSS day, unsatisfactory conduct grade, greater than 75th percentile rank on DI).

Traditional detection practices for behavioral at-risk status include collecting office discipline referrals, school suspensions, behavior report cards, teacher report, or universal behavior screening. Often, these data are used singularly for decision-making despite any one factor not demonstrating high accuracy in understanding student behavior histories (Appleton et al., 2019; Bowers et al., 2012). In early warning systems (EWS) approaches, these traditional risk factors can be collected and measured, assigned a weight, and used in predicting which students are the most at-risk of dropping out of school. The three behavioral indicators collected for the discipline index accrue from the beginning of the school year and are dynamically calculated.

Demographic data. Student demographic data (e.g., gender, ethnicity, disability status) were obtained from the de-identified dataset. Free and reduced lunch (FRL) was defined as students who qualify for either free or reduced lunch prices per income eligibility guidelines determined by the United States Department of Agriculture. Students classified as English learners (EL) meet certain criteria such as speaking a native language other than English, coming from an environment that significantly impacts English development, or whose ability to speak, read, write, or understand English impedes access to a free and appropriate education.

Procedures

Data were drawn from a de-identified data set provided by the GCPS Research and Evaluation office from surveys collected in the Fall and Spring of the 2014-15, 2015-16, and 2016-17 academic years from third through fifth grade elementary school students. The number of schools participating in collecting the pilot data increased as the data were collected.

The district is familiar with collecting the SEI through passive consent in all high schools to advise students and monitor student engagement. The SEI-E was previously piloted in elementary schools in the same district in 2011, with no issues arising in the administration and collection of those data. Data were collected from different schools in third grade (~3700-3800 students) than for those in fourth and fifth grade (~12,000 students). Because of these differences and what that would do to overall measurement size over time, it was decided that only fourth and fifth grade students would be used for analytic procedures.

After merging student demographic data with SEI-E administration results for fall and spring of fourth and fifth grade (n=12,298), the sample underwent additional data cleaning procedures to prepare for analysis. Administrations were removed that did not have any outcome data available (n=10,822). Following this procedure, only the students who responded to the SEI-E and disaffection items across all four time points were retained for analysis (n=6164) to make longitudinal comparisons. The demographic information for each reduction in sample size across the analysis is provided in Table 3.1. Differences in outcome proportions between the students who responded to all four administrations and those who did not are presented in Table 3.2.

Analytic Method

Analyses were conducted using Mplus 8.2 (Muthén & Muthén, 2017) with data cleaning and visualization of data conducted using R 3.4.1 (R Core Team, 2017) and Rstudio 1.0153 (Rstudio Core Team, 2017). Consistent with procedures recommended from researchers preparing data for longitudinal latent class or latent profile analyses, called latent transition analyses (LTA), models were run from two to eight classes and compared along a range of fit criteria across each time point (Nylund, 2007, Ryoo et al., 2018). Prior to analysis, response categories were re-coded to reflect endorsement rather than degree of responding, though the mid-point endorsement was not collapsed as it may reflect uncertain or neutral responding (e.g., responses ‘1’ and ‘2’ became ‘0’, response ‘3’ became ‘1’, and responses ‘4’ and ‘5’ became ‘2’; Matell & Jacoby, 1972; Nylund, 2007). Though other LCA studies have reduced odd Likert-type scales down to a binary endorsement, the neutral or midpoint response was not collapsed for this analysis. Item probabilities for endorsing high levels of a variable (i.e., response of ‘2’) were graphed for each of the selected models at each of the four time points for determining class comparisons and interpretability (Ryoo et al., 2018).

Each item of the 28 items administered were used in the analysis for model selection and class interpretations. Following the selected model and class interpretation, the 3-step method was used to determine if latent classes could predict the distal outcomes of being at-risk for attendance, behavior, or course failure in English/Language Arts or Mathematics courses for each time point (Lanza, Tan, & Bray, 2013). The 3-step procedure is described as follows. In the first step, the LCA model is fit. Next, the individuals are assigned to latent classes based on their probabilities of class membership. Finally, covariates and distal outcomes are fit if they are available. Odds-ratios and chi-square tests were reported and compared across time points for distal outcomes.

Research Question One

It is hypothesized that latent class analysis procedures will produce interpretable classes across the fall and spring administrations of fourth and fifth grade students. Furthermore, it is suspected that class membership will result in groups that fit with dual-factor or multiple continua theories of engagement, including a group that is more likely to rate higher levels of engagement but also has a higher likelihood of rating disaffection with school relative to other latent classes. Class membership is also expected to be greatest for classes that consist of highly engaged students who are not disaffected with school. There are no expectations for the total number of interpretable classes, though given the number of categorical indicators and previous factor analysis complexity, it is suspected that models with greater than two classes will provide better fit and interpretability for analysis.

Research Question Two

Balfanz, Herzog, and Mac Iver (2007) presented longitudinal cohort research which analyzed numerous singular “flags,” or low inference indicators of student disengagement, from a cohort of sixth grade students that schools can use to predict whether a student fails to graduate. After controlling extensively for demographics and the other warning flags, four flags evidenced high predictive power for failing to graduate. The four flags were chronic absenteeism, unsatisfactory behavior grades, math course failure, and English course failure. When taken together as a set, these flags contributed 34 times more explanatory power in predicting graduation than demographic factors. The most common presentation for students in sixth grade was to either have a single risk factor of the four identified, or two of the risk factors in combination.

Class membership is expected to be related to whether a student is likely to present with one or more of these four risk factors. It is hypothesized that membership in classes that have lower engagement, higher disaffection, or a combination of the two will be have stronger associations with at risk variables than for classes with higher engagement and lower disaffection. It is hypothesized that the relationships will remain in the expected directions across each time point but have stronger associations as it reaches the fifth grade Spring administration as this administration is the closest measurement to the distal outcome.

Table 3.1 – Description of Participants, Fourth and Fifth Grade Students

	Total Sample with Demographic Data	**Sample with Outcome Data**	**Sample with Four Administrations**
Demographic Variables	Sample Size/ Percentage	Sample Size/ Percentage	Sample Size/ Percentage
Total Sample Size	12,298 (100%)	10,824 (100%)	6,164 (100%)
Male	6,337 (51.5%)	5,562 (51.3%)	3,043 (49.4%)
Race:			
Black	3,610 (29.3%)	3,109 (28.7%)	1546 (25.1%)
Hispanic	3,958 (32.1%)	3,620 (33.4%)	2038 (33.1%)
White	3,023 (24.6%)	2,546 (23.5%)	1580 (25.6%)
Asian/ Pacific Islander	1,247 (10.1%)	1,150 (10.6%)	787 (12.8%)
Multiracial	449 (3.7%)	388 (3.6%)	207 (3.4%)
Native-American	11 (.08%)	11 (0.1%)	6 (0.1%)
Primary Language:			
English	7,986 (65%)	6,839 (63.2%)	3,827 (62.1%)
Other (ELL indicator)	4,312 (35%)	3,985 (36.8%)	2,337 (37.9%)
Special Education Eligible	1,967 (16%)	1,699 (15.7%)	576 (9.3%)
FRL Status Eligible	7,259 (59%)	6,402 (59.1%)	3,501 (56.8%)

Table 3.2 – Proportions of Outcome Data for Four or Fewer vs. All Four Administrations

Four or Fewer	Attendance	Behavior	ELA	Math
No risk	86.9%	99%	83.9%	84.8%
Some risk	7.5%	0.5%	12.3%	11.2%
At risk	5.6%	0.5%	3.7%	4%

All Four	Attendance	Behavior	ELA	Math
No risk	89.3%	99.2%	88.1%	89.6%
Some risk	6.4%	0.4%	9.2%	7.9%
At risk	4.3%	0.5%	2.6%	2.5%

CHAPTER 4

RESULTS

Descriptive Statistics

Item endorsement distributions were visualized for analysis from each time point to compare any differences in how students rated items across time points across the 28 items administered (see Figures 4.1-4.4). Item response distributions appear to be very similar proportionally over time and maintain a similar negative skew for disaffection items and a positive skew for engagement items. In other words, most students endorse being engaged and do not endorse being disaffected. Items vary in proportion of uncertainty (e.g., 'In the Middle' ratings) and endorsement within expected factors, though items within FSL and FG factors appear to have low proportions of uncertainty (e.g., around 10% or lower) and very high proportions of endorsement (e.g., >85%) across each factor. Items with missing responses were counted and summarized in Table 4.1.

Missing data were tabulated according to theorized factor structure of the SEI-E and disaffection items starting with the most average missing data per factor given the number of items within that factor given. There was a total of 690,368 possible values across 24,656 respondents given the sample (n=6164) over four administrations. Of these possible values, there were a total of 2242, or 0.3%, missing values. DIS items had 504 missing values across the four administrations as a four-item factor, averaging 126 missing values per item. TSR had 868 missing values across the four administrations as a nine-item factor, averaging 96 missing values per item. FG had 327 missing values across the five-item factor, averaging 65 missing values per item. PSS had 362 missing values across the six-item factor, averaging 60 missing values per item. Lastly, FSL had 181 missing values across the four-item factor, averaging 45 missing values per item across the four timepoints. Missing data is suspected to be missing at random (MAR) and is then handled automatically by MPlus using robust, or full information, maximum likelihood (FIML) procedures. This strategy for handling missing data uses all data points, rather than excluding those with missing cases, for model estimation, adjusts standard errors and chi-squared estimates for data that have non-normal distributions, and does not interfere with class estimation procedures or tests like other missing data methods (i.e., multiple imputation methods; Berlin, Williams, & Parra, 2014). The patterns for students who were missing entire administrations were not able to be ascertained.

Table 4.2 provides the counts of students who either have no risk designation, some risk designation, or have been designated at risk status in grade 6. Frequencies are very low for the behavior risk category, which may lead to difficulties estimating contingency table over a number of latent classes as it will subset the students in the 'some risk' and at-risk designations even further depending on the number of classes derived.

Latent Class Analyses

Model building. The first part of model building performed is consistent with initial step of the LTA procedures described by Nylund (2007) and Ryoo et al., (2018), to explore cross-sectional LCA data. For models that are unable to proceed to the next step due to measurement inequality, different numbers of latent classes being suggested, or other model-related reasons, researchers recommend fitting repeated measures of LCA (Collins & Lanza 2010; Ryoo et al., 2018). Repeated measures LCA are like an LTA with the transition probabilities removed, leaving the researcher to discuss the merging or formation of classes over time (Ryoo et al., 2018).

Despite an 8-class solution having the lowest (i.e., best) values across fit indices, it is suspected that fit indices such as AIC, BIC, and ABIC would have kept fitting larger models (Table 4.3). It is very likely that the complexity of the model (e.g., three response categories across 28 items for over 6,000 respondents) led to difficulty assessing fit as there was little agreement for the best fitting class due to the large contingency tables created (Wurpts & Geiser, 2014). Furthermore, models proposed beyond 8-classes would still terminate but would produce errors relating to the inclusion of distal outcomes and when estimating many of the parameters. When addressing the bivariate residual output, output which can describe residual covariances, of the data across classes, there are several items that are of considerable concern within the model, suggesting that there may be significant covariances in the SEI-E and disaffection items that may affect model interpretation (see Table 4.4). For these reasons, a repeated measures LCA was chosen as the interpretative model rather than testing for longitudinal measurement invariance and an LTA model. Additionally, due to model size and complexity, such a model appeared unable to be terminated using Mplus.

When the interpretation of classes to relate to outcomes and the context of school-based intervention were considered, a 5-class or 6-class model appeared to provide the greatest utility (see Table 4.5). The 6-class solution appeared to have the least variability in class membership transitions over time following visual analysis of class membership and was suspected to be interpretable across administrations. The 6-class model would be described further by visualizing the relationship of item probability endorsements across the different classes (Nylund, 2007; Ryoo et al., 2018).

Description of the six classes. Item response probabilities for endorsements (i.e., when responses = ‘2,’ indicating endorsements of affective engagement, cognitive engagement, or disaffection) were graphed for all six classes at each time point for each of the 28 items used to estimate the latent class model (see Figures 4.5-4.8). The items were organized by their expected loadings under a factor analytic model for ease of interpretation. Classes were defined for each grade level given changes in classes from fourth grade to fifth grade. Classes were matched based on visual analysis of item probability patterns and labeled, as analyses were run unconstrained at each time point. For example, Class 4 for the fourth grade Fall administration described the same item probability patterns as Class 5 for Spring. Classes were renamed based on their interpreted pattern and left in their original location. Five of six class patterns remained across the four time points, with one class changing from the fourth grade to fifth grade analyses. It is possible that fewer classes may be appropriate in fourth grade and a greater number of classes are appropriate toward fifth grade, consistent with the Vuong-Lo-Mendell-Rubin likelihood ratio tests (LMR-LRTs) reported with fit indices. However, for interpreting classes and describing relationships with distal outcomes and demographic variables, it was decided to proceed with the 6-class solution as suggested by the LMR-LRT fit index for the fifth grade Spring administration.

Fourth grade six class solutions. For the fourth grade fall analysis, the 6-class latent class model provided a set of interpretable classes. Student rating patterns that resulted in the first class were described as the *Engaged, but Disaffected* class (n=1035, 16.8%). These students had a high likelihood of endorsing engagement items for all areas but also had a higher likelihood for endorsing disaffection items relative to the other classes, including classes with lower probabilities of endorsing engagement across all engagement variables. The size of this class is unexpected given dual-factor model studies, though levels of disaffection endorsed all classes were relatively low or unlikely. In this context, classes considered to be higher disaffection classes had response probabilities between 20-40% for specific items measuring disaffection compared to values between 0-20%. For the Spring administration analysis, the *Engaged, but Disaffected* class membership grew (n=1236, 20%).

Students who endorsed the second class for the Fall administration were described as the *Highly Engaged* class (n=2238, 34.6%). For this class, all disaffection items neared 0% likelihood of being endorsed and all engaged items neared 100% likelihood of being endorsed. For the Spring administration analysis, the *Highly Engaged* class grew (n=2332, 37.8%). This adds some nuance to research that suggests engagement decreases across the school year. Even though this may be true, there are a greater proportion of students who have a high likelihood of endorsing engagement variables for the Spring administration compared to Fall.

Students who endorsed the third class for the Fall administration were described as the *Engaged/Peer Intervention* class (n=1473, 22.8%). Members of this class were likely to endorse Family Support for Learning items, Teacher-Student Relationship items, and Future Goals items with probabilities between 70%-100%. However, Peer and Student Support items ranged from 25%-90% with most items falling below 60%. These would not be students who require interventions such as Check-in/Check-out (Todd, Campbell, Meyer & Horner; 2008) or increasing home-school communication (Cox, 2005), which could improve teacher-student or family support relationships, but rather may need enrollment in extracurricular activities (Carter, Swedeen, Moss, & Jesko, 2010), lunch or recess social skill interventions (Cuccaro & Geitner, 2007), or other types of peer-focused interventions. For the Spring administration analysis, the membership of the *Engaged/Peer Intervention* class decreased (n=1107, 18.0%). There may be significant, but typical developmental changes in peer relationships and perceptions across the school year for fourth grade students.

Students who endorsed the fourth class for the Fall administration were described as the *Disengaged* class (n=622, 9.6%). These students were relatively low across measures of engagement, though Family Support for Learning item endorsement probabilities were between 70-90% and Future Goals item endorsement probabilities were between 85-90%. These students ranged from 21-90% likely to endorse specific Peer and Student Support items, 22%-56% likely to endorse specific Teacher-Student Relationship items, and 5-20% likely to endorse Disaffection items. Students who fall within the *Disengaged* class might benefit from interventions designed to promote both teacher and peer relationships. These students would be better candidates for interventions such as Check-in/Check-out, Peer-assisted Learning Strategies (Fuchs, Fuchs, & Karns, 2001; What Works Clearinghouse, 2013), class-wide positive group contingencies (Wright & McCurdy, 2012), among others. For the Spring administration analysis, student membership of the *Disengaged* class decreased (n=423, 6.8%).

Students who endorsed the fifth class for the Fall administration were described as the *Disaffected/Peer Problems* class (n=473, 7.3%). These students are like the those in the *Engaged/Peer Problems* class as they both have low item probability endorsements for Peer and Student Support variables. These students have lower engagement endorsement rating probabilities and higher item probability ratings for Disaffection items. For the Spring administration analysis, the *Disaffected/Peer Problems* class grew (n=812, 13.0%). It is possible that many of the students who are leaving the *Engaged/Peer Problems* class are becoming disengaged as the school year progresses. This may be an important group to target with peer-focused interventions and may represent students who are at a greater risk for poor educational outcomes related to their peer and student relationships.

Students who endorsed the final class for the Fall administration were described as the *Disengaged and Disaffected* class (n=323, 5.2%). These are students with the lowest engagement and highest disaffection endorsement item probabilities. These students range from 40-60% likely to endorse specific Family Support for Learning items, 20-45% likely to endorse specific Teacher-Student Relationship items, 15-65% likely to endorse specific Peer and Student Support items, 55-70% likely to endorse specific Future Goals items, and 17-40% likely to endorse specific Disaffection items. For the Spring administration analysis, the *Disengaged and Disaffected* class decreased (n=254, 4.1%). These are likely students who might benefit from the most comprehensive, ecologically-driven interventions, such as Check & Connect (Christenson& Reschly, 2010; What Works Clearinghouse, 2015).

Fifth grade six class solutions. For the fifth grade Fall administration analysis, the first class that resulted from the response patterns was the *Highly Engaged* class (n=2760, 44.8%). For the Spring administration analysis, the *Highly Engaged* class decreased (n=2623, 42.5%). This appears to be a negligible change from Fall to Spring of fifth grade, as well as from Spring of fourth grade (n=2332, 37.8%). With this additional context, it appeared that engagement and disaffection response patterns are becoming more consistent from fourth to fifth grade.

The second class described for the fifth grade Fall administration analysis is the *Engaged/Peer Problems* class (n=1270, 20.6%). For the Spring administration analysis, the *Engaged/Peer Problems* class decreased (n=1224, 19.9%). Consistent with the first class of the analysis, the fifth grade analysis provided more stable classes through the year. This class also appeared stable when compared to the fourth grade Spring administration (n=1107, 18%). There appeared to be a continued need for building peer and student relationships across the later elementary grades.

The third class described for the fifth grade Fall administration analysis is the *Engaged, but Disaffected* class (n=575, 9.3%). For the Spring administration analysis, the *Engaged, but Disaffected* class decreased (n=495, 8.0%). When compared to the fourth grade Spring administration, this class decreased significantly (n=1236, 20%).

The fourth class described for the fifth grade Fall administration analysis was the final undescribed class remaining in the model. The fourth class was described as the *Classroom Relationship Problems* class (n=727, 11.8%). The students in this class had item response probability endorsements that were lowest for Teacher-Student Relationship items, falling between 20-60%. Item endorsement probabilities for Peer and Student Support items ranged from 40-100%, Family Support for Learning items ranged from 90-100%, Future Goals items ranged from 95-100%, and Disaffection items from 0-15%. For the Spring administration analysis, the *Classroom Relationship Problems* class grew (n=823, 13.4%). The class that no longer carried over from fourth to fifth grade was the *Disengaged* class. Potential intervention options that this class might benefit from would include behavioral observation for positive to neutral/reprimand statements, additional rating scales for teacher-student relationship quality, or other classroom behavioral consultation.

The fifth class described for the fifth grade Fall administration analysis was the *Disaffected/Peer Problems* class (n=492, 8.0%). For the Spring administration analysis, the class grew (n=656, 10.6%). When compared to the fourth grade Spring administration analysis, the class appeared to be moving back and forth (n=812, 13.0%).

The final class described for the fifth grade Fall administration analysis was the *Disengaged and Disaffected* class (n=340, 5.6%). For the Spring administration analysis, the *Disengaged and Disaffected* class membership remained roughly the same (n=343, 5.6%). Compared to the fourth grade Spring administration analysis, the *Disengaged and Disaffected* class membership is relatively stable (n=254, 4.1%). Table 4.6 presents proportions of class membership and Figure 4.9 presents an additional visualization of class membership and changes in total class membership over time.

Class transitions. In order to assess the stability of the classes over time cross-sectionally, posterior assigned classes were coded and re-ordered to facilitate organization of demographic information and membership over time. For all timepoints, Class 1 is *Highly Engaged*, Class 2 is *Engaged/Peer Problems*, Class 3 is *Engaged, but Disaffected*, Class 4 is *Disengaged || Classroom Relationship Problems*, Class 5 is *Disaffected/Peer Problems*, and Class 6 is *Disengaged and Disaffected*. Names were used whenever possible for tables, but names were unable to be used when generating the frequency of transition patterns presented in Table 4.7.

There were 899 different class frequency patterns across the four administrations for the six classes in the model. Only patterns with a frequency greater than 25 were reported in the table to keep the format to one page. However, limiting the patterns to those observed by 25 students are more results in only 2,783 students of the 6,164 being described. More than half of the students in the model have transition patterns shared with 24 other students or fewer, suggesting that engagement and disaffection endorsements within students vary significantly even if the means across variables may hold. Additional alluvial graphs of the relationships between each time point and across all four administrations were created to visualize the movement of students from one class to another (see Figures 4.10-4.13).

Each graph demonstrates a range of movement across classes that appear to follow some general patterns that can be observed from each class. When the classes were reorganized, they were ordered by estimates of risk or severity. The general heuristic was that the *Highly Engaged* (e.g., Class 1) class was suspected to have the least likelihood of risk where the *Disengaged and Disaffected* class was suspected to have the greatest likelihood of risk given theoretical rationale. The remaining classes were ordered following that same heuristic, with higher engagement and lower disaffection endorsement likelihoods leading to the class being assigned a number closer to one. While this does not change class assignment or modeling, it is helpful to keep it in mind for visualizing the data and the movement of students from one class to the next.

In general, class membership appeared to change most frequently between adjacent classes, with fewer students moving from the *Highly Engaged* class to the *Disengaged and Disaffected* class and vice versa. Interestingly, the stability of each class appeared to vary dramatically over time. Five students held a pattern for remaining in the *Disengaged and Disaffected* class across all four time points. Two students held a pattern for remaining in the *Disaffected/Peer Problems* class. Only one student remained within the *Disengaged || Classroom Relationship Problems* class. Two students remained within the *Engaged, but Disaffected* class. In contrast, 85 students remained within the *Engaged/Peer Problems* class and 958 students remained in the *Highly Engaged* class. It appears that only the most likely to endorse engagement and least likely to endorse disaffection demonstrate stability and consistency in their class membership over time. While classes appear similarly sized across time points, the reality is that student-level change is far more frequent than expected.

Relationships to Distal Outcomes

Relationships to the distal outcomes of being identified as no risk (e.g., a value of '0'), some risk (e.g., a value of '1'), and at risk (e.g., a value of '2') were described for each time point given the use of a repeated measures LCA approach. Given the different estimation of classes across each time point from an exploratory LCA approach, different classes were held as the reference group for the 3-step regression analysis or a different order of classes were presented depending on the administration. Only the Spring administration of fourth grade ended up with a different reference class. Probabilities, odds ratios (ORs), standard errors, and confidence intervals were reported for each class at each time point, and significant relationships reported according to the reference class from chi-square tests (Tables 4.8-4.23). Figures 4.13-4.17 show the relationships of odds ratios relative to their reference class for attendance, English/Language Arts (ELA), and math risk statuses.

Attendance risk. For the fourth grade Fall administration, student engagement and disaffection classes do not vary significantly in the likelihood of becoming at risk for attendance (Table 4.8). All chi-squared tests between classes and for the overall model are non-significant for the change in risk status explained by class membership. The lowest p-value for chi-squared class comparisons was 0.237, with most values above 0.5. The fourth grade Spring administration held a similar pattern, with non-significant chi-squared tests for all class comparisons and for the overall model (Table 4.12). The lowest p-value was 0.484, with most values above 0.6.

The fifth grade Fall administration also maintained the non-significant p-values for the overall test model and all class comparisons for attendance risk (Table 4.16). The classes that had highest engagement probabilities neared significant values in this model when compared to the class with the lowest engagement and highest disaffection scores, with the *Highly Engaged* class and the *Disengaged and Disaffected* class comparison, p=0.195, and the *Engaged/Peer Problems* and *Disengaged and Disaffected* class comparison, p=0.095, nearing significance compared to fourth grade administrations. Though the overall model was not significant for the fifth grade Spring administration, the relationship for the *Highly Engaged* to *Disengaged and Disaffected* class comparison reached significance, p=0.026 (Table 4.20). The *Engaged/Peer Problems* to *Disengaged and Disaffected* class comparison neared significance at p=0.052. Interestingly, the *Classroom Relationship Problems* to *Disengaged and Disaffected* class comparison also neared significance at p=0.092, which is unexpected as this class has relatively low engagement scores. These classes have some similar trends for teacher-student relationship and peer relationship item endorsement probabilities, but differ on disaffection, cognitive engagement, and family relationship ratings.

Behavior risk. Behavior ratings are largely uninterpretable for the Fall and Spring fourth grade administrations, with data sparseness likely being the culprit. Confidence intervals for the ORs ranged from .012 on the lower bound to 51.901 on the upper bound across risk categories and classes. Standard errors were large and there were cases in each administration where there were values unable to be calculated. Though the outcome data appear better distributed to produce fewer errors in the fifth grade Fall and Spring administrations, there is evidence of unreliable variability across the confidence intervals provided. Therefore, significant overall models and relationships between classes will not be discussed due to suspected unreliability of the data (Tables 4.9, 4.13, 4.17, 4.21).

ELA risk. Academic risk for the overall model and for a significant number of class comparisons are significant for all timepoints and appear to be related to engagement and disaffection classes given the direction of these relationships (Tables 4.10, 4.14, 4.18, 4.22). With the *Disengaged and Disaffected* class set as the reference group and the one expected to have the greatest risk, the ORs for each class meet expectations for being less likely to have an at-risk designation (e.g., ORs are less than 1). The *Highly Engaged* class was significantly less likely to be at-risk compared to all other classes but the *Engaged/Peer Problems* class. To make the *Highly Engaged* OR more interpretable with relation to the *Disengaged and Disaffected* reference class, students in the *Highly Engaged* class during the Fall of their fourth grade year are 9.34 (Reference OR/Case OR, 1/.107 = 9.34) times less likely to have an at-risk designation in ELA at the end of their sixth grade year. The reference class did not significantly differ from the *Disaffected/Peer Problems* or the *Engaged, but Disaffected* classes, but did significantly differ from the *Disengaged* and the *Engaged/Peer Problems* class.

Although most classes appear to have significant or non-significant relationships around their proximity to student disaffection differences (e.g., classes with high engagement endorsement probabilities are more likely to be significant from those with low engagement), the *Engaged/Peer Problems* class was significantly different from the *Disengaged* class. The *Disengaged* class also did not significantly differ from the *Disaffected/Peer Intervention* group. It is possible that there may be more similarities between students who become disaffected and those who are disengaged than currently known, similar to the dual-factor models overlap with psychopathology and well-being. Student engagement and student disaffection also appear to be distinct but related in how they relate to academic outcomes.

For the fourth grade Spring administration, many of the same class comparisons held significance. However, this time the *Disengaged and Disaffected* class was not significantly different in predicting risk than the *Disengaged* group. Notably, the *Disengaged* group had higher endorsements for disaffection than in the Fall administration and compared to the *Classroom Relationship Problems* class that takes its place for the fifth grade administrations. In general, the *Highly Engaged* class remained had stability from the Fall to Spring administrations, but all other classes appeared to be more likely to have an at-risk designation for ELA.

For the fifth grade Fall administration, an unexpected relationship for the likelihood of an at-risk designation in ELA. The *Engaged, but Disaffected* class and the *Classroom Relationship Intervention* class had higher likelihoods of at-risk designations than the *Disengaged and Disaffected* class. The *Engaged, but Disaffected* class comparison did not reach significance at p=0.198, but the *Classroom Relationship Problems* did reach significance between both the *Disengaged and Disaffected* class at p=0.02 and the *Engaged, but Disaffected* class at p=0.02. It does appear that the higher likelihood of the 'some risk' designation contributed to the significant values for the *Classroom Relationship Problems* class, as the *Engaged, but Disaffected* class has a higher likelihood to have an at-risk designation compared to the reference class.

For the fifth grade Spring administration, all relationships returned to their expected relationships as the reference class, *Disengaged and Disaffected* was the most likely class of students to have an at-risk designation. However, an unexpected relationship emerged during this time point. The *Classroom Relationship Problems* class went from being significantly more likely to have an at-risk or a 'some risk' designation to being significantly less likely to have either distinction. This class was not significantly different from the *Highly Engaged* class either. Potential reasons for this change are unknown at this time and may be related to some other information such as relevant demographic covariates or some unknown mediating variable.

Math risk. Consistent with patterns found for ELA risk, the odds ratios for math outcomes for each class compared to the *Disengaged and Disaffected* reference class suggest that being disengaged and disaffected with school in fourth or fifth grade is associated with greater risk for failing math in sixth grade, though class relationships differ across administrations (Tables 4.11, 4.15, 4.19, 4.23). ELA and math risk class comparisons are more alike across the fifth grade administrations than across the fourth grade administrations. The fourth grade Spring administration class comparisons showed fewer significant relationships, though odds ratios for risk designations were still in expected directions.

For the fourth grade Fall administration, most classes were less likely to have a 'some risk' or an at-risk designation than the *Disengaged and Disaffected* reference class. The *Engaged, but Disaffected* class was the only class that did not reach significance from the reference class in chi-squared class comparisons, but that may be due to the 'some risk' designation as the at-risk confidence intervals do not contain the reference class values (95% CI = 0.266,0.952). While the *Engaged, but Disaffected* class did not significantly differ from the *Disaffected/Peer Intervention* class, and the *Engaged/Peer Problems* class did not significantly differ from the *Disengaged* class, all other class comparisons reached significance. Students whose response patterns classified them as members in the *Highly Engaged* class were about 13 times less likely (reference OR/case OR, 1/0.77 = 12.99) to have an at-risk designation than the reference class.

For the fourth grade Spring administration, the *Engaged, but Disaffected* class was the reference class. Significant class comparisons held between the highest engagement and lowest disaffection classes, *Highly Engaged* and *Engaged/Peer Problems* compared to *Disengaged and Disaffected, Disaffected/Peer Problems*, but there were far fewer significant class comparisons between the remaining classes. The *Highly Engaged* class was significantly protective compared to the reference class and the *Disaffected/Peer Problems* class, but not when compared to the *Engaged/Peer Problems* and *Disengaged* classes. The *Disengaged and Disaffected* class was not significantly different compared to the reference, *Disengaged*, and *Disaffected/Peer Problems* classes. The *Highly Engaged* class was about 7 times less likely (*Disengaged and Disaffected* OR/*Highly Engaged* OR, 2.043/. 0279 = 7.32) to have an at-risk designation when compared to the *Disengaged and Disaffected* class.

The fifth grade Fall administration had the *Disengaged and Disaffected* class as the reference class. The *Highly Engaged* and *Engaged/Peer Problems* classes maintained the direction and relative placement regarding ORs compared to the fourth grade administrations and the reference class, but the remaining classes had closer ORs. This produced a similar result to the fourth grade Spring administration where the reference class was not significantly different than many of the other classes. The *Disaffected/Peer Problems* class was significantly less likely to have ‘some risk’ designations compared to the reference, *Classroom Relationship Problems*, and *Engaged, but Disaffected* classes. For this administration, the *Highly Engaged* class was only 3.4 times less likely to be associated with an at-risk designation compared to the reference class.

The fifth grade Spring administration had similar patterns between ELA and math risk, including the unexpected relationship from the *Classroom Relationship Problems* class associated with being protective at similar levels to the *Engaged/Peer Problems* class. These classes had similar probabilities for endorsing positive family relationships, future goals, and for not endorsing student disaffection. They differed by the *Classroom Relationship Problems* having a lower likelihood of endorsing positive teacher-student relationships, but a higher likelihood of endorsing positive peer relationships. The higher risk classes differed by having relatively lower likelihoods of endorsing positive future goals, lower likelihoods of endorsing positive family supports, and higher likelihoods of endorsing disaffection items. However, these item probability patterns and differences between classes were still present in the Fall administration and produced different estimates of risk for sixth grade distal academic outcomes.

Table 4.1 – Number of Missing Values at Each Time Point

Item	Grade 4 Fall	Grade 4 Spring	Grade 5 Fall	Grade 5 Spring	**Row Sum**
FSL1	7	6	3	7	**23**
DIS1	24	25	32	20	**101**
TSR1	26	30	35	32	**123**
PSS1	26	24	20	16	**86**
TSR2	18	13	16	15	**62**
PSS2	25	17	21	21	**84**
PSS3	10	7	9	12	**38**
FG1	18	9	14	14	**55**
DIS2	34	31	20	19	**104**
TSR3	41	27	22	34	**124**
FG2	14	14	12	17	**57**
FSL2	16	15	8	7	**46**
TSR4	17	13	15	12	**57**
PSS4	38	28	15	16	**97**
TSR5	35	31	13	14	**93**
FG3	20	17	19	8	**64**
FG4	21	22	23	18	**84**
FSL3	25	9	14	10	**58**
TSR6	26	16	24	18	**84**
TSR7	18	12	6	7	**43**
PSS5	2	7	7	2	**18**
PSS6	15	14	7	3	**39**
DIS3	27	21	13	14	**75**
DIS4	61	78	50	35	**224**
TSR8	39	44	30	41	**154**
FSL4	15	14	17	8	**54**
FG5	29	21	7	10	**67**
TSR9	33	30	35	30	**128**
Column Sum	**680**	**595**	**507**	**460**	**2242**

Table 4.2 – Sixth Grade Distal Outcome Frequency Prior to Latent Class Analysis

	Attendance	Behavior	ELA	Math
No risk	n=5503	n=6112	n=5432	n=5521
Some risk	n=393	n=24	n=569	n=490
At risk	n=268	n=28	n=163	n=153

Table 4.3 - Results of Latent Class Solutions at Each Time Point

Time 1	G^2	AIC	BIC	ABIC	Entropy	LRT
2-solution	-95225.875	190667.750	191437.842	191078.759	**0.849**	p<0.05
3-solution	-93316.337	186972.673	188116.175	187575.961	0.812	**p<0.05**
4-solution	-92757.162	185968.363	187495.235	186773.890	0.773	p=0.19
5-solution	-92256.325	185080.650	186990.970	186088.495	0.778	p=0.61
6-solution	-91857.068	184396.136	186689.866	185606.230	0.757	p=0.24
7-solution	-91523.696	183843.393	**186520.532**	185255.796	0.766	p=0.14
8-solution	-91292.588	**183495.176**	186555.725	**185109.858**	0.759	p=0.59

Time 2	G^2	AIC	BIC	ABIC	Entropy	LRT
2-solution	-93570.380	187366.761	188126.853	187767.770	**0.877**	p<0.05
3-solution	-91084.282	182508.563	183652.065	183111.851	0.846	p<0.05
4-solution	-90078.018	180610.035	182136.947	181415.602	0.846	**p<0.05**
5-solution	-89462.747	179493.494	181403.815	180501.340	0.811	p=0.15
6-solution	-88964.492	178610.984	180904.714	179821.108	0.801	p=0.09
7-solution	-88547.622	177891.243	180568.383	179303.647	0.792	p=0.06
8-solution	-88202.176	**177314.351**	**180374.900**	**178929.034**	0.787	p=0.08

Time 3	G^2	AIC	BIC	ABIC	Entropy	LRT
2-solution	-87721.886	175669.773	176429.865	176070.782	**0.878**	p<0.05
3-solution	-85402.432	171144.863	172288.365	171748.151	0.844	p<0.05
4-solution	-84414.841	169283.682	170810.593	170089.248	0.849	**p<0.05**
5-solution	-83796.693	168161.385	170071.706	169169.231	0.826	p=0.07
6-solution	-83313.227	167308.454	169602.184	168518.578	0.820	p=0.11
7-solution	-82898.559	166593.117	169270.257	168005.521	0.815	p=0.17
8-solution	-82564.796	**166039.593**	**169100.142**	**167654.275**	0.814	p=0.46

Time 4	G^2	AIC	BIC	ABIC	Entropy	LRT
2-solution	-93157.981	186541.962	187302.054	186942.970	**0.886**	p<0.05
3-solution	-90477.266	181294.531	182438.033	181897.819	0.852	p<0.05
4-solution	-88818.411	178090.822	179617.734	178896.389	0.869	p<0.05
5-solution	-87956.143	176480.286	178390.606	177488.131	0.864	p<0.05
6-solution	-87417.613	175517.226	177810.956	176727.350	0.851	**p<0.05**
7-solution	-87005.884	174807.768	177484.908	176220.171	0.855	p=0.08
8-solution	-86651.269	**174212.538**	**177273.086**	**175827.220**	0.850	p=0.77

Note: Bolded values represent the best fit. G^2 = log-likelihood, AIC = Akaike Information Criteria, BIC = Bayesian Information Criteria, ABIC = Sample-adjusted Bayesian Information Criteria, LRT = Vuong-Lo-Mendell-Rubin Likelihood Ratio Test

Table 4.4 – Significant Bivariate Residual Covariances

Item 1	Item 2	Pearson Chi-Sq (>30)
FSL1	FSL2	104.8
FSL1	FSL4	106
FSL1	FG5	40.8
DIS1	DIS2	85.8
DIS1	DIS3	67.9
DIS1	DIS4	124.4
DIS1	FG5	44.3
TSR1	TSR2	45.8
TSR1	TSR4	50.2
TSR1	TSR5	32.4
TSR1	TSR9	57.7
PSS1	PSS2	157.3
PSS1	PSS3	47.1
PSS1	PSS4	92.9
PSS1	PSS5	97.7
PSS1	PSS6	74.4
TSR2	TSR3	73.8
TSR2	TSR5	38.1
TSR2	TSR6	72.5
TSR2	TSR9	41.6
PSS2	PSS3	148.1
PSS2	PSS4	84.2
PSS2	PSS5	65.3
PSS2	PSS6	56.7
PSS3	TSR5	124
PSS3	PSS5	50.6
FG1	FG2	104.9
FG1	FG3	62.3
FG1	FG4	402.6
FG1	FG5	53.2
DIS2	DIS3	37
DIS2	DIS4	93.1
TSR3	TSR6	89.1
TSR3	TSR8	56.9
FG2	FG3	423.4
FG2	FG4	168.5
FG2	FG5	37.5
FSL2	FSL3	221.1
FSL2	FSL4	98.2
TSR4	TSR5	31.7
TSR4	TSR7	61.8
TSR4	TSR9	46.2
PSS4	PSS5	36.1
TSR5	TSR6	31.9
TSR5	TSR9	42.1
FG3	FG4	101
FG3	FG5	42.4
FG4	FSL4	35
FG4	FG5	48.1
FSL3	FSL4	181.8
TSR6	TSR8	30.1
TSR6	TSR9	91.5
TSR7	TSR8	33.4
PSS5	PSS6	274.7
PSS6	FG5	45.9
DIS3	DIS4	97.1
DIS3	TSR8	64.9

Table 4.5 – Class Membership Across Timepoints

Class Membership for 2-class to 8-class for Fourth Grade Fall Administration (n=6164)

	2-class	3-class	4-class	5-class	6-class	7-class	8-class
Class 1	n=4032	n=2680	n=1478	n=2524	n=1035	n=451	n=334
Class 2	n=2132	n=2621	n=1188	n=397	n=2238	n=300	n=883
Class 3	x	n=863	n=2795	n=788	n=1473	n=1413	n=521
Class 4	x	x	n=703	n=1816	n=622	n=394	n=565
Class 5	x	x	x	n=639	n=473	n=2223	n=2212
Class 6	x	x	x	X	n=323	n=355	n=195
Class 7	x	x	x	X	x	n=1028	n=1144
Class 8	x	x	x	X	x	x	n=310

Class Membership for 2-class to 8-class for Fourth Grade Spring Administration (n=6164)

	2-class	3-class	4-class	5-class	6-class	7-class	8-class
Class 1	n=4021	n=2586	n=2155	n=688	n=812	n=1253	n=433
Class 2	n=2143	n=2716	n=541	n=2079	n=2332	n=1145	n=569
Class 3	x	n=862	n=718	n=2180	n=254	n=2083	n=928
Class 4	x	x	n=2750	n=881	n=1107	n=343	n=2042
Class 5	x	x	x	n=336	n=423	n=367	n=528
Class 6	x	x	x	X	n=1236	n=713	n=234
Class 7	x	x	x	X	x	n=260	n=1190
Class 8	x	x	x	X	x	x	n=240

Class Membership for 2-class to 8-class for Fifth Grade Fall Administration (n=6164)

	2-class	3-class	4-class	5-class	6-class	7-class	8-class
Class 1	n=2006	n=3029	n=1849	n=2758	n=2760	n=2642	n=653
Class 2	n=4158	n=2314	n=3073	n=896	n=1270	n=765	n=1137
Class 3	x	n=821	n=504	n=1637	n=575	n=510	n=576
Class 4	x	x	n=738	n=331	n=727	n=373	n=343
Class 5	x	x	x	n=542	n=492	n=1142	n=448
Class 6	x	x	x	X	n=340	n=534	n=2567
Class 7	x	x	x	X	x	n=198	n=243
Class 8	x	x	x	X	x	x	n=197

Class Membership for 2-class to 8-class for Fifth Grade Spring Administration (n=6164)

	2-class	3-class	4-class	5-class	6-class	7-class	8-class
Class 1	n=3997	n=2007	n=2867	n=2670	n=2623	n=432	n=361
Class 2	n=2167	n=2895	n=1064	n=1053	n=1224	n=663	n=2540
Class 3	x	n=1262	n=1529	n=1401	n=495	n=207	n=183
Class 4	x	x	n=704	n=349	n=823	n=751	n=696
Class 5	x	x	x	n=691	n=656	n=1169	n=444
Class 6	x	x	x	x	n=343	n=322	n=437
Class 7	x	x	x	x	x	n=2620	n=303
Class 8	x	x	x	x	x	x	n=1200

Table 4.6 – Proportions of Class Membership for Each Administration

Classes	Fourth Grade Fall	Fourth Grade Spring	Fifth Grade Fall	Fifth Grade Spring
Highly Engaged	36.31%	37.83%	44.78%	42.55%
Engaged/Peer Problems	23.90%	17.96%	20.60%	19.86%
Engaged, but Disaffected	16.79%	20.05%	9.33%	8.03%
Disengaged* || Classroom Relationship Problems**	10.09%*	6.86%*	11.79%**	13.35%**
Disaffected/Peer Problems	7.67%	13.17%	7.98%	10.64%
Disengaged and Disaffected	5.24%	4.12%	5.52%	5.56%

|| - Signifies a change in class designation over time.

Table 4.7 – Class Membership Cross-sectional Transition Frequencies

Fourth Grade Fall	Fourth Grade Spring	Fifth Grade Fall	Fifth Grade Spring	Frequency
1	1	1	1	958
2	1	1	1	207
3	1	1	1	125
1	1	1	2	117
2	2	1	1	96
1	3	1	1	94
2	2	2	2	85
1	2	1	1	84
1	1	2	1	83
2	3	1	1	69
1	1	1	4	68
1	2	2	2	52
3	3	1	1	45
2	1	1	2	43
2	2	2	1	43
1	1	2	2	40
2	1	2	1	39
2	1	2	2	39
3	2	1	1	37
3	3	4	3	35
1	1	5	1	34
1	2	1	2	33
1	2	2	1	33
1	1	5	4	31
2	5	2	2	30
2	4	5	4	29
3	3	2	2	28
3	2	2	2	27
2	2	1	2	26
4	3	1	1	26
5	5	6	5	26
1	3	1	2	25
2	1	1	4	25
4	3	5	4	25
5	5	2	2	25

Table 4.8 - Fourth Grade Fall Attendance Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Engaged, but Disaffected						
No risk	0.892	0.014	1	0	1	1
Some risk	0.067	0.01	1.667	0.761	0.682	4.077
At risk	0.041	0.01	0.794	0.278	0.4	1.578
Highly Engaged						
No risk	0.899	0.007	1	0	1	1
Some risk	0.064	0.006	1.583	0.687	0.676	3.708
At risk	0.036	0.005	0.701	0.225	0.374	1.314
Engaged/Peer Problems						
No risk	0.893	0.011	1	0	1	1
Some risk	0.06	0.008	1.495	0.664	0.626	3.57
At risk	0.047	0.007	0.908	0.306	0.469	1.759
Disengaged						
No risk	0.869	0.024	1	0	1	1
Some risk	0.073	0.014	1.851	0.969	0.663	5.166
At risk	0.058	0.018	1.157	0.585	0.43	3.115
Disaffected/Peer Problems						
No risk	0.89	0.021	1	0	1	1
Some risk	0.065	0.014	1.622	0.801	0.617	4.269
At risk	0.044	0.014	0.86	0.355	0.383	1.93
Disengaged and Disaffected						
No risk	0.906	0.022	1	0	1	1
Some risk	0.041	0.017	1	0	1	1
At risk	0.052	0.015	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			6.083	0.808	10
Engaged, but Disaffected	vs.	Highly Engaged	0.232	0.891	2
Engaged, but Disaffected	vs.	Engaged/Peer Problems	0.409	0.815	2
Engaged, but Disaffected	vs.	Disengaged	0.575	0.75	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	0.061	0.97	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	2.178	0.337	2
Highly Engaged	vs.	Engaged/Peer Problems	1.428	0.49	2
Highly Engaged	vs.	Disengaged	1.541	0.463	2
Highly Engaged	vs.	Disaffected/Peer Problems	0.286	0.867	2
Highly Engaged	vs.	Disengaged and Disaffected	2.881	0.237	2
Engaged/Peer Problems	vs.	Disengaged	0.812	0.666	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	0.114	0.945	2
Engaged/Peer Problems	vs.	Disengaged and Disaffected	1.221	0.543	2
Disengaged	vs.	Disaffected/Peer Problems	0.316	0.854	2
Disengaged	vs.	Disengaged and Disaffected	1.704	0.426	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	1.276	0.528	2

Table 4.9 - Fourth Grade Fall Behavior Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Engaged, but Disaffected						
No risk	0.998	0.003	1	0	1	1
Some risk	0.002	0.003	0.654	1.334	0.012	35.553
At risk	0	0	0	0	0	*******
Highly Engaged						
No risk	0.995	0.002	1	0	1	1
Some risk	0.002	0.001	0.568	0.795	0.036	8.842
At risk	0.004	0.001	0.57	0.544	0.088	3.699
Engaged/Peer Problems						
No risk	0.988	0.003	1	0	1	1
Some risk	0.007	0.003	2.434	3.059	0.207	28.587
At risk	0.006	0.002	0.926	0.872	0.146	5.863
Disengaged						
No risk	0.984	0.006	1	0	1	1
Some risk	0.006	0.003	2.027	2.683	0.152	27.12
At risk	0.01	0.005	1.641	1.632	0.234	11.524
Disaffected/Peer Problems						
No risk	0.984	0.008	1	0	1	1
Some risk	0.009	0.006	3.335	4.671	0.214	51.901
At risk	0.007	0.005	1.151	1.405	0.105	12.601
Disengaged and Disaffected						
No risk	0.991	0.006	1	0	1	1
Some risk	0.003	0.003	1	0	1	1
At risk	0.006	0.005	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			32.142	**0**	10
Engaged, but Disaffected	vs.	Highly Engaged	6.328	0.042	2
Engaged, but Disaffected	**vs.**	**Engaged/Peer Problems**	7.47	**0.024**	2
Engaged, but Disaffected	vs.	Disengaged	4.809	0.09	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	3.435	0.179	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	1.397	0.497	2
Highly Engaged	vs.	Engaged/Peer Problems	3.604	0.165	2
Highly Engaged	vs.	Disengaged	2.872	0.238	2
Highly Engaged	vs.	Disaffected/Peer Problems	2.193	0.334	2
Highly Engaged	vs.	Disengaged and Disaffected	0.336	0.846	2
Engaged/Peer Problems	vs.	Disengaged	0.732	0.693	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	0.209	0.901	2
Engaged/Peer Problems	vs.	Disengaged and Disaffected	0.874	0.646	2
Disengaged	vs.	Disaffected/Peer Problems	0.452	0.798	2
Disengaged	vs.	Disengaged and Disaffected	0.622	0.733	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	0.842	0.656	2

Table 4.10 - Fourth Grade Fall ELA Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Engaged, but Disaffected						
No risk	0.726	0.026	1	0	1	1
Some risk	0.225	0.023	1.507	0.345	0.962	2.36
At risk	0.049	0.009	0.699	0.24	0.357	1.368
Highly Engaged						
No risk	0.951	0.007	1	0	1	1
Some risk	0.04	0.006	0.203	0.047	0.129	0.318
At risk	0.01	0.003	0.107	0.045	0.047	0.243
Engaged/Peer Problems						
No risk	0.943	0.011	1	0	1	1
Some risk	0.044	0.009	0.229	0.065	0.132	0.398
At risk	0.013	0.005	0.14	0.062	0.059	0.334
Disengaged						
No risk	0.88	0.023	1	0	1	1
Some risk	0.078	0.018	0.428	0.141	0.224	0.816
At risk	0.042	0.013	0.496	0.245	0.189	1.304
Disaffected/Peer Problems						
No risk	0.822	0.025	1	0	1	1
Some risk	0.141	0.022	0.831	0.225	0.49	1.412
At risk	0.037	0.011	0.474	0.2	0.207	1.082
Disengaged and Disaffected						
No risk	0.768	0.027	1	0	1	1
Some risk	0.158	0.024	1	0	1	1
At risk	0.074	0.019	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			151.253	**0**	10
Engaged, but Disaffected	**vs.**	**Highly Engaged**	67.201	**0**	2
Engaged, but Disaffected	**vs.**	**Engaged/Peer Problems**	62.917	**0**	2
Engaged, but Disaffected	**vs.**	**Disengaged**	25.071	**0**	2
Engaged, but Disaffected	**vs.**	**Disaffected/Peer Problems**	6.532	**0.038**	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	5.18	0.075	2
Highly Engaged	vs.	Engaged/Peer Problems	0.432	0.806	2
Highly Engaged	**vs.**	**Disengaged**	9.386	**0.009**	2
Highly Engaged	vs.	Disaffected/Peer Problems	22.747	**0**	2
Highly Engaged	vs.	Disengaged and Disaffected	42.669	**0**	2
Engaged/Peer Problems	**vs.**	**Disengaged**	6.473	**0.039**	2
Engaged/Peer Problems	**vs.**	**Disaffected/Peer Problems**	19.375	**0**	2
Engaged/Peer Problems	**vs.**	**Disengaged and Disaffected**	36.762	**0**	2
Disengaged	vs.	Disaffected/Peer Problems	5.25	0.072	2
Disengaged	**vs.**	**Disengaged and Disaffected**	9.614	**0.008**	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	3.316	0.19	2

Table 4.11 - Fourth Grade Fall Math Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Engaged, but Disaffected						
No risk	0.792	0.024	1	0	1	1
Some risk	0.166	0.022	0.921	0.217	0.581	1.461
At risk	0.042	0.009	0.503	0.164	0.266	0.952
Highly Engaged						
No risk	0.955	0.006	1	0	1	1
Some risk	0.037	0.005	0.169	0.039	0.108	0.267
At risk	0.008	0.002	0.077	0.031	0.035	0.17
Engaged/Peer Problems						
No risk	0.928	0.01	1	0	1	1
Some risk	0.05	0.008	0.235	0.058	0.145	0.381
At risk	0.023	0.006	0.232	0.08	0.119	0.455
Disengaged						
No risk	0.908	0.02	1	0	1	1
Some risk	0.06	0.018	0.292	0.108	0.142	0.602
At risk	0.032	0.011	0.338	0.147	0.144	0.792
Disaffected/Peer Problems						
No risk	0.838	0.024	1	0	1	1
Some risk	0.138	0.022	0.723	0.18	0.444	1.177
At risk	0.024	0.009	0.274	0.133	0.106	0.71
Disengaged and Disaffected						
No risk	0.751	0.028	1	0	1	1
Some risk	0.171	0.024	1	0	1	1
At risk	0.078	0.017	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			122.985	**0**	10
Engaged, but Disaffected	**vs.**	**Highly Engaged**	40.024	**0**	2
Engaged, but Disaffected	**vs.**	**Engaged/Peer Problems**	25.221	**0**	2
Engaged, but Disaffected	**vs.**	**Disengaged**	12.775	**0.002**	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	2.56	0.278	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	3.92	0.141	2
Highly Engaged	**vs.**	**Engaged/Peer Problems**	7.126	**0.028**	2
Highly Engaged	**vs.**	**Disengaged**	7.578	**0.023**	2
Highly Engaged	**vs.**	**Disaffected/Peer Problems**	22.285	**0**	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	51.491	**0**	2
Engaged/Peer Problems	vs.	Disengaged	0.889	0.641	2
Engaged/Peer Problems	**vs.**	**Disaffected/Peer Problems**	14.176	**0.001**	2
Engaged/Peer Problems	**vs.**	**Disengaged and Disaffected**	36.057	**0**	2
Disengaged	**vs.**	**Disaffected/Peer Problems**	7	**0.03**	2
Disengaged	**vs.**	**Disengaged and Disaffected**	20.771	**0**	2
Disaffected/Peer Problems	**vs.**	**Disengaged and Disaffected**	9.051	**0.011**	2

Table 4.12 – Fourth Grade Spring Attendance Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Disaffected/Peer Problems						
No risk	0.892	0.013	1	0	1	1
Some risk	0.061	0.01	1.022	0.247	0.636	1.642
At risk	0.047	0.009	0.956	0.262	0.559	1.635
Highly Engaged						
No risk	0.894	0.007	1	0	1	1
Some risk	0.064	0.006	1.067	0.198	0.742	1.534
At risk	0.042	0.005	0.836	0.197	0.527	1.328
Disengaged and Disaffected						
No risk	0.857	0.031	1	0	1	1
Some risk	0.088	0.024	1.531	0.513	0.794	2.951
At risk	0.055	0.018	1.163	0.442	0.552	2.451
Engaged/Peer Problems						
No risk	0.896	0.011	1	0	1	1
Some risk	0.065	0.009	1.081	0.252	0.684	1.707
At risk	0.039	0.008	0.781	0.238	0.43	1.418
Disengaged						
No risk	0.905	0.02	1	0	1	1
Some risk	0.061	0.015	1	0.307	0.548	1.825
At risk	0.034	0.011	0.674	0.283	0.296	1.534
Engaged, but Disaffected						
No risk	0.891	0.012	1	0	1	1
Some risk	0.06	0.008	1	0	1	1
At risk	0.049	0.008	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			2.498	0.991	10
Disaffected/Peer Problems	vs.	Highly Engaged	0.355	0.837	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	1.069	0.586	2
Disaffected/Peer Problems	vs.	Engaged/Peer Problems	0.457	0.796	2
Disaffected/Peer Problems	vs.	Disengaged	0.76	0.684	2
Disaffected/Peer Problems	vs.	Engaged, but Disaffected	0.036	0.982	2
Highly Engaged	vs.	Disengaged and Disaffected	1.388	0.5	2
Highly Engaged	vs.	Engaged/Peer Problems	0.088	0.957	2
Highly Engaged	vs.	Disengaged	0.418	0.811	2
Highly Engaged	vs.	Engaged, but Disaffected	0.723	0.697	2
Disengaged and Disaffected	vs.	Engaged/Peer Problems	1.452	0.484	2
Disengaged and Disaffected	vs.	Disengaged	1.32	0.517	2
Disengaged and Disaffected	vs.	Engaged, but Disaffected	1.313	0.519	2
Engaged/Peer Problems	vs.	Disengaged	0.185	0.912	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	0.798	0.671	2
Disengaged	vs.	Engaged, but Disaffected	1.095	0.578	2

Table 4.13 - Fourth Grade Spring Behavior Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Disaffected/Peer Problems						
No risk	0.982	0.006	1	0	1	1
Some risk	0.007	0.003	1.662	1.787	0.202	13.674
At risk	0.012	0.005	11.528	29.194	0.081	*******
Highly Engaged						
No risk	0.995	0.002	1	0	1	1
Some risk	0.002	0.001	0.528	0.529	0.074	3.756
At risk	0.003	0.001	2.848	7.342	0.018	445.528
Disengaged and Disaffected						
No risk	0.983	0.011	1	0	1	1
Some risk	0.007	0.005	1.876	2.026	0.226	15.58
At risk	0.009	0.01	9.115	25.576	0.037	*******
Engaged/Peer Problems						
No risk	0.996	0.003	1	0	1	1
Some risk	0.003	0.002	0.653	0.865	0.049	8.74
At risk	0.001	0.001	1.212	3.486	0.004	340.267
Disengaged						
No risk	0.975	0.009	1	0	1	1
Some risk	0.009	0.006	2.281	2.991	0.175	29.795
At risk	0.016	0.008	16.054	40.113	0.12	*******
Engaged, but Disaffected						
No risk	0.995	0.005	1	0	1	1
Some risk	0.004	0.003	1	0	1	1
At risk	0.001	0.002	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			15.493	0.115	10
Disaffected/Peer Problems	vs.	Highly Engaged	5.163	0.076	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	0.054	0.974	2
Disaffected/Peer Problems	vs.	Engaged/Peer Problems	5.543	0.063	2
Disaffected/Peer Problems	vs.	Disengaged	0.423	0.809	2
Disaffected/Peer Problems	vs.	Engaged, but Disaffected	3.754	0.153	2
Highly Engaged	vs.	Disengaged and Disaffected	1.465	0.481	2
Highly Engaged	vs.	Engaged/Peer Problems	0.925	0.63	2
Highly Engaged	vs.	Disengaged	4.975	0.083	2
Highly Engaged	vs.	Engaged, but Disaffected	0.803	0.669	2
Disengaged and Disaffected	vs.	Engaged/Peer Problems	1.54	0.463	2
Disengaged and Disaffected	vs.	Disengaged	0.328	0.849	2
Disengaged and Disaffected	vs.	Engaged, but Disaffected	0.853	0.653	2
Engaged/Peer Problems	vs.	Disengaged	5.358	0.069	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	0.116	0.944	2
Disengaged	vs.	Engaged, but Disaffected	4.198	0.123	2

******* indicates that a value could not be calculated due to sparseness of data

Table 4.14 - Fourth Grade Spring ELA Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Disaffected/Peer Problems						
No risk	0.805	0.024	1	0	1	1
Some risk	0.15	0.019	1.017	0.239	0.642	1.612
At risk	0.045	0.01	0.905	0.295	0.477	1.716
Highly Engaged						
No risk	0.946	0.008	1	0	1	1
Some risk	0.048	0.007	0.279	0.08	0.159	0.489
At risk	0.006	0.002	0.102	0.047	0.041	0.252
Disengaged and Disaffected						
No risk	0.778	0.03	1	0	1	1
Some risk	0.172	0.026	1.208	0.289	0.756	1.931
At risk	0.05	0.018	1.024	0.467	0.419	2.504
Engaged/Peer Problems						
No risk	0.933	0.015	1	0	1	1
Some risk	0.051	0.011	0.296	0.101	0.151	0.578
At risk	0.017	0.007	0.287	0.165	0.093	0.884
Disengaged						
No risk	0.868	0.024	1	0	1	1
Some risk	0.098	0.02	0.616	0.204	0.321	1.181
At risk	0.034	0.01	0.624	0.259	0.277	1.409
Engaged, but Disaffected						
No risk	0.803	0.027	1	0	1	1
Some risk	0.147	0.021	1	0	1	1
At risk	0.05	0.009	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			110.936	**0**	10
Disaffected/Peer Problems	**vs.**	**Highly Engaged**	28.941	**0**	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	0.472	0.79	2
Disaffected/Peer Problems	**vs.**	**Engaged/Peer Problems**	19.815	**0**	2
Disaffected/Peer Problems	vs.	Disengaged	2.83	0.243	2
Disaffected/Peer Problems	vs.	Engaged, but Disaffected	0.156	0.925	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	28.667	**0**	2
Highly Engaged	vs.	Engaged/Peer Problems	2.199	0.333	2
Highly Engaged	**vs.**	**Disengaged**	13.185	**0.001**	2
Highly Engaged	**vs.**	**Engaged, but Disaffected**	23.443	**0**	2
Disengaged and Disaffected	**vs.**	**Engaged/Peer Problems**	21.677	**0**	2
Disengaged and Disaffected	vs.	Disengaged	5.335	0.069	2
Disengaged and Disaffected	vs.	Engaged, but Disaffected	0.629	0.73	2
Engaged/Peer Problems	**vs.**	**Disengaged**	6.865	**0.032**	2
Engaged/Peer Problems	**vs.**	**Engaged, but Disaffected**	13.156	**0.001**	2
Disengaged	vs.	Engaged, but Disaffected	2.473	0.29	2

Table 4.15 – Fourth Grade Spring Math Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Disaffected/Peer Problems						
No risk	0.834	0.017	1	0	1	1
Some risk	0.119	0.015	1.12	0.269	0.699	1.793
At risk	0.047	0.009	1.514	0.47	0.824	2.781
Highly Engaged						
No risk	0.948	0.007	1	0	1	1
Some risk	0.042	0.006	0.346	0.109	0.187	0.641
At risk	0.01	0.002	0.279	0.101	0.137	0.566
Disengaged and Disaffected						
No risk	0.791	0.035	1	0	1	1
Some risk	0.149	0.027	1.469	0.355	0.915	2.36
At risk	0.06	0.018	2.043	0.743	1.001	4.168
Engaged/Peer Problems						
No risk	0.917	0.02	1	0	1	1
Some risk	0.066	0.018	0.56	0.253	0.23	1.359
At risk	0.018	0.006	0.518	0.24	0.209	1.283
Disengaged						
No risk	0.875	0.035	1	0	1	1
Some risk	0.093	0.025	0.83	0.386	0.334	2.063
At risk	0.033	0.014	0.998	0.553	0.337	2.956
Engaged, but Disaffected						
No risk	0.858	0.022	1	0	1	1
Some risk	0.11	0.02	1	0	1	1
At risk	0.032	0.007	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			105.652	**0**	10
Disaffected/Peer Problems	**vs.**	**Highly Engaged**	37.467	**0**	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	1.218	0.544	2
Disaffected/Peer Problems	**vs.**	**Engaged/Peer Problems**	10.615	**0.005**	2
Disaffected/Peer Problems	vs.	Disengaged	1.026	0.599	2
Disaffected/Peer Problems	vs.	Engaged, but Disaffected	1.78	0.411	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	17.04	**0**	2
Highly Engaged	vs.	Engaged/Peer Problems	3.154	0.207	2
Highly Engaged	vs.	Disengaged	5.262	0.072	2
Highly Engaged	**vs.**	**Engaged, but Disaffected**	13.493	**0.001**	2
Disengaged and Disaffected	**vs.**	**Engaged/Peer Problems**	8.02	**0.018**	2
Disengaged and Disaffected	vs.	Disengaged	1.842	0.398	2
Disengaged and Disaffected	vs.	Engaged, but Disaffected	4.581	0.101	2
Engaged/Peer Problems	vs.	Disengaged	1.871	0.392	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	2.998	0.223	2
Disengaged	vs.	Engaged, but Disaffected	0.295	0.863	2

Table 4.16 – Fifth Grade Fall Attendance Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.898	0.006	1	0	1	1
Some risk	0.061	0.005	1.04	0.257	0.64	1.688
At risk	0.041	0.004	0.62	0.145	0.393	0.979
Engaged/Peer Problems						
No risk	0.889	0.011	1	0	1	1
Some risk	0.074	0.009	1.279	0.346	0.752	2.172
At risk	0.037	0.007	0.567	0.161	0.324	0.991
Engaged, but Disaffected						
No risk	0.908	0.018	1	0	1	1
Some risk	0.054	0.014	0.916	0.349	0.434	1.931
At risk	0.038	0.012	0.571	0.229	0.26	1.251
Classroom Relationship Problems						
No risk	0.884	0.019	1	0	1	1
Some risk	0.064	0.014	1.119	0.387	0.568	2.205
At risk	0.052	0.012	0.804	0.265	0.421	1.533
Disaffected/Peer Problems						
No risk	0.889	0.014	1	0	1	1
Some risk	0.065	0.011	1.123	0.338	0.623	2.025
At risk	0.046	0.009	0.714	0.212	0.399	1.276
Disengaged and Disaffected						
No risk	0.879	0.018	1	0	1	1
Some risk	0.057	0.012	1	0	1	1
At risk	0.064	0.013	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			7.158	0.71	10
Highly Engaged	vs.	Engaged/Peer Problems	1.752	0.417	2
Highly Engaged	vs.	Engaged, but Disaffected	0.261	0.878	2
Highly Engaged	vs.	Classroom Relationship	0.811	0.667	2
Highly Engaged	vs.	Disaffected/Peer Problems	0.469	0.791	2
Highly Engaged	vs.	Disengaged and Disaffected	3.269	0.195	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	1.399	0.497	2
Engaged/Peer Problems	vs.	Classroom Relationship	1.45	0.484	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	1.038	0.595	2
Engaged/Peer Problems	vs.	Disengaged and Disaffected	4.704	0.095	2
Engaged, but Disaffected	vs.	Classroom Relationship	0.993	0.609	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	0.681	0.711	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	2.164	0.339	2
Classroom Relationship	vs.	Disaffected/Peer Problems	0.135	0.935	2
Classroom Relationship	vs.	Disengaged and Disaffected	0.667	0.716	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	1.479	0.477	2

Table 4.17 - Fifth Grade Fall Behavior Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.995	0.002	1	0	1	1
Some risk	0.002	0.001	0.279	0.222	0.059	1.33
At risk	0.003	0.001	0.305	0.203	0.083	1.127
Engaged/Peer Problems						
No risk	0.992	0.003	1	0	1	1
Some risk	0.005	0.002	0.72	0.562	0.156	3.32
At risk	0.002	0.002	0.242	0.22	0.041	1.438
Engaged, but Disaffected						
No risk	0.971	0.013	1	0	1	1
Some risk	0.008	0.013	1.087	1.97	0.031	37.929
At risk	0.021	0.008	2.321	1.542	0.631	8.536
Classroom Relationship Problems						
No risk	0.997	0.003	1	0	1	1
Some risk	0.003	0.003	0.397	0.531	0.029	5.466
At risk	0	0	0	0	0	0.067
Disaffected/Peer Problems						
No risk	0.987	0.009	1	0	1	1
Some risk	0.005	0.008	0.615	1.193	0.014	27.514
At risk	0.008	0.004	0.918	0.644	0.232	3.629
Disengaged and Disaffected						
No risk	0.984	0.007	1	0	1	1
Some risk	0.007	0.005	1	0	1	1
At risk	0.009	0.005	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			32.507	**0**	10
Highly Engaged	vs.	Engaged/Peer Problems	1.832	0.4	2
Highly Engaged	vs.	Engaged, but Disaffected	5.774	0.056	2
Highly Engaged	vs.	Classroom Relationship	5.635	0.06	2
Highly Engaged	vs.	Disaffected/Peer Problems	2.044	0.36	2
Highly Engaged	vs.	Disengaged and Disaffected	2.816	0.245	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	5.457	0.065	2
Engaged/Peer Problems	vs.	Classroom Relationship	2.352	0.309	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	2.281	0.32	2
Engaged/Peer Problems	vs.	Disengaged and Disaffected	2.002	0.367	2
Engaged, but Disaffected	**vs.**	**Classroom Relationship**	**7.363**	**0.025**	**2**
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	2.149	0.341	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	1.575	0.455	2
Classroom Relationship	vs.	Disaffected/Peer Problems	4.995	0.082	2
Classroom Relationship	vs.	Disengaged and Disaffected	4.239	0.12	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	0.101	0.951	2

Table 4.18 - Fifth Grade Fall ELA Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.935	0.008	1	0	1	1
Some risk	0.053	0.006	0.363	0.072	0.246	0.535
At risk	0.012	0.003	0.253	0.095	0.122	0.527
Engaged/Peer Problems						
No risk	0.904	0.015	1	0	1	1
Some risk	0.077	0.013	0.542	0.13	0.338	0.868
At risk	0.02	0.006	0.44	0.183	0.195	0.995
Engaged, but Disaffected						
No risk	0.8	0.026	1	0	1	1
Some risk	0.123	0.021	0.983	0.259	0.586	1.649
At risk	0.077	0.016	1.958	0.753	0.922	4.16
Classroom Relationship Problems						
No risk	0.735	0.027	1	0	1	1
Some risk	0.206	0.022	1.792	0.381	1.181	2.718
At risk	0.059	0.012	1.634	0.617	0.78	3.424
Disaffected/Peer Problems						
No risk	0.873	0.016	1	0	1	1
Some risk	0.104	0.014	0.757	0.167	0.492	1.166
At risk	0.023	0.008	0.546	0.245	0.226	1.315
Disengaged and Disaffected						
No risk	0.829	0.02	1	0	1	1
Some risk	0.13	0.017	1	0	1	1
At risk	0.041	0.011	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			129.626	**0**	10
Highly Engaged	vs.	Engaged/Peer Problems	4.65	0.098	2
Highly Engaged	**vs.**	**Engaged, but Disaffected**	27.029	**0**	2
Highly Engaged	**vs.**	**Classroom Relationship**	57.441	**0**	2
Highly Engaged	**vs.**	**Disaffected/Peer Problems**	12.079	**0.002**	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	23.766	**0**	2
Engaged/Peer Problems	**vs.**	**Engaged, but Disaffected**	14.614	**0.001**	2
Engaged/Peer Problems	**vs.**	**Classroom Relationship**	28.988	**0**	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	1.903	0.386	2
Engaged/Peer Problems	**vs.**	**Disengaged and Disaffected**	8.652	**0.013**	2
Engaged, but Disaffected	**vs.**	**Classroom Relationship**	7.788	**0.02**	2
Engaged, but Disaffected	**vs.**	**Disaffected/Peer Problems**	10.463	**0.005**	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	3.24	0.198	2
Classroom Relationship	**vs.**	**Disaffected/Peer Problems**	17.382	**0**	2
Classroom Relationship	**vs.**	**Disengaged and Disaffected**	7.796	**0.02**	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	2.941	0.23	2

Table 4.19 - Fifth Grade Fall Math Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.938	0.007	1	0	1	1
Some risk	0.049	0.006	0.338	0.068	0.228	0.501
At risk	0.013	0.002	0.294	0.097	0.155	0.56
Engaged/Peer Problems						
No risk	0.902	0.016	1	0	1	1
Some risk	0.076	0.013	0.553	0.136	0.342	0.894
At risk	0.022	0.006	0.508	0.195	0.239	1.08
Engaged, but Disaffected						
No risk	0.779	0.028	1	0	1	1
Some risk	0.164	0.023	1.373	0.333	0.853	2.21
At risk	0.057	0.015	1.534	0.646	0.671	3.503
Classroom Relationship Problems						
No risk	0.815	0.021	1	0	1	1
Some risk	0.151	0.018	1.206	0.26	0.791	1.841
At risk	0.034	0.01	0.882	0.369	0.388	2.002
Disaffected/Peer Problems						
No risk	0.908	0.014	1	0	1	1
Some risk	0.054	0.012	0.388	0.107	0.226	0.667
At risk	0.038	0.008	0.867	0.318	0.422	1.778
Disengaged and Disaffected						
No risk	0.833	0.02	1	0	1	1
Some risk	0.128	0.017	1	0	1	1
At risk	0.04	0.01	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			100.203	**0**	10
Highly Engaged	vs.	Engaged/Peer Problems	5.965	0.051	2
Highly Engaged	**vs.**	**Engaged, but Disaffected**	29.985	**0**	2
Highly Engaged	**vs.**	**Classroom Relationship**	28.981	**0**	2
Highly Engaged	**vs.**	**Disaffected/Peer Problems**	8.198	**0.017**	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	26.595	**0**	2
Engaged/Peer Problems	**vs.**	**Engaged, but Disaffected**	13.033	**0.001**	2
Engaged/Peer Problems	**vs.**	**Classroom Relationship**	9.688	**0.008**	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	4.122	0.127	2
Engaged/Peer Problems	**vs.**	**Disengaged and Disaffected**	8.222	**0.016**	2
Engaged, but Disaffected	vs.	Classroom Relationship	1.781	0.41	2
Engaged, but Disaffected	**vs.**	**Disaffected/Peer Problems**	20.101	**0**	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	2.162	0.339	2
Classroom Relationship	**vs.**	**Disaffected/Peer Problems**	18.322	**0**	2
Classroom Relationship	vs.	Disengaged and Disaffected	0.986	0.611	2
Disaffected/Peer Problems	**vs.**	**Disengaged and Disaffected**	12.462	**0.002**	2

Table 4.20 - Fifth Grade Spring Attendance Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.902	0.006	1	0	1	1
Some risk	0.059	0.005	0.644	0.154	0.404	1.028
At risk	0.039	0.004	0.499	0.123	0.308	0.811
Engaged/Peer Problems						
No risk	0.899	0.01	1	0	1	1
Some risk	0.06	0.008	0.665	0.175	0.397	1.113
At risk	0.041	0.007	0.517	0.145	0.298	0.898
Engaged, but Disaffected						
No risk	0.863	0.019	1	0	1	1
Some risk	0.09	0.016	1.035	0.308	0.578	1.854
At risk	0.047	0.012	0.627	0.216	0.319	1.233
Classroom Relationship Problems						
No risk	0.897	0.012	1	0	1	1
Some risk	0.059	0.009	0.655	0.183	0.379	1.132
At risk	0.044	0.008	0.561	0.168	0.312	1.008
Disaffected/Peer Problems						
No risk	0.893	0.014	1	0	1	1
Some risk	0.063	0.011	0.698	0.216	0.38	1.282
At risk	0.045	0.009	0.571	0.185	0.302	1.078
Disengaged and Disaffected						
No risk	0.842	0.022	1	0	1	1
Some risk	0.085	0.017	1	0	1	1
At risk	0.074	0.015	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			11.298	0.335	10
Highly Engaged	vs.	Engaged/Peer Problems	0.056	0.972	2
Highly Engaged	vs.	Engaged, but Disaffected	4.2	0.122	2
Highly Engaged	vs.	Classroom Relationship	0.268	0.874	2
Highly Engaged	vs.	Disaffected/Peer Problems	0.404	0.817	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	7.29	**0.026**	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	2.967	0.227	2
Engaged/Peer Problems	vs.	Classroom Relationship	0.104	0.949	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	0.144	0.93	2
Engaged/Peer Problems	vs.	Disengaged and Disaffected	5.902	0.052	2
Engaged, but Disaffected	vs.	Classroom Relationship	2.758	0.252	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	2.064	0.356	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	1.882	0.39	2
Classroom Relationship	vs.	Disaffected/Peer Problems	0.062	0.969	2
Classroom Relationship	vs.	Disengaged and Disaffected	4.779	0.092	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	3.694	0.158	2

Table 4.21 - Fifth Grade Spring Behavior Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.996	0.001	1	0	1	1
Some risk	0.002	0.001	0.171	0.119	0.044	0.672
At risk	0.002	0.001	0.142	0.098	0.036	0.551
Engaged/Peer Problems						
No risk	0.99	0.004	1	0	1	1
Some risk	0.006	0.003	0.488	0.356	0.117	2.04
At risk	0.003	0.002	0.23	0.181	0.049	1.078
Engaged, but Disaffected						
No risk	0.993	0.006	1	0	1	1
Some risk	0.004	0.005	0.274	0.402	0.016	4.853
At risk	0.003	0.003	0.207	0.228	0.024	1.788
Classroom Relationship Problems						
No risk	0.985	0.005	1	0	1	1
Some risk	0.003	0.003	0.25	0.293	0.025	2.492
At risk	0.011	0.004	0.814	0.491	0.25	2.657
Disaffected/Peer Problems						
No risk	0.993	0.004	1	0	1	1
Some risk	0.002	0.004	0.154	0.291	0.004	6.282
At risk	0.005	0.003	0.347	0.298	0.064	1.871
Disengaged and Disaffected						
No risk	0.973	0.009	1	0	1	1
Some risk	0.013	0.007	1	0	1	1
At risk	0.014	0.007	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			13.307	0.207	10
Highly Engaged	vs.	Engaged/Peer Problems	1.808	0.405	2
Highly Engaged	vs.	Engaged, but Disaffected	0.154	0.926	2
Highly Engaged	vs.	Classroom Relationship	5.478	0.065	2
Highly Engaged	vs.	Disaffected/Peer Problems	0.762	0.683	2
Highly Engaged	vs.	Disengaged and Disaffected	5.685	0.058	2
Engaged/Peer Problems	vs.	Engaged, but Disaffected	0.172	0.918	2
Engaged/Peer Problems	vs.	Classroom Relationship	3.747	0.154	2
Engaged/Peer Problems	vs.	Disaffected/Peer Problems	0.641	0.726	2
Engaged/Peer Problems	vs.	Disengaged and Disaffected	3.165	0.205	2
Engaged, but Disaffected	vs.	Classroom Relationship	2.892	0.236	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	0.283	0.868	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	3.597	0.166	2
Classroom Relationship	vs.	Disaffected/Peer Problems	1.672	0.433	2
Classroom Relationship	vs.	Disengaged and Disaffected	1.544	0.462	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	3.492	0.174	2

Table 4.22 - Fifth Grade Spring ELA Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.937	0.007	1	0	1	1
Some risk	0.052	0.006	0.336	0.072	0.221	0.51
At risk	0.01	0.002	0.108	0.034	0.059	0.199
Engaged/Peer Problems						
No risk	0.903	0.012	1	0	1	1
Some risk	0.077	0.01	0.508	0.115	0.327	0.791
At risk	0.02	0.005	0.215	0.072	0.112	0.413
Engaged, but Disaffected						
No risk	0.717	0.027	1	0	1	1
Some risk	0.221	0.023	1.854	0.414	1.196	2.874
At risk	0.062	0.012	0.839	0.258	0.46	1.532
Classroom Relationship Problems						
No risk	0.915	0.012	1	0	1	1
Some risk	0.064	0.011	0.423	0.108	0.257	0.696
At risk	0.021	0.006	0.223	0.084	0.106	0.467
Disaffected/Peer Problems						
No risk	0.793	0.018	1	0	1	1
Some risk	0.163	0.016	1.235	0.271	0.803	1.899
At risk	0.043	0.009	0.529	0.168	0.284	0.986
Disengaged and Disaffected						
No risk	0.788	0.024	1	0	1	1
Some risk	0.131	0.02	1	0	1	1
At risk	0.081	0.016	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			144.559	**0**	10
Highly Engaged	**vs.**	**Engaged/Peer Problems**	7.218	**0.027**	2
Highly Engaged	**vs.**	**Engaged, but Disaffected**	61.624	**0**	2
Highly Engaged	vs.	Classroom Relationship	3.552	0.169	2
Highly Engaged	**vs.**	**Disaffected/Peer Problems**	51.823	**0**	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	37.697	**0**	2
Engaged/Peer Problems	**vs.**	**Engaged, but Disaffected**	37.669	**0**	2
Engaged/Peer Problems	vs.	Classroom Relationship	0.664	0.717	2
Engaged/Peer Problems	**vs.**	**Disaffected/Peer Problems**	24.385	**0**	2
Engaged/Peer Problems	**vs.**	**Disengaged and Disaffected**	21.342	**0**	2
Engaged, but Disaffected	**vs.**	**Classroom Relationship**	43.028	**0**	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	5.315	0.07	2
Engaged, but Disaffected	**vs.**	**Disengaged and Disaffected**	9.704	**0.008**	2
Classroom Relationship	**vs.**	**Disaffected/Peer Problems**	29.468	**0**	2
Classroom Relationship	**vs.**	**Disengaged and Disaffected**	22.699	**0**	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	5.301	0.071	2

Table 4.23 - Fifth Grade Spring Math Risk Odds Ratios and Chi Square Table

	Prob	S.E.	Odds Ratio	S.E.	95% CI	
Highly Engaged						
No risk	0.948	0.006	1	0	1	1
Some risk	0.04	0.005	0.22	0.048	0.144	0.337
At risk	0.012	0.002	0.143	0.044	0.079	0.261
Engaged/Peer Problems						
No risk	0.906	0.011	1	0	1	1
Some risk	0.074	0.009	0.422	0.092	0.276	0.646
At risk	0.021	0.005	0.27	0.092	0.138	0.528
Engaged, but Disaffected						
No risk	0.77	0.027	1	0	1	1
Some risk	0.184	0.024	1.241	0.302	0.769	2.001
At risk	0.046	0.011	0.697	0.243	0.352	1.38
Classroom Relationship Problems						
No risk	0.925	0.012	1	0	1	1
Some risk	0.057	0.01	0.318	0.082	0.192	0.526
At risk	0.018	0.006	0.229	0.102	0.096	0.548
Disaffected/Peer Problems						
No risk	0.806	0.018	1	0	1	1
Some risk	0.142	0.016	0.911	0.205	0.587	1.416
At risk	0.052	0.01	0.765	0.245	0.408	1.435
Disengaged and Disaffected						
No risk	0.783	0.025	1	0	1	1
Some risk	0.151	0.022	1	0	1	1
At risk	0.066	0.015	1	0	1	1

Classes			Chi-Sq	P-Value	df
Overall test			151.171	**0**	10
Highly Engaged	**vs.**	**Engaged/Peer Problems**	13.682	**0.001**	2
Highly Engaged	**vs.**	**Engaged, but Disaffected**	40.845	**0**	2
Highly Engaged	vs.	Classroom Relationship	2.913	0.233	2
Highly Engaged	**vs.**	**Disaffected/Peer Problems**	55.447	**0**	2
Highly Engaged	**vs.**	**Disengaged and Disaffected**	43.354	**0**	2
Engaged/Peer Problems	**vs.**	**Engaged, but Disaffected**	20.113	**0**	2
Engaged/Peer Problems	vs.	Classroom Relationship	1.59	0.451	2
Engaged/Peer Problems	**vs.**	**Disaffected/Peer Problems**	22.387	**0**	2
Engaged/Peer Problems	**vs.**	**Disengaged and Disaffected**	21.647	**0**	2
Engaged, but Disaffected	**vs.**	**Classroom Relationship**	23.55	**0**	2
Engaged, but Disaffected	vs.	Disaffected/Peer Problems	2.275	0.321	2
Engaged, but Disaffected	vs.	Disengaged and Disaffected	2.217	0.33	2
Classroom Relationship	**vs.**	**Disaffected/Peer Problems**	27.97	**0**	2
Classroom Relationship	**vs.**	**Disengaged and Disaffected**	26.836	**0**	2
Disaffected/Peer Problems	vs.	Disengaged and Disaffected	0.753	0.686	2

Figure 4.1 – Grade 4 Fall Item Response Distributions

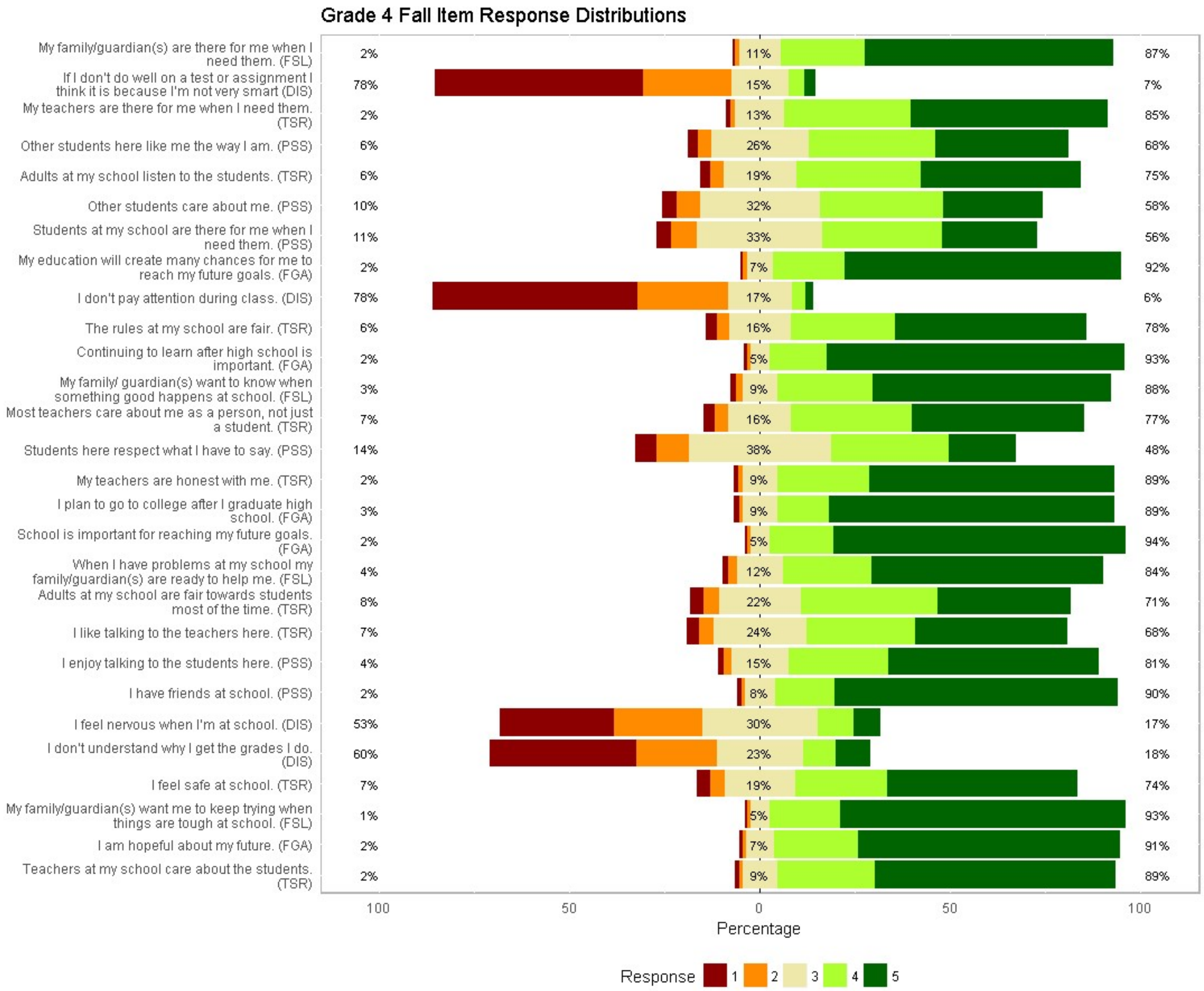


Figure 4.2 – Grade 4 Spring Item Response Distributions

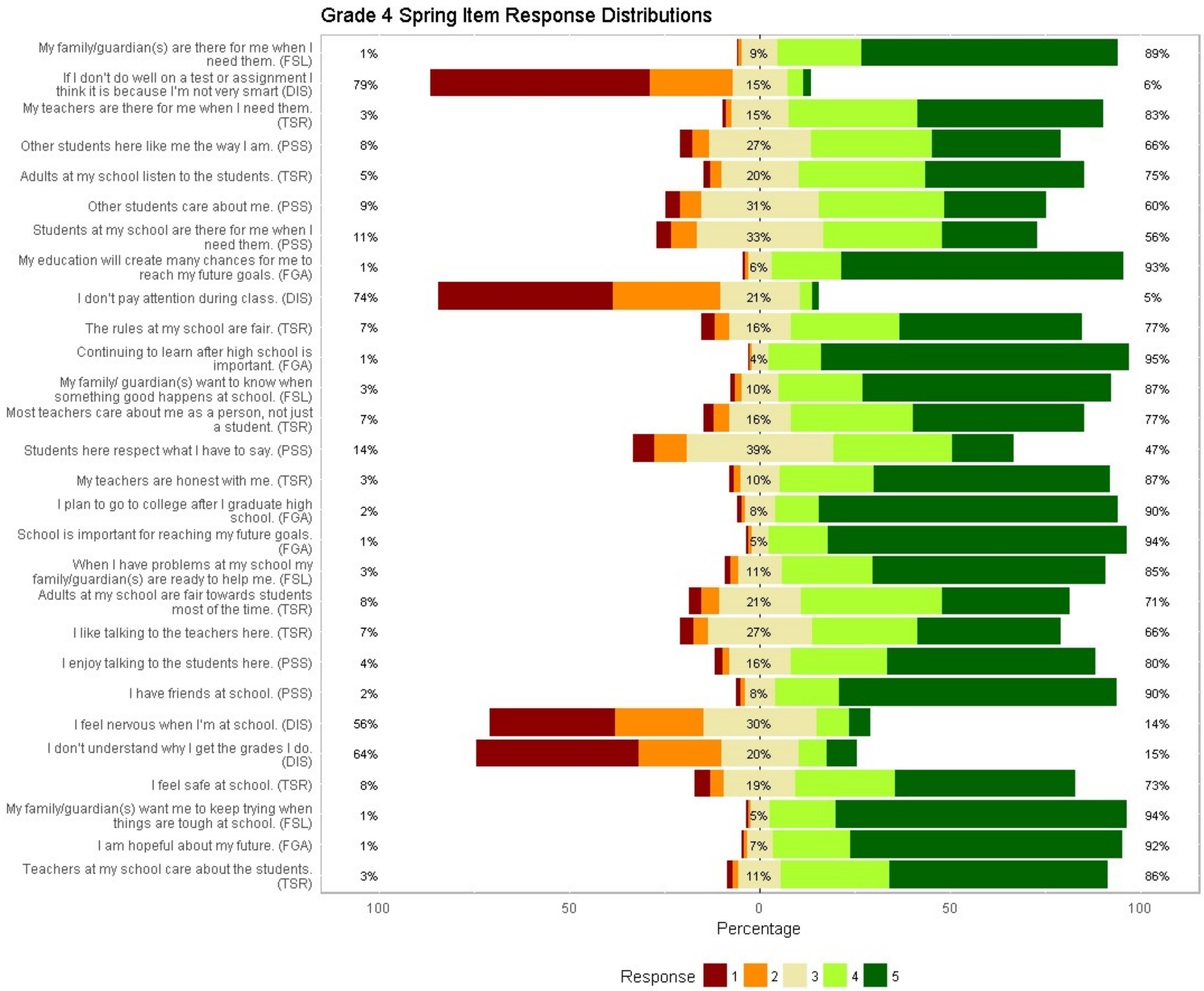


Figure 4.3 – Grade 5 Fall Item Response Distributions

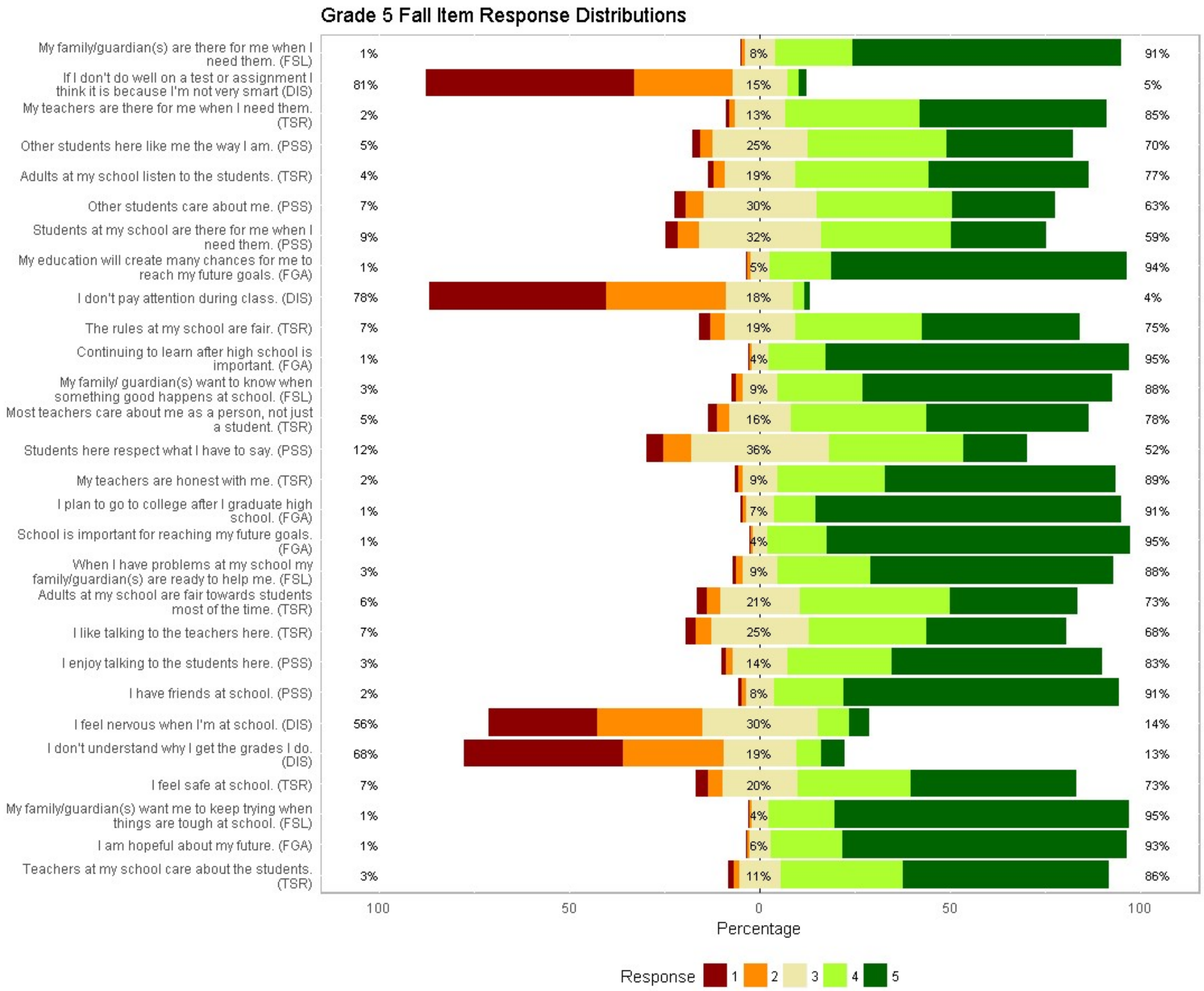


Figure 4.4 – Grade 5 Spring Item Response Distributions

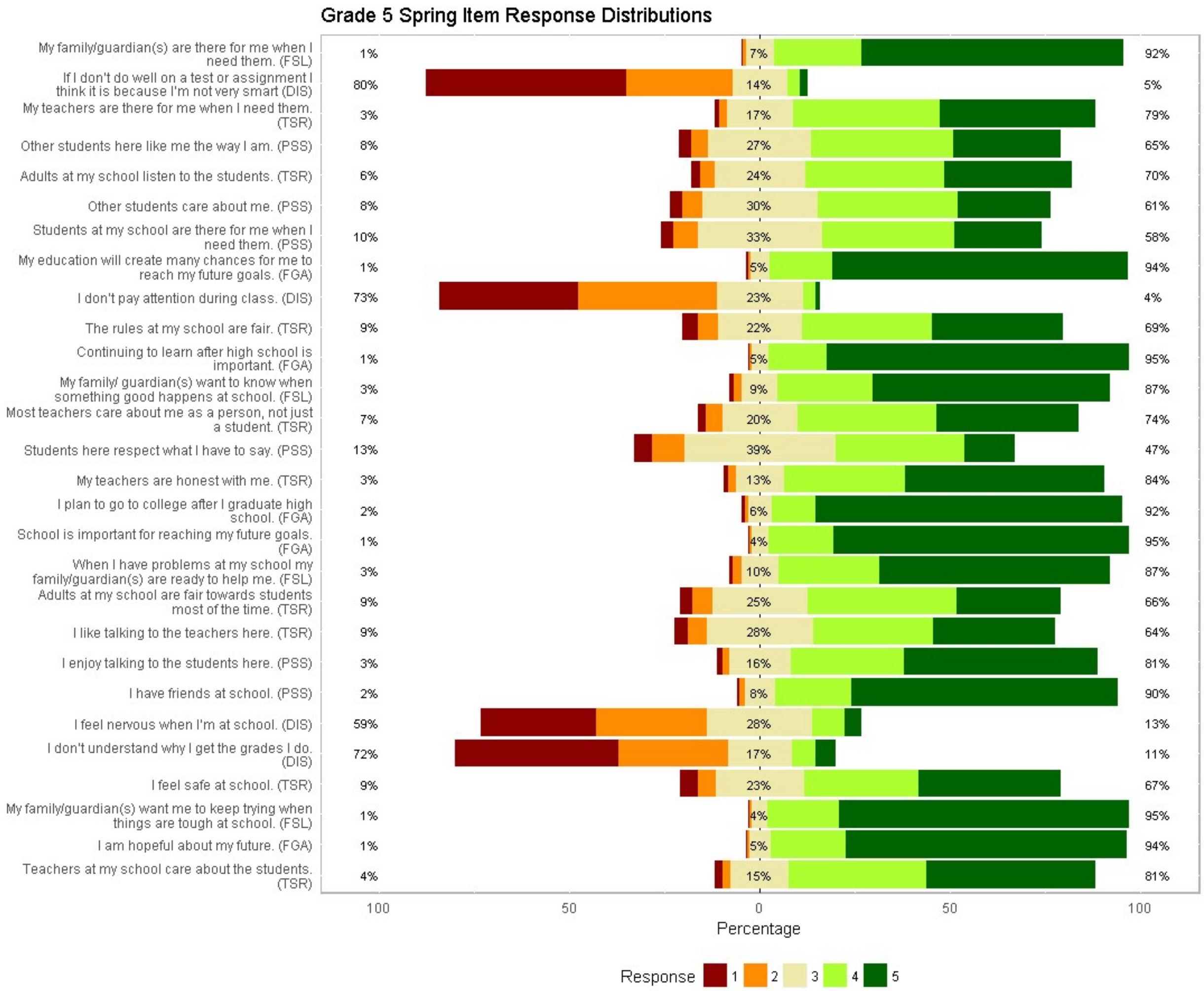


Figure 4.5 – Grade 4 Fall Item Probability Graph

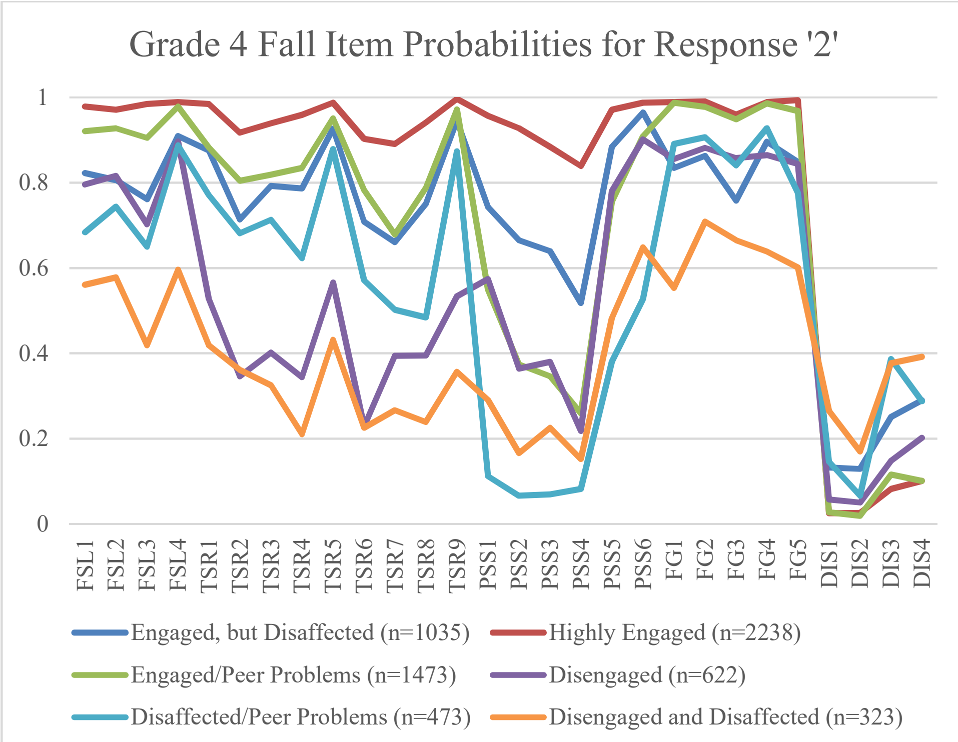


Figure 4.6 – Grade 4 Spring Item Probability Graph

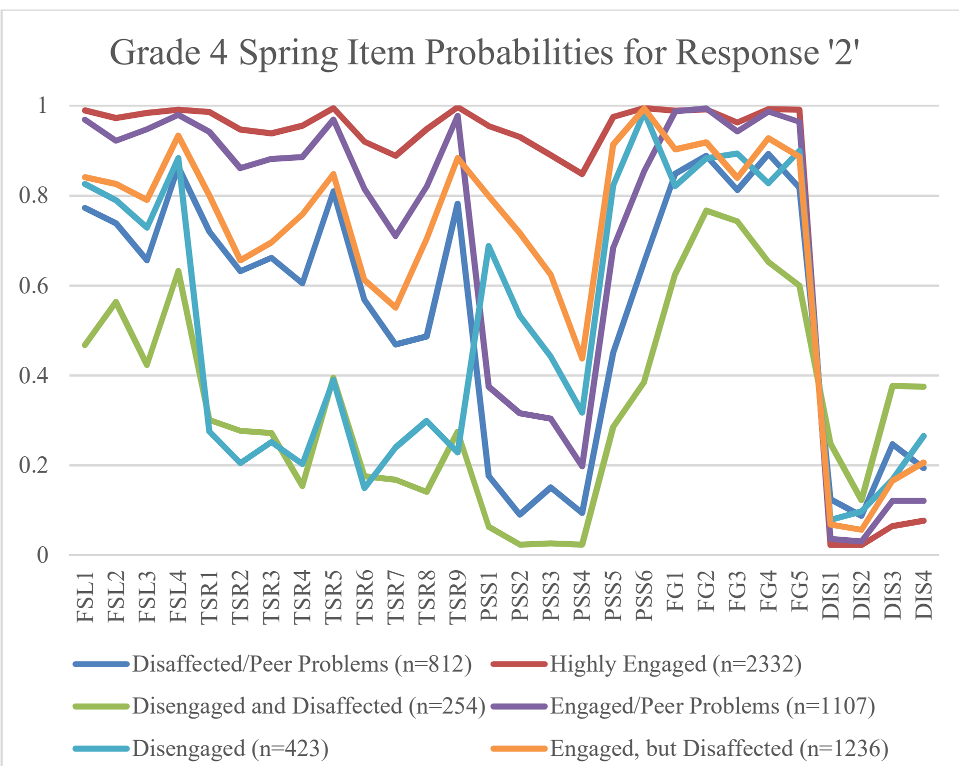


Figure 4.7 – Grade 5 Fall Item Probability Graph

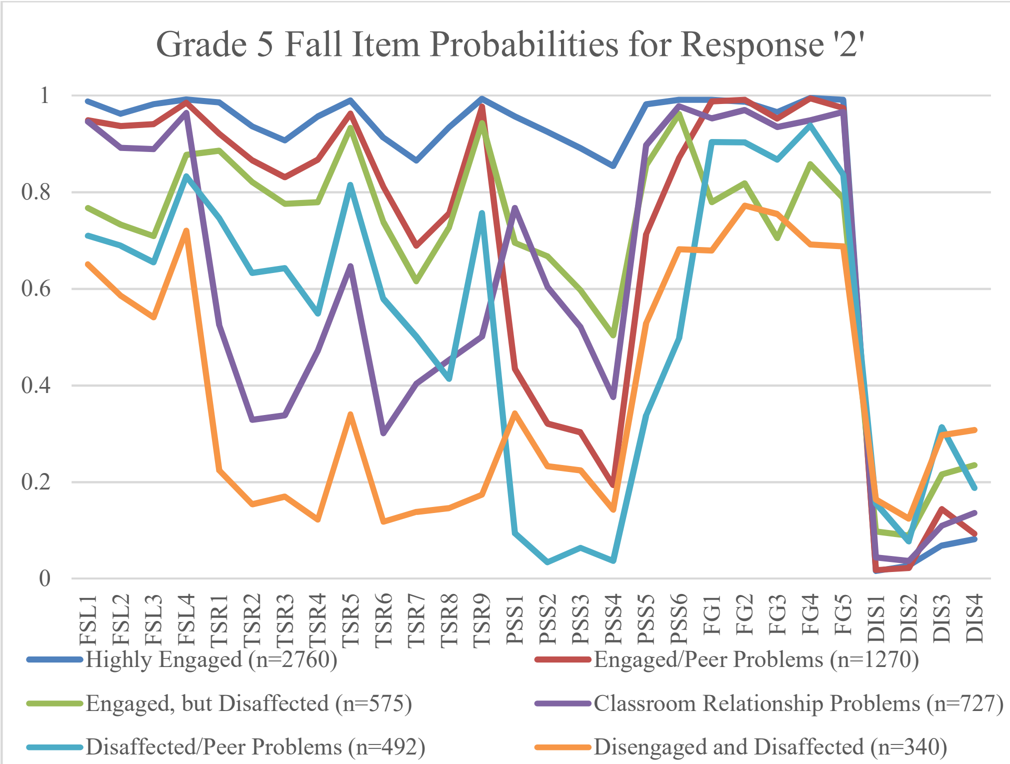


Figure 4.8 – Grade 5 Spring Item Probability Graph

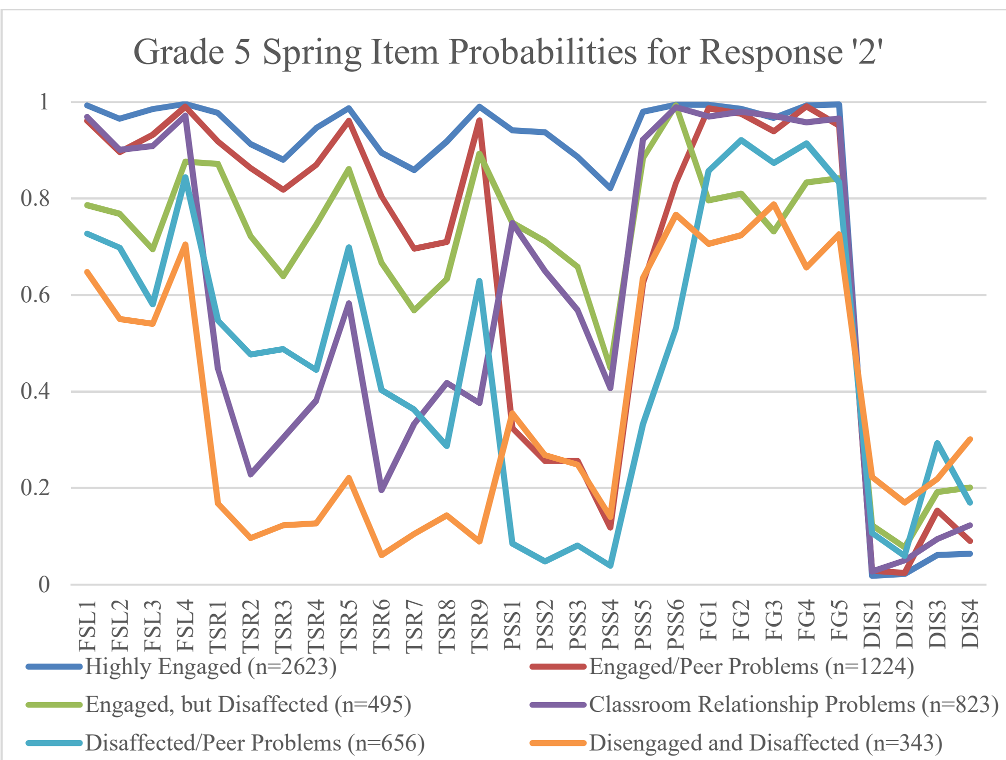


Figure 4.9 – Change in Latent Class Membership Across Four Timepoints

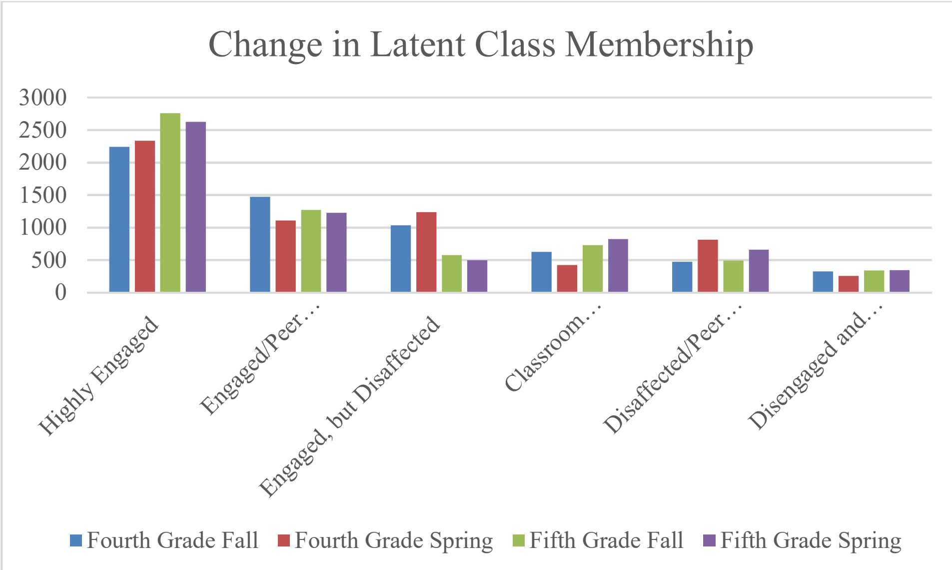


Figure 4.10 – Alluvial Graph of Fourth Grade Fall to Spring Class Transitions

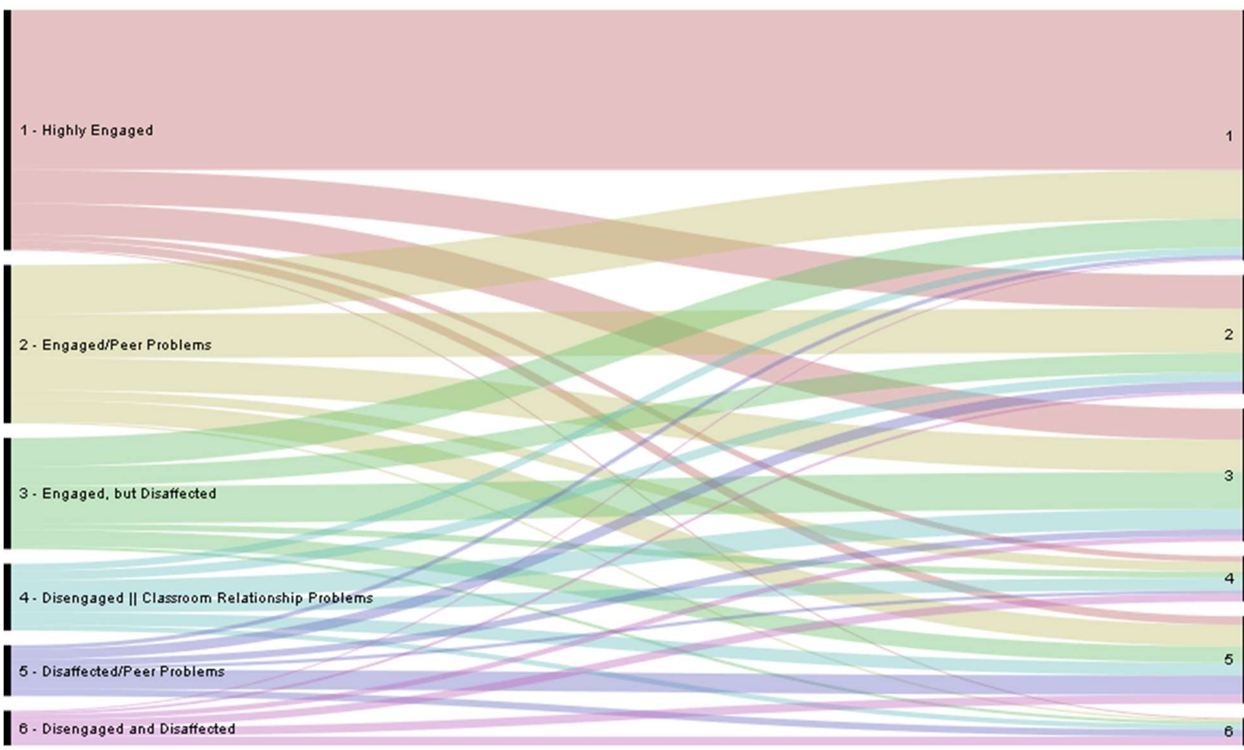


Figure 4.11 – Alluvial Graph of Fourth Grade Spring to Fifth Grade Fall Class Transitions

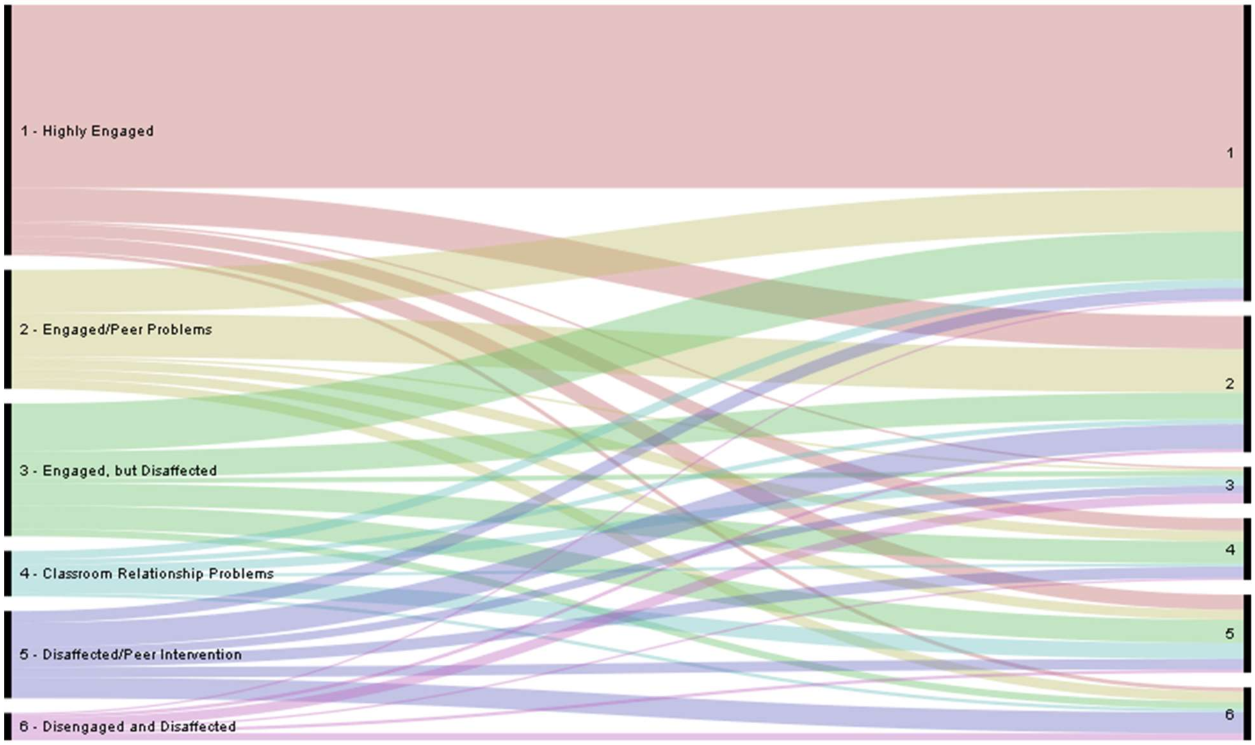


Figure 4.12 – Alluvial Graph of Fifth Grade Fall to Spring Class Transitions

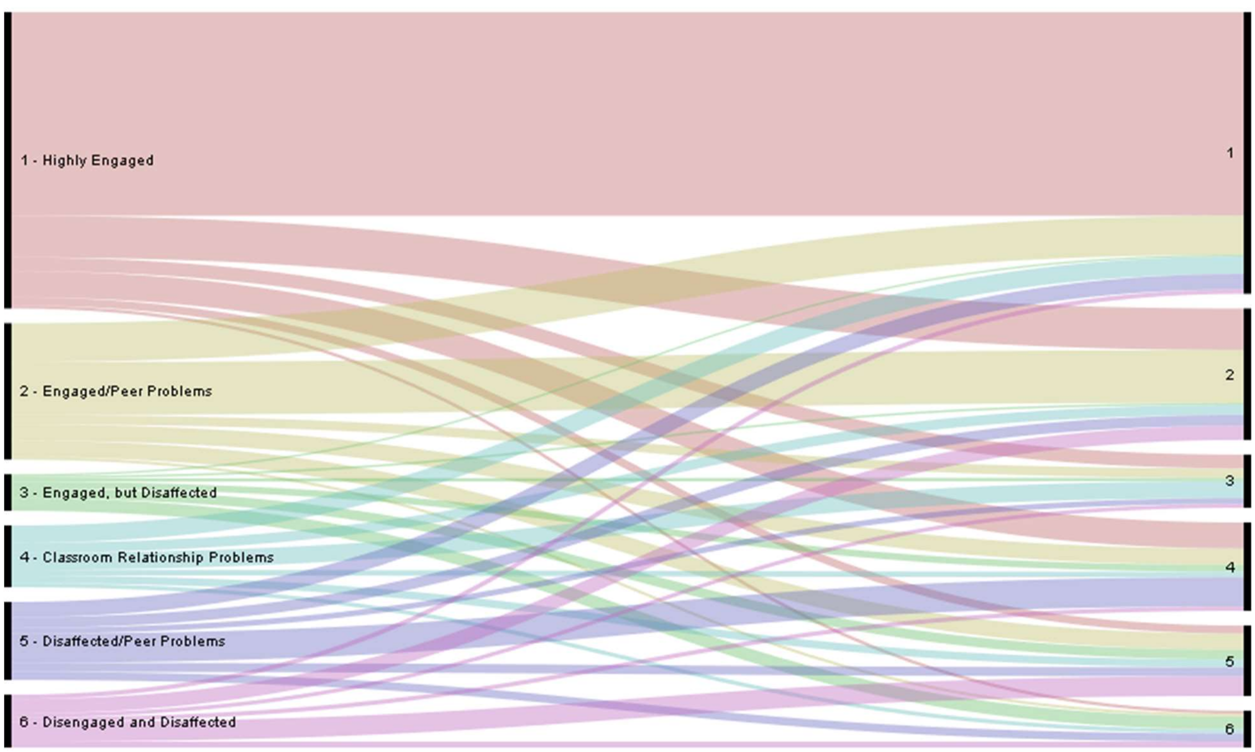


Figure 4.13 – Alluvial Graph of Class Transitions Across All Four Timepoints

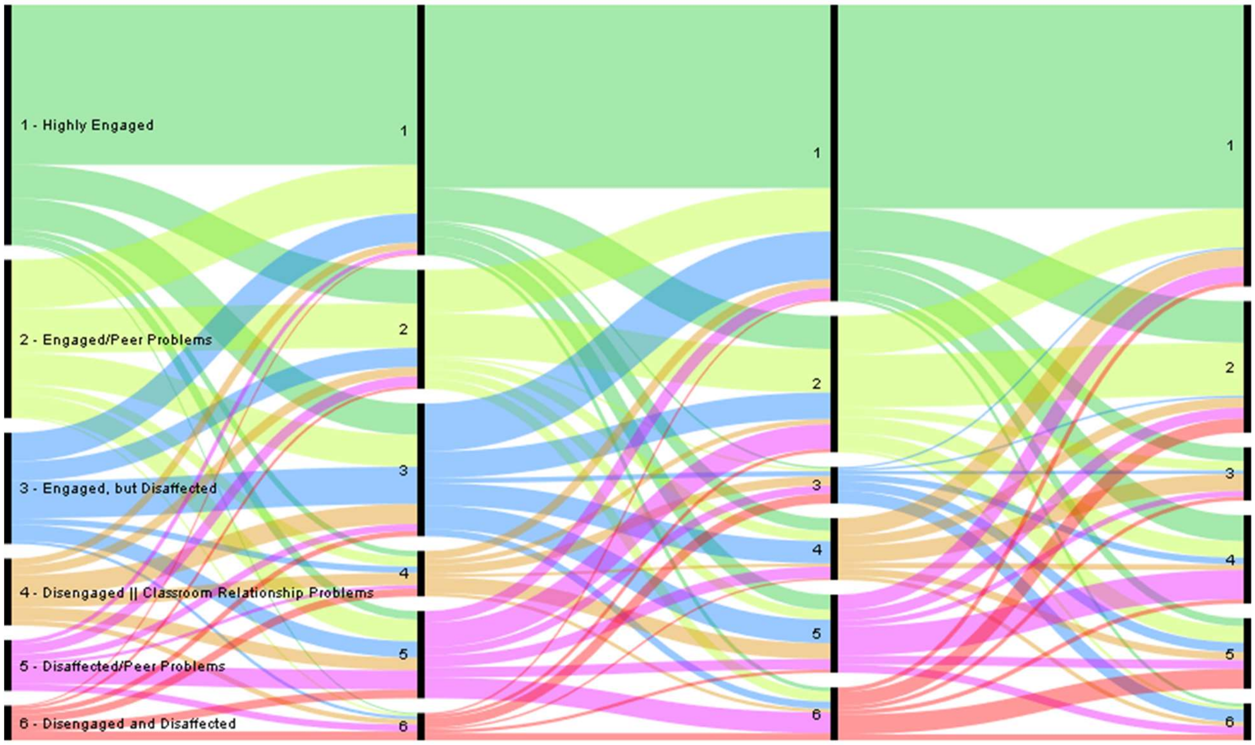


Figure 4.14 – Odds Ratios for Sixth Grade Outcomes from Fall Fourth Grade

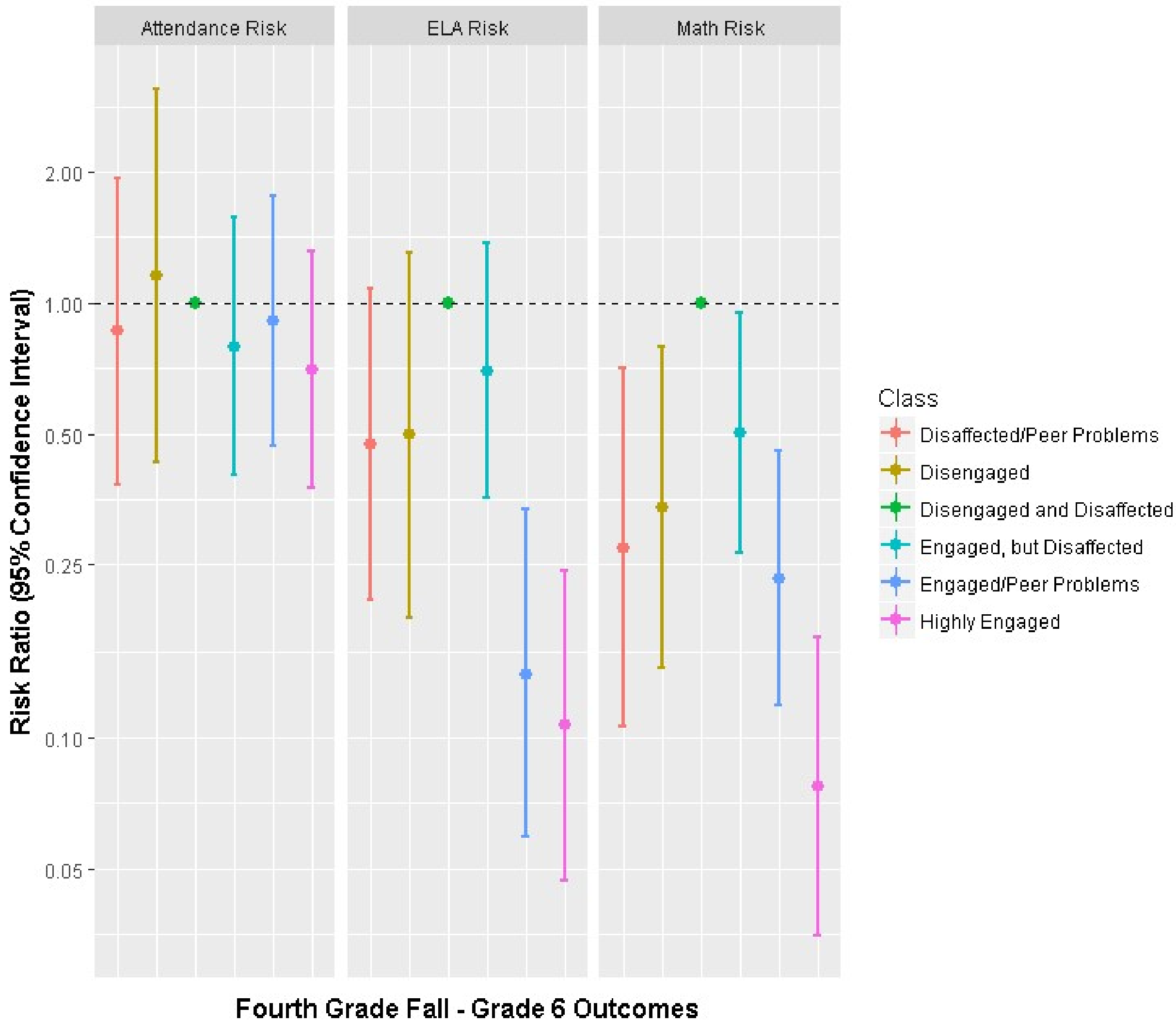


Figure 4.15 – Odds Ratios for Sixth Grade Outcomes from Spring Fourth Grade

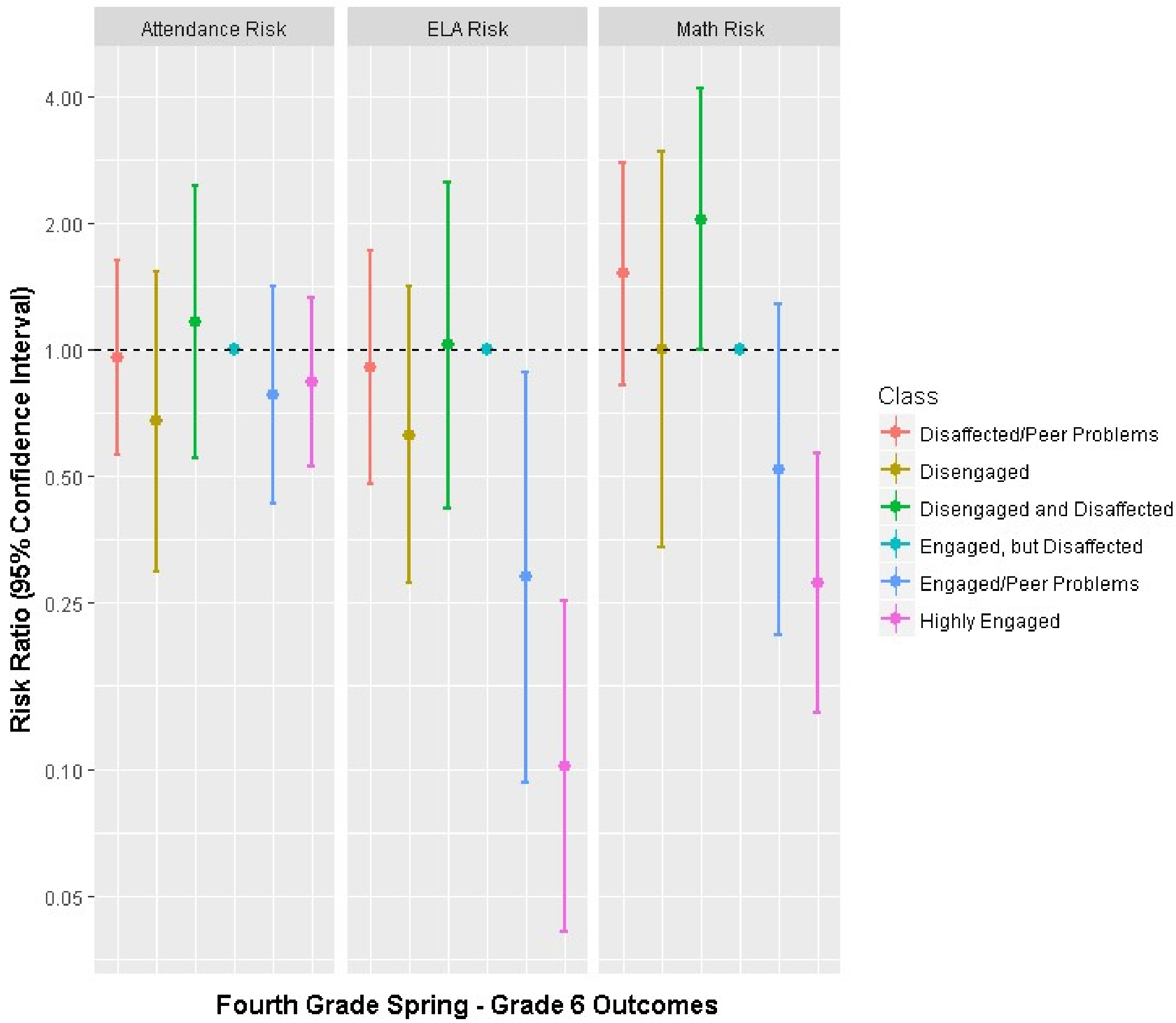


Figure 4.16 – Odds Ratios for Sixth Grade Outcomes from Fall Fifth Grade

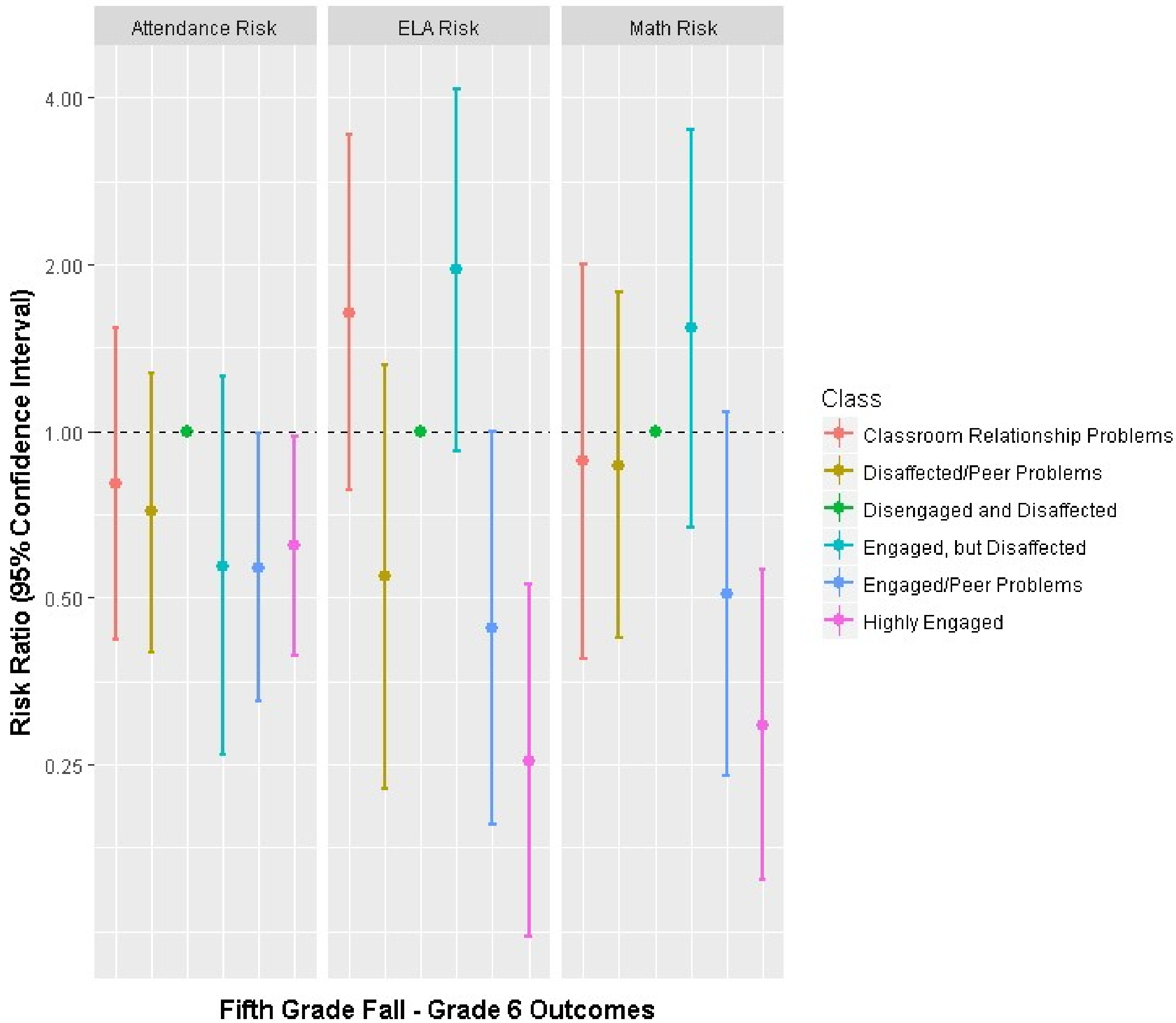
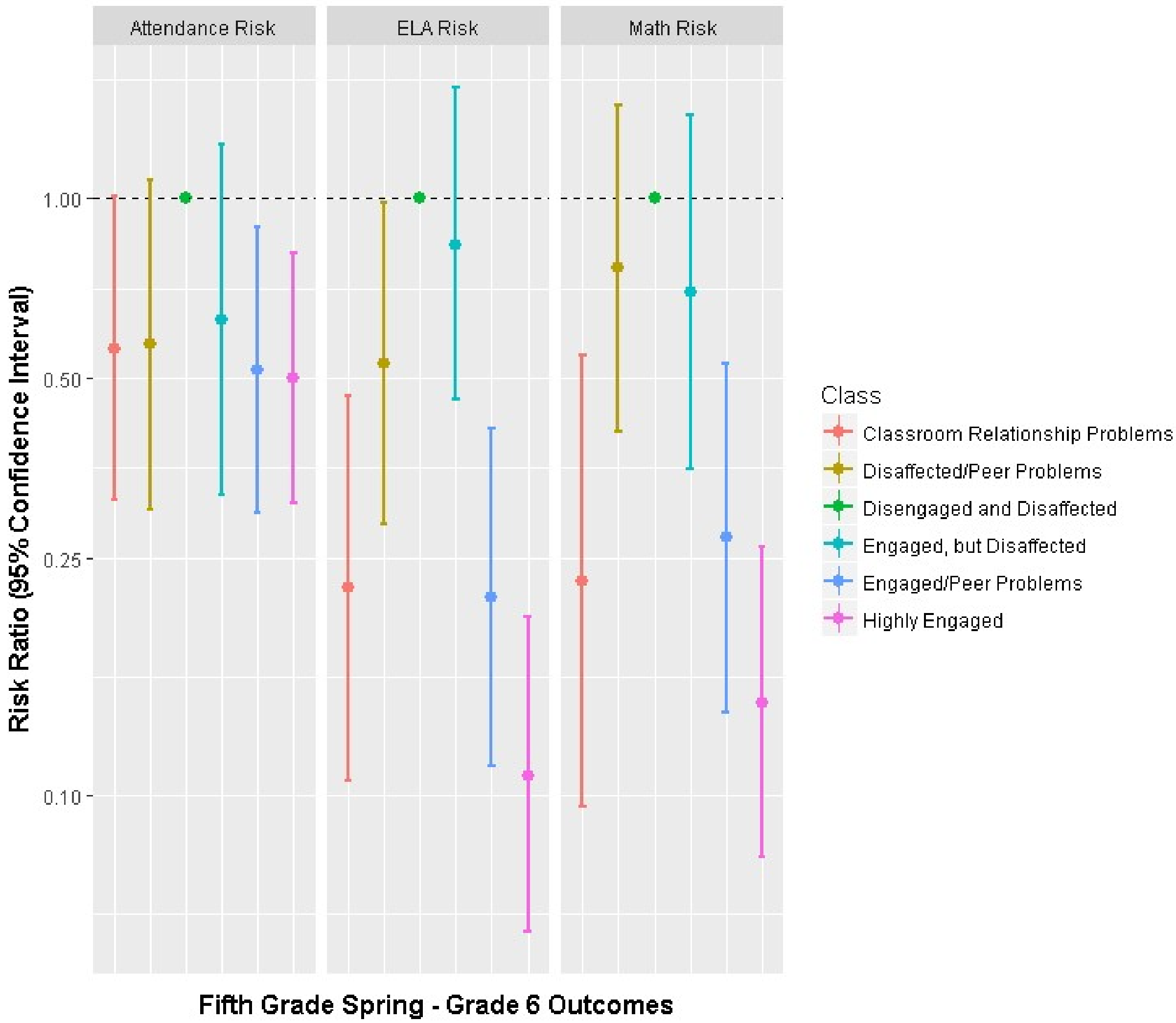


Figure 4.17 - Odds Ratios for Sixth Grade Outcomes from Spring Fifth Grade



CHAPTER 5

DISCUSSION

The dual factor conceptualization promotes a closer look at the assumptions that frame how important topics are discussed and researched. Given the shared relationship to important proximal and distal life outcomes and the importance of school as a developmental context where children are spending much of their lives, student engagement warrants the same thought and scrutiny as found within dual factor models. A focus, investment, and thoughtful intervention on student engagement and student disaffection from elementary school and beyond postsecondary school may allow us to produce higher qualities of lives for more adults by reducing criminality, increasing employment, ensuring educational success and providing behavioral, emotional, and cognitive well-being for those individuals and across their social relationships. Moving from a single continuum model, where students lack of engagement implies disaffection with school, to one that allows more possibilities for being engaged but also disaffected with certain contexts or relationships allows an opportunity to more meaningfully tie our assessment to students' actual experiences. It is easy to consider a student who understands that school is important to their future but does not find their schoolwork enjoyable or fulfilling given that is the norm for high school students (Duckworth, Taxer, Eskreis-Winkler, Galla, & Gross, 2019).

Person-centered approaches of student engagement and student disaffection is an exciting and promising area of study that appears to only be beginning. There are few studies published that apply person-centered or hybrid approaches toward student engagement over time, incorporate student disaffection, and even fewer that concern elementary students. There are no latent class analysis explorations of engagement data for elementary school students known to date, let alone longitudinal studies that provide multiple measures in a school year (e.g., Fall and Spring administrations) to determine whether students' engagement and disaffection appraisals maintain an expected developmental course across each school year. Results of this exploratory repeated measures LCA suggest there are classes from the SEI-E and Disaffection items that could be tied theoretically to intervention, though there is suspicion that there are significant developmental differences in engagement and responding across the later elementary school years. This finding is not dissimilar to those found in other research using person-centered analyses of student engagement for other age groups and from other parts of the world, which suggest that many of the dispositions or classes identified through the model data could benefit from different types of interventions (Archambault & Dupéré, 2017; Lawson & Masyn, 2015).

With latent class model assignments and with knowing measurement variance or invariance over time, intervention effectiveness could be measured based on class membership. For example, student membership in classes that are defined by poor peer relationships and are more likely have an at-risk designation may result in being placed into peer-focused interventions that are demonstrated to increase students' engagement or decrease students' disaffection with school. Additionally, groups of students who fall within a specific class could be given two different interventions and then changes in response patterns could be measured. Person-centered approaches create an interesting link to measuring intervention effectiveness within smaller groups of students. As the national focus in education continues to concern student outcomes for all students and pushes for state and school accountability, bridging the research to practice and the assessment to intervention divide will continue to grow in importance. Laursen and Hoff (2006) described studies where variable-centered approaches describe general effects of an intervention, but that the person-centered approaches provide information about the individuals for whom the intervention is effective.

This study suggests that academic risk is predicted by student engagement and disaffection membership, though the magnitude of this relationship differs over time in unexpected ways across classes. There may be important moderating or mediating factors that affect how students determine their engagement and disaffection with school over time that are presently unknown to explain these differences in class membership. The data collected for the current study leave the question of behavioral risk unanswered due to few cases of ‘some risk’ and at-risk designation found within the sample to provide confident estimates of class membership and risk. Attendance risk in sixth grade appears to be non-significantly related to elementary engagement and disaffection ratings across fourth and fifth grade, though being in the *Highly Engaged* class for the Spring of fifth grade was significantly protective compared to the *Disengaged and Disaffected* class. Given the higher frequency of stable class membership in the *Highly Engaged* class compared to all other classes, it is suspected that those students are less likely to be at risk for attendance compared to less stable and likely more disengaged and disaffected students.

Limitations and Future Directions

Latent classes are possible to determine for elementary school students, though it appears that there may be significant developmental considerations warranting further exploration in future analyses. This is the first study examining student engagement and disaffection latent classes across multiple timepoints using the same students for each administration in elementary school, enhancing the inferences that can be made about changes in class membership over time.

In the case of the SEI-E and its piloted disaffection items, it may be useful for the instrument to be revised to better align with person-centered and hybrid approaches, such as factor mixture modeling or latent class and profile analysis. The SEI and SEI-E were designed and validated using factor analytic procedures that often benefit from having many items that are correlated or provide similar information. With LCA and other person-centered approaches, local and conditional independence assumptions make it difficult to model these same measures without significant adjustment, revision, and adaptation (e.g., modeling of residual covariances, item removal; Vermunt & Magidson, 2002). Many of the SEI-E and disaffection variables that have shown to factor together imply a local or conditional dependence, that some variables are providing overlapping information about a single construct shown in the bivariate residuals (Oberski, van Kollenburg, & Vermunt, 2013). Such characteristics can lead to inflated model fit indices which overestimate latent classes, but modeling local dependence adds more parameters for each class estimated.

One alternative suggestion aligns with a methodological discussion by Feldman, Masyn, and Conger (2009). Rather than models, like latent class growth analysis or growth mixture methods, that imply growth over time to be represented by a single continuous scale, the differences in Fall and Spring administrations suggest instead that states should be modeled across time instead like the patterns represented in the alluvial graphs provided in Figures 4.10-13. Comparing hierarchical generalized linear models, growth mixture models, latent class growth analysis, and longitudinal latent class models against one another should improve the clarity of information and inferences made when considering longitudinal engagement data. It appears that there may be some students who represent a stable membership trajectory, but another sizeable proportion of students better represented by varying states of engagement across the school year.

To improve the person-centered approaches and analyses more items should be developed for the SEI-E and the SEI to have a better understanding of student disaffection and its relationship to engagement. Alternatively, combinations of existing indicators could be used to create a smaller set of overall items to represent engagement and disaffection to limit the number of parameters run. At present, 28-items with three response categories is difficult to run for most statistical software, even without attempting to model residual covariances or attempt to free or fix parameters within or across classes. These models with a large number of items and response categories also make interpretation more difficult, requires much larger samples, and may make relationships to distal outcomes difficult if they do not occur with enough frequency. Large measurement models also tend to require more classes to produce significance for fit statistics in person-centered approaches because of the number of possible response patterns. For item reduction in cross-sectional and longitudinal latent variable analyses, it might be useful to reduce the item responses to a binary endorsement or through using a 4- to 6-point Likert-type scale and to eliminate some items with high residual covariances based on item data and theoretical considerations.

Longitudinal analyses following item revisions will be a crucial step forward not only for elementary data, middle school data, or high school data, but across those developmental periods to determine the models that provide the most utility for intervening with students and making meaningful change for their future outcomes. With an accepted model, such as a 4-class model for third and fourth graders that changes to a 6-class model through middle school, and reduced to a 5-class model for high school, interventions can be measured, analyzed, and tied to meaningful future outcomes (e.g., school completion, post-secondary enrollment, future employment). It is suspected that given the lack of stability in class membership across this study, that student transitions may be more meaningfully tied to outcomes than their class memberships. These memberships may be useful to describe students in the moment, set expectations and goals for what students we strive for in schools, and to show improvements in overall levels of engagement and disaffection over time, but may not be as useful as class transitions to determine student risk (i.e., a student who has a sharp drop in engagement or a sharp increase in disaffection may be at greater risk than a student who is gradually lowering over time).

In addition to examining changes in class membership and the optimal number of classes at each time point, model revision and simplification should allow for covariates to be included in the model. Likely, models should be compared with demographic variables determining class membership and without demographic variables determining class membership. It is possible that not all demographic variables will be relevant or provide additional utility in interpreting engagement and disaffection classes, but it is also possible that there may be meaningful groups of students or proportions of class membership explained by demographic variables. Following the removal of students who did not participate at all four time points led to changes in demographic data proportions that are likely meaningful. There were fewer Black students, students with special education status, and fewer students with free and reduced lunch status proportionally compared to other groups.

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APPENDICES

Appendix A.

Mplus Input Example for Latent Class Analysis

```
TITLE: Fourth Grade Fall LCA (6-class)
DATA: FILE = "seieLTAonly4.dat"; !MPlus file that contains the data
VARIABLE: !All variables are listed here
    NAMES ARE id t3q1 t3q2 t3q3 t3q4 t3q5 t3q6 t3q7 t3q8 t3q9 t3q10
    t3q11 t3q12 t3q13 t3q14 t3q15 t3q16 t3q17 t3q18 t3q19
    t3q20 t3q21 t3q22 t3q23 t3q24 t3q25 t3q26 t3q27 t3q28
    t4q1 t4q2 t4q3 t4q4 t4q5 t4q6 t4q7 t4q8 t4q9 t4q10 t4q11
    t4q12 t4q13 t4q14 t4q15 t4q16 t4q17 t4q18 t4q19 t4q20
    t4q21 t4q22 t4q23 t4q24 t4q25 t4q26 t4q27 t4q28
    t5q1 t5q2 t5q3 t5q4 t5q5 t5q6 t5q7 t5q8 t5q9 t5q10 t5q11
    t5q12 t5q13 t5q14 t5q15 t5q16 t5q17 t5q18 t5q19 t5q20
    t5q21 t5q22 t5q23 t5q24 t5q25 t5q26 t5q27 t5q28
    t6q1 t6q2 t6q3 t6q4 t6q5 t6q6 t6q7 t6q8 t6q9 t6q10 t6q11
    t6q12 t6q13 t6q14 t6q15 t6q16 t6q17 t6q18 t6q19 t6q20
    t6q21 t6q22 t6q23 t6q24 t6q25 t6q26 t6q27 t6q28
    sped frl ethcty gender attrisk bhvrisk elarisk mathrisk;

USEVARIABLES = t3q1 t3q2 t3q3 t3q4 t3q5 t3q6 t3q7 t3q8 t3q9 t3q10
    t3q11 t3q12 t3q13 t3q14 t3q15 t3q16 t3q17 t3q18 t3q19
    t3q20 t3q21 t3q22 t3q23 t3q24 t3q25 t3q26 t3q27 t3q28; !Specific timepoint variables
CATEGORICAL = t3q1 t3q2 t3q3 t3q4 t3q5 t3q6 t3q7 t3q8 t3q9 t3q10
    t3q11 t3q12 t3q13 t3q14 t3q15 t3q16 t3q17 t3q18 t3q19
    t3q20 t3q21 t3q22 t3q23 t3q24 t3q25 t3q26 t3q27 t3q28; !Note which are categorical
AUXILIARY = (DCAT) attrisk bhvrisk elarisk mathrisk; !Distal outcomes for 3-step
IDVARIABLE = id; !This variable identifies individual cases
MISSING are all(9999); !The value missing data are represented by in the dataset
CLASSES = c(6); !The number of classes to fit for the model

ANALYSIS:
   TYPE = MIXTURE; !This specifies a mixture model with extra starts due to size
   STARTS = 200 50;

OUTPUT: TECH1 TECH8 TECH10 TECH11; !Tech11 provides LMR-LRT
SAVEDATA:  SAVE = cprobabilities; !Creates class membership output
        FILE=grade4_6cf_cprob.dat;
```