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THE ROLE OF SCHOOL CONTEXT ON AGGRESSION AND SUBSTANCE USE DURING MIDDLE SCHOOL: A PERSON-ORIENTED DEVELOPMENTAL APPROACH

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DEDICATION

To my Parents,

who gave me an education.

To those in Singapore and the United States,

who inspired me to pursue social work.

To Felicia,

who selflessly supported me in this journey.

TABLE OF CONTENTS

LIST OF TABLES vii

LIST OF FIGURES ix

ACKNOWLEDGEMENTS xi

ABSTRACT xiv

CHAPTER ONE INTRODUCTION 1

1.1 Problem Statement 1

1.2 Dissertation Goals, Research Questions, and Significance 11

1.3 Organization of Dissertation 12

CHAPTER TWO THEORETICAL FRAMEWORK 14

2.1 Social-Cognitive Theory 14

2.2 Person-Oriented Perspective 16

2.3 Developmental Psychopathology 18

2.4 Person-Oriented Developmental Psychopathology 21

2.5 Implication of Theories for Research Questions 23

CHAPTER THREE LITERATURE REVIEW 25

3.1 Aggression and Substance Use: Common and Independent Cause Perspectives 25

3.2 Aggression: Multi-Dimensional Perspective 30

3.3 Substance Use: Socio-Contextual Perspective 34

3.4 Social-Cognitive Problems 37

3.5 Co-occurring Patterns of Social-Cognitive Problems and Behaviors 43

3.6 Schools as Important Context for Development 48

3.6.1 School Interpersonal Climate 50

3.6.2 School Norms about Behavior 52

3.6.3 School Safety Concern and Awareness of Problems 55

3.7 Interaction of School Context, Patterns of Social-Cognitive Risk, and Behaviors 58

3.8 Contributions of Present Study 61

CHAPTER FOUR RESEARCH QUESTIONS AND HYPOTHESES 63

4.1 Research Question 1 64

4.2 Research Question 2 65

4.3 Research Question 3 66

CHAPTER FIVE METHODS 69

5.1 Multisite Violence Prevention Project 69

5.2 Overall Sample 70

5.3 Analytic Sample 72

5.4 Measures 75

5.4.1 Social-Cognitive Factors 75

5.4.2 School Context Factors 76

5.4.3 Aggression and Substance Use 79

5.5 Analytic Strategy 82

5.6 Question 1 Analyses: Patterns of Social-Cognitive Risk 87

5.7 Question 2 Analyses: Behavioral Trajectories 89

5.8 Question 3 Analyses: School Moderation 92

CHAPTER SIX RESULTS 95

6.1 Question 1 Results: Patterns of Social-Cognitive Risk 95

6.2 Question 2 Results: Behavioral Trajectories 102

6.3 Question 3 Results: School Moderation 113

CHAPTER SEVEN DISCUSSION 117

7.1 Patterns of Social-Cognitive Risk 119

7.2 Trajectories of Aggression and Substance Use 123

7.3 Interaction of School Context, Patterns of Social-Cognitive Risk, and Behaviors 129

7.4 Implications for Practice 134

7.5 Limitations 138

7.6 Areas for Future Research 139

7.7 Conclusion 141

APPENDIX A Aggression and Substance Use Trajectories, and Summary of Studies 143

APPENDIX B Descriptive Summary of Study Measures 151

APPENDIX C Fit Indices of Other Mixture Models Considered in this Study 166

REFERENCES 167

LIST OF TABLES

Table 5.1 Community and Demographic Characteristics by Site 71

Table 5.2 Demographics for the Analytical Sample 74

Table 5.3 Percentage of Missing Data in Analytical Sample 84

Table 6.1 Percentage of Binary-Coded Clinical Classification by Locations 96

Table 6.2 Fit indices for Latent Class Analysis 97

Table 6.3 Site Description of Four-Class Solution Based on Posterior Probability-Based Multiple Imputations 101

Table 6.4 Growth Parameters and Fit Indices for Random Intercepts and Slopes 102

Table 6.5 Pattern Specific Aggression Growth Parameters 107

Table 6.6 Pattern Specific Substance Use Growth Parameters 110

Table 6.7 Overall Ward Tests of Parameter Constraints 114

Table 6.8 Pairwise Tests of Significance across Patterns of Risk 115

Table A.1 Summary of Findings (Roeser et al. Studies). 147

Table A.2 Summary of Findings (Kamphaus et al., Kim et al., and Orpinas et al. Studies) .. 148

Table B.1 Student Learning Problems (BASC) 151

Table B.2 Student Social Skills Problems (BASC) 152

Table B.3 Student Anxiety Problems (BASC) 153

Table B.4 Student Conduct Problems (BASC) 154

Table B.5 Student-Student Relationship 155

Table B.6 Student-Teacher Relationship 156

Table B.7 School Safety Concerns 157

Table B.8 Awareness and Reporting of Safety Concerns 158

Table B.9 School Norms 159

Table B.10 Physical Aggression 161

Table B.11 Non-Physical Aggression 162

Table B.12 Relational Aggression 163

Table B.13 Overall Aggression 164

Table B.14 Substance Use 165

Table C.1 Fit Indices of Other Mixture Models Considered in this Study 166

LIST OF FIGURES

Figure 4.1 Study Conceptual Model 68

Figure 5.1 CONSORT Diagram for Multisite Violence Prevention Project 70

Figure 5.2 Evaluation of Moderation by School Factor 94

Figure 6.1 Three-Class Solution 99

Figure 6.2 Four-Class Solution 100

Figure 6.3 Aggression Trajectories (Overall Analytic Sample) 104

Figure 6.4 Substance Use Trajectories (Overall Analytic Sample) 104

Figure 6.5 Overall Aggression 108

Figure 6.6 Physical Aggression 108

Figure 6.7 Non-Physical Aggression 109

Figure 6.8 Relational Aggression 109

Figure 6.9 Overall Substance Use 111

Figure 6.10 Cigarette Use 111

Figure 6.11 Alcohol Use 112

Figure 6.12 Marijuana Use 112

Figure 6.13 Student-Student Relationships on Relational Aggression Effect Sizes 116

Figure 6.14 Student-Teacher Relationships on Non-Physical Aggression Effect Sizes 116

Figure A.1 Physical Aggression (Pittsburgh Youth Study) 143

Figure A.2 Physical Aggression (Southeastern United States)..... 144

Figure A.3 Substance Use and Aggression Trajectories (Pittsburgh Youth Study) 145

Figure A.4 Substance Use Trajectories (Seattle Social Development Project) 146

Figure A.5 Aggression and Substance Use Trajectories (New York City) 150

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ABSTRACT

Despite more than 30 years of research and a growing list of evidence-based prevention strategies, high rates of risk behavior such as aggression and substance use continue to persist among early adolescent urban boys (Hawkins et al., 2015). Much of the early research and intervention and prevention strategies have focused on individual and then family factors related to risk, with less attention paid to other contextual factors, particularly school (Bosworth, 2015; Petras & Slobada, 2014). Practice strategies that integrate knowledge regarding developmental trajectories, contextual malleable risk, and protective factors are needed to better address problem behaviors. Using data from a sample of urban middle school boys in four US cities, risk patterns based on social-cognitive deficiencies (i.e., learning, social skills, anxiety and conduct problems) at school entry and their relation to aggression and substance use trajectories through the middle school years are examined. In addition, the role of school context and the interaction between patterns of social-cognitive risk and developmental patterns of aggression and substance use is investigated. Informed by person-oriented developmental psychopathology principles, the aim of this dissertation is to evaluate the role of the school environment in influencing youth aggression and substance use across profiles of social-cognitive risk. The study shifts the focus from risk and intervention based in the individual to factors that influence risk and development salient in the school context. Results from this study can inform school-based behavioral prevention and intervention programming.

Using latent class analysis, four patterns of youth risk profiles were identified in the sample: a “low all” group (61.3%) which displayed low risk across all factors, a group with “moderate” learning and anxiety problems (15.5%), a group with “poor social skills” that

showed some learning and conduct problems (16.9%), and a "high all" group with high-levels of risk across all characteristics assessed (6.3%). Latent growth curve analyses were conducted and revealed that the "low all" group had the lowest growth of aggression and substance use through middle school. The "moderate" group had an average growth of behaviors, while the "poor social skills" group had higher levels of aggression and substance use at 6^{th} and 7^{th} grade. The "high all" group showed the fastest growth in problem behaviors and had the highest levels of aggression and substance use at 8^{th} grade.

Analyses conducted to evaluate the role of school-level characteristics (i.e., quality of student-student and student-teacher relationships, sense of safety, awareness of school problems and school norms about behavior) identified two significant school effects on behaviors. Quality of student-student relationships significantly moderated the relation between the probability of membership in the "poor social skills" group and growth of relational aggression only. Additionally, quality of student-teacher relationships moderated the relationship between membership in the "high all" group and growth of non-physical aggression only. Further analysis found that higher quality student-student relationships among the "poor social skills" group were associated with a decrease in relational aggression by an effect size of $d = 0.24$ ($p \leq 0.001$). Moreover, higher quality student-teacher relationships were associated with a reduction in non-physical aggression among the "high all" group by an effect size of $d = 0.25$ ($p \leq 0.05$). Notably, no school factors moderated substance use across all groups.

There are two important implications of these findings. First, social-cognitive characteristics of boys at school entry are related to growth in risk behaviors over the course of middle school. These findings point to important variation in risk during this developmental

period. The findings also highlight the role of school context for some behavioral risk outcomes, particularly for non-physical and relational aggression. Results are relevant to prevailing national prevention strategies and educational trends that focus on a multi-tiered approach to behavioral risk management. The dissertation concludes with a discussion of how future research can promote the development of practice strategies and interventions that target pattern-specific behavioral risk among vulnerable urban youth populations.

CHAPTER ONE

INTRODUCTION

1.1 Problem Statement

Preventing and reducing aggression and substance use among boys in early adolescence is a major public health issue in the United States. Aggression and drug use in adolescence are related to acute and long-term health risks. The risks include unintended injuries, physical disabilities, substance dependency, and poor academic and employment outcomes (Eaton et al., 2010; Knoll & Sickmund, 2010; White & Lauritsen, 2012). The risks are greater for youth, particularly boys who reside in impoverished urban communities (Fagan, Wright, & Pinchevsky, 2013; Finigan-Carr, Gielen, Haynie, & Cheng, 2015; Gibson, 2011). Epidemiologic data suggest that rates of aggression increase through the elementary and middle school years (e.g., Farrell, Henry, Mays, & Schoeny, 2011; Jolliffe, Farrington, Loeber, & Pardini, 2016). For example, in a sample of urban boys from the Pittsburgh Youth Study, the percentage of those who were physically aggressive ranged from 10% to 17% between the ages of 6 to 15 years (Loeber & Hay, 1997). While aggression persists at a stable rate from early to mid-adolescence, data indicate that substance use increases during this period (e.g., Kosterman, Hawkins, Guo, Catalano, & Abbott, 2000; White, Loeber, Stouthamer–Loeber, & Farrington, 1999). Again, in the Pittsburgh Youth Study, alcohol use increased dramatically between ages 13 and 18 from an average of five times per year at age 13 to 60 times per year (several times per month) by age 18 (Loeber & Hay, 1997). This increase in substance use combined with aggressive behavior is concerning because it can result in pernicious outcomes (Felson & Staff, 2010; Felson, Teasdale,

& Burchfield, 2008; White, Tice, Loeber, & Stouthamer-Loeber, 2002). In addition to the associated personal costs, the financial costs borne by society providing related health treatments are staggering and estimated to be approximately $247 billion per year (O'Connell, Boat, & Warner, 2009). Other costs, such as lost potential to society, are incalculable.

Thus, focusing prevention and intervention efforts during this important developmental period is especially critical. A number of developmental shifts are shown to be related to an increase in aggression and substance use. For example, the transition from smaller elementary schools to larger, less structured middle schools can disrupt social structures and create situations for student interactions that can result in conflict (Farrell et al., 2007; Spriggs, Iannotti, Nansel, & Haynie, 2007; Sullivan et al., 2006). Also, as youth spend more time away from parents and family while increasing hours spent with peers, there is a greater exposure and susceptibility to deviant peer groups and, consequently, increased access to and use of drugs and alcohol (Dodge et al., 2003; Fletcher, Bonell, & Hargreaves, 2008; Fletcher, Bonell, Sorhaindo, & Strange, 2009; Webster-Stratton & Taylor, 2001).

Although studies indicate that the middle school years are a time of enhanced risk for aggression and substance use, evidence over the last 30 years has found that problem behaviors are preventable (Hawkins et al., 2015). This large body of work draws attention to salient malleable risk and protective individual and contextual factors influencing development. Among the important individual factors influencing development are social-cognitive factors, widely promoted as targets for the standard of best practice to address youth problem behaviors (Boxer, Goldstein, Musher-Eizenman, Dubow, & Heretick, 2005; Thornton et al., 2002). This body of research draws attention to deficits such as learning problems, social skills difficulties, anxiety,

and conduct problems as key for understanding risk and development (e.g., Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003; Gil, Vega, & Turner, 2002; Henry, Tolan, Gorman-Smith, & Schoeny, 2012; Herrenkohl et al., 2001; Jolliffe, Farrington, Loeber, & Pardini, 2016).

Certainly, social-cognitive factors can heighten or inhibit risk for aggression and substance use. Theory draws attention to the way social-cognitive factors interact with the environment to influence human agency and behaviors through processes such as self-efficacy and self-regulation (Bandura, 1986, 1989, 2001). For instance, learning problems have been identified as critical for understanding risk and development because students with poor academic and learning functions may not be behaviorally or psychologically engaged in the classroom and as a result are at increased risk for engaging in problem behaviors (Bos & Vaughn, 2002). Henry and colleagues (2012) found that students with poor study skills when in the 6^{th} grade increased their odds of aggression in 7^{th} and 8^{th} grade by 38%.

Moreover, social skills deficiencies are important considerations as these can increase risk for involvement in anti-social activities and risk behaviors (Catalano, Oesterle, Fleming, & Hawkins, 2004; Hawkins & Weis, 1985). Lonczak et al. (2001) observed that the quality of social skills (e.g., ability to follow directions, resist influences towards antisocial behaviors) was important in predicting socialization pathways towards or away from drug use. The researchers found that positive social skills directly influence the attainment of positive rewards which led to more positive bonding and more positive belief about the importance of the relationship that resulted in lowered alcohol use (Lonczak et al., 2001).

Additionally, anxiety problems have been identified as important in risk for later aggression and substance use. Literature highlights that problems include anxiety, depression,

withdrawal, and loneliness relate to poor regulatory efficacy which increases youth propensity for negative behaviors (Reijntjes, Kamphuis, Prinzie, & Telch, 2010; White, Jarrett, & Ollendick, 2012). King and others (2004) found that emotional problems at age 11 had a small but significant relationship with increased substance at age 14 and suggested that youth with poor affect during middle school may be more susceptible to the negative influence of peers to consume drugs as a means to gain or maintain their acceptance. Studies further revealed that anxiety and depression are prevalent among young people and they commonly co-exist (Axelson & Birmaher, 2001; Chavira, Stein, Bailey, & Stein, 2004; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Cummings, Caporino, & Kendall, 2014). While anxiety and depression may represent distinct constructs, there are substantial overlaps in symptoms (Axelson & Birmaher, 2001). Research suggest that anxiety symptoms are most salient in understanding mental health risk and behaviors because anxiety has an earlier age of onset as compared to other problems like depression (Cummings et al., 2014; Fichter, Quadflieg, Fischer, & Kohlboeck, 2010; Woodward & Fergusson, 2001).

Lastly, conduct problems such as school misbehaviors and delinquent behaviors are imperative to assess as these increase risk for later aggression and substance use (Masten et al., 2005; Masten & Cicchetti, 2010; Moffitt, 1993, 2003; Moilanen, Shaw, & Maxwell, 2010; Obradović, Burt, & Masten, 2009). Jolliffe et al. (2016) based on data from the Pittsburgh Youth Study reported that early behavioral problems at age 12 were associated with at least a three times increase in risk for violence between ages 13 to 19. The researchers further found that early behavioral problems were consistent predictors of risk for violence across boys from all

socio-economic status, yet risk for behaviors particularly increases for those from poorer backgrounds.

Concurrent to the important role of social-cognitive characteristics for understanding risk and development, research over the last three decades emphasized the important social contexts – particularly the role of school – in influencing risk and development (Bosworth, 2015; Hawkins et al., 2015; Sullivan, Sutherland, Farrell, & Taylor, 2015). Studies highlight that interpersonal relationships, behavioral norms, and safety concerns at school are important for understanding risk behaviors and that modifying these can result in changes in individual and school-level aggressive behavior and substance use (e.g., Farrell et al., 2008; Henry, 2008; Pianta, Hamre, & Stuhlman, 2003; West, Sweeting, & Leyland, 2004). For instance, negative normative beliefs about aggression, such as those linking aggression with higher social status, has been associated with increased aggressive behavior over time (Fagan & Wilkinson, 1998; Farrell, Henry, & Bettencourt, 2013). Other studies have highlighted the positive role of school climate. That is, enhancing aspects of the school environment such as interpersonal relationships between students, relationships between students and teachers, safety concerns and awareness, and norms about behaviors can result in decreased problem behaviors (Osher, Kendziora, Spier, & Garibaldi, 2014; Pianta, 2006). West and colleagues (2004) found that promoting a positive school culture, including support among students and quality of student-teacher relationships, at age 11 was associated with reduced drugs, alcohol, and tobacco use at age 15. In another study, Henry et al. (2011) found that improving school behavioral norms, student-teacher relationships, and school safety awareness and reporting was associated with reduced aggression among boys. Specifically, Henry and colleagues observed that the influence of school factors on aggression

was strongest at 6th grade and persisted through 8th grade although the influence weakened over time. Findings suggest that fostering a culture of positive school climate, particularly at the beginning of middle school, is important to reduce levels of aggression.

Furthermore, theory and research highlight the key role schools play in the early identification and intervention of those at risk for poor outcomes (Albers, Glover, & Kratochwill, 2007; Bosworth, 2015; Farrell, Meyer, Kung, & Sullivan, 2001; Gottfredson, 2001; Severson, Walker, Hope-Doolittle, Kratochwill, & Gresham, 2007; Sullivan, Sutherland, Farrell, & Taylor, 2015; Walker, Cheney, Stage, Blum, & Horner, 2005). Transactional cascading models of development point to the impact early risk factors have on poor development; risk in one domain (e.g., failing academic grades) have accumulating, snowballing, or cascading effects in other domains (e.g., poor school conduct) (Masten et al., 2005; Masten & Cicchetti, 2010; Moilanen et al., 2010; Obradović et al., 2009). Thus, the time youth spend in schools is a critical window of opportunity for the provision of interventions to disrupt problematic cascading patterns (Bosworth, 2015; Sullivan et al., 2015). Studies draw attention to the importance of effective early screening of behaviorally at-risk students so that tailored interventions can be directed to prevent and intervene risk for poor outcomes (Albers, Glover, & Kratochwill, 2007; Bosworth, 2015; Severson, Walker, Hope-Doolittle, Kratochwill, & Gresham, 2007; Sullivan et al., 2015; Walker, Cheney, Stage, Blum, & Horner, 2005).

Unfortunately, while a large volume of research provides important information on social-cognitive risk and school factors in influencing behaviors, significant gaps exist in the extant literature. The vast majority of studies have looked at the relation between social-cognitive problems and behaviors in silos and focused on variable-level relationships without

considering patterns of co-occurring risk (Bergman, Eklund, & Magnusson, 1991; Magnusson, 1985, 1998). Examples include those studies that evaluated for the influence of learning problems on aggression only (e.g., Henry et al., 2012) or the impact of internalizing problems on substance use only (e.g., King et al., 2004) negating the possibility that different configurations of social-cognitive problems may co-exist and relate to enhanced risk for poor development (e.g., co-occurring learning and internalizing problems leading to higher levels of aggression and substance use) (Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993).

Although variable-oriented studies provide important information on the independent influence of social-cognitive factors on behaviors (e.g., the specific role of learning problems on aggression or the precise influence of internalizing problems on substance use), a major limitation of these studies is their siloed nature and assumption of homogeneity within samples. Relying only on variable-oriented studies to inform screening efforts of behaviorally at-risk students will result in insufficeint knowledge on the continuum of students that exist in the student body. The groups of students based on profiles of social-cognitive risk cannot be properly determined because risk was not assessed across multiple social-cognitive domains (Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993). Understanding the profiles of social-cognitive risk that exist in a student body is important because these may be associated with different patterns of aggression and substance use over time, requiring specific targeted prevention and intervention approaches.

Some studies have examined patterns of social-cognitive risk (e.g., Kamphaus, Huberty, DiStefano, & Petoskey, 1997; Kim et al., 2010; Orpinas, Raczynski, Peters, Colman, & Bandalos, 2014; Roeser, Eccles, & Freedman-Doan, 1999; Roeser, Eccles, & Sameroff, 1998;

Roeser, Strobel, & Quihuis, 2002). However, information from these studies to inform targeted behavioral interventions is limited and none have focused on urban boys and their developmental aggression and substance use outcomes. Prevailing studies focus on White, middle class samples (e.g., Roeser, Eccles, & Freedman-Doan, 1999; Roeser, Eccles, & Sameroff, 2000) or general middle-school youth (e.g., Kim et al., 2010; Orpinas et al., 2014). Moreover, current studies focus primarily on academic outcomes (e.g., Roeser et al., 1999, 1998, 2002) or aggression at a single point in time (e.g., Orpinas et al., 2014). Thus, how a constellation of co-occurring social-cognitive problems may relate to developmental patterns of aggression and substance use over the course of early adolescence remains to be investigated.

Additionally, studies have not fully examined the way school context may relate to profiles of social-cognitive risk and patterns of aggression and substance use. Ecological transactional understanding of development highlights the importance of the interactions between persons and the environment in understanding outcomes (e.g., Bandura, 1989; Bandura, 1986, 2001; Bergman & Magnusson, 1997; Cicchetti, 2006; Cicchetti & Rogosch, 2002; Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993). Substantial evidence exists in the literature supporting the ability of school to attenuate risk and development (e.g., Fairchild & McQuillin, 2010; Kuperminc et al., 2001; Kuperminc, Leadbeater, Emmons, & Blatt, 1997; Loukas & Robinson, 2004). In one study, Kuperminc et al. (2001) evaluated the relation between academic self-criticism and internalizing and externalizing problems, contrasting between those with high/low academic self-criticism and student-reported school climate. In this study, Kuperminc and colleagues found that positive individual perceptions of school climate was important in supporting youth with high levels of self-criticism (as compared to those with low

levels) as these youth did not increase in their internalizing/externalizing problems. In another study, Loukas & Robinson (2004) examined the link between behavioral effortful control and depressive symptoms and how these are moderated by high/low self-reported levels of school cohesion and high/low individual-reported levels of satisfaction with classes. The researchers observed that self-report of positive perceptions of school cohesion and satisfaction with classes were important in attenuating depressive symptoms among those students with low levels in effortful control.

Nonetheless, existing studies of school context interaction are limited in a number of ways. For instance, the studies examined interaction based on a single risk factor (e.g., self-criticism only, effortful control only) and on two student groups only (e.g., high versus low). There is a restricted understanding of the range of at-risk students because risk is not assessed across multiple domains (Albers et al., 2007). Additionally, extant studies examined interaction at the individual-level, without adequate consideration of school effects at the broader school-level (Farrell et al., 2013). Such studies are limited because problematic ecological conclusions can occur, such as the claim that all students/groups are equally influenced by changes in overall school climate (Sterba & Bauer, 2010). In reality, it may be that only particular segments of the student body are influenced by changes in the overall school environment. Thus, a need to evaluate for school-level interaction across different groups of students in a single analysis to determine if school effects are consistent across the entire student body persists. In fact, clarifying the generalizability of any contextual effects is an area of study consistently highlighted by researchers as a prevailing gap in the field of prevention study (Farrell, Henry, & Bettencourt, 2013; Flay et al., 2005; Gottfredson et al., 2015).

Understanding the exact nature of school influences on behaviors is important in promoting and directing school-based intervention efforts. School behavioral prevention and intervention studies to date have identified best practices to be either targeted at the entire student body (i.e., universal approach), or with groups of students and individuals (i.e., selected and indicated approaches) (Hawkins et al., 2015; Institute of Medicine, 1994). By promoting studies that consider multiple profiles of risk, results from these analyses can guide the development of programs tailored at those specific student groups that are most likely to benefit (Nylund-Gibson & Hart, 2014; Supplee, Kelly, MacKinnon, & Barofsky, 2013). Generally, the questions addressed and the series of analyses conducted utilize a person-oriented analytic approach to identify meaningful patterns or profiles based on social-cognitive characteristics that exist at entry into middle school, and the relation to developmental risk for aggression and substance use through the middle school years. Common analyses evaluate the role of the school environment as related to patterns of social-cognitive risk and behaviors.

This study evaluates the multi-faceted domains of aggression, including physical, non-physical, and relational aggression, and a range of drug use involving cigarettes, alcohol, and marijuana. Overall, the study focuses on the school context as the target of change and identifies salient school factors that should be directed at specific groups of students. Findings from this study can be used to promote and enhance the effectiveness of current school behavioral prevention and intervention programming approaches.

1.2 Dissertation Goals, Research Questions, and Significance

The overall goal of this dissertation is to evaluate the relations between profiles of early adolescent urban boys' social-cognitive problems at middle school entry, their respective trajectories of aggression and substance use through the middle school years, and the role of school context in moderating the relations between student patterns and behaviors. The study addresses the following specific research questions:

1. Using teacher reports of student social-cognitive deficits at middle school entry (i.e., learning problems, social skills deficits, anxiety and conduct problems), are there identifiable patterns of behavioral risk profiles among a sample of urban boys?
2. Is there a relationship between subgroups of boys based on behavioral risk profiles entering 6th grade and developmental trajectories of boys' self-report aggression and substance use over the course of middle school?
3. Do school contextual factors (e.g., interpersonal relationships, safety concerns, and norms about behaviors) moderate the relation between student patterns and growth of aggression and substance use over the course of middle school?

For the first research question, analyses are conducted to identify heterogeneous student patterns based on four social-cognitive student problems: learning problems, social skills deficiencies, anxiety, and conduct problems. Investigating the student patterns that exist at entry into middle school (Fall 6th grade) is important in helping practitioners use these social-cognitive factors to screen for boys at risk.

For the second question, analyses are conducted to evaluate the trajectories between patterns of social-cognitive risk and aggression and substance use through the middle school

years (Spring 6th, Spring 7th, and Spring 8th grades). In this study, the aggression trajectories of three forms of aggression are examined and compared: physical, non-physical, and relational aggression. Similarly, three substance use trajectories are investigated: cigarette, alcohol, and marijuana. Understanding the relations between patterns of risk and longitudinal behavioral outcomes can help practitioners prioritize and direct limited school resources toward segments of the student body at greatest need for prevention and intervention efforts.

For the third research question, analyses are conducted to investigate the role of school context to moderate the relation between social-cognitive risk patterns and behaviors. A better understanding of the interplay between risk patterns and school influences can lead to improved behavioral outcomes. Identifying those influential school factors on behaviors can help researchers and practitioners tailor school prevention and intervention practices according to those who would most likely to benefit from its modification.

1.3 Organization of Dissertation

Following this introductory chapter, the theoretical perspectives guiding this study are reviewed in Chapter 2. Principles of the social-cognitive theory, a person-oriented perspective, and the developmental psychopathology framework as applied to the relations between school context, social-cognitive problems, and early adolescent male aggression and drug use are outlined. The literature on early adolescent aggression and substance use, as well as on social-cognitive deficits involving learning problems, social skills deficiencies, and anxiety and conduct problems is presented in Chapter 3. Also reviewed is the literature on the school contextual features involving interpersonal relationships, safety concern and awareness, and behavioral norms, emphasizing their relation to aggression and substance use. Additionally, extant research

on patterns and trajectories of behavioral risk is discussed. Chapter 4 will address the assumptions, hypotheses, and conceptual framework guiding the analysis in this study. Chapter 5 provides an overview of study design, sample, measures, and analytic plan. Chapter 6 describes the dissertation findings. Chapter 7 reviews key findings in light of the study limitations, highlighting the contributions to the literature and implications for scholarship and practice.

CHAPTER TWO

THEORETICAL FRAMEWORK

In this study, the conceptualization of social-cognitive factors, school context, and problem behaviors is informed by social-cognitive theory (Bandura, 1986, 1989, 2001), the person-oriented perspective (Magnusson, 1985, 1988, 1998), and developmental psychopathology principles (Cicchetti, 2006; Cicchetti & Rogosch, 2002). Additionally, the overarching person-oriented developmental psychopathology framework (Bergman & Magnusson, 1997) informs the theoretical understanding of developmental risk processes and the moderating role of school context across patterns of risk.

2.1 Social-Cognitive Theory

Social-cognitive theory focuses on person-in-environment interactions and the idea of reciprocal determinism. The development of behaviors such as aggression and substance use can be understood as the result of ongoing transactions between three key domains that interact and influence one another: these domains are person (e.g., cognition, emotions), environment (e.g., social events and interactions), and behavior (Bandura, 1986, 1989).

In the person domain, social-cognitive theory accounts for what is called the self-system (Bandura, 1978) and its relation to ideas of human agency (Bandura, 1989, 2001). The self-system consists of multiple cognitive structures that support the evaluation of environmental events and inform subsequent action. Early conceptualizations of this process revolved around social learning theory, which held that individuals learn behaviors by observing others in their environment, evaluating their behaviors, then internalizing the observed behaviors as part of their

self-system (Bandura, 1977). Later conceptualizations of the self-system included human agency and its emphasis on the ability to take proactive and purposeful action in response to cues and stimuli from one's social environment (Bandura, 1989, 2001). When thinking of human agency, the cognitive capabilities of reflection, discernment, perceptions of self-efficacy, and self-regulation are important factors (Bandura, 1989, 2001).

In the environmental domain, social-cognitive theory defines different dimensions: imposed, selected, and constructed (Bandura, 1999). The imposed environment refers to those contexts which the individual has limited control over, such as social-economic structures, communities, and neighborhoods. The selected environment refers to chosen settings such as school activities. Lastly, constructed environments are those with closest proximity to the individual, such as peer groups. Constructed environments are viewed as having the greatest influence on individuals.

In understanding how behaviors are learned from the environment, social-cognitive theory draws on the notion of operant conditioning and social learning (Bandura, 1986, 1989). For instance, youths may learn to resolve conflicts in an aggressive manner by imitating the way peers in his selected and constructed environments resolve hostile situations. Such behaviors can be sustained, particularly if they are socially reinforced through recognition from deviant peers from these environments (Akers & Lee, 1996; Hay et al., 2011).

Social-cognitive theory is used in this study to identify the social-cognitive factors that can indicate which boys may be at risk for aggression and drug use during middle school. Again, the theory posits that behaviors are shaped by individual cognitive aptitudes that process inputs from social settings (Bandura, 1989, 2001) and contends that one's cognitive ability influences

the way individuals reflect on and perceive their own behaviors in relation to environmental norms. Subsequently, it will be assumed that individuals adjust their behaviors based on their perceptions of social expectations (Bandura, 1989, 2001). The study also pays close attention to social skills, as markers of an individual's ability to effectively interact and engage with others in the environment (Bandura, 1989, 2001). The theory suggests that emotional control is essential in regulating behaviors because mood can influence how well behaviors are self-monitored and cognitively processed (Bandura, 1989, 2001). Furthermore, the theory highlights the cyclical process in the evolution of behaviors in a way that current actions have an impact on later behaviors. Therefore, individuals' ability for behavioral control is another important indicator as it reflects individual susceptibility towards later risk behaviors (Bandura, 1989, 2001).

2.2 Person-Oriented Perspective

The person-oriented perspective is grounded in personality research (Carlson, 1971), which seeks to understand how and why individuals think, feel, and behave the way they do (Magnusson & Torestad, 1993). It focuses on understanding and explaining the underlying individual processes and mechanisms that lead to individual actions and behaviors. Broadly, personality research is a holistic-interactional approach that determines similarities and differences in developmental processes among persons and takes into account three basic propositions. First, persons are seen as integrated beings; second, persons are influenced by their interactions with the environment; and third, development is shaped by the interactions of factors within the subsystem of the individual (Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993).

Looking at individuals as integrated beings keeps the theory from being reductionistic. The cognitive domain highlights the thought-processes that anticipate outcomes; the biological domain draws attention to physical processes, such as neurological growth and maturation; and the psychosocial domain underscores the motivational or regulatory factors behind one's actions within a social environment. The individual-environment interactional principle underlies many developmental theories (e.g., developmental psychopathology, social-cognitive theory) and can be recognized as the "classic" understanding of the person-in-environment interaction (Magnusson, 1988). Its unique strength, however, comes from accounting for the ongoing, bi-directional, and dynamic factors in the environment. It stresses variance among persons as the main reason for the array of outcomes that can emerge in a population (Magnusson, 1988). For example, two separate individuals may experience and respond differently to a same provocative situation: one with an aggressive response, and the other a non-aggressive reaction. In this situation, the person-oriented approach emphasizes that the divergence in behaviors is due to individual differences. For instance, these individual differences may include the past social history of individuals, resulting in their unique interpretations of the physical, cultural, and social structures and stimuli from the environment.

The within-individual interactional principle is a "modern interactionism" view of development (Magnusson, 1988) and provides an opportunity to bridge disciplines like biology and psychology. This merging of perspectives from psychology and biology is significant in furthering the understanding of why the same population produces different outcomes for individuals. By accounting for the way human functioning influences and id influenced by an individual's subsystems, it reinforces the significance of environmental influences on individual

domains. Particularly, it draws attention to the way individuals function and develop as an integrated complex unit within their environments.

The person-oriented perspective is relevant to this study because it best locates common patterns of social-cognitive factors for youth who may be at risk for aggression and drug use during middle school. Although an infinite number of patterns may be elicited, the approach posits that from any given population, a small number of patterns will be observed most frequently.

2.3 Developmental Psychopathology

Developmental psychopathology is an interdisciplinary perspective on risk and development used to uncover the mechanisms and processes related to the evolution of normal and pathological development, respectively (Rutter, 1987). To promote positive development, the perspective focuses on malleable risk factors that lead to maladaptation and offers ways to foster the protective processes which support normal development (Cicchetti, 2006; Cicchetti & Rogosch, 2002). In this theory, the interplay between individual and ecological factors is understood within the context of their life-stage challenges (Cicchetti, 2006).

The inclusion of the life stage is crucial for this study. The life stage of early adolescence is characterized by multiple biological, psychological, and social changes that can heighten risk for problem behaviors (Crockett & Petersen, 1993). However, the perspective does not view risk, particularly during early adolescence, to be deterministic of poor outcomes. Instead, it accounts for the plasticity of the human person, drawing attention to mechanisms seen as malleable and processes thought to reduce risk and enhance protection amidst developmental changes. From this view, the middle school years are a critical widow of opportunity for intervening to prevent

and remediate developmental risk processes because strengthening prevention efforts during this period is more salient given the impending crystallization of life experiences, and the greater resistance to change that is associated with the period of late adolescence (Cicchetti, 2006; Cicchetti & Rogosch, 2002). In this framework, individuals are seen as fluid and capable of changing their behavior (Cicchetti, 2006; Cicchetti & Rogosch, 2002). It draws on resilience studies to consider how individual background risk and protective factors shape development as an individual participates in, and processes, their environment (Luthar, 2003; Luthar & Cicchetti, 2000; Luthar, Cicchetti, & Becker, 2000).

This perspective understands environment to be comprised of ongoing multi-level ecological influences on individuals (Bronfenbrenner, 1979). The environment is an important consideration for understanding the behaviors of early adolescent urban boys, boys who are likely to reside in impoverished, high-crime neighborhoods associated with increased risk for problem behaviors (Sampson, 2012; Sampson, Morenoff, & Gannon-Rowley, 2002). Since activities, social exchanges, and interactions between persons and their contexts are thought to facilitate, impede, or buffer the occurrence and growth of behaviors (Bronfenbrenner & Morris, 2007), processes playing out within an individuals' most immediate, proximal contexts—such as family, peers, and school—are said to have more direct effects on development (Bronfenbrenner & Morris, 2007).

The interplay between individuals and ecology within a developmental framework is a critical principle of developmental psychopathology. This perspective, broadly based in a developmental-ecological understanding of risk (Tolan, Guerra, & Kendall, 1995), emphasizes the bidirectional nature of ongoing, unfolding transactions between maturating individuals and

their evolving environments (Sameroff, 2000). Because of the individualistic process of person-environment interactions, the perspective employs the concepts of equifinality and multifinality (Von Bertalanffy, Hofkirchner, & Rousseau, 1969).

Equifinality is defined as multiple pathways leading to the same outcome. The idea is that at each point in time, typical patterns exist that can be connected to an outcome. For instance, various patterns of social-cognitive risk at middle-school entry can have different pathways leading to a single outcome, that is, entry into high school. This is known as *start equifinality* (Bergman, Andershed, & Andershed, 2009). Multifinality refers to a single starting point connected to diverse outcomes. To extend the example above, entry into middle school can concurrently lead to the emergence of different patterns of aggression and drug use. This is known as *strong multifinality* (Bergman et al., 2009), which highlights the clear relations between a single point (entry into middle school) and several developmental patterns (patterns of aggression and substance use trajectories). Together, equifinality and multifinality draw attention to the diversity of pathways that can emerge within any given population (Bergman & Magnusson, 1997; Cicchetti, 2006; von Eye & Bergman, 2003). Developmental psychopathology offers this study a conceptual framework for investigating the processes occurring between an array of co-occurring social-cognitive risk factors and the associated multiplicity of aggression and substance use trajectories.

Lastly, the nature of context to buffer developmental risk and outcomes is another principle from developmental psychopathology relevant to this study. Critical to understanding the role of context in buffering risk starts with an awareness of the innate ability of the individual to adapt to changes in their environment (Bandura, 1986, 1989). Developmental change occurs in

relation to human capacity for continuous adaptation to their environment. This interplay between individuals and ecology is critical for understanding the ability of context to buffer individual risk and developmental outcome. It highlights the fundamental role of the environment to support and influence individual change. Developmental psychopathology is relevant to this study as it shifts the focus of risk and change from the individual level to understanding the role of context in preventing negative and promoting positive developmental outcomes.

2.4 Person-Oriented Developmental Psychopathology

This perspective integrates principles from the person-oriented total interactionalism paradigm (Magnusson, 1985) and developmental psychopathology (Cicchetti, 2006; Cicchetti & Rogosch, 2002). The framework is a typological approach to studying development. The goal is to identify developmental patterns in a population and then to understand how they emerge and what outcomes they produce (Bergman & Magnusson, 1997).

The framework strongly emphasizes the nonlinearity and multi-dimensional nature of the human development process. A prominent underpinning of this view is the existence of multiple developmental patterns across individuals which are attributed to the unique interplay between the dynamic systems, humans, and their subcomponents that occurs across time. The perspective posits that common patterns of development can be identified through the integration, organization, and developmental crystallization that results in a clearer distinction and sharper categorization of individuals (Bergman, von Eye, & Magnusson, 2006).

The person-oriented developmental psychopathology perspective is a shift from the variable-oriented dimensional approach that most studies are based on. The focus of variable-

oriented studies is on the analysis of variables, such as the use of composite independent measures of learning problems and social skills to broadly predict outcomes and establish causality (Magnusson, 1998; Magnusson & Torestad, 1993).

To illustrate an example of a variable-oriented study and its limitations, Bandura and colleagues (1996) applied a path analysis model to a sample of 279 Italian children aged 11 to 14 years. While Bandura's study provides insights on the broad causal relations between social-cognitive constructs and behaviors, findings from his research are limited in a way that it assumes homogeneity in the sample, which negates the possibility that different configurations of social-cognitive attributes may co-exist within his sample. For instance, a group of children with high academic ability and high social efficacy may likely have different outcomes when compared to groups with high academic but poor social skills. Nonetheless, there are multiple strengths of a variable-oriented paradigm. For instance, robust inferential statistics and causal inferences with proper controls for confounders can enhance knowledge on risk and development broadly (Bergman & Andersson, 2010). Unfortunately, such studies are hard to interpret at the individual level. It is difficult to make inferences about individual development because of the strong assumption that the same model holds for all subjects (Bergman & Andersson, 2010). Furthermore, developmental processes are examined at the group level based on linear models and through studying the relations between pairs of variables (von Eye & Bergman, 2003).

A person-oriented developmental psychopathology approach to understanding risk and development is important for preventing youth problem behaviors (Supplee et al., 2013). There is a need to move away from a variable-oriented understanding of risk and development; and instead, consider patterns of developmental phenomena. A benefit of this perspective is the

ability to parse out main effects across patterns of risk. It is helpful to understand whether an effect was more or less effective for a particular subpopulation. Such knowledge has strong practice implications as it can help practitioners tailor or target programs at specific groups of individuals (Rothman, 2013; Supplee et al., 2013).

2.5 Implication of Theories for Research Questions

Collectively, the social-cognitive theory, person-oriented, and developmental-psychopathology perspectives are integrated into an overarching person-oriented developmental psychopathology framework to guide the conceptualization of this study.

Person-oriented developmental psychopathology views development as the result of ongoing interactions between the individual and his/her environment. The total-integrative interactionalism principle draws attention to the within-person interactions that influence development. Additionally, the social-cognitive theory informs the conceptualization of this process. Based on this theory, four important areas influence the individual self-regulatory abilities against problem behaviors: 1) academic skills deficits, 2) social skills deficits, 3) anxiety problems, and 4) conduct problems. From these factors, the person-oriented paradigm posits that common configurational patterns can be identified across individuals. Thus, in understanding behavioral risk, a key theoretical principle relevant for the first research question is the salience for studying the individual domains and the common configurational patterns that exist across individuals.

The principles of equifinality and multifinality further emphasize the importance of understanding the multiple behavioral pathways that can emerge through time in a given study population. Because of the transactional understanding of development, the interactions between

persons and environment are likely to produce multiple behavioral pathways based on different patterns of social-cognitive risk. Guided by these principles, the second research question seeks to investigate the relation between patterns of social-cognitive risk and developmental patterns of behaviors. Additionally, the person-in-environment interaction paradigm highlights the nature of context to moderate the relation between social-cognitive risk and behavioral trajectories. The concept of contextualism also draws attention to the multiple evolving domains of the environment that can buffer behavioral risk. Different contextual influences on behaviors can vary across the different risk patterns. Therefore, the third research question explores whether different aspects of the school environment moderate behaviors differently across the patterns of social-cognitive risk.

In summary, this dissertation integrates theoretical principles from three paradigms to understand the relations between patterns of social-cognitive risk, problem behaviors, and the moderating role of school context. The social-cognitive theory draws attention to the important factors influencing risk and development and the person-oriented perspective highlights the salience of examining their configurational patterns of risk. Furthermore, informed by developmental psychopathology principles, the study investigates the trajectories of aggression and substance use associated with the patterns of risk. Finally, integrating principles across the three theoretical paradigms, this study examines the school context in moderating the relation between patterns of social-cognitive risk and behaviors through the middle school years.

CHAPTER THREE

LITERATURE REVIEW

3.1 Aggression and Substance Use: Common and Independent Cause Perspectives

Early adolescent male aggression and substance use are serious public health concerns in the United States. National data from the Middle School Youth Risk Behavior Survey (YRBS) revealed that in 2013, more 6th grade boys (60%) than girls (35%) were involved in physical fights, and they engaged in more substance (e.g., marijuana) use (7%) compared to girls (4%). At 8th grade, there are comparatively higher numbers of boys exhibiting problem behaviors. At that grade level more boys (67%) than girls (44%) display physical aggression and more boys (20%) engage in marijuana use than girls (16%) (Centers for Disease Control and Prevention, 2015). Racial/ethnic differences in rates of problem behaviors also exist. From 6th through 8th grade, 78% of African-American boys reported having been in a fight compared with 63% of Hispanics and 57% of Whites. Furthermore, African American (15%) and Hispanic (14%) youth reported higher rates of having ever used marijuana compared to White boys (8%) (Centers for Disease Control and Prevention, 2015).

To address problems relating to youth aggression and substance use, two related bodies of literature evaluate whether the behaviors should be analyzed as common or separate constructs. One large body of research seeks to disentangle and establish the directionality between aggressive behaviors and drug use (see Boles & Miotto, 2003; Ostrowsky, 2011; Wagner, 1996). This area of work evaluates whether targeting aggression will lead to secondary decreases in substance use (e.g., Cho et al., 2014; Englund, Egeland, Oliva, & Collins, 2008;

Merline, Jager, & Schulenberg, 2008), or if substance use should be the target of intervention as it precedes aggression (e.g., Brook, Brook, Rubenstone, Zhang, & Saar, 2011; Maldonado-Molina, Reingle, & Jennings, 2011; Stouthamer–Loeber, Wei, Loeber, & Masten, 2004). Likewise, research to determine whether aggression and substance use are related in a way that targeting one or the other will lead to concurrent decreases in both behaviors (e.g., D'Amico, Edelen, Miles, & Morral, 2008; Xue, Zimmerman, & Cunningham, 2009). There is substantial evidence supporting all three perspectives, but it is difficult to determine if one approach is superior to the other in informing behavioral interventions.

There is another associated area of research seeking to understand the linkages, co-variations, and assorted factor structures of behaviors including aggression and drug use (e.g., Allen, Leadbeater, & Aber, 1994; Busseri, Willoughby, & Chalmers, 2007; Farrell et al., 2000; Monahan & Hawkins, 2009; White, 1991; Willoughby, Chalmers, & Busseri, 2004). Pursuing this line of inquiry also has strong practice implications insofar as understanding the uniqueness or interdependence of behaviors can properly guide prevention and intervention programming efforts (Busseri et al., 2007). Practitioners and researchers can determine if tailored strategies are needed to address aggression and substance use separately, or if programs can account for coincidences between the two. Hence, to guide the current study's conceptualization regarding whether aggression and substance use should be examined as separate or common entities, the two general perspectives in understanding the way these behaviors are interlinked are reviewed: a common cause perspective and an independent cause perspective.

Common Cause Perspective. A key feature of the common cause perspective is that a single variable can account for and influence a multitude of behaviors. In other words, this

framework hypothesizes that a general deviance orientation underlies problem behaviors. Gottfredson and Hirschi's (1990) Social Control Theory is one illustration of the common cause model. Gofffredson and Hirschi posited that delinquency is the result of poor self-control due to the lack of bonding to pro-social institutions and adult figures such as schools, teachers, and parents. Another illustration of the common cause perspective is Jessor & Jessor's (1977) Problem Behavior Theory. Jessor and Jessor believed that the emergence of one problem behavior is likely to be followed by another problem behavior owing to an individual's psychosocial proneness to risk. From the common cause perspective, programs seeking to reduce problem behaviors should focus on enhancing youth self-control or reducing their overall proneness to risk. There is some evidence supporting the proposition of an underlying syndrome of adolescent problem behaviors. For instance, studies have documented the strong correlation between one type of problem behavior and other problem behaviors (for reviews see Monahan & Hawkins, 2009; O'Connell, Boat, & Warner, 2009). Such inter-related manifestations of behaviors suggest that changing a single factor (e.g., reducing youth proneness to risk) can alter all behaviors, which is the basis of Jessor's conceptualization of problem behavior theory.

Indeed, empirical tests of the problem behavior theory showed that a single first-order latent factor accounted for the inter-correlations among problem behaviors. Based on two separate samples of high school (n=243) and college (n=184) students in Colorado (83% White, 70% intact families), Jessor and colleagues observed that a one-factor model involving four behaviors (i.e., alcohol, marijuana, illicit drug use and general delinquency) was found to best fit their high school and college data (Donovan & Jessor, 1985; Donovan, Jessor, & Costa, 1988). The concept of a single problem behavior syndrome is also supported by other research that

includes studies on second-order latent factors and shows that a general underlying construct can account for multiple domains of problem behaviors (e.g., Chun & Mobley, 2010; Newcomb et al., 2002). Recent replications of Jessor's analyses have also been conducted and findings were consistent with earlier analyses. For example, in the study by Racz, McMahon and Luthar (2011) on a sample of affluent youth, confirmatory factor analyses provided support that a general underlying factor best fit the data involving five items (i.e., substance use, hard drugs, general delinquency, sexual activity, school performance).

Independent Cause Perspective. Although studies provide evidence for a general problem behavior syndrome, another large volume of research corroborated evidence that the influences on and development of behaviors are different and independent from each other. Hence, in contrast to the common cause perspective, the independent cause perspective suggests that aggression and substance use are not caused by the same set of factors and, thus, reducing risk behaviors requires separate approaches.

A number of studies have identified at least three underlying factors that can account for a broad range of problem behaviors (e.g., Farrell et al., 2000; Verona, Javdani, & Sprague, 2011; Willoughby et al., 2004). Willoughby, Chalmers and Busseri (2004) conducted a study on 7290 high school Canadian youth from mostly college-educated parents. They found that a three-factor model provided a better overall fit than did a single-factor model. The three factors are delinquency (consisting of major, minor, and gambling items), aggression (direct and indirect aggression items), and problem syndrome (drug use and risky sexual items). In another study based on two separate samples of urban and rural middle school youth, Farrell and colleagues (2000) also identified a three-factor model as the best fit of the data to both groups. These factors

were labeled as drug use (e.g., smoked cigarettes, drank beer), delinquency (e.g., skipped school, shoplifted), and aggression (e.g., physical and non-physical).

The preponderance of studies finding multi-factor structures have led some scholars to suggest that the case for a single-source influence on behaviors may be overstated (Monahan & Hawkins, 2009). For one, empirical tests of problem behavior theory emerged from studies that focused on homogeneous populations of White affluent individuals (e.g., Donovan & Jessor, 1985; Donovan, Jessor, & Costa, 1988; Racz, McMahon, & Luthar, 2011). Subsequent empirical tests over the last two decades on African American (e.g., Williams, Ayers, Abbott, Hawkins, & Catalano, 1996) and Hispanic samples (e.g., Zamboanga, Carlo, & Raffaelli, 2004) provide weak support for a general problem behavior syndrome. Moreover, studies revealed differences in developmental growth patterns between substance use and aggression, further negating the assumption of a common problem behavior syndrome. Based on longitudinal data from their urban and rural early adolescent samples, Farrell and colleagues (2005) investigated and observed that models with separate growth trajectories for drug use, delinquency, and aggression provided the best fit for their data. Specifically, divergent patterns of change were noted within their urban sample: drug use and delinquency increase steadily from 6th grade Fall to 8th grade Fall, while aggression peaks between 7th grade Fall to Spring and slightly decreases at 8th grade Fall.

Divergent growth patterns of change between aggression and substance use were also observed in studies based on Pittsburgh Youth Study (e.g., Wei, Loeber, & White, 2004; White, Loeber, Stouthamer–Loeber, & Farrington, 1999). Despite data revealing a high degree of co-occurrence among alcohol, marijuana, and aggression, White and colleagues (1999) noted the

dissimilar pathways throughout adolescence: alcohol and marijuana use increased over time, while violent behavior decreased with age.

An independent cause approach to understanding developmental trajectories of aggression and substance use is taken in the analyses conducted in this study. The approach assumes that aggression and substance use are independent, distinct constructs, and that risk and protective factors influence these behaviors differently. While the close inter-relatedness between the two behaviors may suggest adopting the common cause perspective, the volume of studies pointing to multi-factorial problem behavior models direct focus to the independent cause perspective. Furthermore, the dissimilarities in aggression and substance use trajectories provide further support for the independent cause perspective. As hypothesized by White (1991), the inter-relatedness between substance use and aggression may be due to adolescent experimentation, but the divergent pathways indicate separate maturation and socialization processes. That is, while it is probable that most adolescents can mature out of aggressive actions, while the majority of substance users will increase their substance use beyond adolescence. Given this study's objective to expand knowledge related to negative behaviors during the period of mid adolescence, aggression and substance use are discussed and evaluated as separate constructs.

3.2 Aggression: Multi-Dimensional Perspective

Aggression is widely described in the literature as multi-faceted and complex (see Archer & Coyne, 2005; Bushman et al., 2016; Farrell & Flannery, 2006; Tolan & Guerra, 1994). Aggression is a behavior that begins early in life and can be examined to differentiate between those who will exhibit a pattern of persistent chronic and serious conduct problems and those

whose problem behaviors will decrease in adolescence (Moffitt, 1993, 2003). Because aggression can appear on a continuum of severity (Farrell & Flannery, 2006), understanding the multi-dimensional aspects of aggression is important to avoid the blurring of differential risk and the obscuring the diverse trajectories of aggressive behaviors that can exist in a student body.

A clear delineation of the different facets of aggression can provide more insight into the development of this behavior (Farrell et al., 2005). For example, there are nuanced differences between "aggression" and "violence." Aggression is defined as behaviors intended to harm another person who does not want to be harmed and violence is defined as overt actions with the goal of causing extreme harm, such as injury or death (Bushman & Huesmann, 2010). This distinction is important because excluding someone from a group or insulting someone's family are not acts of violence, but rather are acts of aggression. Crucially all violent behaviors are aggressive, but not all aggressive actions are violent (Bushman et al., 2016). Moreover, non-violent aggressive behaviors can be further differentiated. For example, relational aggression seeks to harm an individual through his/her peer relationships (e.g., excluding someone from a group, spreading a rumor) (Archer & Coyne, 2005; Crick & Bigbee, 1998; Crick & Grotpeter, 1995; Farrell et al., 2000). These behaviors are distinctly different from other forms of non-violent aggression that are verbal in nature (e.g., insults, calling someone names) (Archer & Coyne, 2005; Farrell et al., 2000; Lagerspetz, Björkqvist, & Peltonen, 1988).

Reviews of the literature indicate that physical aggression is a frequent occurrence among youth during the middle school years. Based on the sample of boys in the Pittsburgh Youth Study, physical aggression appears fairly regularly from early to mid-adolescence. Between the ages of 6 to 14, physical aggression ranged from 10 – 17% (Loeber & Hay, 1997; see Appendix

Figure A.1). Following which, the percentage of aggressive boys dropped to below 10% between the ages of 14 – 15. The percentage further decreases until it stabilizes at about 5% into late adolescence (17 years). Other studies also support evidence that physical aggression is a frequent occurrence among youth from early to mid-adolescence. Farrell et al., (2005) found that physical aggression among middle school youth consistently averaged between 1-2 incidences in a month from 6th through 8th grade (see Appendix Figure A.2).

Analyzing relational and non-physical aggression separately from physical aggression is important because both often precede assault (Coyne, Archer, & Eslea, 2006; Dailey, Frey, & Walker, 2015; Farrell et al., 2007; Leff, Waasdorp, Waanders, & Paskewich, 2014). Preventing the escalation from relational/non-physical aggression to physical aggression is important in reducing overall aggression. As illustrated in the qualitative study by Farrell and colleagues (2007) with a sample of African-American middle-school youth and school adults, they found that the management of transactions between peers who "crossed the line"—informal, verbal instigations of aggression—was important in preventing situations from escalating toward a violent outcome. Thus, strategies to screen, prevent, and reduce relational and non-physical aggression are important for reducing physical and overall aggression (Walker, 2010).

Reviews of the literature indicate that indirect forms of aggression are sophisticated and require understanding of an array of social-cognitive influences including emotional regulation abilities (Card, Stucky, Sawalani, & Little, 2008) and perspective taking (Eccles, Wigfield, & Byrnes, 2003; Prinstein, Boergers, & Vernberg, 2001). Studies found that indirect aggression is related to internalizing problems such as depression as it influences their decisions to enact a behavioral response (Leff, Waasdorp, & Crick, 2010). Indirect aggression can also occur when

youth perceive the costs of direct aggression are too high or they evaluate actions as a low-cost way of harming others (Archer & Coyne, 2005; Coyne et al., 2006). These may include "behind-the-back" approaches of manipulation or disrupting relationships, which were found to be distinctly different from other covert non-physical aggression such as "making fun of someone's personality behind a person's back" (Coyne et al., 2006). Further reviews of the literature indicate that the consequences of such indirect aggression are severe and detrimental and can include depression, isolation, peer rejection, drug use, and other behavioral problems (Card, Stucky, Sawalani, & Little, 2008; Crick, Bigbee, & Howes, 1996; Cullerton-Sen & Crick, 2005; Galen & Underwood, 1997; Sullivan, Farrell, & Kliewer, 2006).

There is need for a better understanding of relational and non-physical aggression among urban boys. Although the literature suggests that relational and non-physical aggression are exhibited and experienced more by girls (Coyne et al., 2006; Crick & Bigbee, 1998; Crick & Grotpeter, 1995; Finigan-Carr et al., 2015; Xie, Farmer, & Cairns, 2003), other studies observed that such dichotomization along gender lines is untrue and that boys can be equally affected by relational and non-physical aggression (Farrell et al., 2000; Lagerspetz et al., 1988; Waasdorp & Bradshaw, 2009). For example, Waasdorp, Bagdi, and Bradshaw (2009) observed that in their sample of 4^{th} and 5^{th} grade urban African American children, 77% of boys and girls experienced relational aggression within their close friendships, and most respondents believed that relational aggression affected both genders equally (79.7% and 71.6% respectively).

Differentiating between the multiple aspects of youth aggression is salient for a holistic understanding of this behavior to inform prevention and intervention efforts. In the meta-analyses based on 25 years of studies, Matjasko and colleagues (2012) observed that the

literature on youth aggression prevention programs is fragmented and called for more rigorous studies on understanding appropriate strategies for dealing with aggression across different settings. The need to focus on contextual influences, particularly on indirect forms of aggression is echoed in the review of the research by Ostrov & Kamper (2015). Ostrov and Kamper (2015) call for more studies to examine the role of context across different forms of aggression, and the school context is particularly important as argued by Dailey and colleagues (2015). In their review of relational aggression programs in school, they found variations in effect sizes and highlighted the need for more research on school contextual influences. Overall, by adopting a multi-dimensional perspective for investigating social-cognitive risk and aggression, as well as the impact of school context on behaviors, can inform effective school prevention and intervention efforts for reducing aggression (Farrell & Flannery, 2006; Farrell, Kung, White, & Valois, 2000; Tolan & Guerra, 1994).

3.3 Substance Use: Socio-Contextual Perspective

Contemporary perspectives on youth substance use have moved away from an understanding of sequential patterns of consumption as posited by the Gateway Theory of Drug Use. Instead, more focus is on evaluating the social context of substance use behaviors. The Gateway Theory of Drug Use hypothesized that the first substances with which youth experiment are beer/wine or cigarettes, then marijuana and other illicit drugs, such as cocaine and heroin (Adler & Kandel, 1981; Donovan & Jessor, 1983; Kandel, Yamaguchi, & Chen, 1992; Kandel, 2002; Kandel et al., 1978; Kandel & Faust, 1975). Despite some empirical evidence in support of the theory, scholars have questioned the relevance of a progressive model of drug use given more recent findings that the sequencing of drug use can differ across socio-

cultural contexts (e.g., Golub, Elliott, & Bennett, 2015; Golub, Johnson, & Dunlap, 2005). Thus, current perspectives on youth substance use highlight the importance of examining the social-contextual influences in planning for substance use prevention and intervention.

Understanding the social-contextual influences of drug use is particularly important during the early to mid-adolescent years, since studies indicate that substance use increases over time into late adolescence. For example, findings from the Pittsburgh Youth Study observed that alcohol and marijuana use increased with age (Loeber & Hay, 1997; White et al., 1999) (see Appendix Figure A.3). Alcohol consumption was consistently higher than marijuana use, and consumption of both substances increased over time (White et al., 1999). Other youth studies report similar findings. In a study based on the Seattle Social Development Project, alcohol and marijuana consumption also increased with age (see Appendix Figure A.4). Further, Kosterman and colleagues (2000) highlighted different trends in substance use before and after age 13. Before age 13, alcohol use increased more steeply than marijuana use, but after age 13, increase in alcohol use was more gradual while a steeper increase in marijuana use was observed. Thus, understanding the social influences on early adolescent drug use and their effects on different substances during the middle school years is key for informing strategies to curb the overall increasing growth in substance use.

The literature emphasizes that social-contexts critical in understanding youth drug use include the family, peers, and other ecologies, particularly the school environment (Donovan, 2004; Fletcher et al., 2008, 2009; Oetting & Donnermeyer, 1998; Viner et al., 2012; West et al., 2004). Family was found to be one source of early initiation to alcohol or cigarettes particularly if older relatives regularly consume these substances (e.g., Chuang, Ennett, Bauman, & Foshee,

2005; Rankin & Quane, 2002). Peer groups may introduce youth to substances that are popular and widely consumed among friends (e.g., Golub & Johnson, 2001; Trucco, Colder, Wieczorek, Lengua, & Hawk, 2014). Peer influences in school are especially important. For example, Fletcher (2010) draws attention to the way smoking behaviors are influenced by the social interactions that occur among peers in school, finding that a 10% increase in the number of classmates who smoked increases the risk of smoking by 3%. Studies also draw attention to the individual problems that increase youth vulnerabilities for substance use that may be heighted by the influences from the larger social environment (Haegerich & Tolan, 2008). Important individual factors include an array of social-cognitive abilities including decision making skills (Epstein, Griffin, & Botvin, 2000a, 2000b) and social skills competencies (Catalano, Kosterman, Hawkins, Newcomb, & Abbott, 1996; Lonczak et al., 2001).

Certainly, social contexts play critical roles in the introduction and maintenance of youth drug use. Substance use behaviors, as informed by developmental socialization theory, are learned through interactions within their proximal and distal contexts (Oetting & Donnermeyer, 1998). Thus, research has focused less on understanding the types or sequencing patterns of youth drug use (Degenhardt et al., 2009; Degenhardt et al., 2010; Golub & Johnson, 2001; Golub & Johnson, 2002). Rather, as youth coming-of-age would typically start with the current popular drug used by their peers and family within their most influential and proximal social contexts, evaluating the role of environmental norms, activities, and interactions that influences the initiation, promotion, and maintenance of drug use are important for understanding youth substance consumption patterns (Golub & Johnson, 2001).

This research focuses on the school environment, specifically how school factors influence the interplay between multiple social-cognitive risks and their relation to developmental substance use. Further, the study examines for school effects across different forms of substances including alcohol, cigarettes, and marijuana. As highlighted earlier, substances increases at different rates during the mid to late adolescence years (Kosterman et al., 2000; Loeber & Hay, 1997; White et al., 1999), thus, tailored approaches to drug use may be needed based on patterns of individual risks and substance type. Understanding the specifics of social-cognitive risks, school influences, and their relation to explicit type of substances is salient for informing school prevention and intervention efforts.

3.4 Social-Cognitive Problems

The association between social-cognitive factors and aggression and substance use is well established: early adolescents with poorer learning abilities, social skills deficits, anxiety problems, and conduct problems have higher levels of aggression and substance use than those individuals with more positive competencies (e.g., Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003; Gil, Vega, & Turner, 2002; Henry, Tolan, Gorman-Smith, & Schoeny, 2012; Herrenkohl et al., 2001; Jolliffe, Farrington, Loeber, & Pardini, 2016). There is clear evidence that each of these social-cognitive areas has independent effects on aggression and substance use. In the following paragraphs, empirical studies highlighting the independent influences of the respective social-cognitive factors on behaviors are reviewed.

Learning Problems. Student learning factors and academic achievement directly affect youth problem behaviors. Findings from the Seattle Social Development Project show that high academic achievement at age 15 is associated with a reduction in risk for aggression at age 18

(OR: 0.42, $p \leq 0.05$) (Herrenkohl et al., 2003). Moreover findings from the Pittsburgh Youth Study indicate that among African-American boys, high academic achievement at age 12 is associated with a reduced likelihood of serious violence between the ages of 13 to 19 (odds ratio: 8.1, CI: 1.9 to 35.2, $p < 0.005$) (Jolliffe et al., 2016). Notably, among the 15 protective factors examined in the study, academic achievement had the greatest impact on violence.

Student academic factors also directly influence youth substance use. In a 6-year longitudinal study based on the national Monitoring the Future Project, Bryant et al. (2003) investigated the relations between multiple school factors and substance use trajectories involving cigarette, alcohol, and marijuana. They observed that academic achievement at age 14 was negatively associated with growth of cigarette use (effect size: -0.33, $p \leq 0.001$) and marijuana use (effect size: -0.25, $p \leq 0.001$) from age 14 to 20. Significant effects were observed for the linear slope for marijuana use and perceived school difficulty ($p \leq 0.001$). In other words, school difficulty at age 14 was an overall risk factor for increased marijuana use through age 20.

Classroom performance during early adolescence was also found to be directly related to problematic substance use in young adulthood. In a longitudinal study based on data from the Miami-Dade public school system by Gil and colleagues (2002), poor schoolwork among African Americans in grades 8 – 9 are associated with an increase in odds for a diagnosis of alcohol dependence at age 18 – 20 by a ratio of 2.9 ($p \leq 0.05$). Poor classroom work is also significantly associated with an increase in the odds of a marijuana abuse/dependence diagnosis by a ratio of 2.1 ($p \leq 0.05$) (Gil et al., 2002). These figures indicate that poor schoolwork among African Americans at grades 8 – 9 is associated with a three-fold increase in risks for

problematic alcohol use, and a two-fold increase for worrisome marijuana use at young adulthood.

Social Skills Problems. Studies point to the direct and indirect influences social skills problems have on behaviors. For instance, Fleming and colleagues (2002) observed that poor social skills such as the inability to make friends, lack of ability to control one's emotions, and the inability to solve problems directly predicted problem behaviors. Social skills also had indirect effects on problem behaviors through rewards and beliefs (e.g., whether the young person believed it was fun to do things he/she was not supposed to do). Fleming and colleagues reported that the direct and indirect pathways between poor social skills were consistent across gender and social-economic status and reported that the variance in problem behaviors accounted by these direct and indirect pathways ranged from 32% to 35%.

Research also found that other interactional skills, such as the ability to follow directions and resist influences towards antisocial behaviors, are important for understanding risk for aggression and substance use. A number of studies based on the Seattle Social Development Project highlighted the importance of social skills for decreasing problem behaviors. Lonczak et al. (2001) observed that interactional skills significantly predicted the socialization pathways towards later substance use. In other words, the quality of social skills was important in predicting whether an individual was on a pro-social pathway (leading to decrease in later alcohol use) or an anti-social pathway (leading to increases in alcohol consumption). Huang and colleagues (2001) similarly observed that social skills significantly predicted the socialization pathways towards later aggression. That is, the nature of interactional skills predicted whether an

individual was on a pro-social pathway leading to decreases in later violence, or an anti-social pathway leading to increases in aggressive behaviors.

In addition to studies drawing attention to the direct link between social skills and behavior, studies also highlight that this relation is indirect, operating through pro-social/anti-social rewards for their ability to connect with others. For instance, Herrenkohl and colleagues (2001) observed that pro-social rewards (e.g., teachers and pro-social adults complemented youth for doing well) and anti-social rewards (e.g., the likelihood of youth being seen as "cool" if they beat up somebody) were important in positively or negatively influencing the pathway between social skills and later aggression.

Research has also identified that the link between social skills and problem behaviors operates through their association with pro-social or anti-social peers. Dishion & Tipsord (2011) found that a persistent history of peer rejection is a vulnerability factor for negative influences by deviant peers. They draw attention to the role of "give-and-take" exchanges, such as suggestions for future deviant behavior and stories about past deviant actions, in amplifying engagement in aggression and drug use. In other studies, Dishion and colleagues draw attention to the role of "deviancy training" (Dishion et al., 1999), the way anti-social behaviors are initiated, learned, promoted, and maintained particularly through associations with deviant peers. Data indicate that deviancy-training accounts for as much as 53% of the variance in later growth of new forms of delinquent behaviors (Patterson, Dishion, & Yoerger, 2000). Overall, this area of work draws attention to the importance of fostering positive social skills as a protective factor against the influences of negative peers in which problem behaviors are learned.

Anxiety Problems. Although there is theoretical support linking anxiety problems and problem behaviors, particularly operating through regulatory affect mechanisms (Bandura, 1989, 2001; White et al., 2012), the literature examining the direct relationships between anxiety problems and behaviors yield inconsistent findings. For example, in a meta-analysis on 66 longitudinal studies that examined aggression, Hawkins et al. (2000) observed weak evidence of the link between anxiety and depression and problem behaviors: anxiety and depression had a slight negative correlation with or were unrelated to later aggression. Findings from the Pittsburgh Youth Study also observed that anxiety at age 12 significantly predicted lower probabilities of serious violence between the ages of 13 to 19 (odds ratio 1.90; $p < 0.05$) (Jolliffe et al., 2016).

There were inconsistent findings in studies on substance use, too. In a longitudinal study based on African-American and Puerto Rican youth in the East Harlem area of New York City, Brook and colleagues (2006) observed that anxiety and depression differentiated the early and persistent cigarette smokers from the rest of the sample. Specifically, they observed that those who started smoking early and continuously over the 13-year course of the study were more likely to have experienced emotional problems between ages 1 and 10. However, a different set of results emerged from the British National Child Development Study. Maggs and colleagues (2008) reported that anxiety and depression at age seven and 11 were inversely related to alcohol use among boys at age 16, 23 and 33. The inconsistency in findings were also reflected in Morris et al.'s (2005) review of the literature between social anxiety disorder and alcohol use. The lack of consensus in the causality or directionality of the relationships between social anxiety and alcohol consumption persists.

Although studies examining the direct effects between anxiety and behavior have largely showed inconsistent and mixed results, there is robust evidence of an indirect link operating through individual factors such as social cognitions (e.g., Crick & Dodge, 1994; Huesmann, 1988, 1998). Crick and Dodge's (1994) and Huesmann's (1988, 1998) social information processing models posit that problem behaviors such as aggression are the result of cognitive schemas and scripts learned over time through social settings, and the social cognitions subsequently serve as guides for behaviors.

Empirical evidence also supports the link between anxiety problems and substance use through social cognitions such as youth perception of peer usage. Anderson and colleagues (2011) found that among socially anxious youth, their perception of peer use was one important factor associated with their own alcohol use. Interaction analysis revealed that among youth with high social anxieties, those with higher perceptions of peer drinking and high need for affiliation reported more alcohol use compared to all the other students. In other words, there is greater alcohol consumption among socially anxious youth when the perceived peer usage of alcohol and need for affiliation is high. Findings suggest that evaluating youth beliefs of their peers' usage is one important aspect of preventing and reducing alcohol use among socially anxious youth who feel a need to belong to a social group.

Conduct Problems. Lastly, there is strong empirical evidence that early school conduct problems (e.g., classroom misbehaviors) and delinquent problems such as stealing can predict young people's developmental outcomes. In the multi-site Fast Track longitudinal study of high-risk children, Okado and Bierman (2014) observed that early childhood behavioral problems (ages 5 - 7) significantly differentiated between those with and without severe behavioral

problems in late adolescence (ages 17 – 19). Those who displayed early conduct problems are associated with at least a three times increase in odds of having later severe aggression (OR: 3.03, $p = 0.02$).

Evidence from the Pittsburgh Youth Study found similar findings. Jolliffe et al. (2016) reported that early behavioral problems at age 12 were associated with at least a three times increase in risk for violence between ages 13 to 19 (OR: 3.10, $p < 0.01$ for African American boys and OR: 3.30, $p < 0.01$ for White boys). For boys from deprived neighborhoods in the Pittsburgh Youth Study, early conduct problems at age 12 were associated with close to a five-fold increase in violence (age 13 – 19) than those without problems (OR: 4.6, $p < 0.01$). For boys from non-deprived neighborhoods, early conduct problems were only linked to a two-fold increase in later violence (OR: 2.3, $p < 0.05$) (Jolliffe et al., 2016).

In another study based on African-American middle-school students in the Miami-Dade public school system, Gil et al. (2002) found that students with school behavioral problems at 6th grade were associated with a three times increase in worrisome alcohol use at 8th grade as compared to those without problems (OR: 2.90, $p < 0.01$). Gil and colleagues also observed that school behavioral problems were associated with at least a three times increase in later marijuana use (OR: OR: 3.30, $p < 0.1$).

3.5 Co-occurring Patterns of Social-Cognitive Problems and Behaviors

Despite studies highlighting the independent associations between social-cognitive domains and behavioral risk, evidence suggests that configurations of characteristics, that is, the combination of social-cognitive factors within individuals, relate to differentiated outcomes. An individual may have difficulties in learning only, or may struggle in multiple social-cognitive

areas (e.g., learning problems with co-occurring social skill problems). It is plausible that outcomes can differ between these two individuals. Nonetheless, few studies have looked at how social-cognitive problems co-exist and fewer studies have examined for profiles of risk based on samples of urban boys. Likewise, there is little developmental information from existing studies relating to aggression and drug use based on profiles of social-cognitive risk.

Support for the inter-relatedness of social-cognitive factors can be found in the few studies that have investigated for patterns among middle school youth. One set of studies conducted by Roeser and colleagues is based on indicators of academic motivation and social-emotional measures among mostly middle-class samples of youth between 6th and 8th grade (see Roeser, Eccles, & Freedman-Doan, 1999; Roeser et al., 1998; Roeser, Strobel, & Quihuis, 2002). In these studies, analyses were conducted to identify patterns based on social, emotional, and academic functioning. Four student patterns were identified: 1) a group of students with high academic motivation and low emotional distress (labeled as multiple strengths), 2) a group with low motivation and high distress (multiple problems), 3) a group with high motivation and high distress (poor mental health), and 4) a group with low academic motivation and low emotional distress (poor academic motivation). The study sample and findings are summarized in Appendix Table A.1.

Some noticeable differences in outcomes across the four patterns were consistent across the three studies. Students in the "multiple strengths group" had the lowest rates of academic failure and school related conduct problems as compared to the other groups. Conversely, the "multiple problem group" had higher rates of educational failure and poor behavioral school conduct. There were also similarities between the "poor academic" and "poor mental health"

groups insofar as both had similar percentages of school failure, frequency skipping school and problem behaviors (Roeser et al., 1999). However, there were also differences between these two groups: the "poor academic" group had lower levels of cognitive engagement and attention distraction compared to the "poor mental health" group; furthermore, the "poor mental health" group had lower self-esteem and higher levels of sadness and anger than the "poor academic" group (Roeser et al., 2002).

Another set of studies used data collected on Behavior Assessment System for Children Scale (BASC) (Sandoval & Echandia, 1994) across several samples to identify patterns of risk. The subscales represented externalizing (e.g., aggression, hyperactivity, conduct problems), internalizing (e.g., anxiety, depression, somatization), school (e.g., attention problems, learning problems), and adaptive skills (e.g., leadership, social skills, and study skills). The first study (Kamphaus et al., 1997) is based on nationally representative sample (6 – 11 years). There are two other studies that focused on urban middle school samples – combined for both boys and girls – from impoverished and high-crime neighborhoods (e.g., Kim et al., 2010; Orpinas et al., 2014). In these studies, seven student patterns were identified. The seven patterns reflected a spectrum of students ranging from (1) a group of well-adapted students, (2) a group with average problems, (3) a group with average social skills deficit, (4) a group with predominantly internalizing problems, (5) a group with some levels of disruptive behaviors, (6) a group with higher levels of externalizing behaviors, and (7) a group with severe problems across multiple areas. Notably, the seven patterns in all studies were derived using separate cluster analytic methods. The study sample and findings are summarized in Appendix Table A.2.

There were observable differences across the seven profiles. The profiles with higher externalizing behaviors and multiple severe problems had the highest levels of learning, anxiety, and conduct problems. The group with mostly internalizing problems had the highest levels of anxiety problems. Additionally, the group with social skills deficits had the higher levels of social interaction problems. In terms of other outcomes, the groups with multiple severe problems and disruptive behaviors had the highest levels of dropouts. Moreover, at 6th grade these groups were assessed to be at the highest risk for aggression (Orpinas et al., 2014). Unfortunately, there is no information on developmental aggression from these studies, and no studies have looked at substance use.

Evidence from the literature clearly indicates that patterns of individual risk matter for different behavioral outcomes (Supplee et al., 2013). Problem behaviors are well-established as multiply determined (Farrell et al., 2013). That is, behavioral risk factors do not operate in isolation and no single risk factor can predict with complete accuracy who will exhibit problem behaviors (Farrell & Flannery, 2006). Because risk behaviors are determined by several individual factors, and because individual factors interact dynamically with the environment, multiple behavioral pathways can emerge (Cicchetti, 2006; Cicchetti & Rogosch, 2002).

Longstanding studies highlight that diverse behavioral pathways can emerge from any given population of youth. Although boys are at increased risk for more aggression and substance use, studies estimate that this increase applies to less than 10% of a given population; the majority of boys will abstain from negative behaviors during their lifespan (Lahey, Loeber, Burke, & Applegate, 2005; Tolan & Gorman-Smith, 2002). For those who do not abstain from problem behaviors, studies have found different cascading patterns (Dishion & Patterson, 2006;

Farmer et al., 2013; Masten et al., 2005). Problem behaviors, for instance, will diminish for some boys as they mature (Moffitt, 1993, 2003), whereas other boys will persist in behavioral patterns with varying intensities that result in differentiated health outcomes (e.g., Deković, Buist, & Reitz, 2004).

There is a large volume of empirical research that examined for trajectories of aggression and substance use specifically (e.g., Guo et al., 2002; Lynne-Landsman, Graber, Nichols, & Botvin, 2011; Maldonado-Molina, Reingle, Tobler, Jennings, & Komro, 2010). Reviews of this body of work identified five common trajectories of behaviors that can emerge over the course of adolescence: (1) consistently high levels of behaviors, (2) moderate rates of behaviors, (3) very low levels (or none), (4) increasing growth of behaviors, and (5) decreasing rates over time. These five trajectories were represented in the study by Lynne-Landsman and colleagues (2011) on aggression and substance use among urban middle school youth in New York City (see Appendix Figure A.5). The researchers found that aggression and substance use showed patterns in these areas: (a) high levels of behaviors through middle school: aggression (14% of sample) and substance use (3%); (b) low levels of behaviors: aggression (45%) and substance use (73%); and (c) increasing rates of behaviors: aggression (38%) and substance use (11%). A distinct trajectory was found for aggression, that is, (d) decreasing levels over time (3%). Another unique pattern was observed for substance use indicating (e) moderate rates of consumption (13%).

Overall, there is a need for studies linking the bodies of literature on co-occurring patterns of social-cognitive risk with those on trajectories of aggression and substance use. Currently, there is a dearth of studies in this area. Knowledge gained from understanding the developmental behaviors based on social-cognitive risk profiles can inform behavioral

prevention and intervention efforts: decisions to devote attention and resources targeted at student subgroups can be based on assessment of developmental risk (Clark & Alvarez, 2010; Hawkins et al., 2015). Early preventative efforts can be dedicated at those student profiles with expected increasing trajectories over time. Further, intensive remedial work can be channeled at those student groups with persistently high behaviors, while lesser intensive selective programs may be more appropriate for those students with moderate levels of behaviors. To date, no studies have linked profiles of social-cognitive risk with behavioral trajectories into an integrative framework.

3.6 Schools as an Important Context for Development

Schools are important contexts for influencing risk and development, particularly during early adolescence (Bosworth, 2015; Graber, Hill, & Saczawa, 2014; Sullivan et al., 2015). Early adolescents must adapt from smaller elementary schools to the generally larger environments of middle schools (Nansel, Haynie, & Simons-Morton, 2003). Such transitions can be socially unsettling for some youth and may lead to conflicting interactions among peers and school adults (Farrell et al., 2007; Spriggs, Iannotti, Nansel, & Haynie, 2007; Sullivan et al., 2006). For other teenagers, the exposure to a new community may disrupt protective social networks and increase their susceptibility to negative school peers, resulting in access to and use of substances (Dodge et al., 2003; Fletcher et al., 2008, 2009; Webster-Stratton & Taylor, 2001). These social changes are occurring at a period when early adolescents spend increasingly more time on campuses and away from protective family influences (Graber et al., 2014). Moreover, for urban youth, their risk for poor outcomes is heightened because of the broader context of their social environment which they reside in. Inner-city and disadvantaged neighborhoods amplifies young people's

propensity of involvement with delinquent peers (Finigan-Carr et al., 2015; Goffman, 2014). The stress of urban living also diminishes the protective influence of family and parents (Kohen, Leventhal, Dahinten, & McIntosh, 2008), leading to increases in problem behaviors such as aggression (Gorman-Smith et al., 2004; Tolan et al., 2003) and drug use (Chuang et al., 2005; Rankin & Quane, 2002; Tobler, Komro, & Maldonado-Molina, 2009).

In the context of developmental, neighborhood, and family risk, schools play an essential compensatory role (Bosworth, 2015; Duncan & Brooks-Gunn, 1995; Sullivan et al., 2015), and multiple domains of the school system influence risk and development (Osher, Kendziora, Spier, & Garibaldi, 2014; Pianta, 2006). At the more proximal level to the individual, interpersonal relationships (e.g., student-student, student-teacher) is one unit of analysis (e.g., Noam & Hermann, 2002; Noam, Warner, & Van Dyken, 2000; Pianta, Hamre, & Stuhlman, 2003; Pianta, 2006). At a more distal level, macro-regulations, broadly defined as the contextual parameters that regulate individual behaviors, are another important consideration (Pianta, 2006). For instance, school norms about behaviors are important for understanding risk and development (e.g., Henry et al., 2000; Henry et al., 2013; Henry, Cartland, Ruchross, & Monahan, 2004; Henry et al., 2011). Moreover, safety awareness and responsiveness are also important considerations, particularly for issues related to aggression and other behavioral problems (e.g., Astor, Guerra, & Acker, 2010; Benbenishty & Astor, 2005; Eklund, Bosworth, & Bauman, 2014; Gottfredson, 2001; Henry et al., 2011; Horner, Sugai, & Anderson, 2010; Sugai & Horner, 2002).

Schools are important contexts for all young people because they spend large amounts of time on school campuses and are subjected to the extended influence of peers, teachers, and the

overall environment (Sullivan et al., 2015). Schools are also important settings for implementing programs to reduce problem behaviors because of their accessibility to large numbers of students (Bosworth, 2015; Sullivan et al., 2015). Schools are salient contexts for preventing and intervening against problem behaviors because school factors are malleable and can be modified to prevent and reduce student involvement in troublesome behaviors (Gottfredson, 2001; Sullivan et al., 2015). Based in the literature on schools and developmental processes, the present study examines three broad aspects of the school environment among urban youth: interpersonal climate, school norms about behaviors, and school safety concerns and awareness of problems. The following sections outline the importance of these school contextual factors in youth behavioral development processes and presents evidence of their influence on aggression and substance use.

3.6.1 School Interpersonal Climate

The literature underscores the importance of the global school relational climate for comprehending risk and development (e.g., Gottfredson, 2001; Gottfredson & Hirschi, 1990; Noam & Hermann, 2002; Noam et al., 2000; Pianta, 2006; Pianta et al., 2003). The significance of positive relations in preventing and intervening risk are espoused in a host of concepts, including school bonding (e.g., Maddox & Prinz, 2003), school engagement (e.g., Fredricks, Blumenfeld, & Paris, 2004), and school risk prevention models (e.g., Social Development Model; Catalano, Oesterle, Fleming, & Hawkins, 2004).

The importance of positive school interpersonal climate to behavioral health improvement is based in an ecological perspective (Fletcher, 2015) and school pro-social relationships support positive youth development in a number of ways. There is evidence that

school interpersonal relationships can influence behaviors. For example, Fletcher et al. (2008) conducted a meta-analysis on studies reporting school- and individual-level effects on drug use and found that studies consistently reported that poor teacher-student relationships were associated with increased drug use. A second study also found that targeting the whole school environment can reduce substance use (Fletcher et al.,2009). The principle behind the whole school approach is that student behaviors are shaped by their school environment and that targeting change in the school environment (e.g., promoting a sense of belonging) can influence individual behaviors (Fletcher et al., 2008, 2009). Similar findings on school-wide effects on substance use are also observed by West et al. (2004). West and colleagues found that strong student-teacher relationships and positive climate were associated with decreases in substance use.

There is also evidence that improving school ethos particularly among urban schools can reduce problem behaviors. Flay and colleagues (2004) reported findings of a randomized trial of the "Aban Aya" project designed to reduce high-risk behaviors among inner-city African American youth. Based in twelve Chicago schools, the program aimed to foster a more inclusive school climate through activities such as promoting growth of cultural pride and strengthening community, family, and school relationships. Flay and colleagues (2004) reported that promoting a more positive school climate reduced substance use by 34% and violent behaviors by 47% as compared to the control group.

Other studies based on middle school samples also point to the importance of school interpersonal relationships on behavioral risk. In studies by Farrell et al., (1998, 2007) with urban middle school students, Farrell and colleagues observed that experiences with teachers who

behaved inappropriately or treated them unfairly were linked to outcomes of increased aggression. Poor relationships with school adults can be a source of considerable distress leading to increased problem behaviors. In the study by Henry et al. (2011), positive student-teacher and student-student relationships were inversely associated with physical aggression, and this relationship weakened over the course of middle school. A study conducted by Elsaesser and colleagues (2013) also found that positive student-teacher and student-student relationships were inversely associated with relational aggression. Similar to the study by Henry et al., (2011), this relationship diminished over time and did not vary by gender.

Additional studies found that positive school relationships are powerful incentives that can deter students from engaging in risk behaviors. Woolley and colleagues (2007, 2009), based on middle school students from the School Success Profile Project, observed that the number of caring and supportive adult relationships – including those within the school environment – is associated with lower levels of school behavioral problems. In another study also based on middle school students, Wang, Dishion and others (2010) reported that students who reported more positive student-teacher relationships were associated with lower behavioral problems. In a follow up study, Wang and Dishion (2012) noted that positive school climate moderated the relation between the influence of deviant peers and problem behaviors.

3.6.2 School Norms about Behavior

The influence of school norms on behavioral risk and development can be understood through numerous theories relating to social cognition and social influence (e.g., social-cognitive theory, social norm theory, general systems theory). To begin, social norm theories emphasize the ability of the collective school-wide process to influence individual beliefs and actions (e.g.,

Theory of Reasoned Action, Ajzen & Fishbein, 1980; Theory of Planned Behavior, Ajzen, 1991; Theory of Normative Social Behavior, Rimal & Real, 2003). Furthermore, social-cognitive theory draws attention to the process in which school collective action influences individual behaviors by altering cognitive structures (e.g., Bandura, 1986, 1989; Huesmann, 1988, 1998). Finally, general ecological systems theory helps identify the behaviors and beliefs that are maintained through a constant feedback loop between the school-level process and individual behaviors (Barker, 1968; Henry, 2008). Together, this large body of theoretical work suggests that behavioral prevention and intervention approaches can target the collective norms of all students because group norms are malleable and can influence individual beliefs and behaviors.

The literature also highlights two inter-related norms that can influence behaviors: descriptive norms (i.e., the perception of what most other people believe), and injunctive norms (i.e., the perception of what most others approve or disapprove) (Cialdini, Reno, & Kallgren, 1990). The common element between these two norms is the belief that behaviors are guided by expectations of others' perceptions about behaviors (Rimal & Real, 2003). Research reveals that both individual belief about actual aggressive behavior (descriptive norms) and others' beliefs about aggression (injunctive norms) are linked to both actual aggression (Barth, Dunlap, Dane, Lochman, & Wells, 2004; Espelage, Holt, & Henkel, 2003; Henry et al., 2011) and substance use (Rimal, 2008; Rimal & Real, 2003, 2005).

Descriptive and injunctive norms can co-exist because persons often behave based on their beliefs and observations of what others do (Rimal & Real, 2005). For instance, school regulations and rules convey both descriptive and injunctive norms about behaviors, regulating student actions by restricting negative behaviors and enforcing consequences (Gottfredson,

2001). At a more proximal level, norms are transmitted and learned through social interactions within the school context. Based in the literature on interpersonal relationships and behaviors, the stronger the affinity people perceive with their reference group, the more likely it is that they will emulate the group's norms and behaviors (e.g., Dishion et al., 1999; Dishion & Tipsord, 2011; Dishion & Patterson, 2006; Farrell et al., 2007; Patterson et al., 2000).

Other studies, however, reveal that descriptive and injunctive norms can have different influences on behaviors. For instance, Henry et al. (2000) observed that injunctive norms exert stronger influences on student aggression when compared to descriptive beliefs. For example, empirical studies related to alcohol consumption (e.g., Rimal & Real, 2003, 2005) show that a student may view failure to engage in alcohol use with peers with the loss of future group social benefits and friendship (Rimal & Real, 2003). Similarly, students may feel pressured to engage in behaviors because of perceived threats (e.g., losing friendships) or perceived benefits (e.g., gain social status). The use of aggression to correct perceived injustices, for instance, may be misunderstood by early adolescents as an appropriate course of action or a method to gain social standing among peers (Fagan & Wilkinson, 1998). Although injunctive norms may have a strong influence on behaviors, studies caution that they are not necessarily associated with an increased propensity to engage in the behavior itself. Henry et al. (2013) found that early adolescents consistently overestimated peer normative support for aggression and underestimated peer normative support for nonviolent problem-solving strategies, both aggregated at the school-level. They suggest that this could be attributed to a "majority fallacy" (Henry et al., 2013, p. 422) by which those who engage in a certain behaviors tend to overestimate the prevalence of their peers engaging in the same behaviors.

There is empirical evidence that school norms about behaviors can influence aggression and substance use among middle school youth. Henry et al. (2011) reported that school norms favoring the use of non-violence were significantly related to decreases in physical aggression. Elsaesser et al. (2013) also reported similar findings. School norms were related to decreased relational aggression, and males showed weaker relations between beliefs favoring aggression and relational aggression. Evidence shows that school norms are important factors in reducing aggression among urban middle school students. Further studies also indicate that school norms are more protective against substance use during early adolescence as compared to mid- and late adolescence. In a study on school norms based on the Monitoring the Future Project, Kumar and colleagues (2002) compared the effects of school norms on student substance use among 8^{th}, 10^{th}, and 12^{th} grade. Kumar et al., found that the school disapproval of cigarette and marijuana use had the greatest influence on reducing student use of cigarettes and marijuana at 8^{th} grade than 10^{th} grade and 12^{th} grade. There were no significant differences on student alcohol consumption across all three-grade levels. Findings from this study highlight that school norms can be a protective factor against youth cigarette and marijuana consumption during middle school.

3.6.3 School Safety Concern and Awareness of Problems

School safety problems are particularly salient for urban youth because of increased safety issues (e.g., Aisenberg & Herrenkohl, 2008; Hardaway, McLoyd, & Wood, 2012; Margolin & Gordis, 2000; Overstreet, 2000; Overstreet & Mazza, 2003; Sanchez, Lambert, & Cooley-Strickland, 2012). Longstanding strategies addressing school safety problems focused on identifying and intervening with those individual students most at risk of problematic outcomes.

However, contemporary strategies emphasize a school-wide approach to prevention (Eklund et al., 2014). The theory is that engaging all students in addressing school safety problems can lead to a better regulation of individual behaviors (Astor et al., 2010; Eklund et al., 2014). Moreover, a focus on the whole school addressing school safety concerns is important because outcomes are closely related to the complex social dynamics among students, teachers, and staff. These social interactions occur within physical settings such as classrooms and hallways, as well as at social events (e.g., athletic competitions) (Astor, Benbenishty, & Estrada, 2009). Students, teachers, and school adults collectively contribute to the organizational patterns of the school that promote positive or adverse school safety outcomes (Astor et al., 2010; Benbenishty & Astor, 2005).

Encouraging the whole school in fostering positive safety outcomes is based in social cognition models of understanding behaviors (e.g., Crick & Dodge, 1994; Huesmann, 1988, 1998; Nigoff, 2008). According to these models, youths' views of their environment are important for influencing their regulatory responses, because individuals are active problem-solvers and sensitive to the representations and images of their environments. Moreover, they are reactive to their subjective experience of encounters within social settings. In times of any perceived or actual safety threats that can heighten problematic outcomes, encouraging students, teachers, and staff to take prompt, appropriate action is important for preventing undesirable results.

Research highlights the salience of a school-wide approach to addressing school safety concerns and behavioral problems on positive outcomes. Studies illustrate that the establishment, communication, and enforcement of school safety policies and practices is widely associated with a reduction in undesirable student outcomes (e.g., Gottfredson, 2001; Horner, Sugai, Todd,

& Lewis-Palmer, 2005; Horner, Sugai, & Anderson, 2010; Sugai & Horner, 2002, 2006). In a four year longitudinal evaluation of a middle school "whole school" behavioral support intervention, Luiselli and colleagues (2002) observed that the incidences of disruptive-antisocial behaviors decreased from 1,326 reports (year 1) to 599 cases (year 4). The researchers attributed this reduction in negative outcomes to prevention programs implemented during the period of assessment. For instance, the school adopted a "Caught Being Good" program where teachers and administrative staff delivered rewards for exemplary student behaviors. The teachers and school staff actively participated in the planning of this program and periodically reviewed and modified the operation of the intervention across the academic years.

While the study by Luiselli and colleagues (2002) was based on a predominantly White middle class sample in Massachusetts, findings of "school-wide" approaches on urban samples suggest a need for more research to better understand school effects on student behaviors. The study by Reid and colleagues (2006) based on students in an urban high school context highlighted the importance for urban schools to address safety problems and concern at the school-level. Findings showed that the lack of enforcing school rules and the presence of unsafe places in and around the school had direct impacts on student drug use and an indirect influence through violence victimization. In contrast to the positive results of the intervention reported by Luiselli and colleagues (2002), the study by Reid and colleagues illustrated the detrimental outcomes associated when schools fail to address school-wide problems and safety concerns.

More knowledge is needed to better understand how promoting school safety influences behaviors among middle school students in urban schools. Henry et al. (2011) reported that school safety problems did not predict physical aggression, whereas Elsaesser et al. (2013) noted

that school safety problems predicted higher levels of relational aggression. Henry et al. (2011) found that awareness and reporting of school problems predicted physical aggression, while Elsaesser et al. (2013) observed that this did not influence relational aggression. These varied findings call for more studies to better understand how school safety concerns influence behaviors among urban middle school students.

In summary, schools play an important role in the prevention and intervention of problem behaviors among urban youth. Multiple aspects of the school context can influence risk and behaviors. Three general school aspects are the focus of this study to better understand the relation between school effects and urban boys. The ability of interpersonal relationships to influence risk and development has strong theoretical and empirical support: caring and supportive student and teacher relationships may modify risk and development. Moreover, there is evidence that establishing clear school norms about behavior can contribute to improved outcomes as studies indicate that the collective group process can impact individual risk and behaviors. Lastly, school safety concerns are also considered in this study because research in this area suggests that improving school safety concerns can influence risk and behaviors.

3.7 Interaction of School Context, Patterns of Social-Cognitive Risk, and Behaviors

The ability for school context to interact with individual characteristics and influence behaviors has strong theoretical support. Social-cognitive theory, person-oriented perspective, and the developmental psychopathology framework all draw attention to the interplay between individual and ecological risk factors in influencing outcomes (Bandura, 1989; Bandura, 1986; Bergman & Magnusson, 1997; Cicchetti, 2006; Cicchetti & Rogosch, 2002; Magnusson, 1985, 1988, 1998). A large volume of research further points to the ability of the school environment to

influence risk and outcomes. In one meta-analysis of school interaction studies from three school psychology journals from 1986 to 2008, Fairchild and McQuillin (2010) found fifty articles highlighting the capacity of school-related activities, including academic and behavioral prevention and intervention programs, to buffer risk such as poor cognitive abilities and behavioral outcomes. Specifically, Fairchild and McQuillin observed that of the studies reviewed, half were based on cross-sectional data. Moreover, half of all studies examined academic achievement as the outcome variable. The other studies examined a broad range of outcomes including general classroom behavior and interpersonal relations among students. Again, reviews of the literature indicate that most school interaction studies explored for school effects focused on two student groups (e.g., high versus low) (e.g., Kuperminc et al., 2001, 1997; Loukas & Robinson, 2004). Kuperminc and colleagues (1997) found that school climate buffered the relations between psychological vulnerabilities and emotional problems. In their analysis, they found that school climate moderated internalizing problems for those with high self-criticism only. For those with low self-criticism, changing levels of school climate did not affect levels of internalizing problems. What remains to be done is an investigation for school effects across a range of heterogeneous groups.

Moreover, as indicated in the introduction, few studies have examined for interaction effects aggregated at the school-level. In one meta-analysis study, Farrell and colleagues (2013) studied school-based prevention programs and outcomes and found 68 studies that evaluated for subgroup differences in universal school-based prevention programs and outcomes. Their review found only four studies examining interaction effects beyond the individual-level, which looked at classroom-aggregated levels of aggression, classroom-level norms about behaviors, school

characteristics, and principal leadership to interact between school programs and outcomes. Needless to say, none of these studies related to profiles of social-cognitive risk and behaviors which is the focus of this current study. In the end, Farrell and colleagues observed the general lack of studies examining school-level interactions in subgroup analyses and called for more research to be conducted in this area.

Therefore, unlike most of the extant studies, this dissertation evaluates for school-level effects across multiple groups, providing the opportunity to clarify the generalizability of school contextual influences on behaviors across profiles of social-cognitive risk (Sterba & Bauer, 2010). Currently, it remains uncertain in the extant literature if modifying school-wide factors will bring about similar or different behavioral outcomes across profiles of social-cognitive risk. Findings from understanding the variability of subgroup responses to school effects is helpful in directing school practice. Prevention and remedial programs can be tailored and targeted at those groups of students who are most likely to benefit from the channeling of more concerted resources (Nylund-Gibson & Hart, 2014; Supplee et al., 2013; Thibodeau, August, Cicchetti, & Symons, 2015). Longstanding approaches to prevention and intervention emphasize programming efforts at three levels: universal, selective, and indicated (Gordon, 1987; Hawkins et al., 2015; Institute of Medicine, 1994). Schools are also moving towards the multi-tiered Response to Intervention (RtI) model of screening, organizing and implementing interventions (Clark & Alvarez, 2010; Sugai & Horner, 2009). Under these multi-tiered approaches, the degree to which students respond to the intervention guides decisions for implementing school programs. Acquiring knowledge on how profiles of social-cognitive risk respond to school

features can inform efforts in planning and directing school-based multi-level behavioral prevention and intervention.

3.8 Contributions of Present Study

This study will contribute important knowledge to school prevention and intervention research by drawing attention to the important school factors (i.e., interpersonal relationships, behavioral norms, safety concerns) that interplay between risk and behaviors. The approach takes into account the broad social-cognitive differences and behavioral pathways that can exist among students. Knowledge of pattern-specific school effects on behaviors can assist practitioners to conduct and design school system-wide assessments and differentiated programs that address the varying needs of groups of students. Findings from this study will provide a degree of specificity in understanding how school effects relate across profiles of social-cognitive risk and different dimensions of aggression (physical, non-physical, relational) and substance use (alcohol, cigarette, and marijuana use). There are few studies focusing on profiles of social-cognitive risk and developmental behaviors, and ever fewer have looked at their interaction within the school context.

Knowledge from this study will advance school prevention research in a way that focuses on the school context as the target of change with less attention to an individual deficit-oriented approach to risk prevention and intervention. The study goes beyond the screening of behavioral risk among students and identifies those salient malleable school factors that can be the focus of school-based behavioral prevention and intervention programs directed at specific groups of students. Given the significance school has in the lives of early adolescent boys, it is important

that behavioral health prevention and intervention approaches focus on this important social context and promote and enhance the effectiveness of current school programming.

CHAPTER FOUR

RESEARCH QUESTIONS AND HYPOTHESES

Based in theory and research, this study addresses gaps in the knowledge of early adolescent urban boys, their social-cognitive problems, aggression, and substance use, as well as the role of school context on their outcomes. Longitudinal data collected from a sample of middle school boys across four geographic sites are used to address the following questions:

1. Using teacher reports of student social-cognitive deficits at middle school entry (i.e., learning problems, social skills deficits, anxiety and conduct problems), are there identifiable patterns of behavioral risk profiles among a sample of urban boys?
2. Is there a relationship between subgroups of boys based on behavioral risk profiles entering 6th grade and developmental trajectories of boys' self-report aggression and substance use over the course of middle school?
3. Do school contextual factors (e.g., interpersonal relationships, safety concerns, and norms about behaviors) moderate the relation between student patterns and growth of aggression and substance use over the course of middle school?

4.1 Research Question 1

Using teacher reports of student social-cognitive deficits at middle school entry (i.e., learning problems, social skills deficits, anxiety and conduct problems), are there identifiable patterns of behavioral risk profiles among a sample of urban boys?

Theories and earlier studies serve as a guide to anticipate patterns of social-cognitive risk for behaviors that exist among early adolescent urban boys at entry into middle school.

> Hypothesis 1: There will be four patterns representing distinct levels of risk for problem behaviors over time: a lowest risk profile, a highest risk profile, and two distinct moderate risk profiles.

The rationale for this hypothesis begins with the person-oriented perspective, which posits that in any given population common patterns of individual functioning can be identified at the population level (Magnusson, 1985, 1988, 1998). Theory and research suggest the possibility of four patterns. Because the majority of early adolescent youth will abstain from negative behaviors across their lifespan (Moffitt, 1993, 2003), this study expects that the largest subgroup of boys will be represented by a pattern of positive social-cognitive factors, suggesting the lowest risk subgroup. Furthermore, consistent with numerous studies, it is hypothesized that there will be a group of boys with multiple social-cognitive problems to comprise the highest-risk group (e.g., Kamphaus et al., 1997; Kim et al., 2010; Orpinas et al., 2014; Roeser et al., 1998, 1999, 2002). Existing studies examining youth at highest risk for problem behaviors estimate this subgroup to be less than 10% of a given population (Lahey et al., 2005; Moffitt, 1993, 2003; Tolan & Gorman-Smith, 2002). This group of boys is expected to be the smallest group among the four hypothesized patterns/groups.

Additionally, based on studies suggesting the potential of youth to progress towards a higher risk profile (e.g., Masten et al., 2005; Masten & Cicchetti, 2010; Moilanen, Shaw, & Maxwell, 2010; Obradović, Burt, & Masten, 2009) or a diminishing risk pattern as they mature (Moffitt, 1993, 2003), two additional patterns are hypothesized. These patterns will be distinctly different from the highest-risk and the lowest-risk subgroup.

4.2 Research Question 2

Is there a relationship between subgroups of boys based on behavioral risk profiles entering 6th grade and developmental trajectories of boys' self-report aggression and substance use over the course of middle school?

> Hypothesis 2: There will be distinct trajectories of aggressive behaviors and substance use among the patterns of social-cognitive risk identified.

Divergent patterns of behavioral trajectories are expected to emerge because of the developmental psychopathology principles of equifinality and multifinality (Bergman & Magnusson, 1997; Cicchetti, 2006; von Eye & Bergman, 2003). Furthermore, support for the range of trajectories is based in empirical research on prior samples (e.g., Guo et al., 2002; Lynne-Landsman et al., 2011; Maldonado-Molina et al., 2010). Comparing the trajectories across these studies, there are five possible patterns that can emerge: (1) consistently high levels of behaviors, (2) moderate rates of behaviors, (3) very low levels (or none), (4) increasing growth of behaviors, and (5) decreasing rates over time. The hypothesized trajectories for the suggested patterns in research questions one are as follows.

The group of boys with the most positive social-cognitive factors – also expected to be the largest group – is believed to be associated with patterns indicating the lowest growth rates of negative behaviors over the course of middle school. Conversely, for those with multiple signs of poor student factors – indicating the smallest and highest-risk sample – behavioral trajectories are expected to persistently increase through their tenure in middle school. Next, for the moderate-risk group with the potential of progressing towards a higher risk profile (e.g., Masten et al., 2005; Masten & Cicchetti, 2010; Moilanen, Shaw, & Maxwell, 2010; Obradović, Burt, & Masten, 2009), these boys are expected to display increasing negative behavior patterns, but at a slower growth rate than the highest-risk boys through their middle school years. Lastly, based in Moffitt (1993, 2003) research on adolescent limited problem behaviors, this study hypothesizes a group of boys with behavioral patterns indicating high initial levels of risk that nonetheless decrease over the course of middle school.

4.3 Research Question 3

Do school contextual factors (e.g., interpersonal relationships, safety concerns, and norms about behaviors) moderate the relation between student patterns and growth of aggression and substance use over the course of middle school?

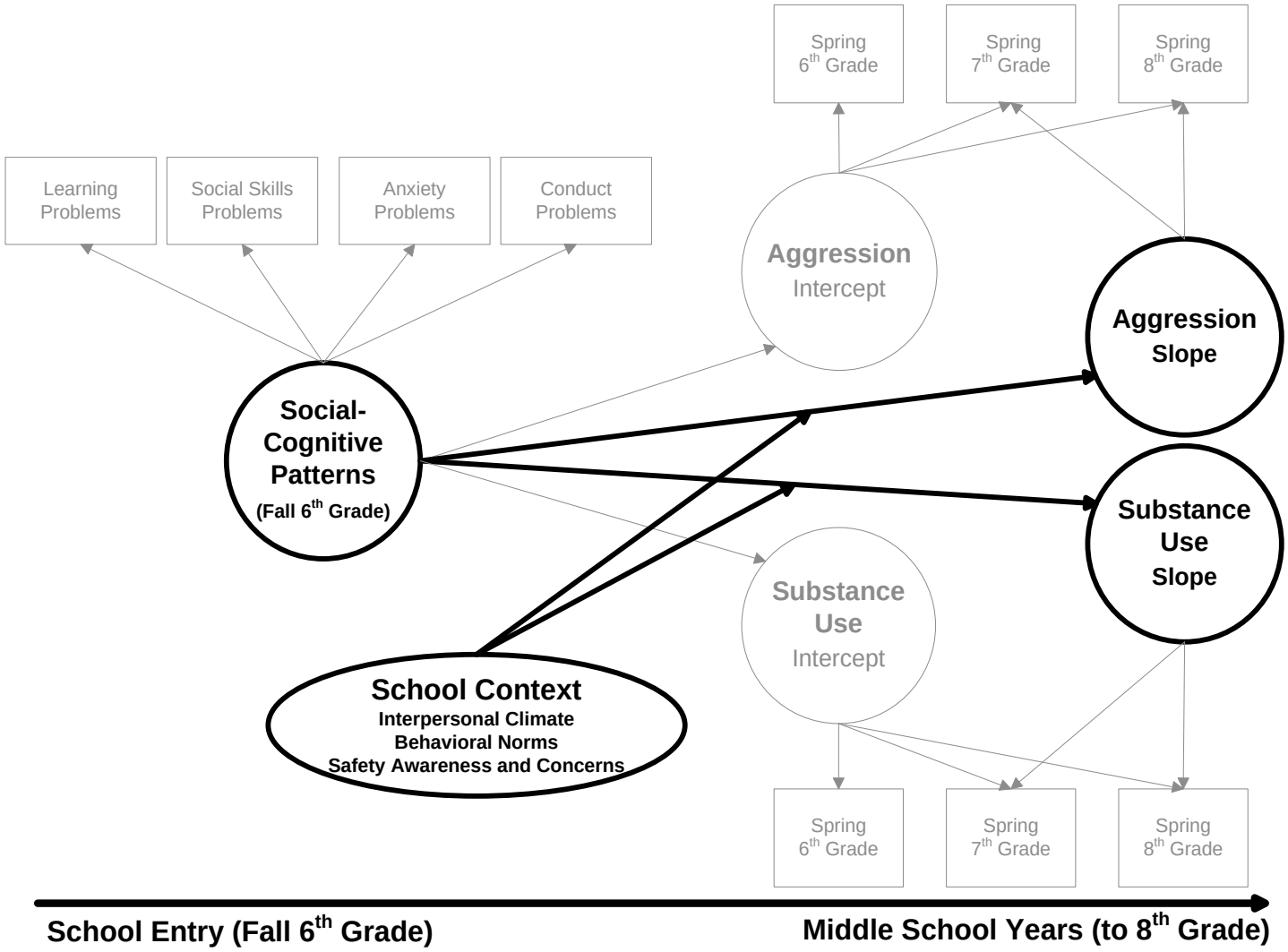
> Hypothesis 3: School contextual factors will moderate the relation between student patterns and behavioral trajectories through the middle school years.

A substantial number of theories and empirical literature support the idea that school context will moderate individual risk and outcomes. It is hypothesized that school effects on behaviors will vary depending on the patterns of student risk because of previous research that

has demonstrated the dynamic transactional nature between context and individuals that can produce different outcomes (Bandura, 1986, 1989; Bergman & Magnusson, 1997; Cicchetti, 2006; Cicchetti & Rogosch, 2002).

Furthermore, it is hypothesized that different aspects of school context have different impacts on aggression and substance use across the patterns. For instance, it may be plausible that school interpersonal climate influences developmental growth in one behavior but not others. This premise is therefore in line with the large body of studies indicating school moderation (e.g., Fairchild & McQuillin, 2010; Kuperminc, Leadbeater, & Blatt, 2001; Loukas & Robinson, 2004). Overall, this question seeks to identify how each school feature examined operates on aggression and substance use within the specific pattern of risk. The study's overall conceptual model is represented in Figure 4.1.

Figure 4.1: Study Conceptual Model



CHAPTER FIVE

METHODS

Data is drawn from the Multisite Violence Prevention Project (MVPP), a longitudinal middle school violence prevention study conducted in four cities in the US (i.e., Chicago, Illinois; Durham, North Carolina; Athens, Georgia; and Richmond, Virginia). The MVPP was funded by the Centers for Disease Control and Prevention (CDC) and was a collaboration between four universities: University of Illinois at Chicago, Duke University, The University of Georgia, and the Virginia Commonwealth University.

5.1 Multisite Violence Prevention Project

Schools were the primary units of sampling under the MVPP. All middle schools in the public school systems in Durham (n=8) and Richmond (n=8) were selected for the project. In Athens, the selected middle schools (n=9) represented 6 school districts. In Chicago, which is a large metropolitan school district, schools (n=12) were selected based on size (i.e., more than 1,100 students), and residence of at least 75% of students within neighborhood school boundaries. There were a total of 37 schools involved in the MVPP.

Following the selection of schools to the intervention conditions, two successive cohorts of sixth graders (2001/02 and 2002/03) from the 37 schools were invited to participate in the MVPP. In three locations (i.e., Durham, Athens, and Richmond), approximately 100 students per cohort were randomly selected from the school rosters to participate in the project. In Chicago, all schools served grades K-8 (other school sites only served grades 6-8). Given the size of the Chicago schools, all 6^{th} graders in the selected schools were invited to participate.

5.2 Overall Sample

Based on the entire sampling frame, there were a total of 7,364 eligible students. At schools sites where it was permitted, students received a $5 gift card for returning the consent forms, whether or not they and their parents agreed to participate. Telephone follow-ups and home visits were used to increase participation rates. However, only 5,625 students returned active parental consent and student assent for a recruitment rate of 76%. Figure 5.1 shows the CONSORT diagram indicating the flow of participants through the MVPP. Table 5.1 summarizes the community and demographic characteristics by site.

Figure 5.1 CONSORT diagram for Multisite Violence Prevention Project (From MVPP, 2009)

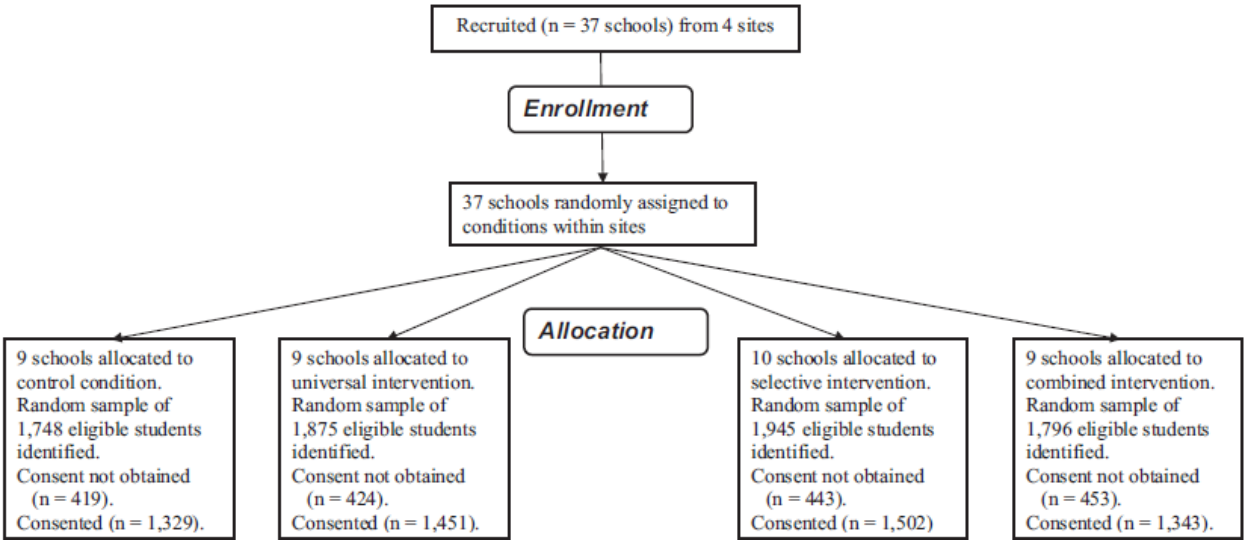


Table 5.1 Community and Demographic Characteristics by Site (Henry & Farrell, 2004; Multisite Violence Prevention Project, 2004, 2009)

	Chicago	Richmond	Athens	Durham	Average
Community Characteristics					
Poverty (%) of Children under 18	30.6	36.6	26.1	17.0	
Juvenile Arrests for violent crime / 100,000 population	62.9	69.2	74.1	47.0	
No. of Schools	12	8	9	8	
Grade levels	K-8	6-8	6-8	6-8	
Average number of 6th Grader	70	236	239	241	
Eligible Free and Reduced Lunch (%)	96	75	47	42	
High School Dropout Rate (%)	17	3	3	2	
Gender (Boys %)	50	49	50	47	49
Racial / Ethnic Distribution					
African American (%)	37	75	29	56	48
Hispanic (%)	53	5	12	9	23
Caucasian (%)	2	6	46	23	18
Multiracial (%)	6	11	9	8	8
Family Structure					
Two-parent biological families (%)	47	30	53	44	44
Single parent families (%)	35	44	27	36	35
Stepparent families (%)	11	15	15	12	13

Schools under all intervention conditions and cohorts collected similar data. For survey items that involved student responses, these were completed at school in groups of 10 to 20, using a computer-assisted survey interview. Students completed surveys in the Fall of their 6th grade year and then again each Spring through 8th grade. Survey items completed by teachers were obtained from one core academic teacher per student at each wave. The teacher in the best position to rate each student was identified by each team of teachers. If teachers had to fill out ratings for multiple students, they were instructed to complete the survey for no more than five students at a time. Teachers received $10 for each student measure completed. Teacher ratings of student behavior in each cohort were collected in the Fall of 6th grade.

The institutional review boards (IRB) at the four participating universities and the CDC approved all study procedures for the intervention study. The IRB at the School of Social Service Administration (SSA), University of Chicago approved the overall MVPP intervention study procedures (IRB14-0730). In addition, for the specific purpose of this dissertation's analyses, approval from SSA IRB was also received (IRB14-0681).

5.3 Analytic Sample

From the overall sample, the following exclusion criteria were applied. Firstly, students who were selected for Cohort 1 but repeated the 6th grade were not included in Cohort 2 (n=155). Secondly, the study excluded students who did not participate in any of the four data collection time points (i.e., 6th grade Fall, 7th - 8th grade Spring) (n=518). Finally, all females were excluded in the study (n=2,785). Females were, however, included in the calculation of school-level variables. The final count for the analytical sample, after taking into account the

aforementioned exclusion criteria, was 2,632 boys. Table 5.2 presents the demographics for the analytical sample of boys only.

The racial / ethnic composition of the overall analytical sample was 44.4% African American, 19.3% Hispanic, 18.5% White, and 7.8% multiracial youth. These vary across the four geographic sites, for instance, more African American boys were represented in Richmond (71.3%). There were also more Hispanic boys in Chicago (45.3%) and more Caucasian boys in Athens (42.5%). In terms of family structure for the overall sample, most boys were from two-parent biological families (48.2%) followed by single parent families (32.3%). Chicago, Athens, and Durham reflect a similar trend. However, in Richmond, most boys were from single parent families (40.3%) followed by two-parent households (36.3%). Race / ethnic composition and family structure were the only demographic measures collected by the MVPP. Other background information such as parental education and poverty (e.g., free and reduced lunch) was aggregated at the site level and is not available at the individual level.

Table 5.2 Demographics for the Analytical Sample

	Overall n=2632	Chicago n=799 30.4%	Richmond n=606 23.0%	Athens n=666 25.3%	Durham n=561 21.3%
Racial / Ethnic Distribution					
African American (%)	44.4	36.3	71.3	24.6	50.4
Hispanic (%)	19.3	45.3	4.5	11.6	7.7
Caucasian (%)	18.5	3.1	7.6	42.5	23.5
Multiracial (%)	7.8	5.4	9.2	10.2	7.0
Others (%)	5.6	5.8	5.6	5.4	5.7
Total:	95.6	95.9	98.2	94.6	94.3
Family Structure					
Two parent biological families (%)	48.2	50.3	36.3	56.6	48.0
Single parent families (%)	32.3	33.7	40.3	25.2	30.3
Stepparent families (%)	9.1	7.3	11.1	8.1	10.7
Others (%)	6.9	5.8	11.0	5.1	6.1
Total:	96.5	97.1	98.7	95.0	95.1

Note: Percentages do not add to 100% because of rounding and missing cases. There were 114 (4.3%) respondents with missing race/ethnicity variable and 93 (3.5%) cases with missing family structure variable.

5.4 Measures

5.4.1 Social-Cognitive Factors

Measures of student social-cognitive problems were based on teacher reports using the Behavioral Assessment Scale of Children (BASC) (Reynolds & Kamphanus, 1992). The BASC is a set of multi-dimensional scales that assesses the behavioral and adaptive skills of children and adolescents (Reynolds & Kamphanus, 1992). The BASC is designed to broadly measure student school, externalizing and internalizing problems, and adaptive skills based on teacher ratings through 13 subscales (138 items). The entire 13 subscales, however, was not used. Instead, the following four subscales, representing social-cognitive problems were selected for the analyses: (a) learning, (b) social skills, (c) anxiety, and (d) conduct problems. The proceeding paragraphs detail the subscales questions and psychometric qualities for these constructs. Reports were based on the analytical sample of boys only.

Learning Problems. Student learning problems were measured on a 9-items subscale that assessed problems in various domains relating to learning abilities. Questions included, "has reading problems," "has problems with mathematics," "does not complete tests," and "gets failing grades." Teachers rated items on a 4-point scale from "0=Never" to "3=Almost always". The mean score was calculated for the overall subscale, and a higher score indicated more learning problems. The internal consistency was 0.90 (see Appendix Table B.1 for details on items related to the learning problems measure).

Social Skills Problems. The measure for student social skills was based on the subscale of 11-items that rated students' adaptive abilities in social situations. Examples of questions asked were "shows interest in others' ideas," "makes suggestions without offending others,"

"compliments others," and "volunteers to help with others." All items were reversed coded ("0=Almost always" to "3=Never"). The overall mean score was calculated, and a higher score reflected poorer social skills. The scale has a Cronbach's alpha of 0.94 (see Appendix Table B.2).

Anxiety Problems. The scale for anxiety problems was based on an 8-items subscale, and measured items such as "is nervous," "bites nails," "expresses self-doubt before tests," and "worries." Items were measured on a scale of "0 = never" to "3 = always." Based on the overall mean score, a higher score suggested higher anxiety problems. The internal consistency of the scale was 0.81 (see Appendix Table B.3 for details).

Conduct Problems. Student conduct problems were measured from a 12-items subscale. The items included "steals at school," "is in trouble with the police," "skips classes at school," and "has to stay after school for punishment." Teachers rated items on a scale of "0 = never" to "3 = always." The subscale did not include any aggression items but did include items related to substance use. However, the frequencies of substance use items were very low (mean: 0.01 to 0.02). The overall mean score was calculated with higher scores indicating more conduct problems. The internal consistency of the scale was 0.82 (see Appendix Table B.4).

5.4.2 School Context Factors

School context measures were based on the aggregate of all student self-reports within each school (i.e., 37 schools). This method involved taking the mean score of all students within each cohort from Spring 6^{th}, 7^{th}, and 8^{th} grade. Although boys are the focus of this study, scores from both males and females were used to calculate the aggregated school-level variable to

accurately depict the overall school climate. Subsequently, each male participant within a school in a given cohort has the same mean score on their respective school context variable.

School Student-Student Relationship. The measure of student-student relationship was based on 7 items from the Vessels school interpersonal climate scale (Vessels, 1998). Examples of survey measures included: "Students are kind and supportive of one another," "Students from different social classes and races get along well," "Students make friends easily," and "Students enjoy being at school". Items were rated on a 4 point scale, anchored by strongly agree, agree, disagree, and strongly disagree. The mean score of all seven items were used to calculate the overall measure of student-student relationship. Items were reversed coded in the calculation of the mean score. A higher score represented more positive student-student relationships. The internal consistency of the individual-level scores among boys ranged from 0.68 (Spring 6th grade) to 0.76 (Spring 8th grade) (see Appendix Table B.5).

School Teacher-Student Relationship. Teacher-student relationship was based on 4 items from the Vessels school interpersonal climate survey (Vessels, 1998). The questions were: "Teachers treat students with respect," "Teachers praise students more often than they criticize them," "Teachers treat students fairly," and "Teachers take the time to help students work out their differences." Items were rated on a scale of "1=strongly agree" to "4=strongly disagree". The overall measure was based on the means of the 4 questions. All items were reverse-coded and a higher score indicated more positive teacher-student relationships. Internal consistency ranged from 0.73 (Spring 6th grade) to 0.80 (Spring 8th grade) (see Appendix Table B.6).

School Safety Concerns. School safety concerns were based on 9 items from the Department of Education School and Staffing Survey (U.S. Department of Education, 1999).

This self-report scale measured malleable characteristics of the school that were related to violence such as "Fighting (hitting and kicking) among students," "Students carrying weapons," "Teachers ignore it when students threaten other students," and "Unsafe areas in the school". Items were based on a scale of "1=Serious problem" to "4=Not a problem." The mean score of all ten items were used to calculate the overall construct of school safety concerns. A higher score indicated fewer safety concerns. The internal consistency was 0.88 across Spring 6^{th} – 8^{th} grade (see Appendix Table B.7).

Awareness and Reporting of Safety Concerns. The awareness and reporting of safety measure was from the Vessels School Climate scale (Vessels, 1998). The construct measured students' perceptions that teachers and students were aware of violence and took the appropriate action to address violence. The measure consisted of seven items such as "Teachers know when students are being picked on or being bullied," "Teachers take action to solve the problem when students report bullying," "Students are encouraged to report bullying and aggression," and "Students report it when one student hits another." Items were rated on a 4 point scale, anchored by strongly agree, agree, disagree, and strongly disagree. The mean score of all seven items were used to calculate the overall measure of awareness and reporting of safety concerns. Items were reversed coded in the calculation of the mean score. Higher number indicated more awareness and reporting of safety concerns. Internal consistency ranged from 0.69 (Spring 6^{th} grade) to 0.77 (Spring 8^{th} grade) (see Appendix Table B.8).

School Norms. School norms were based on the mean of two scales. Firstly, an eight-item scale designed to assess students' perceptions about the extent to which students at their school approved of aggressive behaviors (Henry, Cartland, Ruchross, & Monahan, 2004). Examples of

questions in this scale included “How would the kids in your school feel if a kid asked a teacher or another adult for help when challenged to a fight after school?” “How would the kids in your school feel if a kid avoided a fight by walking down a different hall to class?” and “How would the kids in your school feel if a kid took a deep breath when he or she started to lose his temper?” Secondly, a seven-item scale was added by the MVPP (Miller-Johnson, Sullivan, & Simon, 2004). These included items relating to students’ approval of non-violent alternatives to aggression for solving problems. For instance, questions included “How would the kids in your school feel if a kid hit someone who said something mean?” “How would the kids in your school feel if a kid yelled at someone for no reason?” and “How would the kids in your school feel if a kid threatened someone who hit first?” Items were rated on a 3 point scale, anchored “like it,” “would not like it,” “wouldn’t care.” Items were coded such that higher scores reflected more positive norms. Internal consistency of the overall scale ranged from 0.60 (Spring 6th grade) to 0.62 (Spring 8th grade) (see Appendix Table B.9).

5.4.3 Aggression and Substance Use

Aggression and substance use were assessed based on individual self-reports. Items were drawn from the Problem Behavior Frequency Scale (PBFS) (Farrell, Danish, & Howard, 1992; Farrell et al., 2000). The PBFS consisted of 26-items that measured aggression, drug use, and delinquent behaviors in separate scales. The PBFS was developed based on problem behavior theory which suggested the inter-relatedness of adolescent problem behaviors (Jessor & Jessor, 1977). Prior studies validated the theory that a constellation of problem behaviors can co-exist among urban middle school youth (Farrell et al., 1992). Expanded studies highlighted the need for distinct scales to assess specific domains of problem behaviors among youth (Farrell et al.,

2000). The three domains of aggression measured in this study are physical aggression, non-physical aggression, and relational aggression. Three domains of substance use were also measured in the study: cigarette use, alcohol use, and marijuana use. All items assessed were based on use in the last 30 days. Items were rated on an ordinal scale of 1 = 'Never," 2 = "1 – 2 times," 3 = "3 – 5 times," 4 = "6 – 9 times," 5 = "10-19 times," and 6 = "20 or more times."

Physical aggression. The six items were based on the CDC Youth Risk Survey (Kolbe, Kann & Collins, 1993). These items were validated in previous studies with urban youth (Farrell & Meyer, 1997; Farrell et al., 1996) and were assessed to have high test-retest reliability (Berner, Collins, Kann, Warren, & Williams, 1995). Items included "thrown something at another student to hurt them," "hit or slapped another kid," and "threatened to hit or physically harm another kid." Internal consistency between Spring 6th to Spring 8th grade ranged from 0.78 to 0.80 (see Appendix Table B.10).

Non-Physical Aggression. Five items represented non-physical aggression. Items were based on school observations and focus groups on interpersonal problem situations conducted by the MVPP. A number of these items reflected verbal aggression (e.g., put down someone, insulted someone's family, teased someone to make them angry). Other examples included "picked on someone," and "gave mean looks to another student." The internal consistency over the three time points averaged at 0.81 (see Appendix Table B.11).

Relational Aggression. The items were based on Crick and Grotpeter (1995) measure of relational aggression. These behaviors aimed to harm a person through peer relationships. Items included "said things about another student to make other students laugh," "left another kid out on purpose when it was time to do an activity," and "spread a false rumor about someone." The

internal consistency of the relational aggression scale was 0.74 to 0.78 (see Appendix Table B.12).

Overall Aggression. Overall aggression was based on the combined physical aggression (7 items), non-physical aggression (5 items), and relational aggression (6 items) subscales (details below). The overall measure for aggressive behaviors was based on the total mean score for the 18 items. A higher score indicated more aggressive behaviors. The internal consistency of the overall aggression scale between Spring 6th to Spring 8th grade was 0.91 (see Appendix Table B.13).

Substance Use. Overall substance use was based on six questions involving cigarette, alcohol, and marijuana use. *Cigarette use* was based on a single item if respondent had "smoked cigarettes." *Alcohol use* was based on the mean of three items: "drunk beer (more than a sip or taste)," "drunk wine or wine coolers (more than a sip or taste)," and "drunk liquor (like whiskey or gin)." *Marijuana use* was based on a single item if respondent had "used marijuana (pot, hash, reefer)." The overall measure for drug use was based on a total of six questions. In addition to the five items asking about cigarette, alcohol, and marijuana use, another item was included in the overall drug use measure: "been drunk." One study found this drug use scale to have adequate test-retest reliability (Farrell & White, 1998). A higher score indicated more substance use. The internal consistency of the overall substance scale ranged between Spring 6th to Spring 8th averaged at 0.92 (See Appendix Table B.14).

5.5 Analytic Strategy

Descriptive analyses were performed using SPSS version 23.0 and Mplus version 7.3. Mplus was chosen because of its ability to model non-normal data and treat missing data that maintains maximum analytical power. Other advantages of using Mplus include is its capacity to conduct multi-level longitudinal analysis and its versatility to support an array of analytical methods such as mixture modeling, latent growth analysis, and a combination of mixture models and latent growth analysis within a structural equation modeling framework (Muthen & Muthen, 2012).

All students were included in the analysis, and all intervention effects were statistically controlled for during the analyses. Analyses also included all boys in cohort 1 and 2 aggregated at the school-level for a total of 37 clusters. Although prior studies based on this data set have separated cohort 1 and 2 for a total of 74 clusters, these studies utilized the entire sample (e.g., Farrell, Henry, Mays, & Schoeny, 2011; Farrell, Henry, Schoeny, Bettencourt, & Tolan, 2010). Because this study focuses on the subsample of boys, the sample size will be relatively smaller for each of these 74 clusters (some clusters reduced to below 30 students). Analyses were conducted to compare for differences between cohort 1 and 2. Minimal differences on the school measures were observed (range 0.01 to 0.02). Hence, cohort 1 and 2 were combined to form 37 clusters.

Descriptives. The means and standard deviations of the individual items were analyzed. Bivariate correlation analyses were conducted to understand the relations between the social-cognitive factors, school context variables, aggression and substance use.

Multivariate normality was explored using tests of skewness and kurtosis (see Appendix B1 to B14). Skewness refers to the degree and direction of asymmetry of a distribution and kurtosis refers to the extent that data is peaked or flat in a distribution. There is no definite cutoff to indicate a problematic level of skewness. Some researchers indicate that a value +3 / -3 is considered extreme (Kline, 2011). Others adopt a more conservative value of +1 / -1 as an unacceptable level of skewness (Bowen & Guo, 2012). Similarly, there is no clear cutoff value to indicate unacceptable level of kurtosis. Extreme kurtosis values can range from +20 / -20 (Kline, 2011), while more conservative estimates range from +4 / -4 (Bowen & Guo, 2012).

Few variables indicated minor to moderate normality issues (see Appendix B1 to B14). To handle non-normality of data, robust maximum likelihood (MLR) estimation was used. Mplus has the capability to support MLR estimation. Robust maximum likelihood estimation does not assume multivariate normal distribution and also estimates standard errors that are robust to deviations of normality with a revised version of a model chi-square test (Bowen & Guo, 2012; Kline, 2011). Other methods considered in this study include transformation of variables to adjust for normality. However, data transformation may make interpretation more complex, and does not adequately address variables that are particularly ordinal in nature, as in the case for many of this study's variables (Bowen & Guo, 2012).

Missing data. Percent of missing data in the analytical sample ranged from a minimum of 4.6% (Fall 6th grade) to a maximum of 37.7% (Spring 8th grade) (see Table 5.3). Analyses of attrition showed no significant differences in retention across conditions, cohorts or school; the amount of missing data was also unrelated to family structure, site, or race/ethnicity (Multisite Violence Prevention Project, 2008).

Table 5.3 Percentage of Missing Data in Analytical Sample

	Fall 6th	Spring 6th	Spring 7th	Spring 8th
Social-Cognitive Areas				
Learning Problems	4.6	NA	NA	NA
Social Skills Problems	4.6	NA	NA	NA
Anxiety Problems	4.6	NA	NA	NA
Conduct Problems	4.9	NA	NA	NA
School Contextual Factors				
Student-Student Relationship	NA	9.9	24.6	32.1
Student-Teacher Relationship	NA	9.8	24.6	32.1
School Safety Concern	NA	11.6	28.6	37.7
Awareness and Reporting of School Safety	NA	9.8	24.6	32.1
School Norms	NA	11.8	28.7	37.7
Aggression				
Physical Aggression	NA	9.9	24.6	32.1
Non-Physical Aggression	NA	9.9	24.6	32.1
Relational Aggression	NA	9.9	24.6	32.1
Substance Use				
Cigarette Use	NA	9.9	24.7	32.1
Alcohol Use	NA	9.9	24.6	32.1
Marijuana Use	NA	10.0	24.7	32.2

Although the percent of missing data increased over time, further examination found that the relation between the number of waves of student data collected and aggression were only slightly related. For instance, the correlation between the number of student data waves and physical aggression was small (r = -0.07) and the correlation between data waves and overall aggression was also minimal (r = -0.03) (Multisite Violence Prevention Project, 2009).

Missing data were treated as ignorable (i.e., missing at random). In the analysis, missing data was handled using full information maximum likelihood (FIML). This approach allowed for the inclusion of cases with missing data in order to maximize analytical power. This method reduces biasness related to missing data (Collins, Schafer, & Kim, 2001). Parameter estimation is based on all available information to inform coefficients and standard errors (Bowen & Guo, 2012). Another advantage of using FIML is that parameter estimation are estimated in a single step and it does not require multiple imputed files and aggregation of imputed information (Bowen & Guo, 2012). This approach improves estimation efficiency (Collins, Schafer, & Kim, 2001) and, furthermore, FIML can be used in conjunction with methods to treat non-normality of data (i.e., robust maximum likelihood estimator) in Mplus (Bowen & Guo, 2012).

Intra-class Correlation and Design Effects. Students in the data are nested within 37 schools. This may result in a degree of correlation among subjects within schools. Failure to account for the hierarchical structure of the data may violate the standard regression assumption of uncorrelated errors. This can result in the underestimation of standard errors and inaccurate statistical tests of significance (Heck & Scott, 2009).

To evaluate for the degree of correlation within schools, two measures are considered: intra-class correlations (ICCs) and design effects. The ICCs provide a measure of the amount of variability and the degree of non-independence or clustering of the data within schools. The ICC represents the variation between schools in the intercepts (means) of the item divided by the total variation (sum of the variation between schools in the intercepts and the variation within schools). ICCs can range from 0 to 1.0, with larger values indicating greater clustering effects within agencies; ICCs greater than 0.10 require a multi-level modeling approach (e.g., Dyer, Hanges, & Hall, 2005; Hox, 2002).

In addition to considering the ICC, this study also considers the design effect. The design effect is a function of the intra-class correlation and the average cluster size [1 + (average cluster size - 1)*intraclass correlation]. Muthen (1999) recommended that ICC must be considered in relation to the cluster size. An effect greater than 2 suggests that a multi-level approach during estimation is needed (Muthen, 1999). The ICCs in the sample were small (range 0.01 to 0.06). These ICCs values were also similar to the overall sample; prior studies revealed modest ICCs (range 0.01 to 0.09) (e.g., MVPP, 2009). The average cluster size among the 37 schools in the analytical sample is 67.62. This results in a design effect of between 2.0 to 6.0. Based on Muthen's recommendations, multi-level syntax was applied to account for the clustering of students within schools in the analyses. Because demographic variations (i.e., race/ethnic composition and family structure) are closely related to site differences, background differences were handled through analyses that accounted for clustering within regions.

5.6 Question 1 Analyses: Patterns of Social-Cognitive Risk

Mixture modeling methods are used to identify for patterns of behavioral risk based on the four social-cognitive areas at 6th grade Fall: learning problems, social skills deficits, anxiety, and conduct problems. Mixture modeling refers to analyses involving latent categorical variables. These latent variables represent classification of individuals where membership is not observed but rather inferred from the data (Muthen & Muthen, 2012). Mixture modeling is a person-oriented analytical approach (Magnusson, 1985) with the goal to cluster individuals into categories containing persons who are similar to each other (i.e., have high probabilities of membership in the same subgroup) based on their patterns of scores across several manifest variables (Collins & Lanza, 2010; Muthén & Muthén, 2000). In determining class enumeration, manifest (observed) indicators can be continuous, dichotomized, or a mixture of both (Muthén & Muthén, 2012).

The advantage of using mixture modeling to determine patterns of risk is its ability to derive naturally occurring groups by means of recruitment probabilities (Muthén & Muthén, 2000). In other words, subgroup allocation is based on a probability score with individuals who share similar patterns of student function. This is in contrast to other approaches that use an iterative partitioning approach (DiStefano & Kamphaus, 2006). The K-means clustering method is one such approach where the initial cut of the data into K-number of clusters is specified by the researcher. Cases are assigned to the cluster through an iterative process based on the smallest distance to the centroid (or mean values) through measures such as the Euclidean distance and correlation coefficients (DiStefano & Kamphaus, 2006; Steinley, 2003). The disadvantage of such a partitioning approach is its sensitivity to the initial cut in the data defined

by the researcher, and it may not fully overcome a poor initial partition of the data (Steinley, 2003). In contrast, mixture modeling is preferred because it uses probabilistic scores to evaluate for patterns. Such an approach counters arguments that students are placed into subgroups derived from stereotypical notions of student function or that the subgroups were based on subjective, poorly defined categories (Collins & Lanza, 2010).

Another advantage of mixture modeling in determining patterns of risk is that multiple fit indices are considered. For instance, the Akaike Information Criterion (AIC), Bayesian information criteria (BIC), and the sample size adjusted BIC give an indication of the goodness of fit with smaller values indicating a better fit (Muthen & Muthen, 2010). The entropy, which is an indication of the accuracy of assignment of respondents to the latent classes, was also considered in the study. Entropy values closer to 1 suggest a more accurate classification (Muthen & Muthen, 2010). Other measures considered in the study are the Lo-Mendell-Rubin likelihood-ratio test (LMR-LRT) (TECH 11) and the bootstrapped likelihood ratio test (TECH 14). The LMR-LRT is a direct test of significance between two models, with a *k*-1 class model being accepted once the p-value becomes insignificant (Muthen & Muthen, 2010). The bootstrapped likelihood ratio test is based on the loglikelihood values from the *k* and *k-1* class analyses to compute a test statistic (-2 times the loglikelihood difference). Over an iterative process involving several bootstrap draws, a p-value is computed to decide if a *k*-1 class model is a better fit to the data as compared to a *k* class model (Muthen & Muthen, 2010).

After the final model was selected, the patterns of social-cognitive risk were compared. Demographic differences in risk patterns were examined using the Mplus Auxiliary (e) function (Muthen & Muthen, 2010). This is an overall equality test of means across the latent classes

using posterior probability-based multiple imputations. There were two tests conducted under Auxiliary (e), the first examines if an overall difference exists across the latent classes. This is a chi-square statistic with a *k-1* degree of freedom test. The second test is a set of pairwise comparisons between latent classes. Each test generates a chi-square statistic with 1 degree of freedom.

The Auxiliary (e) function was chosen to explore for pattern differences to avoid criticisms relating to the use of observed class assignment based on most likely membership. Because of the probabilistic nature of class classification and determination, using the most likely class assignment for statistical testing will likely introduce error into the analyses. The advantage of the Auxiliary (e) function to compare for class differences is its ability to maintain the inherent probabilistic uncertainties associated with the use of latent profile/class analyses.

5.7 Question 2 Analyses: Behavioral Trajectories

Following the identification of risk patterns, latent growth analysis will be used to analyze their aggression and substance use trajectories over the course of middle school. This was conducted within a latent variable structural equation modeling framework in Mplus that allows the combination of mixture model and growth curve analyses. The advantage of this approach is that factors such as mean initial levels (intercepts) and growth over time (slopes) can be estimated and analyzed with other variables (e.g., latent classes with slopes of aggression and substance use).

In these analyses, intervention conditions were entered as controls because they were expected to have a direct impact on behavioral outcomes. Multi-level modeling was also applied

at this stage to adjust for the hierarchical structure of the data. Multi-level longitudinal latent curve analyses in Mplus were treated as a two-level model with individuals as the first level and school-level factors as the second level (Muthen & Muthen, 2012). The analyses were conducted in conjunction with the commands TYPE = TWOLEVEL MIXTURE and CLUSTER = School ID of the 37 schools. Time was treated by placing specific restrictions on the values of the factor loading matrix underlying the latent growth factors. For instance, to reflect equal time passage between assessments (e.g., Spring 6^{th}, 7^{th}, and 8^{th} grade), the three time points were fixed to loadings of $\lambda_t = 0, 1, 2$ (Bollen & Curran, 2006; Curran, Bauer, & Willoughby, 2004). This is different than other multi-level approaches such as the hierarchical linear model (HLM) (Raudenbush & Bryk, 2002). The HLM approach treats time as an exogenous predictor variable within level-one (or person-level). However, Mplus takes a multivariate approach to repeated measures analysis, and with longitudinal data, the number of levels is one less than the number of levels in HLM (Muthen & Muthen, 2012).

The first part in the analysis fit latent growth models for each measure of aggression and substance use separately. The objective was to investigate the trajectories for the overall analytic sample and incorporate observed repeated measures (e.g., substance use at Spring 6^{th}, 7^{th}, and 8^{th} grade) to characterize unobserved growth trajectories. Latent growth curve models can be estimated even with partially missing data. Under the assumption of missing at random and using FIML estimation, growth models were estimated by averaging the observed variables of each case such that observations with more data points were more heavily weighted than observations with fewer time points (Curran, Obeidat, & Losardo, 2010).

Overall SEM fit measures were evaluated based on the chi square (χ^2), the comparative fit indices (CFI, Bentler, 1990), and the root mean squared error approximation (RMSEA, Browne and Cudeck, 1993). These fit indices were evaluated based on the following criterion: (1) a chi square probability value greater than 0.05 indicates acceptable model fit, (2) CFI values of > 0.90 are considered a good fit, and (3) for the RMSEA, values of < 0.05 are considered a good fit, values between 0.05 and 0.08 indicate a fair fit, and values greater than 0.10 represent a poor fit (Browne and Cudeck, 1993).

Random effect intercept and slope models were also estimated. Random effect models assume a random probability distribution around a fixed effect, or a single value that provides the mean score of an observed variable. Random effect models are preferred over fixed effects models because random-effect models lead to smaller standard errors and higher power to detect for effects (Curran et al., 2010). Because growth estimation is based on three data points (Spring 6^{th}, 7^{th}, and 8^{th}), only linear trajectories were estimated in this study.

The second part of the analyses links the social-cognitive risk patterns (from step 1) to growth of aggression and substance use. In evaluating the relation between risk patterns and behavioral trajectories, a three-step latent variable modeling process was used (Asparouhov & Muthén, 2014). In the first step, the latent profile/class model from part 1 was estimated. In the second step, the most likely class membership was saved for each individual, based on the highest probability of class membership. However, the most likely class membership was not used alone to avoid introducing error into the analyses. The classification uncertainty rates of the most likely class membership (i.e., measurement error) were also saved. In the third step, the growth curve trajectories of the latent profile/class membership were modeled in a larger model

with the most likely class membership and the uncertainty rates prefixed at the probabilities in step 2. This allowed for the use of most likely class membership while taking into account the inherent classification uncertainties. Following this third step, the trajectories associated with each risk pattern are presented and described in the results section.

The three-step latent variable modeling process was chosen because of the existing limitations involving the use of the latent profile/class categorical variable as a predictor of behavioral trajectories. Because latent profile/class is based on probabilities, using class membership without taking into account the misclassification rates is problematic. This can result in a number of model building problems and violates the probabilistic assumptions of the latent categorical variable (Asparouhov & Muthén, 2014). The three-step latent variable modeling process was developed to minimize these problems for exploring relationships between the latent profile/class variable and other variables.

Following the estimation of the pattern specific trajectories, two tests of significance were conducted on all growth parameters (intercepts and slopes) to focus on the slope coefficients (i.e., rate of change). The first test examined if the slope is significantly different from zero, thus evaluating whether there is a statistically significant change in behaviors from the baseline. The second test evaluated if parameters are statistically different from each other. This was conducted through a pairwise Wald test of parameter constraints and produced a chi square statistic with one degree of freedom.

5.8 Question 3 Analyses: School Moderation

To evaluate for the moderating influence of school context between patterns and behaviors, school factors were independently and systematically entered into the respective

models to understand how they may be associated with a pattern-specific growth or decline of behaviors (i.e., slope) over the course of middle school. Intervention controls and multi-level syntax will continue to be applied in these analyses.

Testing for moderation was based on the literature developed by Bollen & Curran (2006) and Curran et al. (2004). Based on this body of work, the indirect effects of covariates modeled on slope factors can be interpreted as multiplicative interactions between exogenous predictors and time in the prediction of repeated measures (Bollen & Curran, 2006, p. 141). An adapted illustration based on the example in Bollen & Curran (2006) chapter 6 is presented in Figure 5.2. In this step, school factors were included as covariates in the models in step 2 to compare how intercepts and slopes are associated with the school factors within each latent class. The test conducted is: H_0: $i_1 = i_2 = i_3 = i_4$ versus H_1: $i_1 \neq i_2 \neq i_3 \neq i_4$ and H_0: $s_1 = s_2 = s_3 = s_4$ versus H_1: $s_1 \neq s_2 \neq s_3 \neq s_4$. Results were interpreted as the influence of the school factor on change in trajectories as a function of latent group membership.

Cohen's d effect size was used to quantify the difference in the parameter change because of the school factor. The formula used to calculate the effect size is as follows:

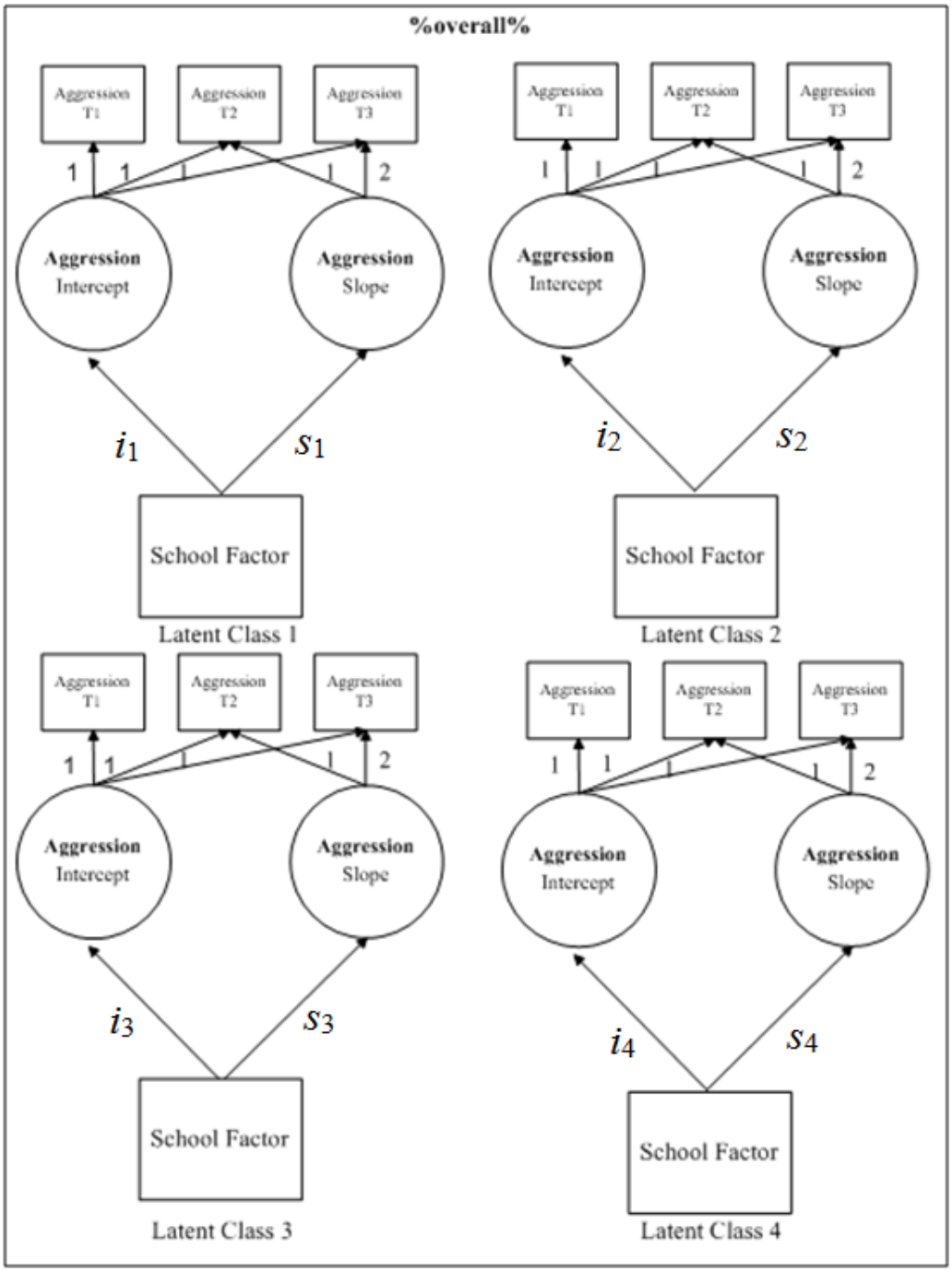
$$\text{Effect Size} = \frac{\text{Effect}}{\text{Standard Deviation}}$$

$$\text{Effect Size} = \frac{\text{2-Year Change}_{\text{75th Percentile}} - \text{2-Year Change}_{\text{25th Percentile}}}{\text{Standard Deviation}_{\text{Baseline}}}$$

Based on Cohen's standards, an effect size of 0.2 is considered small, an effect of 0.5 is described as medium, and an effect of 0.8 is considered large. However, effect sizes must be

interpreted considering its substantive costs and benefits. Based on standards in social science and education research, a small effect size can be considered relatively meaningful (Coe, 2002).

Figure 5.2 Evaluation of Moderation by School Factor



CHAPTER SIX

RESULTS

This chapter presents results for questions 1 through 3. For question 1, the results of the model selection process for patterns of social-cognitive risk is described. For question 2, the aggression and substance use trajectories for the overall sample are described. The trajectories for the patterns identified in question 1 are also presented. For question 3, the results from the moderation analyses between risk patterns and behavioral trajectories are presented.

6.1 Question 1 Results: Patterns of Social-Cognitive Risk

Model Selection. Five mixture models involving the four social-cognitive factors were evaluated and included two latent profile models based on (1) continuous mean scores and (2) t-scores of the social-cognitive indicators. Moreover, two latent class models were also considered: (3) a model based on quartile splits of the social-cognitive mean scores, and (4) another model derived from the BASC *t*-scores clinical classifications (i.e., clinically significant, at-risk, average, low, very low). The *t*-score clinical classifications were based on the instructions in the BASC manual (Reynolds & Kamphaus, 2002). These four models did not converge in the early stages of class determination. Fit indices suggested that the optimal solution is beyond 5-classes (see Appendix Table C.1). The elicitation of too many patterns may result in a model with little differentiation among the groups and may not be the most parsimonious approach. The elicitation of too many patterns may also make analysis for moderation effects difficult, result in a number of computational complexities (e.g., decreasing the number of degrees of freedom), and reduce the study's ability to make stronger predictions

about outcomes and moderation (Simon, 2002). The identification of too many patterns may also be challenging for prevention researchers and practitioners to use for developing school-based prevention strategies and studying schools.

The use of the binary-coded clinical classifications (i.e., fifth model), however, suggested that the optimal solution is between 3 – 4 classes. The binary-coded clinical classifications is based on the BASC *t*-scores clinical classifications. That is, those in the clinically significant and at-risk categories were coded in one group, and those in the average, low, and very low were coded in another group. This method of classification is interpreted as either the presence or absence of being clinically at-risk or having existing clinically significant social-cognitive deficits at school entry. Table 6.1 shows the breakdown of the binary-coded clinical classifications by site at 6^{th} grade Fall. For instance, in Chicago, 35.9% of boys had significant learning problems, 34.6% social skills problems, 16.8% anxiety problems, and 17.8% conduct problems.

Table 6.1 Percentage of Binary-Coded Clinical Classification by Locations

	Learning Problems	Social Skills Problems	Anxiety Problems	Conduct Problems
Chicago	35.9	34.6	16.8	17.8
Richmond	20.9	41.9	10.8	18.6
Georgia	23.5	25.7	9.4	10.8
Durham	19.3	26.2	9.9	15.3

Table 6.2 reports the fit indices for the 1 – 5 class solutions. The BIC and sample-size adjusted BIC suggest that the 3-class solution best fit the data with a classification accuracy of 0.808 (entropy). The AIC and the Lo-Mendell-Rubin and Bootstrapped Likelihood Tests suggest that the 4-class solution is optimal. Among the fit indices, simulation studies indicated that the

sample-size adjusted BIC had the highest accurate information criterion, and the LMR-LRT was a consistent indicator of classes (Nylund, Asparouhov, & Muthen, 2007).

Table 6.2: Fit indices for Latent Class Analysis

	1 Class	2 Class	3 Class	4 Class	5 Class
No. of free parameters	4	9	14	19	24
Log-Likelihood	-4788.353	-4422.482	-4386.431	-4381.323	-4381.323
AIC	9584.707	8862.964	8800.862	**8800.645**	8810.645
BIC	9608.006	8915.388	**8882.409**	8911.317	8950.441
Sample-size Adjusted BIC	9595.297	8886.792	**8837.928**	8850.949	8874.187
Lo-Mendell-Rubin Test	NA	0.001	0.001	**0.035**	0.163
Bootstrapped Likelihood Test	NA	0.001	0.001	**0.013**	1.000
Entropy	NA	0.639	**0.808**	0.685	0.477

Best fitting indices are in bold-face

To decide on the model that best serves the analytical goals of this study, the patterns for the three and four class solutions were plotted (Figure 6.1 and 6.2). The 3-class solution revealed a pattern of boys that were "low problems on all areas" (71.8% of the sample), another group with "learning and conduct problems" (7.3%), and a last pattern of boys with "high learning and social skills problems with some anxiety and conduct problems" (20.9%) (Figure 6.1). The 4-class solution revealed the following patterns. A group of boys that were "low all" across the four social-cognitive domains (61.3%); a pattern of boys with "moderate" problems in learning, anxiety, and conduct (15.5%); a group with "poor social skills" with learning and some conduct problems (16.9%), and lastly, a group of boys with "high all" social-cognitive problems (6.3%) (Figure 6.2).

There are two distinct differences between the three and four class solutions. Prominently missing from the 3-class solution is the group of boys with high problems in all social-cognitive areas. The other notable difference relates to the broader range of patterns involving anxiety

problems. In the 3-class solution, patterns reflected only two levels of anxiety: those with anxiety (23.8%) and those without (1.0%). However, in the 4-class solution, boys were clustered into a broader range of patterns: those with high anxiety (82.5%), moderate anxiety (44.2%), and those without anxiety (0.0%).

The percentages presented in Figures 6.1 and 6.2 represent the probability of being clinically at risk for a particular social-cognitive deficit in a given class membership. For instance, in the 4-class solution (Figure 6.2), if a boy was randomly selected from the "high all" group, he is expected to have a 84.4% chance of exhibiting clinically significant learning problems at school entry, 81.6% chance of social skills problems, 82.5% chance of anxiety problems, and a 58.6% chance of conduct problems. In other words, all boys clustered by the latent class analyses into this category shared a similar pattern of high probability of significant social-cognitive problems in all areas.

Selection of the Four-Class Solution. The 4-class solution was selected for further analyses in this study. It is supported by empirical research (Roeser et al., 1998, 1999, 2002) and based on the hypotheses discussed in Chapter 4 that posit four categories of risk is preferred. The breakdown of these four patterns by site is summarized in Table 6.3. There are two overall significant differences by site: Chicago and Athens. In Chicago, there are fewer boys allocated to the "low all" group (26.0%) when compared to all the other sites. In Athens, there are comparatively more boys allocated to the "low all" group (27.7%) when compared to the "poor social skills" (19.7%) and the "high all" (19.3%) groups.

Figure 6.1: Three-Class Solution

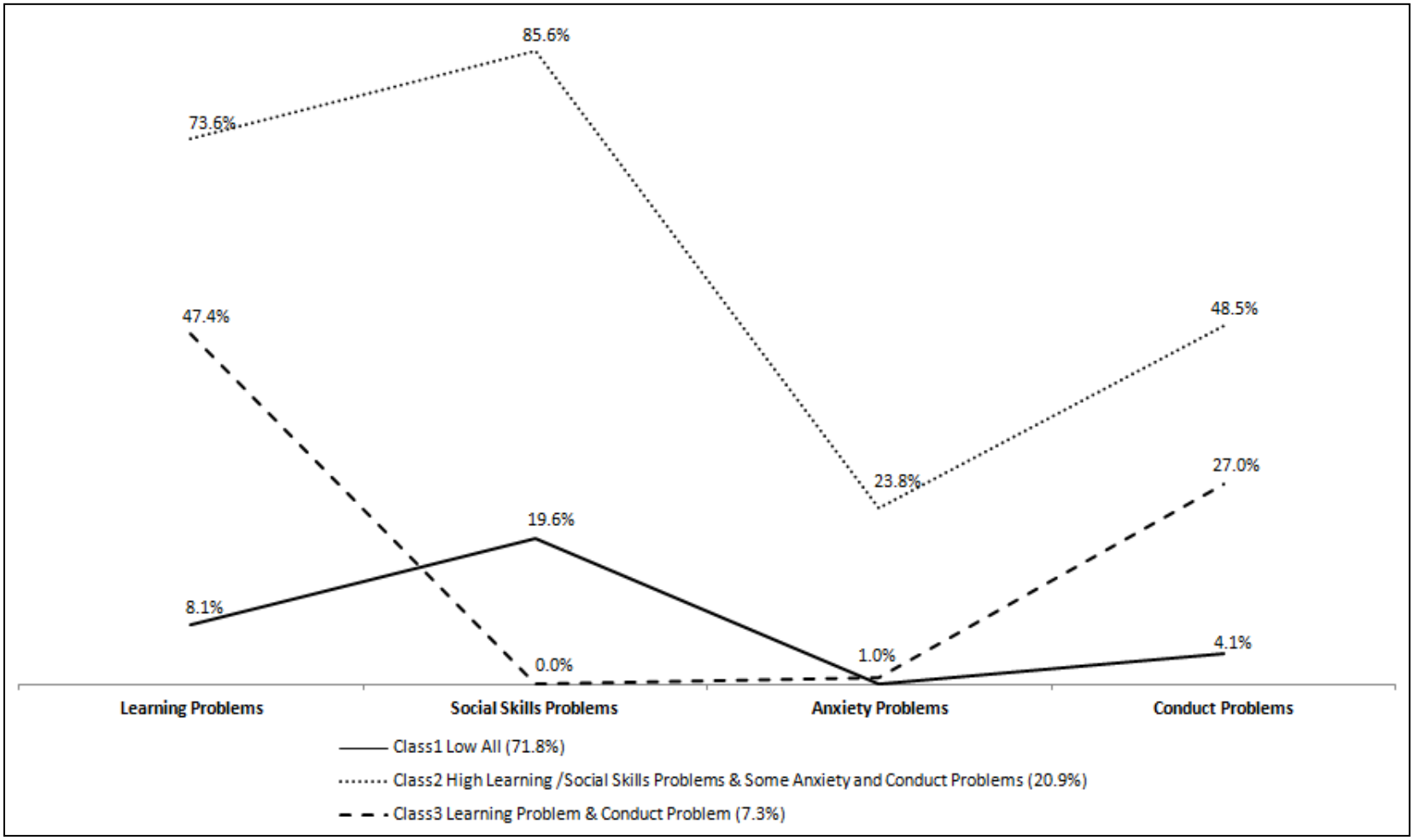


Figure 6.2: Four-Class Solution

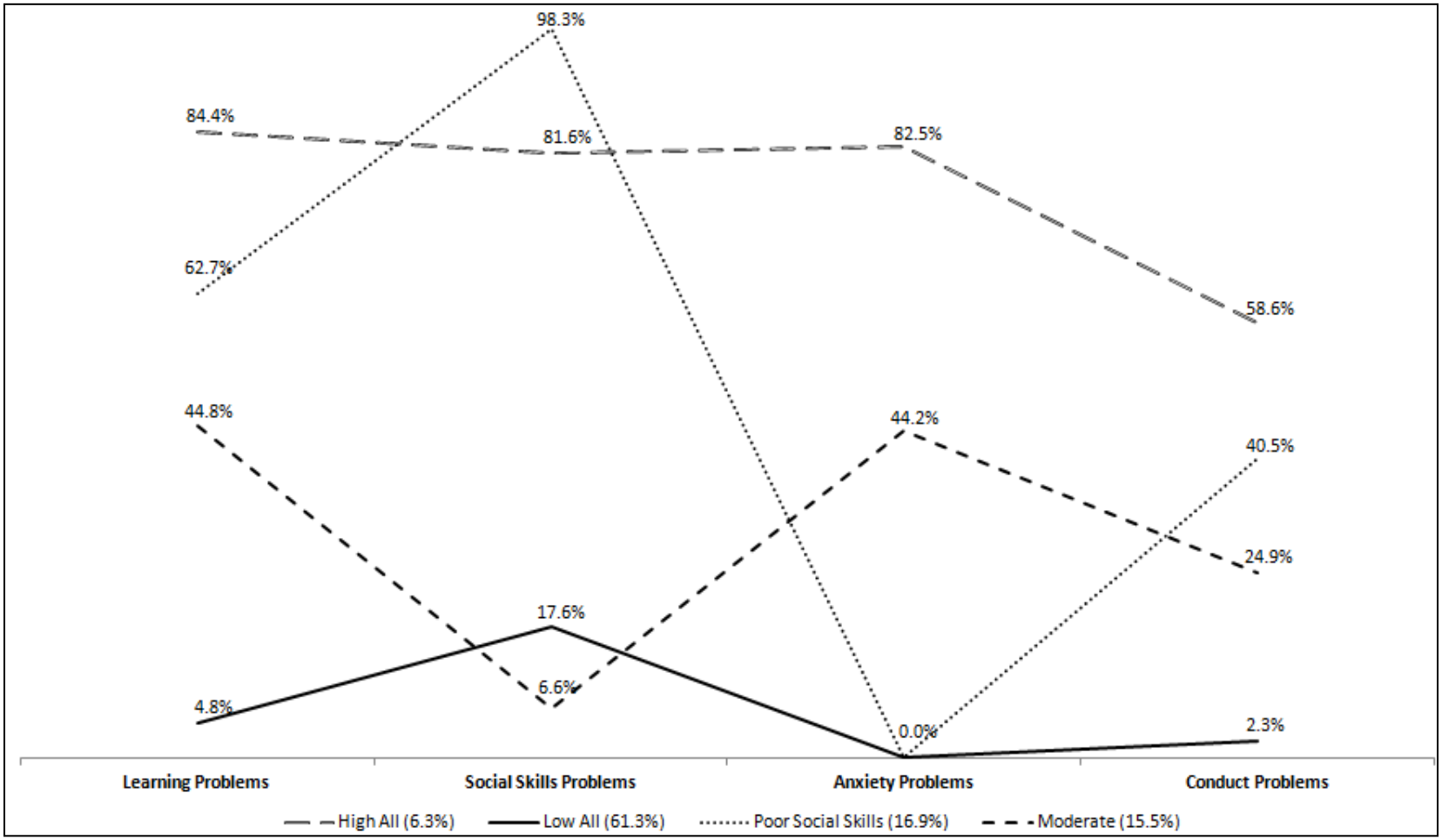


Table 6.3: Site Description of Four-Class Solution Based on Posterior Probability-Based Multiple Imputations

	Overall	Low All (61.3%)	Moderate (15.5%)	Poor Social Skills (16.9%)	High All (6.3%)	Overall Chi Square Test	Pairwise Tests
		LA	MO	PSS	HA		
Sites							
Chicago	30.4	26.0 (0.01)	36.5 (0.03)	35.4 (0.03)	37.0 (0.04)	26.37***	PSS > LA HA > LA MO > LA
Richmond	23.0	23.8 (0.01)	19.6 (0.02)	27.7 (0.03)	25.1 (0.04)	NS	
Athens	25.3	27.7 (0.01)	24.2 (0.03)	19.7 (0.02)	19.3 (0.04)	9.62*	LA > PSS LA > HA
Durham	21.3	22.5 (0.01)	19.6 (0.03)	17.2 (0.02)	18.5 (0.04)	NS	

$p \leq 0.001$ ***; $p \leq 0.01$ **; $p \leq 0.05$ *
Standard errors are in parenthesis

6.2 Question 2 Results: Behavioral Trajectories

Overall Trajectories. The aggression and substance use trajectories were fitted for the overall sample. These models were conditioned on intervention conditions and adjusted for nesting the data within the 37 schools. The fit indices for the random intercept and slope models are presented in Table 6.4, and the respective trajectories are plotted in Figures 6.3 and 6.4.

Table 6.4 Growth Parameters and Fit Indices for Random Intercepts and Slopes

	Growth Factors		Fit Indices		
	Intercept	Slope	Chi-Sq	RMSEA	CFI
Aggression					
Overall	1.83 (0.05)	0.01 (0.03)	27.94 ***	0.029	0.985
Physical	1.78 (0.08)	0.03 (0.03)	36.70 ***	0.035	0.977
Non-Physical	2.12 (0.06)	0.02 (0.03)	19.57 ***	0.022	0.995
Relational	1.66 (0.03)	-0.01 (0.02)	25.36 **	0.027	0.981
Substance Use					
Overall	1.23 (0.03)	0.10 (0.03) ***	33.93 ***	0.034	0.973
Cigarette	1.24 (0.03)	0.08 (0.01) ***	23.61 **	0.026	0.971
Alcohol	1.26 (0.03)	0.10 (0.03) ***	50.33 ***	0.043	0.953
Marijuana	1.17 (0.05)	0.14 (0.03) ***	88.36 ***	0.060	0.859

$p \leq 0.001$ ***; $p \leq 0.01$ **; $p \leq 0.05$ *

Note:

1. Chi-square tests with 9 degrees of freedom
2. Standard errors are in parenthesis
3. All intercepts are statistically significant (not shown)
4. Scale anchors: 1 = ‘Never” 2 = “1 – 2 times” 3 = “3 – 5 times”

Overall, the fit statistics are excellent. Although the chi-square tests are significant, indicating that the data and the model-implied matrices are not statistically equivalent, the RMSEA and CFI support claims of good model fit. Limitations of the chi-square test in determining model fit have been discussed in the literature, and it is generally accepted that a

significant chi-square test along other excellent model fit indices can still indicate good global model fit (see Bowen & Guo, 2012 Chapter 6).

Across all models, the intercepts representing initial levels of behaviors at school entry are statistically significant (not shown in Table 6.4). However, the slopes corresponding to the rate of behavioral change through 8th grade are statistically non-significant for all aggression constructs but significant for all substance use measures. The slope coefficients for all aggression constructs are close to zero, and all drug use coefficients are positive and statistically significant. These results suggest that aggression remains relatively stable over time but that rates of substance use increase. Among the aggression constructs, non-physical aggression is the most common form of violence exhibited (Table 6.4); boys engage in at least 1-2 incidents within any given month through 8th grade (intercept: 2.12; slope: 0.02). Relational aggression is the least common form of behavior displayed by boys (intercept: 1.66; slope: -0.01), and physical aggression closely mirrors the trend for overall aggression, averaging slightly less than 1-2 incidents in any given month during middle school (intercept: 1.78; slope: 0.03).

In contrast to aggression, all substance use trajectories increase over time (Table 6.4). Alcohol is the most prevalent form of substance used by boys from 6th grade through 8th grade (intercept: 1.26; slope: 0.10) and marijuana is least used. However, marijuana is the fastest growing drug and by 8th grade, it is the second most commonly used substance (after alcohol). Cigarette use however diminishes over time. Although cigarettes are the second most commonly used substance at the beginning of middle school, they become the least frequent drug used by 8th grade (slope: 0.08).

Figure 6.3 Aggression Trajectories (Overall Analytic Sample)

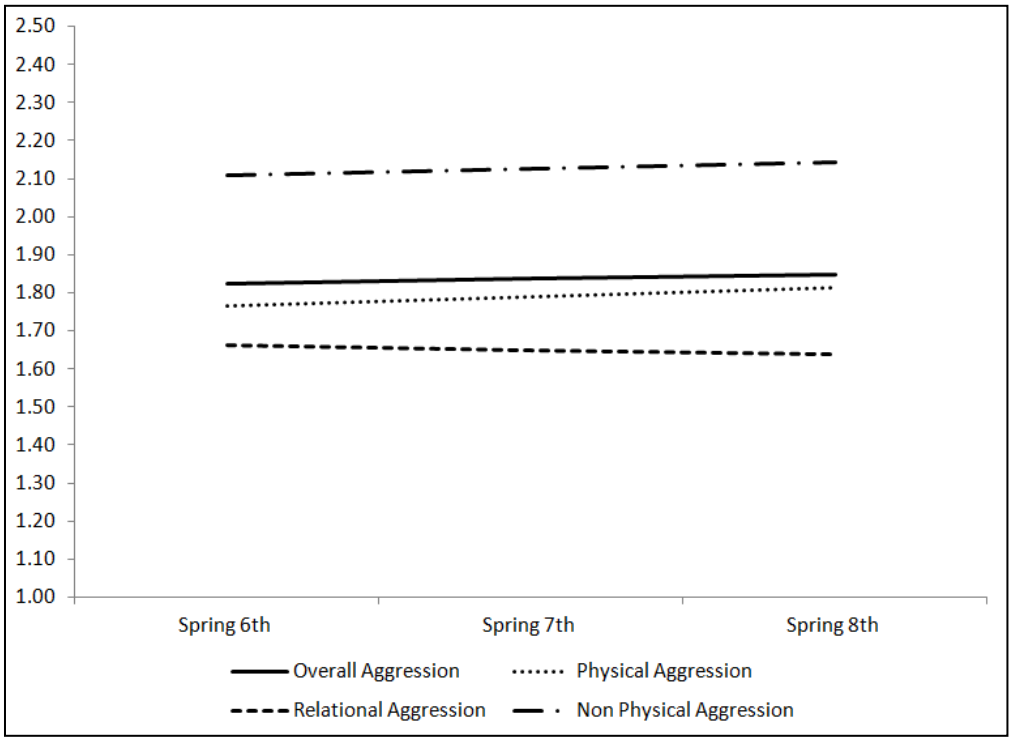
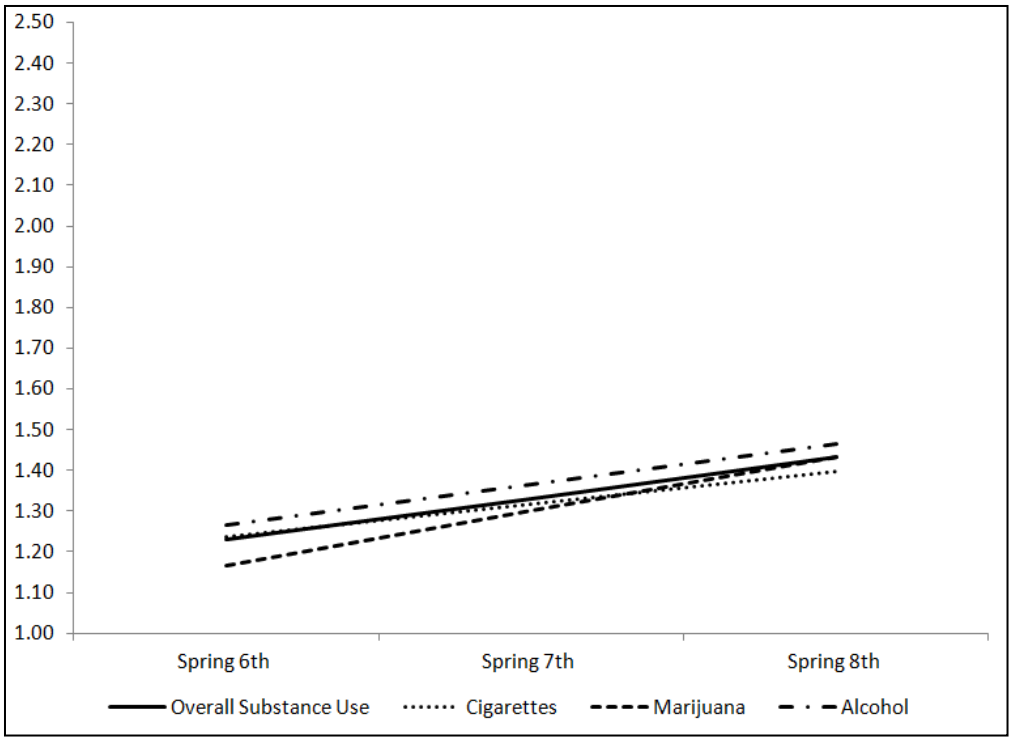


Figure 6.4 Substance Use Trajectories (Overall Analytic Sample)



Relation of Trajectories to Patterns of Social-Cognitive Risk. The trajectory plots are depicted in Figures 6.5 to 6.12. The pattern-specific growth parameters are summarized in Tables 6.5 and 6.6. The general trends of the trajectories are first described, followed by details of the statistically significant tests of the growth parameters. Statistical testing of all growth parameters (i.e., intercepts and slopes) was conducted, and the details involving the slopes are presented below. There are two tests of significance conducted in the analyses. The first test evaluates if the change in behaviors is significantly different from their initial levels and are indicated by the p-values. The second test of statistical significance is pairwise comparisons between parameters, and evaluates for statistical differences between a pair of coefficients. These results are represented by the superscripts—coefficients on the same row sharing the same superscripts are statistically different from each other (Table 6.5 and 6.6).

Plots of the overall aggression trajectories show that slopes are relatively stable for the "moderate" and "low all" patterns (Figure 6.5), while the "poor social skills" group shows a slight decrease in aggression. For the "high all" boys, aggression increases through the middle school years, a pattern which holds for physical (Figure 6.6) and relational aggression (Figure 6.8). There is a marginally slight growth in physical aggression observed for the "low all" group (slope: 0.04; $p \leq 0.10$) (Table 6.5). A different trend is observed for non-physical aggression (Figure 6.7) which increases for the "moderate group" but remains stable over time for the "high all" group. That said, only the slope for physical aggression was significant.

When comparing the aggression slopes between subgroups, two significant effects were observed. Firstly, growth in physical aggression was significantly different between the "poor social skills" group and the "high all" group (represented by the superscripts in Table 6.5). That

is, physical aggression decreases among the "poor social skills" group (-0.07) while it increases among the "high all" group (0.19). Similarly, relational aggression decreases among the "poor social skills" group (-0.03) but increases among the "high all" group (0.12) (Table 6.5).

Plots of the substance use trajectories showed that across the "low all," "moderate," and "high all" groups, substance consumption increases (Figure 6.9). For the "poor social skills" group, the overall substance use trajectory remained relatively stable (Figure 6.9). The specific substance use trajectories for the "poor social skills" group reveal different trends: while alcohol use remains stable over time (Figure 6.11), cigarette use decreases (Figure 6.10), and marijuana use increases (Figure 6.12). The specific trajectories for the "moderate" group also reveal notable differences: cigarette use remains stable (Figure 6.10), while alcohol (Figure 6.11) and marijuana use (Figure 6.12) increase over time. Statistically significant growth was observed for all forms of drug use among the "low all" group ($p \leq 0.001$). For the "moderate" group, there were significant increases in overall use ($p \leq 0.05$), alcohol use ($p \leq 0.10$) and marijuana use ($p \leq 0.05$). For the "high all" group, there was a significant increase in marijuana use only ($p \leq 0.10$) (Table 6.6). There were no significant increases in any substance use for the "poor social skills" group.

When comparing the substance use slopes between subgroups, the following significant effects were observed. Growth in cigarette use was significantly different among the "low all," "moderate" and "poor social skills" group (represented by the superscripts in Table 6.6). Cigarette use decreased among the "poor social skills" group (-0.11) while it increased among the "low all" (0.13) and the "moderate" groups (0.01). The difference in growth of alcohol use between the "low all" and the "poor social skills" group was also significantly different. The

increase in alcohol use was higher among the "low all" group (0.10) compared to the "poor social skills" group (0.022) (Table 6.6).

Table 6.5 Pattern Specific Aggression Growth Parameters

	Low All (61.3%)	Moderate (15.5%)	Poor Social Skills (16.9%)	High All (6.3%)
Overall Aggression				
Intercept (SE)	1.74	1.95	2.16	1.86
	(0.04)	(0.10)	(0.13)	(0.18)
Slope (SE)	0.02	0.02	-0.05	0.12
	(0.02)	(0.12)	(0.06)	(0.12)
Physical Aggression				
Intercept (SE)	1.66	1.93	2.19	1.79
	(0.04)	(0.11)	(0.15)	(0.20)
Slope (SE)	0.04	0.01	-0.07 [a]	0.19 [a]
	(0.02) †	(0.16)	(0.08)	(0.16)
Non-Physical Aggression				
Intercept (SE)	2.02	2.22	2.45	2.24
	(0.05)	(0.16)	(0.18)	(0.25)
Slope (SE)	0.02	0.09	-0.02	0.01
	(0.03)	(0.14)	(0.06)	(0.14)
Relational Aggression				
Intercept (SE)	1.60	1.74	1.89	1.65
	(0.04)	(0.09)	(0.10)	(0.13)
Slope (SE)	-0.00	-0.03	-0.03 [a]	0.12 [a]
	(0.02)	(0.07)	(0.07)	(0.11)

$p \leq 0.001$ ***; $p \leq 0.01$ **; $p \leq 0.05$ *; $p \leq 0.10$ †
Significant pairwise comparisons ($p \leq 0.10$) are noted in the table by superscripts. Intercept results not reported in table.

Figure 6.5 Overall Aggression

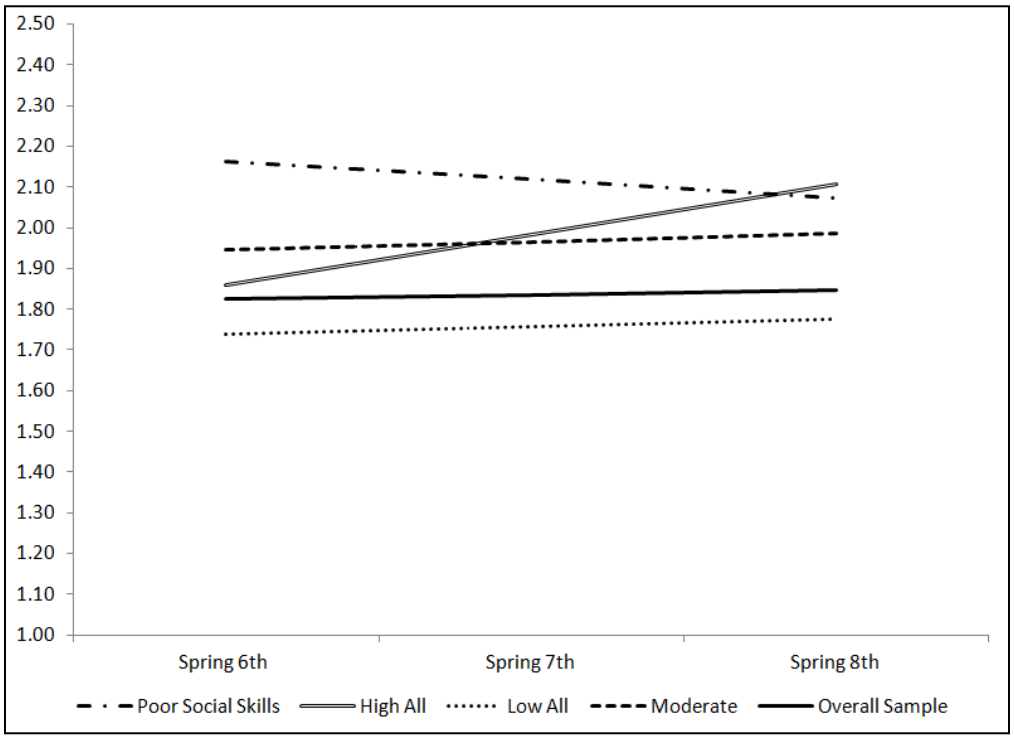


Figure 6.6 Physical Aggression

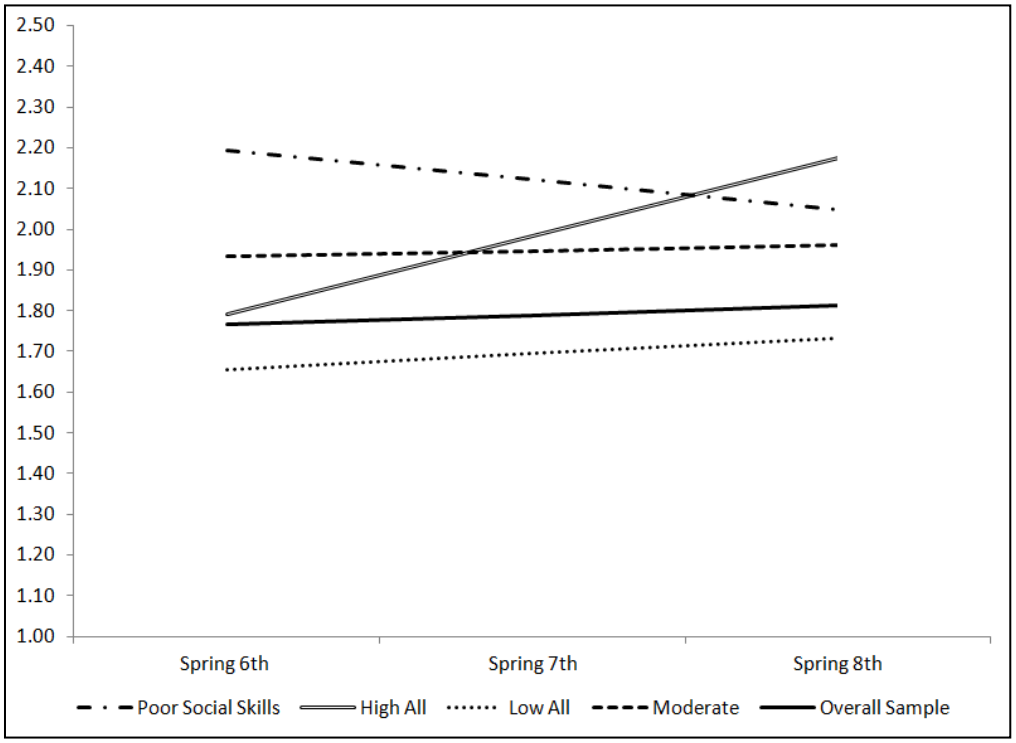


Figure 6.7 Non-Physical Aggression

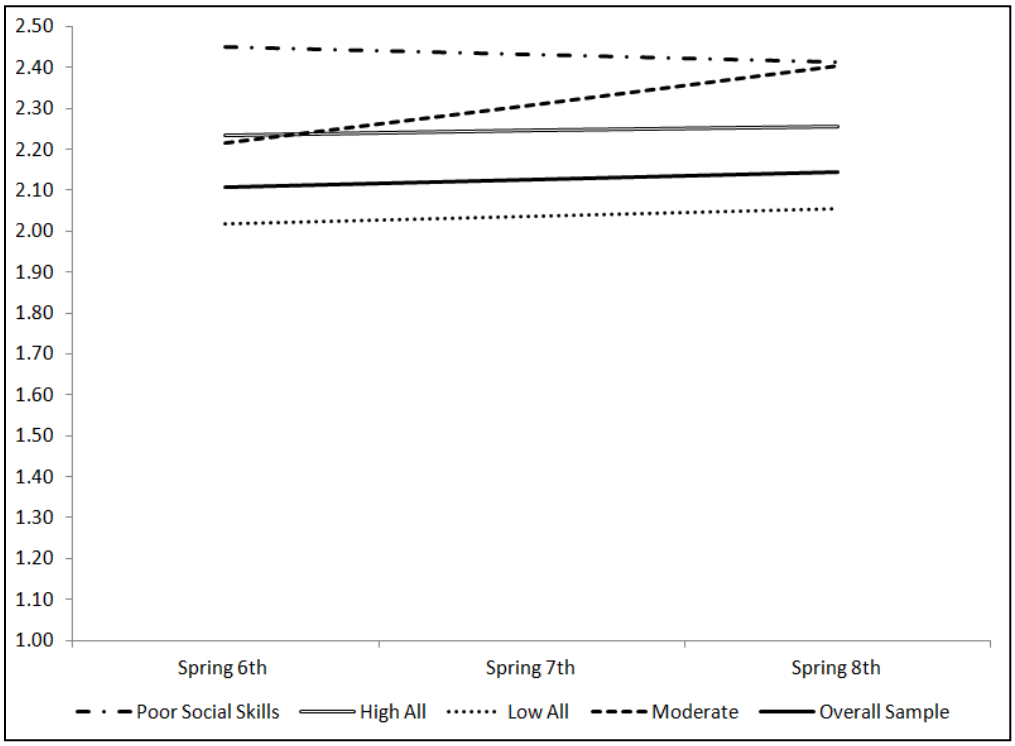


Figure 6.8 Relational Aggression

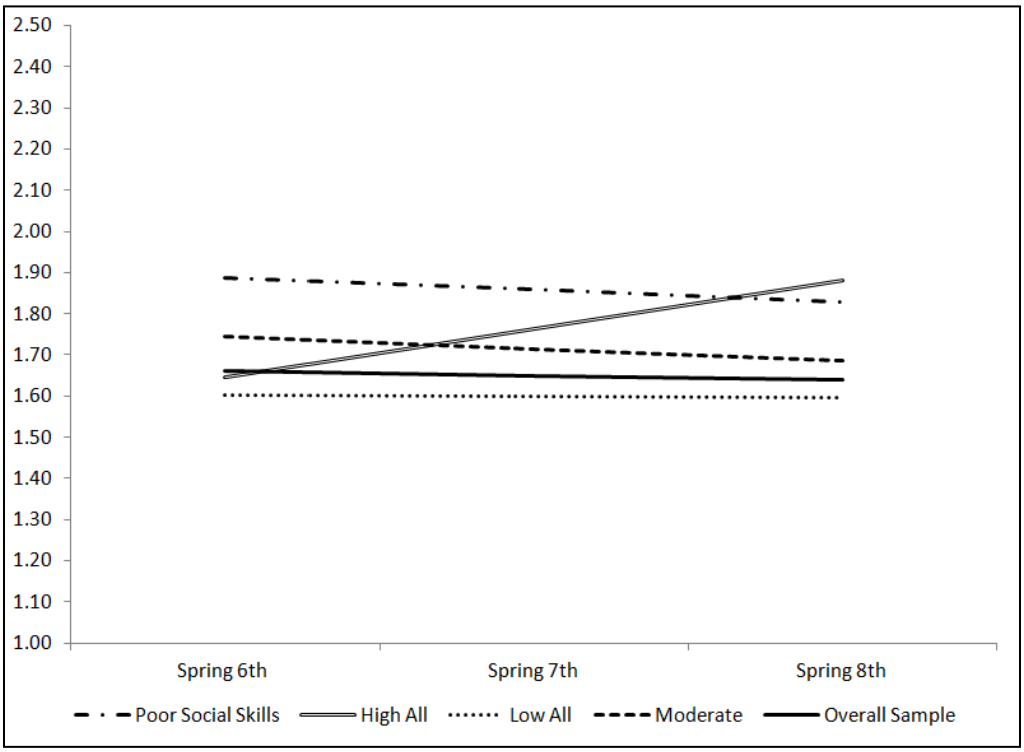


Table 6.6 Pattern Specific Substance Use Growth Parameters

	Low All (61.3%)	Moderate (15.5%)	Poor Social Skills (16.9%)	High All (6.3%)
Overall Substance Use				
Intercept (SE)	1.15	1.33	1.50	1.27
	(0.04)	(0.06)	(0.17)	(0.17)
Slope (SE)	0.10	0.14	0.02	0.24
	(0.02) ***	(0.07) *	(0.05)	(0.16)
Cigarette Use				
Intercept (SE)	1.13	1.34	1.60	1.30
	(0.04)	(0.09)	(0.23)	(0.16)
Slope (SE)	0.13 [a]	0.01 [b]	-0.11 [a, b]	0.21
	(0.03) ***	(0.08)	(0.08)	(0.21)
Alcohol Use				
Intercept (SE)	1.19	1.36	1.56	1.29
	(0.04)	(0.07)	(0.18)	(0.17)
Slope (SE)	0.10 [a]	0.15	0.02 [a]	0.22
	(0.02) ***	(0.09) †	(0.04)	(0.15)
Marijuana Use				
Intercept (SE)	1.09	1.28	1.41	1.18
	(0.05)	(0.14)	(0.20)	(0.15)
Slope (SE)	0.10	0.22	0.07	0.35
	(0.02) ***	(0.09) *	(0.09)	(0.20) †

$p \leq 0.001$ ***; $p \leq 0.01$ **; $p \leq 0.05$ *; $p \leq 0.10$ †
Significant pairwise comparisons ($p \leq 0.10$) are noted in the table by superscripts. Intercept results not reported in table.

Figure 6.9 Overall Substance Use

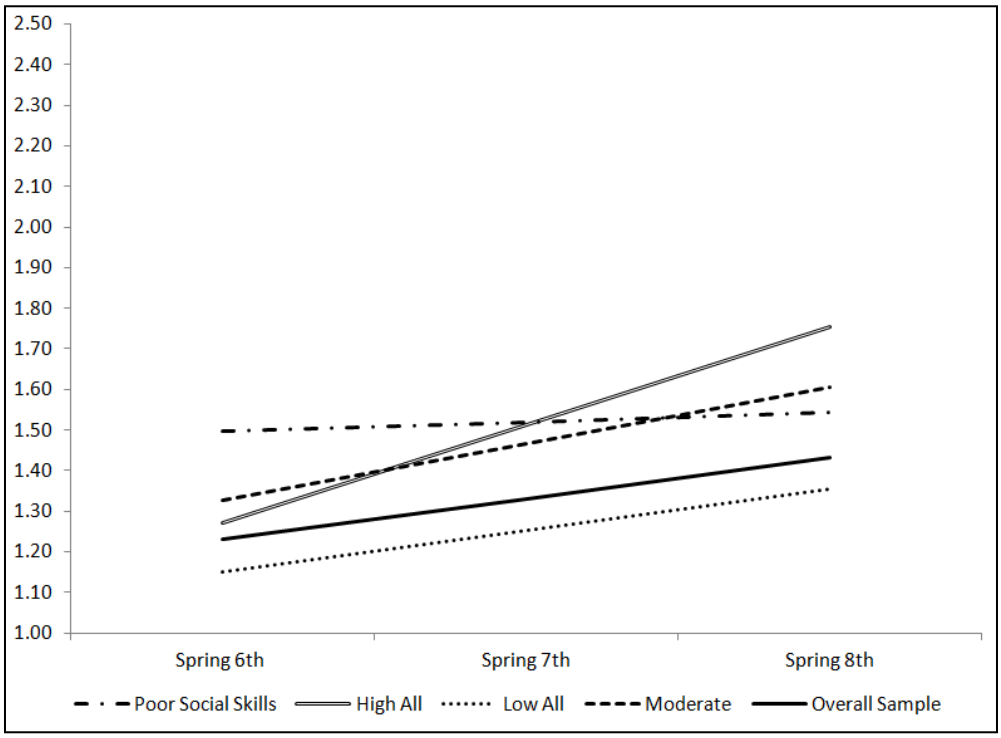


Figure 6.10 Cigarette Use

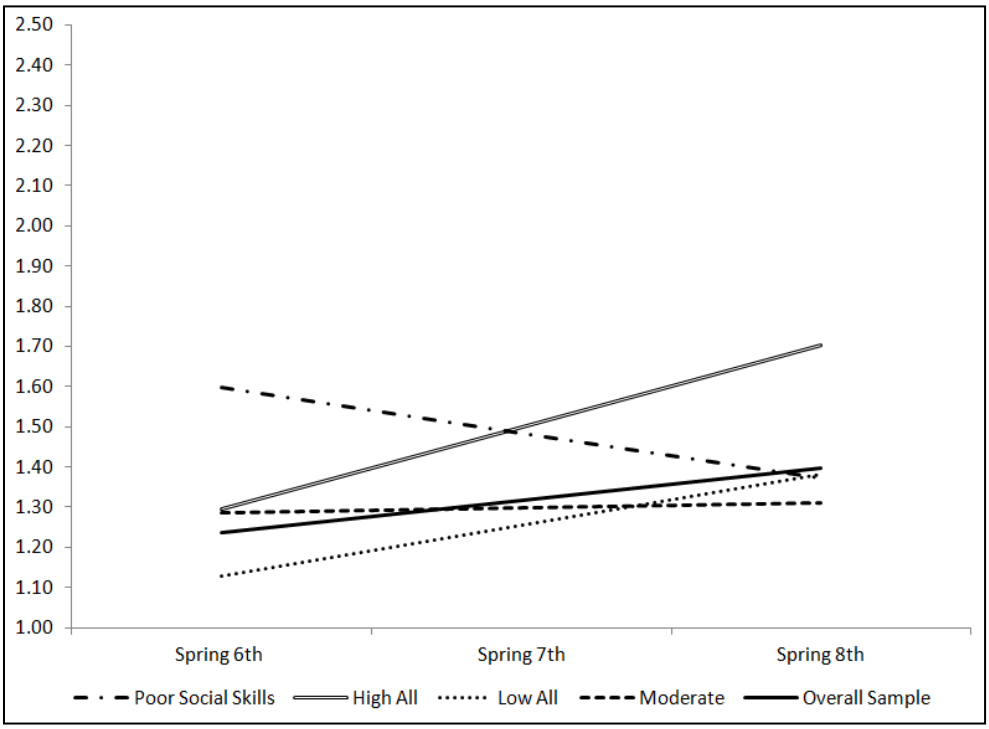


Figure 6.11 Alcohol Use

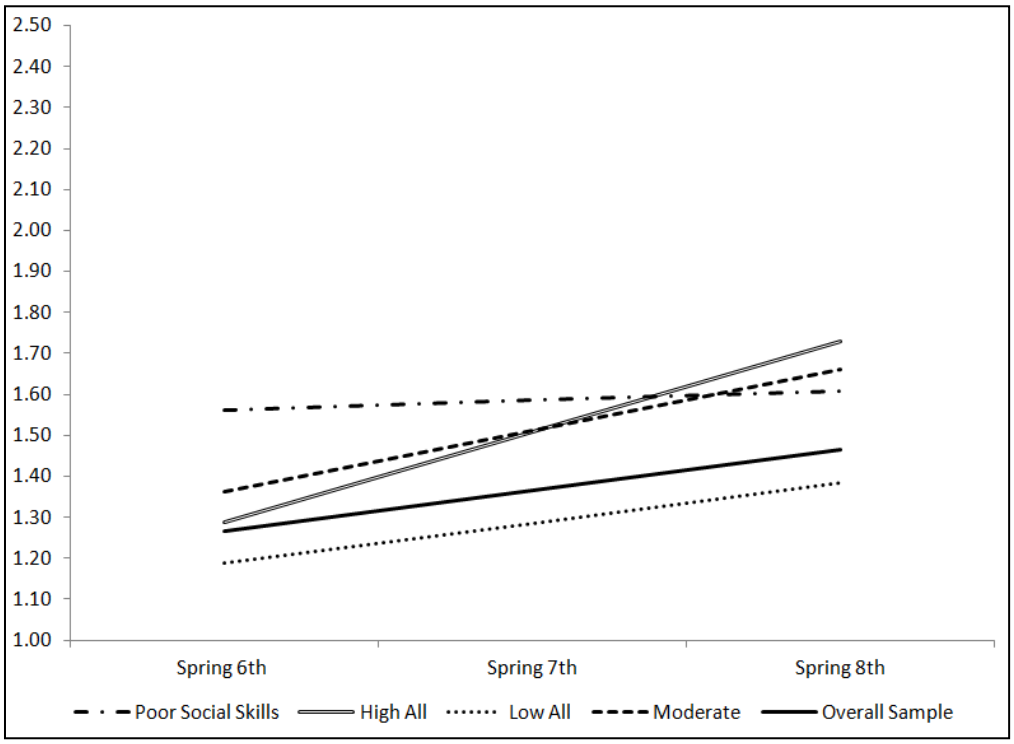
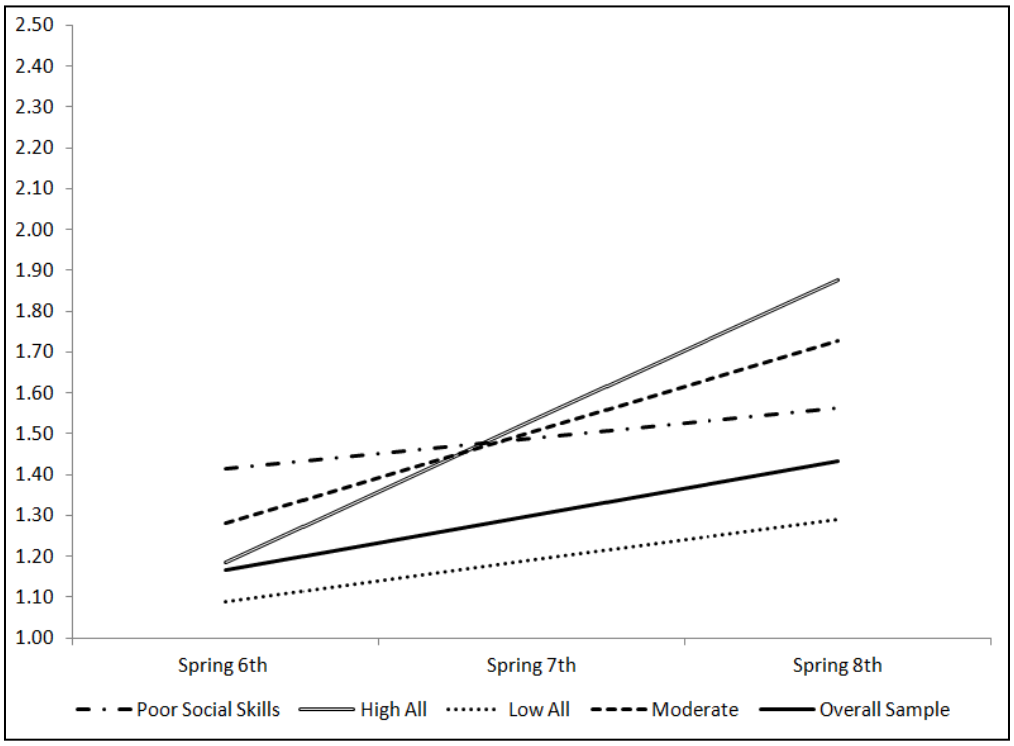


Figure 6.12 Marijuana Use



6.3 Question 3 Results: School Moderation

School factor variables were independently added into the step 2 models to evaluate if and how they influence the relations between patterns and growth parameters. Similar to step 2 analyses, focus is on the slopes although analyses were also conducted on the intercepts (not reported). Changes in slopes are described below.

Overall Tests of Significance. Table 6.7 summarizes the overall test results across the four patterns. These results indicate whether there were significant differences in slopes following the addition of the school factor. Notably, there were two significant changes in slopes. The addition of the student-student relational measure into the model significantly influenced relational aggression ($p \leq 0.001$) and the inclusion of the student-teacher construct significantly modified the non-physical aggression slopes ($p \leq 0.05$). No significant changes in slopes were observed for all forms of substance use.

Pairwise Tests of Significance. To examine how student-student and student-teacher relationships impacted the relations between patterns and trajectories, pairwise tests of significance were conducted (Table 6.8). In the student-student relationship model, results indicate significant changes in the slopes for relational aggression when comparing the "poor social skills" group with the "low all" and "moderate" groups. Relational aggression decreased at a higher rate for the "poor social skills" group (slope: -1.17) compared to the "low all" (slope: 0.15) and "moderate" groups (slope: 0.43).

In the student-teacher relational model, findings indicate significant pairwise differences in slopes when comparing the "high all" group with the "low all", "moderate", and "poor social skills" groups (Table 6.8). Non-physical aggression decreased at a higher rate for the "high all"

group (slope: -0.82) compared to the "low all" (slope: 0.17), "moderate" (slope: -0.01), and "poor social skills" groups (slope: -0.03).

Table 6.7 Overall Ward Tests of Parameter Constraints (Chi-Square Tests with 3 Degrees of Freedom)

	Student-Student	Student-Teacher	Awareness & Reporting	School Safety Problems	School Norms
Overall Aggression					
Intercept	4.87	3.09	0.925	11.57	15.26
Slope	0.11	0.11	0.56	0.75	0.68
Physical					
Intercept	2.92	1.92	0.455	7.90	10.64
Slope	0.43	4.74	5.37	2.60	1.27
Non-Physical					
Intercept	4.50	2.15	1.13	13.70	7.49
Slope	2.05	7.94*	2.15	0.88	0.54
Relational					
Intercept	17.60	5.36	2.33	6.50	24.43
Slope	25.57***	2.39	2.84	1.56	6.92

	Student-Student	Student-Teacher	Awareness & Reporting	School Safety Problems	School Norms
Overall Substance Use					
Intercept	2.33	0.50	1.25	11.10	2.98
Slope	1.04	0.05	0.08	1.40	0.96
Cigarette Use					
Intercept	14.02	2.55	0.49	13.30	5.31
Slope	2.01	1.40	0.27	5.34	4.03
Alcohol Use					
Intercept	0.95	1.15	0.98	8.21	3.22
Slope	0.50	0.37	0.16	1.24	2.03
Marijuana Use					
Intercept	2.68	2.75	2.45	10.39	2.98
Slope	1.93	1.42	2.28	3.65	0.66

$p \leq 0.001$ ***; $p \leq 0.01$ **; $p \leq 0.05$ *; $p \leq 0.10$ †
Intercept results not reported in table.

Table 6.8 Pairwise Tests of Significance across Patterns of Risk

	Overall Test Chi Sq (3 df)	Low All (61.3%)	Moderate (15.5%)	Poor Social Skills (16.9%)	High All (6.3%)
Student-Student Relationship (n=37 schools)					
Relational Aggression					
Intercept	17.60	-0.93	-0.40	0.96	-1.25
		(0.31)	(0.55)	(0.83)	(0.99)
Slope	25.57***	0.15 [a]	0.43 [b]	-1.17 [a,b]	-0.44
		(0.19)	(0.29)	(0.31)	(0.59)
Student-Teacher Relationship (n=37 schools)					
Non-Physical Aggression					
Intercept	2.15	-0.87	-0.14	-0.46	-1.47
		(0.26)	(0.72)	(0.51)	(0.50)
Slope	7.94*	0.17 [a]	-0.01 [b]	-0.03 [c]	-0.82 [a,b,c]
		(0.10)	(0.21)	(0.26)	(0.34)

$p \leq 0.001$ ***; $p \leq 0.01$ **; $p \leq 0.05$ *; $p \leq 0.10$ †
A significant Wald chi-square indicates a parameter difference by class. Significant pairwise comparisons ($p \leq 0.05$) are noted in the table by superscripts. Coefficients that share similar superscripts are significantly different from each other. Intercept results not reported in table.

Effect Sizes. To understand the magnitude of change in slopes as a result of school influences, effect sizes are calculated and plotted (Figures 6.13 and 6.14). Notably, schools with enhanced student-student relationships among the "poor social skills" group is associated with an effect size of 0.24 (Figure 6.13). In other words, within the "poor social skills" group, students from schools at the 75th percentile for student-student relationship decreased their relational aggression by a 0.24 standard deviation more than students from schools at the 25th percentile. Additionally, schools with enhanced student-teacher relationships among the "high all" group is associated with an effect size of 0.25 (Figure 6.14). That is, within the "high all" group, students from schools at the 75th percentile for student-student relationship decreased their non-physical aggression by 0.25 standard deviation more than students from schools at the 25th percentile.

Figure 6.13 Student-Student Relationships on Relational Aggression Effect Sizes

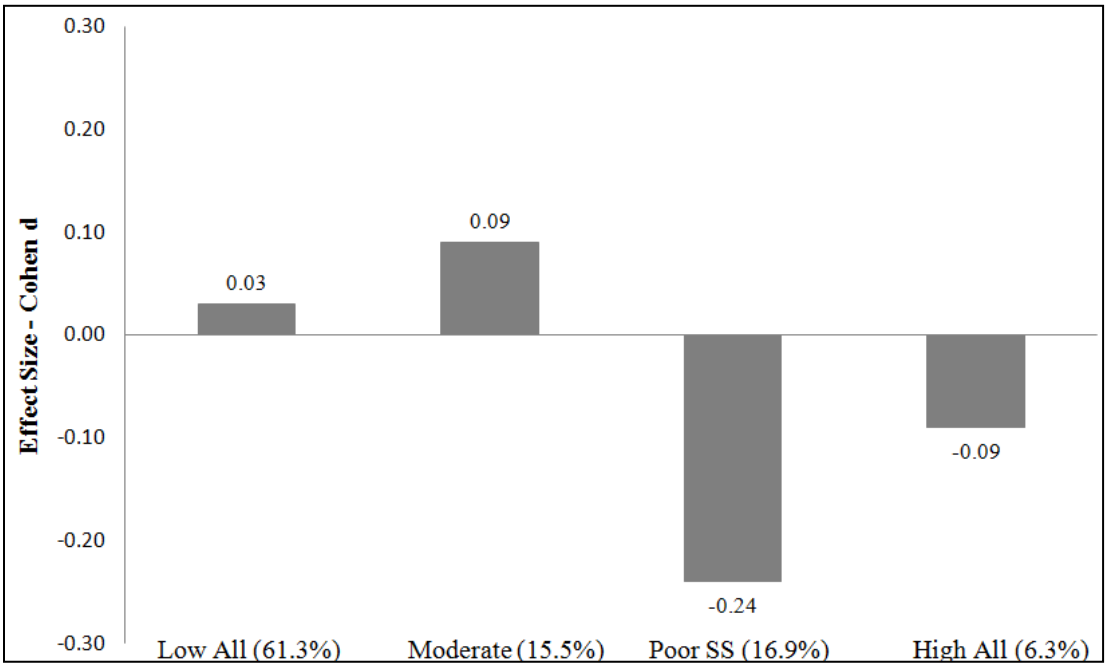
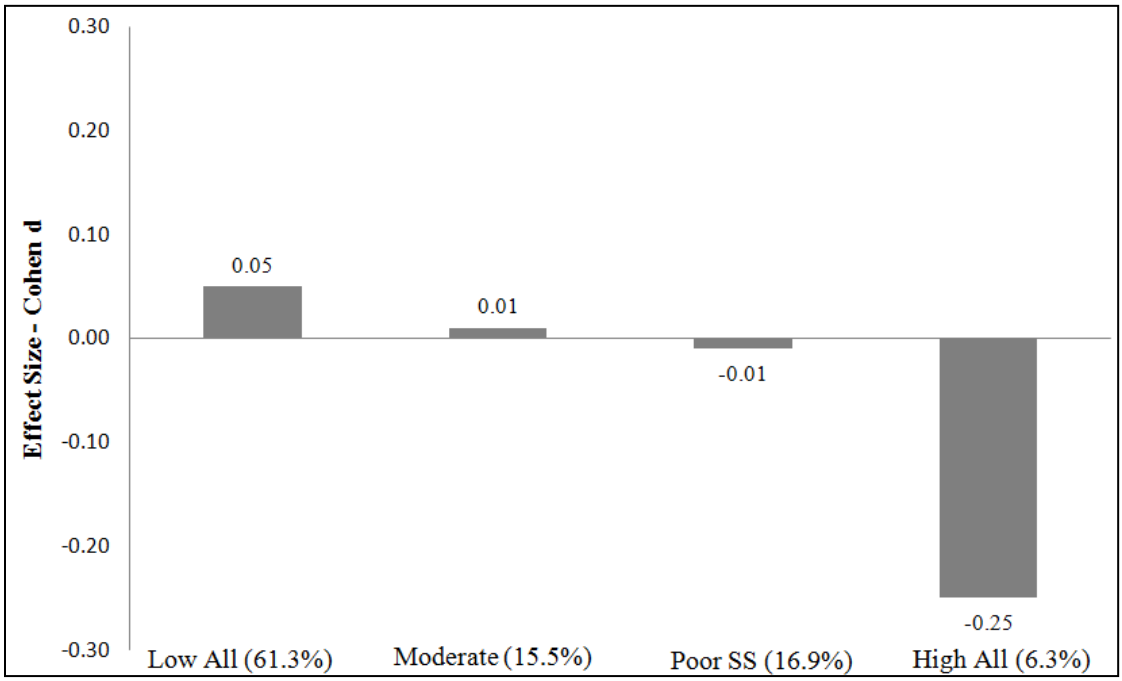


Figure 6.14 Student-Teacher Relationships on Non-Physical Aggression Effect Sizes



CHAPTER SEVEN

DISCUSSION

The purpose of this dissertation was to understand the relations between patterns of social-cognitive risk among early adolescent urban boys entering middle school and their aggression and substance-use trajectories through the middle school years. In addition, the role of school context, particularly how school might moderate the relations between risk patterns and behaviors was evaluated. The overall objective was to identify the pattern-specific aspects of the school environment salient for preventing and reducing youth problem behaviors. Based in the person-oriented developmental psychopathology perspective (Bergman & Magnusson, 1997), three questions were addressed: 1) Using teacher reports of student social-cognitive deficits at middle school entry (i.e., learning problems, social skills deficits, anxiety and conduct problems), are there identifiable patterns of behavioral risk profiles among a sample of urban boys? 2) Is there a relationship between subgroups of boys based on behavioral risk profiles entering 6th grade and developmental trajectories of boys' self-report aggression and substance use over the course of middle school? and 3) Do school contextual factors (e.g., interpersonal relationships, safety concerns, and norms about behaviors) moderate the relation between student patterns and growth of aggression and substance use over the course of middle school?

This study advances knowledge in three key areas. First, unlike much research in this area which considers behavioral risk in silos and often from a variable-oriented approach, this study examines patterns of risk based on co-occurring social-cognitive problems, and their developmental trajectories of aggression and substance use over the course of middle school.

Identifying the patterns of social-cognitive problems and trajectories has practical utility for developing school-based behavioral prevention and intervention programs. Findings can assist practitioners in screening for those boys at risk for poor behavioral outcomes at entry into middle school (Clark & Alvarez, 2010; Sugai & Horner, 2009).

Second, this dissertation focuses on school factors that can be regulated for mitigating behavioral risk by providing researchers and practitioners with specific intervention to reduce and prevent negative behaviors. There is strong empirical support to indicate that interpersonal relationships among students and between students and teachers, safety concerns, and behavioral norms are malleable and can be changed (Farrell et al., 2008; Henry, 2008; Pianta et al., 2003; West et al., 2004). Understanding the relation of school climate and patterns of student behavior can promote the efficient use of limited school resources—directing resources toward student subgroups most needed and most likely to benefit (Clark & Alvarez, 2010; Farrell et al., 2013).

Third, this study considers a broad spectrum of aggressive and drug use behaviors during the critical developmental period of mid-adolescence. No prior study has evaluated the link between risk profiles at school entry and multiple types of aggression and substance use longitudinally. Because aggression persists over the course of middle school, and drug use tends to increase through late adolescence (Farrell et al., 2011; Jolliffe et al., 2016; Maldanado-Molina et al., 2010), the middle-school years are a critical window of opportunity to prevent and intervene against increased risk behaviors (Bosworth, 2015; Sullivan et al., 2015). Thus, knowledge gained from evaluating the role of school context across patterns in interaction with social-cognitive risk on different types of aggression and substance use can provide more depth and specificity for school prevention researchers and practitioners to draw on when planning for

prevention and intervention programs. Importantly, this study highlights that not all students/groups are equally influenced by changes in overall school context (Sterba & Bauer, 2010).

In light of these contributions to the field of school prevention research, the study's key findings on social-cognitive problems, aggression and substance use, and school context are discussed below. Profiles of social-cognitive risk at middle school entry are discussed, followed by their relation to trajectories of aggression and substance use. Findings related to the interaction with school context are also discussed. Implications for practice are highlighted, as well as directions for future research.

7.1 Patterns of Social-Cognitive Risk

The first question addressed was to identify patterns of social-cognitive risk at middle school entry based on co-occurring learning problems, social skills deficits, anxiety, and conduct problems. As hypothesized, four groups were identified: a group of "low all" boys displaying low risk across all four factors; a group with "high all" problems across all four social-cognitive domains; a group distinguished by having "poor social skills" with some inter-related learning and conduct problems; and lastly, a group with "moderate" co-occurring learning, anxiety, and conduct problems, but also low levels of social skills problems. Findings reflect person-oriented theory and illustrate the holistic-interactional paradigm (Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993). Salient social-cognitive deficits – learning, social skills, anxiety, and conduct problems clustered together to form four unique risk profiles of boys. The combination of characteristics, rather than any single factor, is posited as important in variation in self-regulatory abilities against problem behaviors (Bandura, 1986, 1989, 2001). Further,

based on person-oriented theory, these patterns are key to understanding risk and behaviors (Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993). Results are also consistent with previous research that has found that different dimensions of social cognitive problems can co-exist and create distinct patterns of behavioral risk. These findings are consistent with much of the extant literature, which documents high-risk, low-risk, and low social skills profiles (e.g., Roeser et al., 1998, 1999, 2002; Kamphaus et al., 1997; Kim et al., 2010; Orpinas et al., 2014). However, unlike previous research, a fourth distinct profile was identified with youth in that group characterized by having moderate levels of problems in all areas except social skills. The four profiles of social-cognitive risk are discussed in the following paragraphs.

Low-All Group. At school entry, individuals with low levels of co-occurring social-cognitive problems formed a distinct profile representing 61.3% of the sample. The "low all" profile is consistent with the literature that most youth exhibit low rates of problem behaviors and are on-track for positive outcomes across their lifespan (Moffitt, 1993, 2003). This "low all" group is reminiscent of the "multiple-strength" group in studies by Roeser and colleagues (1998, 1999, 2002) and the "well-adapted" group in the study by Orpinas and colleagues (2014). In these studies, the "multiple-strength" and "well-adapted" groups were associated with the most positive outcomes (Orpinas et al., 2014; Roeser et al., 1998, 1999, 2002). For instance, Roeser and colleagues observed that individuals with multiple social-cognitive assets were more engaged in the classroom, had the highest levels of self-esteem, had fewer negative peer affiliations, reported more positive school behaviors and exhibited fewer behavioral problems (Roeser et al., 1998, 1999, 2002). The majority of youth demonstrate positive learning abilities,

strong interactional skills, absence of anxiety and conduct problems and are at low risk for aggression and substance use.

High-All Group. The identification of a "high all" group, those with elevated rates of problems across all social-cognitive domains, is also consistent with previous research. A distinguishing feature of boys in this profile is their high probabilities of co-occurring problems across all four social-cognitive domains. These findings illustrated that poor learning abilities, social skills problems, anxiety, and conduct problems clustered together among a small group of boys (6.3%). Because of their multiple social-cognitive deficits, boys in this group are most susceptible to engage in aggression and substance use. Studies found that those at highest risk for the poorest outcomes constitute a small segment of the population, estimated to be less than 10% (Lahey et al., 2005; Moffitt, 1993, 2003). Indeed, in the study by Orpinas et al., (2014), those who reported the most severe social-cognitive problems represent the smallest proportion of the sample (2.8%) and 84% of these high-risk individuals demonstrated aggression.

Poor Social Skills Group with Co-occurring Learning, and Conduct Problems. The third profile identified in this study represents those boys distinguished by "poor social skills" with some co-occurring learning, anxiety, and conduct problems. This profile constitutes 16.9% of the sample. The prominent feature for this group is their high levels of social skills problems when entering middle school. A number of studies have identified "poor social skills" profiles with proportions ranging from 12.0% to 16.2% (e.g., Orpinas et al., 2014; Kamphaus et al., 1997; Kim et al., 2010). These individuals with "poor social skills" are expected to exhibit a certain amount of risk behaviors because of their poor behavioral control associated with their social, learning, and conduct problems. For example, the study by Orpinas et al., (2014) found moderate levels of

aggression (19.0%) within this group. Social skills have both direct and indirect effects on behaviors (Fleming et al., 2002; Lonczak et al., 2001; Huang et al., 2001) and can lead to peer rejection, which can heighten risk for behaviors (Dishion & Tipsord, 2011). Further, school behavioral problems can lead to increases in substance use (Gil et al., 2002). Classroom performance may suffer, which can result in increased aggression (Jolliffe et al., 2016). All in all, findings show that social skills deficits, learning and conduct problems can co-occur among a group of boys.

Moderate Group with Co-occurring Learning, Anxiety, and Conduct Problems. Finally, the last profile observed in this study is a group of boys with "moderate" levels of co-occurring learning, anxiety, and conduct problems. These boys represent 15.5% of the sample. A distinguishing feature of these boys is the absence of social skills problems (6.6%) but with some moderate levels of learning (44.8%) and anxiety problems (44.2%). These boys also have a lower but notable probability of co-occurring conduct problems (24.9%). Extant studies have identified subgroups representing academic problems, poor social skills, and poor mental health only as distinct categories (e.g., Orpinas et al., 2014; Kamphaus et al., 1997; Kim et al., 2010; Roeser et al., 1998, 1999, 2002). Thus, the identification of this risk profile may be highly relevant for school prevention and intervention. These findings raise concerns about a subset of boys previously unexplored in the research and potentially unnoticed and underserved in practice. Although this subset of boys may be more socially skilled as characterized by an absence of social skills problem, the combination of learning, anxiety, and conduct problems can bring about increases in later aggression and substance use. The constellation of co-occurring learning, anxiety, and conduct problems are expected to influence their self-control abilities

against problem behaviors. Learning problems increase risk for aggression and substance use (Bryan et al., 2003; Jolliffe et al., 2016), and risk can be further exacerbated by co-occurring anxiety problems which can result in diminished regulatory functioning and more aggression and substance use (White et al., 2012). Overall, findings showed that among boys who may be more socially skilled, learning problems, anxiety, and conduct problems can co-exist.

7.2 Trajectories of Aggression and Substance Use

Analyses were conducted to evaluate whether risk profiles at school entry were related to changes in aggression and substance use over the course of middle school. Findings revealed that risk profiles were related to different behavioral patterns of aggression and substance use. Results advance knowledge regarding how the constellation of social-cognitive risk factors within individuals relates to developmental aggression and substance use in a number of ways. Previous research has documented the relation between social-cognitive risk and behavioral outcomes (e.g., Farrell et al., 2013; Roeser et al., 1998, 1999, 2002; Kamphaus et al., 1997; Kim et al., 2010; Orpinas et al., 2014; Supplee et al., 2013) and, separately, trajectories of aggression and substance use have been identified in studies (e.g., Guo et al., 2002; Lynne-Landsman et al., 2011; Maldonado-Molina et al., 2010). Yet, the bodies of research on social-cognitive profiles and behavioral trajectories have not previously been linked into an integrative framework. Moreover, most studies on indirect aggression (e.g., non-physical and relational aggression) have focused on girls. Studies have also mostly focused on physical aggression among boys. There is a dearth of knowledge on how rates of non-physical and relational forms of aggression among boys progresses (e.g., Coyne et al., 2006; Crick & Bigbee, 1998; Crick & Grotpeter, 1995;

Finigan-Carr et al., 2015; Xie et al., 2003). Needless to say, there are fewer studies on how a constellation of social-cognitive factors relate to indirect aggression among boys.

Results accentuate the dynamic nature of risk and development, and draw attention to developmental psychopathology concepts such as multifinality and equifinality in understanding risk and development (Cicchetti, 2006; Cicchetti & Rogosch, 1996). It is observed that for some groups, similar starting levels of risk can result in different outcomes (i.e., multifinality). For example, the "moderate" and the "high all" boys both started 6th grade with similar levels of non-physical aggression, but by 8th grade, different outcome behaviors were found: non-physical aggression was higher for the "moderate" group as compared to the "high all" boys. Moreover, similar outcomes can be predicted by different profiles (i.e., equifinality). The equifinality principle is demonstrated by the "poor social skills" and the "moderate" boys for non-physical aggression. These two groups started 6th grade at different levels, but at 8th grade, both ended with the same levels of non-physical aggression. Overall, findings reflect developmental psychopathology principles which posit that a multiplicity of pathways can emerge in a given population because of the interplay between individual social-cognitive factors and context. In the following paragraphs, the four social-cognitive profiles and their relations to behavioral trajectories are discussed.

Low-All Group. It was hypothesized that the "low-all" group would be associated with the lowest levels and growth of aggression and substance use through the middle school years. Study findings support this hypothesis. Across all risk profiles, levels of aggression and drug use are the lowest in this group. Although physical aggression showed a small but weak increase over time ($p \leq 0.10$), rates among this group are lower than the overall group mean. Moreover,

while there is an overall increase in substance use for the full sample, rates here are still the lowest across all the groups. The low patterns of problem behaviors are consistent with other trajectory studies indicating that the majority of early adolescent youth abstain from negative behaviors (e.g., Moffitt, 1993, 2003; Lynne-Landsman et al., 2011). The rates of problem behaviors are low for this group probably because of the presence of multiple positive social-cognitive assets. Results indicate that positive social-cognitive domains at school entry promote healthy behavioral development through the middle school years.

High-All Group. Furthermore, it was hypothesized that the "high-all" group would be associated with increasing trajectories of negative behaviors through middle school. Findings support this hypothesis. Plots of the aggression and substance use show dramatic increases through the middle school years. Specifically, the trajectory for marijuana use showed a large but marginally significant ($p \leq 0.10$) increase over time – the largest across all groups. The general increase in marijuana use is consistent with other developmental studies which found that marijuana use increased more steeply after age 13 (e.g., Seattle Social Development Project; Kosterman et al., 2000). However, results from this study specify that the "high all" group has the steepest increase over time. This finding suggests that boys with the most severe social-cognitive problems are at greatest risk for marijuana use. Results show that those who enter school with a constellation of social-cognitive problems have heightened risk for problem behaviors.

Poor Social Skills Group with Co-occurring Learning, and Conduct Problems. It was hypothesized that a profile identified in this study will show a diminishing risk pattern over time (Moffitt, 1993, 2003). This hypothesis was partially supported by the "poor social skills" group.

Boys in this group enter 6th grade with the highest levels of problem behaviors. However, there are two behavioral trends that suggest a weakening of risk over time. First, while substance use increased over time for the other three groups, the trajectory for the "poor social skills" group remained flat through the middle school years. Second, when comparing between the "poor social skills" and the "high all" group, there was a decrease in physical and relational aggression among the "poor social skills" group, while physical and relational aggression increase among the "high all" group. The difference in slopes between the two groups was statistically significant.

Because this group is characterized by predominantly "poor social skills," coupled with some learning and conduct problems, it is likely that decreasing problems related to boys social skills can bring about improvement in learning and conduct problems which subsequently lowers risk for aggression and substance use. Cascading models of development highlight how change in one domain (e.g., improvement in poor social skills) has cumulating and snowballing effects in other domains (e.g., improved academic and classroom behaviors) (Masten et al., 2005; Masten & Cicchetti, 2010; Moilanen et al., 2010; Obradović et al., 2009). Thus, it is probable that risk for aggression may have decreased among the "poor social skills" group because these boys learned and developed the necessary skills to resolve conflicts in a non-aggressive manner (Huang et al., 2001; Herrenkohl et al., 2001). Moreover, the decrease in cigarette use and the lack of growth in alcohol and marijuana use may, likewise, be explained by a socialization and maturation process. Over time, these boys with "poor social skills" enhance their decision making skills, ultimately reducing their vulnerabilities for substance use from influences such as deviant peers (Epstein et al., 2000a, 2000b; Haegerich & Tolan, 2008).

Findings suggest that it is important for prevention and intervention work to facilitate and promote attainment of social skills, as it may have positive effects into other domains and collectively reduce risk for aggression and substance use. In the research on social skills, there are many direct and indirect opportunities for learning interaction skills (e.g., Catalano et al., 2004; Hawkins & Weis, 1985; Herrenkohl et al., 2011). For example, Herrenkohl et al. (2001) showed that the link between positive social skills and reduced problem behaviors can be strengthened through social rewards, such as a compliment by a respected adult. Likewise, Catalano et al. (2004) identified youth involvement and investment in pro-social activities as a means of reducing negative behaviors. Results draw attention to the salience of enhancing social skills and the need to employ multiple strategies for positive behavioral development.

Moderate Group with Co-occurring Learning, Anxiety, and Conduct Problems. Lastly, it was hypothesized that a profile will show increasing risk over time (e.g., Masten et al., 2005; Masten & Cicchetti, 2010; Moilanen, Shaw, & Maxwell, 2010; Obradović, Burt, & Masten, 2009). This hypothesis is partially supported by the "moderate" group. Rates of non-physical aggression increased through middle school. Although physical and relational aggression persisted through middle school, rates were higher than the overall sample mean but lower than the "high-risk" group. For substance use, alcohol and marijuana use significantly increased through 8th grade, but remained generally lower than the "high-risk" group. These trends suggest a certain amount of increasing risk over time particularly involving non-physical aggression, alcohol, and marijuana use.

The increases in behavioral risk may be accounted for by a number of reasons. Boys in this group have strong positive social skills yet have co-occurring anxiety, learning, and conduct

problems. The increase in non-physical aggression may be related to boys' social skills abilities. Because these boys are more socially competent, it is probable that they are more attuned in utilizing indirect forms of aggression as a means of harming others and become more accustomed over time to dealing with interpersonal matters through non-physical means (Archer & Coyne, 2005; Coyne et al., 2006). Moreover, boys also have a certain degree of anxiety problems which may be another reason why they are less inclined to use overt aggression for fear of repercussions and, instead, adopt more covert, non-physical acts of aggression to solve difficult situations (Archer & Coyne, 2005; Coyne et al., 2006; Leff et al., 2010).

Increases in substance use among these boys may also be related to their positive social skills. Studies draw attention to the role of peer groups in introducing and maintaining substance use that may account for the increases in substance use (e.g., Golub & Johnson, 2001; Trucco et al., 2014). Because of their social nature, these boys may be more vulnerable to negative peer influences. While social skills may account for the increase in substance use, the co-occurring anxiety problems are not believed to be the factor behind increases in alcohol and marijuana use. Literature has highlighted the inconsistency in findings relating anxiety problems and substance use, in fact, anxiety problems have shown weak or no effect on substance use (e.g., Brook et al., 2006; Maggs et al., 2008; Morris et al., 2005). Rather, increases in substance use may be related to their learning and conduct problems, since these problems are shown to be directly associated with heightened drug use (e.g., Bryant et al., 2003; Gil et al., 2002).

All in all, the identification of a group of boys with positive social skills, coupled with a certain degree of anxiety, learning, and conduct problems, and their relation to non-physical aggression and substance use is a novel contribution to the literature. Few studies have

highlighted how social skills inter-relate with other social-cognitive domains to account for increases in problem behaviors, and how patterns relate to multiple forms of aggression and substance use (e.g., Dishion et al., 1999; Dishion & Tipsord, 2011; Fleming et al., 2002; Herrenkohl et la., 2001; Huang et al., 2001; Lonczak et al., 2001, Patterson et al., 2000). Boys in the "moderate" group show a certain amount of increasing risk: aggression persists at levels higher than the sample mean and there are significant increases in alcohol and marijuana use. Thus, results from this study highlight the need to pay attention to this group to identify strategies for reducing these negative behaviors through attention on their individual social capabilities, academic and conduct problems.

7.3 Interaction of School Context, Patterns of Social-Cognitive Risk, and Behaviors

Analyses were conducted to evaluate the influence of school context in the interplay between patterns of social-cognitive risk and behaviors. While the multifinality and equifinality concepts highlight the dynamic nature of risk and development, ecological transactional principles underscore the malleable nature of individual development through the interaction with context (e.g., Bandura, 1989; Bandura, 1986, 2001; Bergman & Magnusson, 1997; Cicchetti, 2006; Cicchetti & Rogosch, 2002; Magnusson, 1985, 1988, 1998; Magnusson & Torestad, 1993). It was hypothesized that varied aspects of school climate would be important in understanding the different types of aggression and substance use across the risk profiles. These hypotheses were partially supported. Findings highlight the importance of school interpersonal climate on aggression only. Specifically, results showed that the quality of relationships among students moderated the relation between boys with "poor social skills" and relational aggression, and the quality of student-teacher relationships moderated the link between boys with "high all"

problems and non-physical aggression. There was no school moderating effect between profiles and behaviors involving school norms about behavior and school safety concern and awareness. There were null findings involving the "low all" and the "moderate" groups. Further, there was no school moderating effect on substance use across all profiles. Findings showed that aggression can be modified through the school interpersonal context particularly among boys in the "high all" and "poor social skills" profiles.

The significance of school relational climate in understanding risk and behaviors is further underscored by the null findings involving school norms about behaviors and safety concerns and awareness. It is probable that school norms did not show a moderation effect between profiles and behaviors because norms are primarily transmitted and learned through social interactions (Dishion et al., 1999; Dishion & Tipsord, 2011; Dishion & Patterson, 2006; Farrell et la., 2007; Patterson et al., 2000). For instance, school rules and regulations about behaviors are conveyed through interpersonal relationships (Gottfredson, 2001). Similarly, another reason for the lack of moderation effect involving safety concerns and awareness is because these are primarily conveyed through teachers and peers (e.g., Astor et al., 2010; Eklund et al., 2014). A student may feel more assured that school is safe after witnessing the way a trusted teacher addresses issues relating to experiences of bullying. Thus, the null findings relating to school norms and safety concerns and awareness of behaviors emphasize again the importance of school interpersonal relationships in the interplay between risk and development.

It is further observed that the quality of relationships among those within the school had a bigger impact on those aspects of aggression that are relationship driven. Evidence from this study suggests that strengthening boys' peer relationships among those with predominantly poor

social skills are likely to reduce aggression in the realm of relational aggression. Further, it was observed that enhancing the quality of bonding with teachers among boys at highest-risk for poor behavioral outcomes may reduce non-physical aggression. Targeting school student-student and student-teacher relationships for reducing problem behaviors is consistent with the literature. However, the majority of existing studies on school interpersonal relationships have focused on physical aggression or delinquent behaviors and have not examined for the variability of school effects on behaviors across student subgroups (e.g., Herrenkohl et al., 2001; Huang et al., 2001; Wang, et al., 2010; Wang and Dishion, 2012; Woolley et al., 2007, 2009). Hence, in contrast to the extant literature, this study found that enhancing school interpersonal climate is most beneficial for reducing relational and non-physical aggression and, in particular, among the "poor social skills" and the "high all" boys. Findings are important in light of literature that indicates relational and non-physical aggression precedes physical aggression. Improving school relational climate may possibly lead to secondary decreases in more worrisome and serious physical aggression (Coyne et al., 2006; Dailey et al., 2015; Farrell et al., 2007; Leff et al., 2014).

Additionally, studies indicate that aggression is usually concentrated in a particular segment of the student body and that reducing problem behaviors among this subset of the population can lead to school-wide decreases in poor outcomes (Phillips-Smith et al., 2004). Indeed, it is observed that by the end of 8th grade, aggression levels are highest among the "poor social skills" and the "high all" boys, and findings are salient for school prevention efforts because it provides a malleable target of intervention for these boys. Prevention researchers and

practitioners can leverage on their social network with peers and their social bonding with teachers to bring about a reduction in overall school aggression.

Although findings suggest that school interpersonal climate is important in preventing aggression, results indicate that school interpersonal climate only benefits those boys with profiles involving co-occurring poor social skills. That is, boys in the "poor social skills" and the "high all" groups. School interpersonal climate did not influence behaviors among those in the "low all" and the "moderate" groups. Boys in the "low all" and "moderate" groups have relatively low levels of social skills problems and are, therefore, believed to be more socially skilled. There are probable reasons why school context may not affect these boys in terms of behavioral risk. Firstly, boys in the "low all" group may be doing well in school because of their low levels of social-cognitive problems. Moreover, one reason why school relationships may not influence behaviors among boys in the "moderate" group is because their strong social skills may mask the problems associated with co-occurring anxiety, learning, and conduct problems and, therefore, these boys may be perceived as functioning and doing well in school.

Nevertheless, as seen from the study findings, it is important for schools to pay attention to boys in the "low all" and "moderate" groups because they are associated with a certain amount of increasing risk over time. For the "low all" boys, physical aggression increases slightly, but their substance use significantly increases into young adulthood. For the "moderate" group, aggression persists at rates higher than the overall group means, non-physical aggression increases through the middle school years, and there is also substantial increase in substance use. Future studies should examine for other factors that can bring about a reduction in behaviors among the "low all" and "moderate" groups because of their increases in behavioral risk. While

it is beyond the purview of this study to examine for factors not related to the school environment, future studies should examine the influence of social cognitions (e.g., Crick & Dodge, 1994; Huesmann, 1988, 1998), and those involving other social contexts such as peers and family (e.g. Chuang et al., Golub & Johnson, 2001, Rankin & Quane, 2002, Trucco et al., 2014) in influencing behaviors among the more socially skilled boys who are represented by the "low all" and "moderate" groups.

Finally, many studies indicate that school factors can influence substance use (e.g., Fletcher 2008, 2009, 2010; West et al., 2004). However, findings from this study found that school factors did not have any effect on behaviors across the risk profiles. One reason why school norms did not influence substance use is because questions used in this study are specific to aggression only, and there is a need for future studies to examine if school norms specific to substance use can moderate the relation between social-cognitive risk and behaviors. Additionally, another reason for the null school influences on substance use is because of the low rates of drug use in the sample that may yield less power to detect for moderation effects. However, as mentioned, given the expected increase in substance use, there is a strong need to identify those protective factors against substance consumption. The literature points to other influences such as family control and delinquent peers to influence the relation between risk and behaviors (e.g. Chuang et al., Golub & Johnson, 2001, Rankin & Quane, 2002, Trucco et al., 2014). Again, it is beyond the scope of this study to examine for family and peer influences, and future research may explore whether these social contexts modify the relationships between risk profiles and substance use. Moreover, given the low rates of substance use during middle school,

it is noteworthy for future studies to examine if school factors moderate the relation between social-cognitive risk and substance use at a later developmental period (e.g., high school years).

Overall, a significant contribution of this study to the conceptual work on schools and behaviors is the clarification on the generalizability of school influences across different groups of students. That is, understanding if school factors equally influence risk for behaviors across different profiles of students. The specificity of conclusions made in this study about the school environment provided greater conceptual clarity on the school's ability to influence behaviors. Few studies have examined the specificity of the school context in the interplay between risk profiles and behaviors. The conclusions from this study side-stepped the ecological fallacy problem prevalent in the vast majority of studies, such as those claiming that school climate was protective against aggression for all students (Sterba & Bauer, 2010). As shown in this study, such conclusions are inaccurate since only the "poor social skills" and the "high all" groups benefited from the enhancement of school interpersonal relationships. Thus, an important conceptual contribution to the field of school research is the more balanced and optimal knowledge about school effects on risk and behaviors that is undergirded by the person-oriented developmental psychopathology framework.

7.4 Implications for Practice

Findings from this dissertation are relevant for school-based practitioners regarding screening, preventing and intervening with students who are at risk for problem behaviors. Schools are increasingly implementing multi-tiered prevention and intervention models to address student behavioral problems (Clark & Alvarez, 2010; Hawkins et al., 2015; Offord, 2000). These approaches require school personnel to screen, differentiate, and respond to

students who are at low and future risk for problems, and those already experiencing behavioral issues. Findings from this dissertation contribute knowledge to such school practice models in at least two ways.

First, results from this study advance the practice and knowledge related to screening for behavioral risk. Particularly, the utility of social-cognitive indicators based on teachers' perceptions of student social-cognitive risk to serve as screening tools in identifying boys at risk for behaviors was demonstrated in this study. Teachers are essential in the early identification of students at risk for poor outcomes because of their daily close interactions with students in the classroom (Dowdy, Ritchey & Kamphaus, 2010; Franklin et al., 2012). The value of a person-oriented analytic technique (e.g., latent class analysis) to systematically identify groups of students with similar risk patterns and to forecast their behavioral outcomes was illustrated (Nylund-Gibson & Hart, 2014). Knowledge of student patterns and their related outcomes can assist teachers and school practitioners in identifying those boys at risk for behavioral problems and deliver the necessary interventions. Schools can adopt a person-oriented analytic approach as a systematic and scientific screening tool for multi-tiered intervention models.

Secondly, results from this study draw attention to the important school processes that can be used by prevention researchers and practitioners to tailor preventive and remedial behavioral interventions based on profiles of social-cognitive risk. Efforts are needed to enhance school interpersonal relationships between teachers and students, as well as among students. The broader school interpersonal climate can impact boys in the "high all" and "poor social skills" groups. Findings can be translated to inform targeted school prevention and intervention work. Because these boys respond to the broader school interpersonal climate, more concerted efforts

to reduce their levels of aggression can target their relationships with teachers and peers. While the prototype approach of risk and prevention is to universally target all students regardless of degree of risk (Hawkins et al., 2015; Offord, 2000), existing literature points to the importance of identifying key factors that predict differentiated responses across varied groups of students in support of healthy development (Thibodeau, August, Cicchetti, & Symons, 2015; Wang & Ware, 2013). Interaction analyses of subgroups can provide salient knowledge on those variables that can reduce behaviors for particular groups of students (Farrell et al., 2013). Such analyses are important as they better address issues of heterogeneity among students and their variability in response to broad interventions (Thibodeau et al., 2015).

Based on the findings in this study, prevention and intervention work targeted for the boys characterized by particularly low social skills can leverage their peer groups because they best respond to the enhancement of student-student relationships in reducing relational aggression. A promising approach with these boys is a co-operative student learning model. Based in social inter-dependency theory, students can be organized into groups to work together, for instance, on academic content and, should conflict arise when working together, students – under a trained facilitator – can be taught to problem solve together as a group (Johnson & Johnson, 2003).

There are advantages associated with a co-operative learning approach to risk prevention and reduction (Johnson & Johnson, 2003). First, it keeps students in their normative social contexts, such as their classrooms and peer groups. Second, it further promotes opportunities for overall positive interactions among students. And third, students learn the important social skills in dealing with conflicts. Moreover, because students also have a high degree of learning and

behavioral problems, a co-operative learning approach can address other needs. For instance, when students are working on academic content, students can be also coached on the appropriate classroom behavioral skills. The cooperative learning model is promising, and evidence shows that it is related to an array of positive outcomes including enhanced social competency (Magnesio & Davis, 2010), improved academic learning (Sharan, 2015), and reduced behavioral problems such as antisocial behavior and drug use (Johnson, Johnson, & Stanne, 2000).

Furthermore, findings from this study suggest that programming efforts that target the group entering school with problems across all social-cognitive areas should focus on the student-teacher relationship as a means for preempting or deflecting them away from involvement in aggressive behaviors or substance use. For example, approaches such as the Check and Connect program may be useful for youth entering with high rates of risk across areas. Research suggests that the Check and Connect program can be effective in reducing youths' behavioral problems (Christenson, Stout, & Pohl, 2012). This program includes a "check" component, designed to monitor student performance across a wide variety of indicators such as classroom behaviors and academic performances, and a "connect" component, which is a mentoring aspect where a school teacher can provide personalized one-on-one attention to help students solve any personal problems.

There are advantages of such a tailored intervention approach in working with youth with similar risk profiles. The Check and Connect program can be adapted to address a wide variety of individual risk factors including academic struggles, social relational issues, mental health and conduct concerns (Christenson et al., 2012). Moreover, over the course of the intervention, teachers can harness the strengths of other protective systems (e.g., positive family adults and

peers) and connect with parents and pro-social peers, further reducing the propensity to engage in undesirable behaviors. Overall, evidence found that promoting such personalized attention from teachers can reduce problem behaviors (e.g., Cheney et al., 2009; Sinclair, Christenson, Lehr, & Anderson, 2003; Sinclair, Christenson, & Thurlow, 2005). Further, especially for urban youth, there is evidence that similar one-to-one approaches to behavioral management, such as mentoring programs, can reduce problem behaviors (e.g., Dappen & Isernhagen, 2006; Gordon, Iwamoto, Ward, Potts, & Boyd, 2009; Holt, Bry, & Johnson, 2008; Langhout, Rhodes, & Osborne, 2004; Murray & Malmgren, 2005).

7.5 Limitations

Findings from this research must be interpreted with consideration of the study limitations. The measures of this study were based on self-reports of aggression and substance use from middle school students that could bias the findings. Students may not reveal incidences of problem behaviors for fear of consequences from adults (Krumpal, 2011). To improve reporting, youth were assured of their privacy and confidentiality during data collection; students completed measures in groups of 10-20 using a computer-assisted survey (Multisite Violence Prevention Project, 2008, 2009). The use of computer-assisted interview tools can enhance perceptions of privacy and confidentiality among youths (Watson et al., 2001).

Additionally, social-cognitive indicators were based only on teacher reports gathered in the Fall of 6th grade. Relying on teacher assessment only may not accurately represent the scope of student problems which can be influenced by teacher individual prejudices, expectations and biasness (Ready & Wright, 2011). Studies highlight the value of multi-informant assessments in evaluating student characteristics, such as those from parents (Kerr, Lunkenheimer, & Olson,

2007). Future research on understanding behavioral risk based on student social-cognitive competencies should take into account assessment from other sources.

Lastly, despite efforts to enhance generalizability of findings through the use of multiple sites, study findings are not nationally representative of American middle school youth. No nationally representative weights were available for the sample. Findings are therefore not generalizable to other populations such as boys from more affluent backgrounds and those from suburban and rural populations.

7.6 Areas for Future Research

There are notable areas for future research that can build on this study. A follow-up study should be conducted to investigate for non-linear growth of behaviors and study seasonal patterns in aggression and drug use within and across the four groups. Studies observed that alcohol and marijuana use increases at different rates during adolescence (e.g., Kosterman et al., 2000) and that seasonal changes can bring about shifts in behavioral problems (Lauritsen & White, 2014). For instance, in the school environment, fluctuations in behaviors may be reflective of changes in routine activity patterns associated with the start and end of the school year (Lauritsen & White, 2014). Future research should evaluate whether different risk profiles may be influenced by such changes in seasonal patterns. Findings can bring further understanding to the interplay between school and profiles of social-cognitive risk across time.

Future studies can also investigate if and how changes in school processes relate to behaviors across the four groups. Henry et al., (2011) found that school effects can weaken through the middle school. Roderick (2003) found that African American boys experienced more dramatic decline in school experience than girls did over the course of their time in school.

Moreover, Astor et al., (2009) suggested that changes in school leadership can influence school climate. Thus, it is noteworthy for future studies to examine how changes in school processes and behaviors eventuate over the course of development.

Future studies should consider the influence of other individual and social contexts such as individual social-cognitions (e.g., perceptions of peer use of substances), family and negative peers on behaviors across the four patterns. Again, the importance of studying individual, family and peer effects on behaviors has emerged at several points in this dissertation's discussion in understanding potential individual and contextual influences across the subgroups identified in this study. Understanding how other factors relate to behaviors across profiles of risk is important in providing practical information for prevention researchers and practitioners to direct programs at those students whom are likely to benefit.

Lastly, the sample of this study was based on boys only, and it is noteworthy to understand how patterns of risk, school effects, and behaviors differ for girls. Kim et al., (2015) reported discrepancies between boys and girls in various social-cognitive domains including social skills, academic grades, as well as multiple school, family and peers factors. Moreover, findings revealed that some facets of aggression, such as relational aggression can be more common among girls (e.g., Coyne, Archer, & Eslea, 2006; Crick & Bigbee, 1998; Finigan-Carr et al., 2015; Xie, Farmer, & Cairns, 2003). A useful follow up to this study is to conduct the same analyses for females and compare their patterns of risk and school effects on behaviors from this study's findings on boys. Findings from such a study can provide information for prevention researchers and practitioners if gender-specific programs are required across different patterns of social-cognitive risk.

7.7 Conclusion

Findings from this study extend previous work on social-cognitive problems, behaviors, and school context. The study's focus on a person-oriented developmental perspective differs from the vast majority of studies that has been variable-oriented in nature. Moreover, the study focused on the broader school environment in understanding risk and development which has been a neglected area in school prevention studies. At entry into middle school, four profiles of social-cognitive risk were identified: "low all," "high all," "poor social skills" with co-occurring learning and conduct problems, and a "moderate" group with inter-related learning problems, anxiety, and conduct problems, but with enhanced social skills. These profiles were found to be associated with different patterns of aggression and substance use through middle school. Further, school interpersonal climate was important in preventing and reducing aggression among the "poor social skills," and "high all" groups. Overall, school prevention researchers and practitioners can translate these findings into intervention programs to prevent and reduce aggression among middle school boys.

Although some promising approaches in working with the "poor social skills" and the "high all" groups for preventing and reducing aggression is suggested, more work is needed. First, there is a need to identify what works with the "low all" and "moderate" groups as it relates with levels of aggression. Moreover, additional knowledge is needed to identify promising intervention approaches targeting substance use across all the profiles. Current literature suggests that social cognitions, families, and peers are other important factors in influencing risk and development. These were not examined in this study and should be areas for future research. School prevention researchers and practitioners should leverage the findings and

recommendations from this study to enhance the science and practice of targeted school behavioral prevention and intervention work in order to bring about decreases in aggression and substance use among early adolescent boys.

APPENDIX A

AGGRESSION AND SUBSTANCE USE TRAJECTORIES, AND SUMMARY OF STUDIES

Figure A.1 Physical Aggression (Pittsburgh Youth Study) from Loeber and Hay (1997)

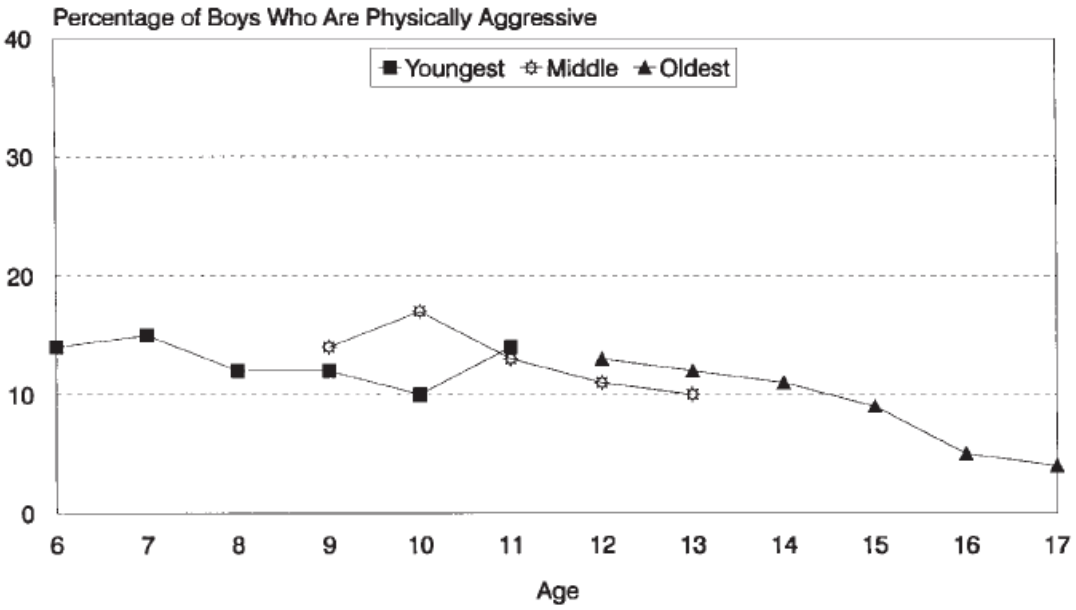


Figure A.2 Physical Aggression (Southeastern United States) from Farrell, Sullivan, Esposito, and Valois (2005)

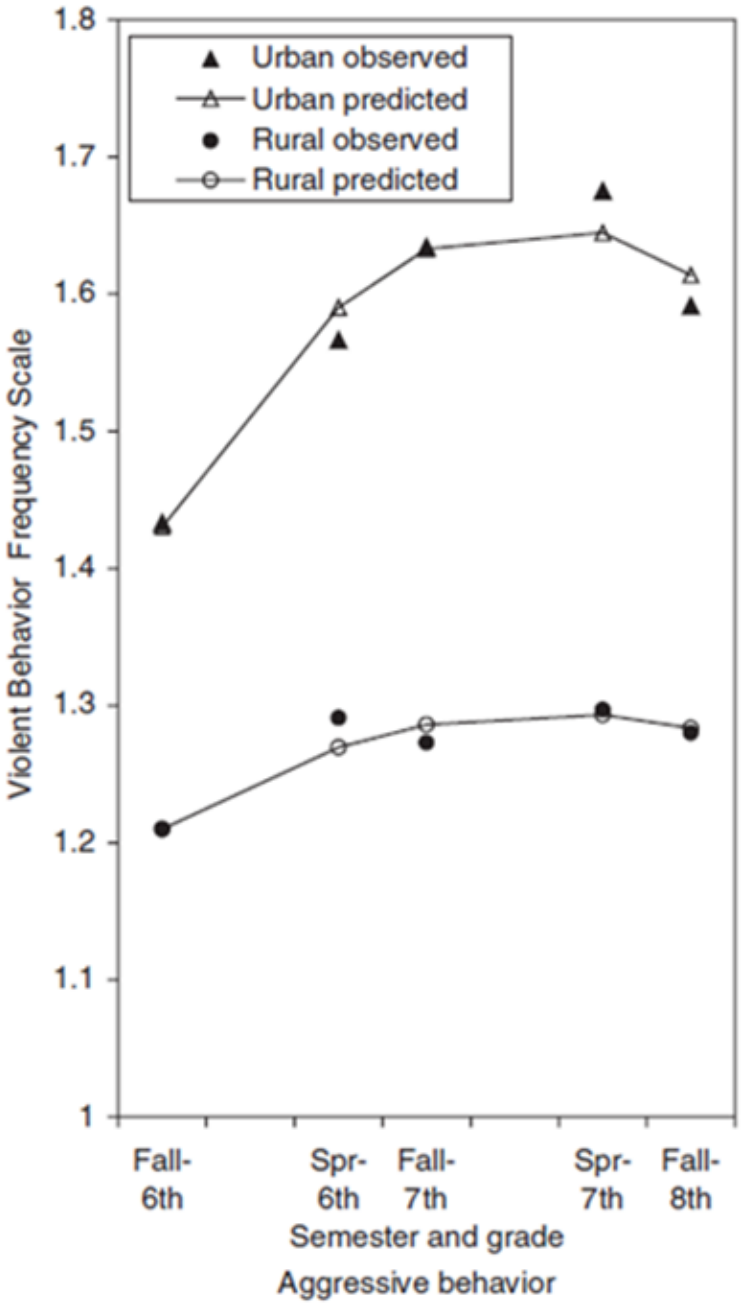


Figure A.3 Substance Use and Aggression Trajectories (Pittsburgh Youth Study) from White, Loeber, Stouthamer-Loeber and Farrington (1999)

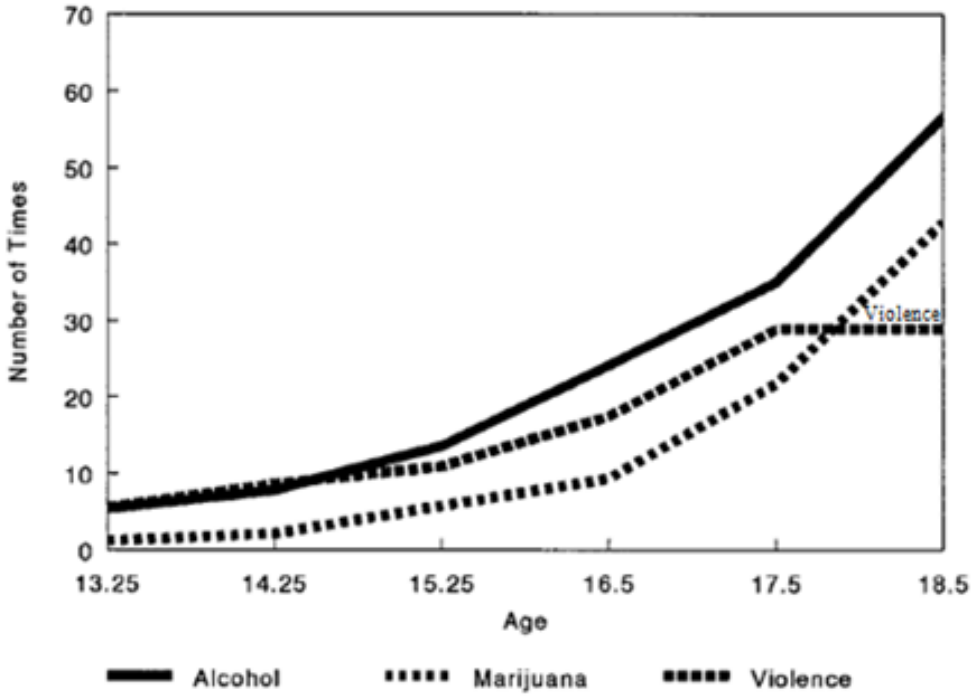


Figure A.4 Substance Use Trajectories (Seattle Social Development Project) from Kosterman, Hawkins, Guo, Catalano, and Abbott (2000)

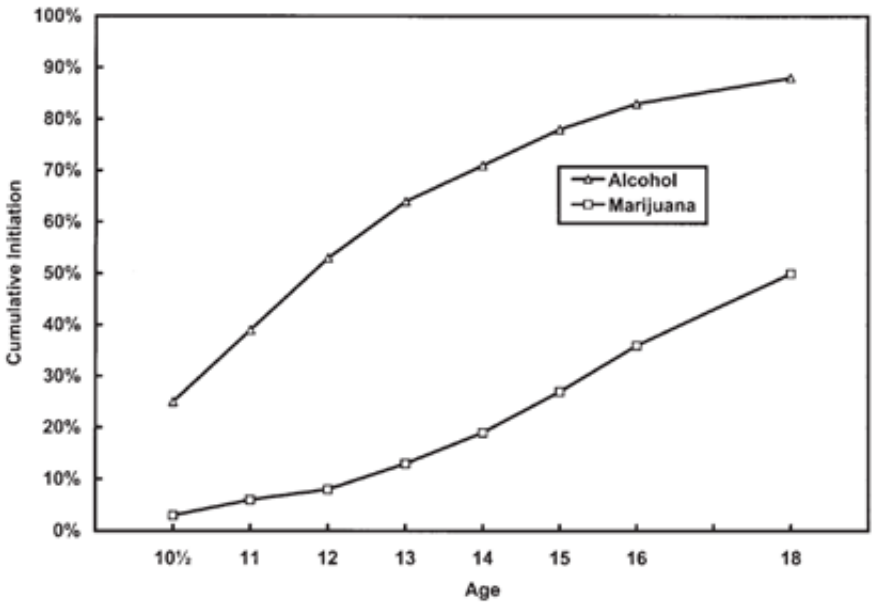


FIGURE 1—Cumulative alcohol and marijuana initiation, by age: Seattle Social Development Project, 1985–1993.

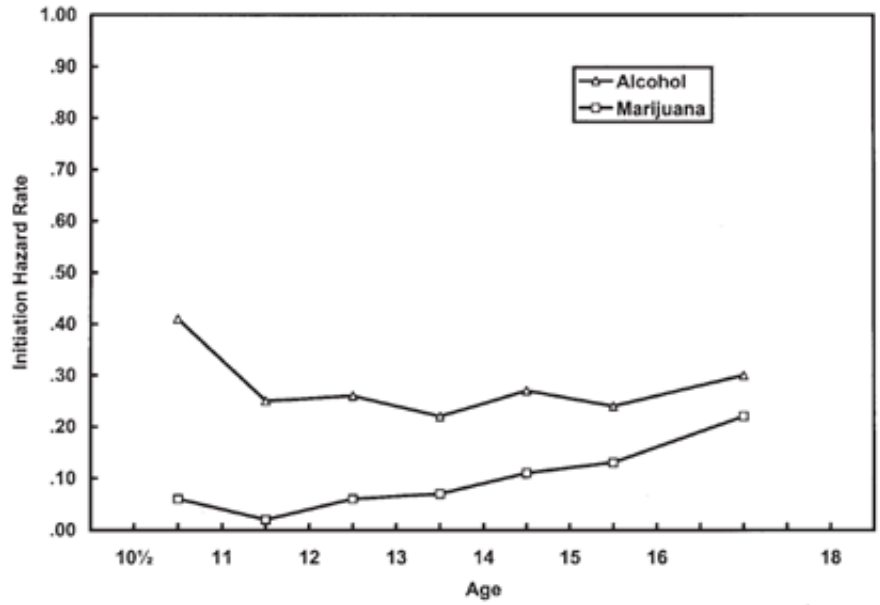


FIGURE 2—Hazard rates for alcohol and marijuana initiation (indicating risk of initiation for those who had not yet initiated), by age: Seattle Social Development Project, 1985–1993.

Table A.1: Summary of Findings (Roeser et al. Studies)

Studies by Roeser et al. (1998, 1999, 2002)	Multiple Strengths	Poor Academic	Poor Mental Health	Multiple Problems
Roeser et al., (1998): Maryland	40%	14%	15%	30%
Self-esteem (Self-report)	0.49	0.17	-0.31	-0.56
Emotional Functioning (Parent report)	0.27	0.06	-0.02	-0.35
% School Failure (Parent Report)	13	20	20	39
Behavioral Measure (School report)	0.21	0.21	0.10	-0.39
Roeser et al., (1999): Michigan	26%	26%	25%	23%
Academic GPA	3.76	3.44	3.44	2.83
Skipping School	1.13	1.39	1.39	1.47
Negative Peer Affiliations	1.80	2.53	2.47	3.28
Community Problem Behaviors	1.58	1.68	1.72	2.07
Roeser et al., (2002): San Francisco	31%	15%	31%	22%
Cognitive Engagement	0.58	-0.39	0.17	-0.76
Attention Distraction	-0.40	-0.64	0.17	0.80
Acting out Behaviors	-0.48	-0.19	0.00	0.79
Withdrawal Behaviors	-0.18	-0.01	0.01	0.31
Self Esteem	0.59	0.52	-0.16	-0.91
Sadness	-0.59	-0.58	0.24	0.86
Anger	-0.28	-0.39	0.13	0.45

Roeser et al., (1998) Maryland: N = 1041, 66% Black, 51% Male, Broad range of SES
Roeser et al., (1999) Michigan: N = 184, 95% White, 49% Male, Lower-middle to middle SES
Roeser et al., (2002) San Francisco: N = 97, 85% White, 42% Male, Middle to upper SES

Table A.2: Summary of Findings (Kamphaus et al., Kim et al., and Orpinas et al. Studies)

	Well-Adapted	Average	Average Skills	Internalizing	Mildly Disruptive	Disruptive Behavior	Severe Problems
Size (%)							
Study A	34.0	19.0	12.0	11.0	12.0	8.0	4.0
Study B	16.4	25.0	16.2	12.0	18.7	8.6	3.1
Study C	21.5	25.2	15.6	8.4	17.3	9.2	2.8
Boys (%)							
Study A	39.0	48.0	60.0	40.0	70.0	78.0	67.0
Study B	30.1	39.6	51.1	53.4	61.9	74.9	55.7
Study C	32.4	48.8	60.0	43.9	69.2	77.4	57.9
Black (%)							
Study A	12.7	43.4	32.9	17.2	24.8	30.1	19.2
Study B	NA	NA	NA	NA	NA	NA	NA
Study C	20.0	31.2	32.4	38.6	56.4	62.9	52.6

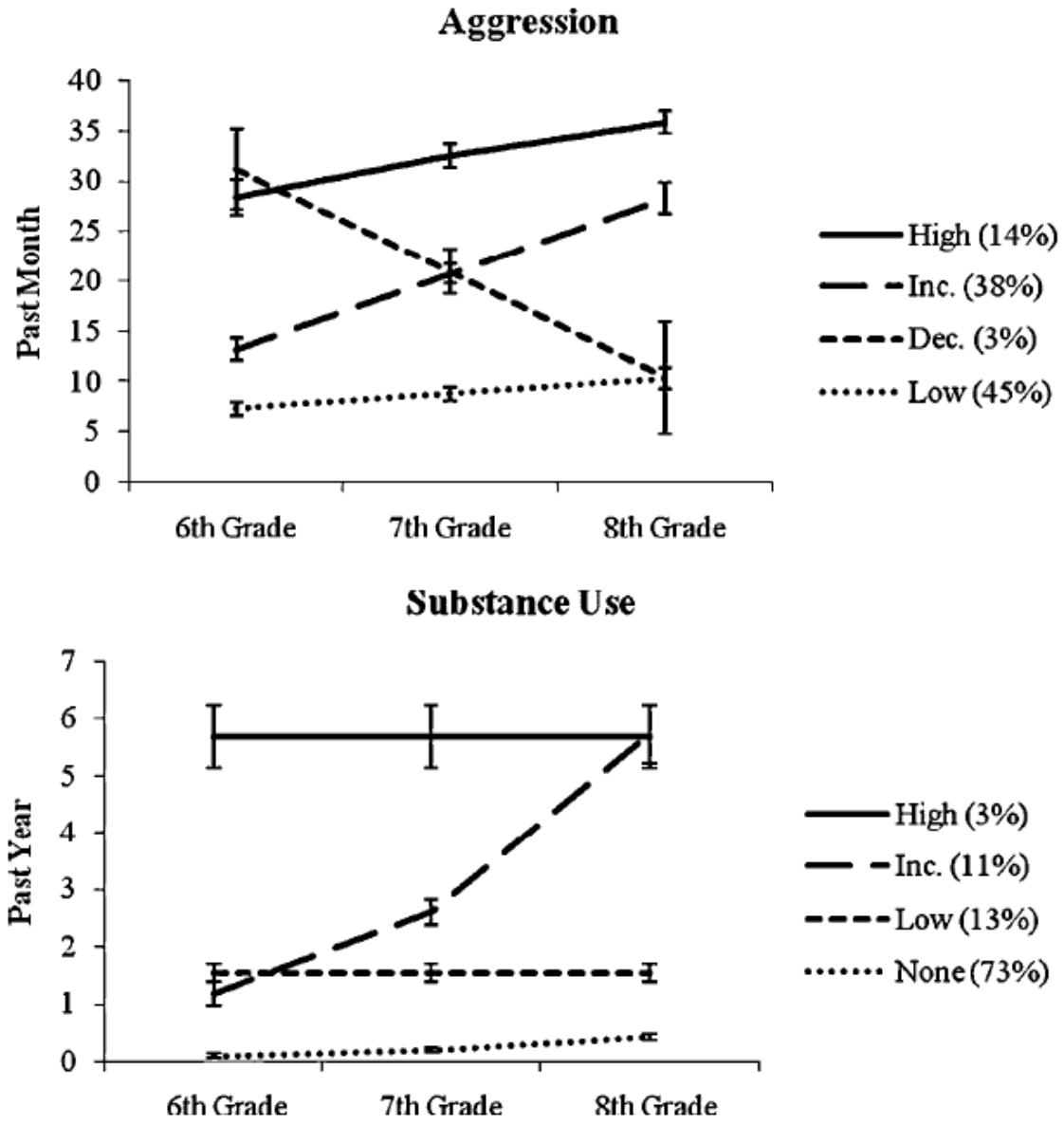
Study A: Kamphaus et al., (1997): National Sample n = 1,227 (ages 6 – 11); Nationally representative demographics
Study B: Kim et al., (2010): MVPP n = 2,552: Boys: 49.3%, African Americans: 47%, Hispanic: 22%
Study C: Orpinas et al., (2014): MVPP Georgia Subsample n = 675: Boys: 53.0%, African American: 38%, Hispanic:11%

Table A.2: Summary of Findings (Kamphaus et al., Kim et al., and Orpinas et al. Studies) (Continued)

	Well-Adapted	Average	Average Skills	Internalizing	Mildly Disruptive	Disruptive Behavior	Severe Problems
Learning Problems (t-scores)							
Study A	42.3	49.3	**61.1**	50.6	49.7	**62.9**	**65.6**
Study B	40.5	45.2	53.5	**58.5**	56.1	**64.4**	**68.1**
Study C	40.7	46.4	55.8	55.7	53.5	**66.3**	**64.1**
Social Skills Problems (t-scores)							
Study A	58.8	44.3	**39.7**	51.9	47.4	41.2	42.3
Study B	**60.8**	48.9	**39.5**	43.8	**39.9**	**36.2**	40.3
Study C	59.1	50.2	41.1	46.4	43.4	40.5	**39.6**
Anxiety Problems (t-scores)							
Study A	45.9	44.8	52.3	58.4	47.3	54.4	**70.6**
Study B	40.8	43.2	44.3	**61.3**	44.9	53.4	**71.2**
Study C	41.1	44.3	46.1	**61.5**	46.4	53.4	**63.2**
Conduct Problems (t-scores)							
Study A	45.3	45.6	51.3	47.6	52.7	**65.4**	**71.3**
Study B	44.8	45.9	47.0	52.6	53.8	**71.1**	**77.8**
Study C	44.7	46.6	47.9	52.3	53.4	**64.5**	**79.7**
Outcomes (from Orpinas et al., 2014)							
Dropout (%)	3.6	9.0	29.3	19.2	24.1	44.1	57.9
Aggression (%)	0.0	11.2	19.0	35.1	43.6	71.0	84.2

Values that differ from the mean by 1 standard deviation or more (regardless of direction) are in boldface
Study A: Kamphaus et al., (1997)
Study B: Kim et al., (2010)
Study C: Orpinas et al., (2014)

Figure A.5 Aggression and Substance Use Trajectories (New York City) from Lynne-Landsman, Graber, Nichols, and Botvin (2011)



APPENDIX B

DESCRIPTIVE SUMMARY OF STUDY MEASURES

Table B.1: Student Learning Problems (BASC)

	Mean (SD)
1. Says that textbooks are hard to understand	0.62 (0.76)
2. Has problems with mathematics	1.09 (0.88)
3. Completes assignments incorrectly because of not following instructions	1.08 (0.83)
4. Gets failing grades	0.95 (0.91)
5. Has poor handwriting or printing	0.83 (0.89)
6. Does not complete tests	0.57 (0.76)
7. Makes careless errors	1.15 (0.77)
8. Has reading problems	0.83 (0.92)
9. Has spelling problems	1.06 (0.89)
Total:	0.91 (0.63)
Cronbach's Alpha:	0.90
Skewness:	0.69
Kurtosis:	0.01

Table B.2: Student Social Skills Problems (BASC)

	Mean (SD)
1. Shows interest in others' ideas	1.67 (0.80)
2. Tries to bring out the best in other people	2.11 (0.80)
3. Congratulates others when good things happen to them	2.02 (0.79)
4. Admits mistakes	1.96 (0.77)
5. Makes suggestions without offending others	1.90 (0.83)
6. Says please and thank you	1.53 (0.91)
7. Politely asks for help	1.53 (0.92)
8. Compliments others	2.08 (0.77)
9. Offers help to other children	2.06 (0.78)
10. Encourages others to do their best	2.14 (0.78)
11. Volunteers to help with others	2.04 (0.80)
Total:	1.91 (0.64)
Cronbach's Alpha:	0.94
Skewness:	-0.53
Kurtosis:	-0.01

Table B.3: Student Anxiety Problems (BASC)

	Mean (SD)
1. Expresses self-doubt before tests	0.83 (0.79)
2. Has trouble deciding which course to take at school	0.37 (0.64)
3. Bites nails	0.19 (0.51)
4. Says 'I'm afraid I will make a mistake'	0.25 (0.51)
5. Worries about things that cannot be changed	0.43 (0.62)
6. Says 'I'm not very good at this'	0.53 (0.68)
7. Worries	0.56 (0.66)
8. Is nervous	0.45 (0.64)
Total:	0.45 (0.41)
Cronbach's Alpha:	0.81
Skewness:	1.20
Kurtosis:	1.78

Table B.4: Student Conduct Problems (BASC)

	Mean (SD)
1. Steals at school	0.09 (0.35)
2. Is in trouble with the police	0.05 (0.28)
3. Complains about police or other law enforcement officers	0.11 (0.39)
4. Has to stay after school for punishment	0.40 (0.66)
5. Skips classes at school	0.12 (0.43)
6. Has been suspended from school	0.30 (0.61)
7. Uses illegal drugs	0.02 (0.16)
8. Cheats in school	0.22 (0.48)
9. Is truant	0.19 (0.52)
10. Drinks alcoholic beverages	0.01 (0.12)
11. Has friends who are in trouble	0.63 (0.80)
12. Smokes or chews tobacco	0.01 (0.14)
Total:	0.18 (0.27)
Cronbach's Alpha:	0.81
Skewness:	2.88
Kurtosis:	13.31

Table B.5: Student-Student Relationship

	Mean (SD)			
	Spring 6th	Spring 7th	Spring 8th	Overall
1. Students are kind and supportive of one another.	2.52 (0.78)	2.52 (0.77)	2.58 (0.76)	2.52 (0.62)
2. Students from different social classes and races get along well.	2.82 (0.87)	2.88 (0.86)	2.89 (0.84)	2.84 (0.69)
3. Students stop other students who are unfair or disruptive.	2.22 (0.92)	2.16 (0.90)	2.13 (0.86)	2.18 (0.71)
4. Students get along well together most of the time.	2.97 (0.75)	2.93 (0.76)	2.96 (0.74)	2.94 (0.59)
5. Students respectfully listen to each other during class discussions.	2.52 (0.84)	2.51 (0.82)	2.53 (0.81)	2.51 (0.67)
6. Students make friends easily.	2.79 (0.87)	2.78 (0.88)	2.82 (0.82)	2.79 (0.70)
7. Students enjoy being at school.	2.20 (0.96)	2.18 (0.96)	2.20 (0.94)	2.20 (0.79)
Total:	2.63 (0.46)	2.66 (0.42)	2.67 (0.40)	2.57 (0.44)
Cronbach's Alpha:	0.68	0.73	0.76	0.76
Skewness:	-0.30	-0.36	-0.31	-0.23
Kurtosis:	0.54	0.63	0.51	0.30

Table B.6: Teacher-Student Relationship

	Mean (SD)			
	Spring 6th	Spring 7th	Spring 8th	Overall
1. Teachers treat students with respect.	3.11 (0.81)	3.03 (0.83)	2.99 (0.78)	3.04 (0.67)
2. Teachers praise students more often than they criticize them.	2.77 (0.90)	2.71 (0.89)	2.67 (0.85)	2.72 (0.71)
3. Teachers treat students fairly.	3.00 (0.92)	2.95 (0.90)	2.88 (0.86)	2.94 (0.74)
4. Teachers take the time to help students work out their differences.	2.90 (0.89)	2.76 (0.87)	2.68 (0.84)	2.79 (0.70)
Total:	2.95 (0.66)	2.86 (0.67)	2.80 (0.66)	2.87 (0.57)
Cronbach's Alpha:	0.73	0.77	0.80	0.82
Skewness:	-0.57	-0.49	-0.46	-0.51
Kurtosis:	0.01	-0.07	0.08	0.20

Table B.7: School Safety Concerns

	Mean (SD)			
	Spring 6th	Spring 7th	Spring 8th	Overall
1. Fighting (hitting and kicking) among students.	2.18	2.01	1.91	2.08
	(0.87)	(0.86)	(0.85)	(0.72)
2. Students carrying weapons.	1.73	1.52	1.48	1.65
	(1.36)	(1.33)	(1.29)	(1.20)
3. Students disrespect for teachers.	2.01	1.93	1.92	1.97
	(0.88)	(0.89)	(0.87)	(0.70)
4. Racial tension or racism.	1.66	1.55	1.49	1.61
	(1.18)	(1.19)	(1.17)	(1.02)
5. Gangs.	1.86	1.67	1.61	1.77
	(1.23)	(1.24)	(1.20)	(1.07)
6. Unsafe areas in the school.	1.56	1.43	1.28	1.48
	(1.22)	(1.22)	(1.18)	(1.05)
7. Teachers ignore it when students threaten other students.	1.66	1.51	1.47	1.59
	(1.25)	(1.21)	(1.16)	(1.05)
8. Teachers ignore it when students tease other students.	1.51	1.43	1.37	1.47
	(1.13)	(1.11)	(1.06)	(0.92)
9. Teachers not knowing what kids are up to.	1.85	1.76	1.73	1.81
	(1.07)	(1.05)	(1.04)	(0.86)
Total:	1.78	1.65	1.58	1.72
	(0.78)	(0.81)	(0.77)	(0.71)
Cronbach's Alpha:	0.86	0.88	0.87	0.89
Skewness:	-0.26	0.02	0.12	-0.11
Kurtosis:	-1.09	-1.17	-1.02	-1.03

Table B.8: Awareness and Reporting of Safety Concerns

	Mean (SD)			
	Spring 6th	Spring 7th	Spring 8th	Overall
1. Students feel free to ask for help from teachers if there is a problem with a student.	2.84 (0.92)	2.73 (0.91)	2.69 (0.89)	2.77 (0.74)
2. Teachers know when students are being picked on or being bullied.	2.34 (0.93)	2.26 (0.91)	2.25 (0.88)	2.29 (0.73)
3. Students are encouraged to report bullying and aggression.	2.98 (0.95)	2.90 (0.97)	2.82 (0.95)	2.91 (0.75)
4. Students know who to go to for help if they have been treated badly by another student.	3.19 (0.86)	3.05 (0.88)	3.00 (0.84)	3.10 (0.68)
5. Students report it when one student hits another.	2.56 (0.95)	2.40 (0.95)	2.28 (0.91)	2.44 (0.76)
6. Teachers take action to solve the problem when students report bullying.	3.06 (0.89)	2.92 (0.90)	2.89 (0.86)	2.96 (0.71)
7. Students report it when one student teases or makes fun of another.	2.41 (0.94)	2.22 (0.91)	2.16 (0.89)	2.29 (0.73)
Total:	2.77 (0.55)	2.64 (0.58)	2.58 (0.57)	2.68 (0.48)
Cronbach's Alpha:	0.69	0.75	0.77	0.78
Skewness:	-0.26	-0.19	-0.08	-0.11
Kurtosis:	-0.10	0.09	0.17	0.01

Table B.9: School Norms

How would the kids in your school feel if a kid:	Mean (SD) Spring 6th	Spring 7th	Spring 8th	Overall
School Norms for Alternatives to Aggression (Recoded)				
1. Ignored a rumor that was being spread about him or her?	1.76 (0.73)	1.81 (0.69)	1.87 (0.65)	1.80 (0.52)
2. Told another student who was starting to get into a fight that there's a choice between fighting and other ways of solving problems?	1.91 (0.83)	1.80 (0.78)	1.76 (0.75)	1.84 (0.62)
3. Asked a teacher or another adult for help when challenged to a fight after school?	1.82 (0.82)	1.77 (0.76)	1.73 (0.73)	1.78 (0.59)
4. Apologized to someone that he or she accidentally bumped into in the hall?	2.18 (0.73)	2.10 (0.68)	2.04 (0.64)	2.12 (0.55)
5. Told another student to "stop and calm down" when the other student started to get into a fight?	1.92 (0.83)	1.87 (0.77)	1.83 (0.76)	1.89 (0.62)
6. Avoid a fight by walking down a different hall to class?	1.82 (0.81)	1.78 (0.77)	1.72 (0.73)	1.78 (0.60)
7. Listened to a friend's side of the story even though the two were in an argument?	1.98 (0.74)	1.98 (0.70)	1.98 (0.65)	1.98 (0.55)
8. Took a deep breath when he or she started to lose his temper?	2.04 (0.77)	2.00 (0.73)	1.97 (0.69)	2.00 (0.57)
School Norms for Aggression				
9. Hit someone who said something mean?	2.05 (0.82)	2.17 (0.78)	2.25 (0.75)	2.13 (0.64)
10. Yelled at someone who said something mean?	1.98 (0.75)	2.10 (0.72)	2.15 (0.70)	2.06 (0.58)
11. Threatened someone who said something mean?	1.83 (0.81)	1.99 (0.79)	2.04 (0.75)	1.93 (0.62)
12. Hit someone who hit first?	2.17 (0.83)	2.29 (0.78)	2.37 (0.74)	2.24 (0.66)
13. Hit someone for no reason?	1.89 (0.84)	1.99 (0.82)	2.03 (0.82)	1.95 (0.68)
14. Threatened someone because that person yelled first?	1.87 (0.78)	1.97 (0.76)	2.02 (0.73)	1.93 (0.62)
15. Yelled at someone for no reason?	1.84 (0.76)	1.91 (0.74)	1.95 (0.72)	1.89 (0.59)
16. Yelled at someone who yelled first?	1.97 (0.75)	2.04 (0.73)	2.10 (0.68)	2.02 (0.58)
17. Threatened someone for no reason?	1.79 (0.81)	1.87 (0.79)	1.90 (0.77)	1.85 (0.65)
18. Threatened someone who hit first?	1.98 (0.82)	2.03 (0.79)	2.07 (0.77)	2.01 (0.64)

Table B.9: School Norms (Continued)

	Mean (SD)			
	Spring 6th	Spring 7th	Spring 8th	Overall
Mean (Total)	1.93 (0.27)	1.96 (0.26)	1.97 (0.25)	1.96 (0.23)
Cronbach's Alpha:	0.60	0.62	0.62	0.66
Skewness:	-0.16	-0.26	-0.32	-0.24
Kurtosis:	1.11	1.90	2.24	1.09

Table B.10: Physical Aggression

	Mean (SD)		
	Spring 6th	Spring 7th	Spring 8th
Physical Aggression (Last 30 days)			
1. Thrown something at another student to hurt them	1.79 (1.18)	1.98 (1.33)	1.95 (1.30)
2. Been in a fight in which someone was hit	2.02 (1.40)	1.96 (1.41)	1.83 (1.30)
3. Threatened to hurt a teacher	1.13 (0.57)	1.18 (0.68)	1.14 (0.56)
4. Threatened someone with a weapon (gun, knife, club etc.)	1.21 (0.80)	1.24 (0.83)	1.24 (0.83)
5. Hit or slapped another kid	2.28 (1.53)	2.26 (1.56)	2.28 (1.53)
6. Threatened to hit or physically harm another kid	1.76 (1.29)	1.90 (1.41)	1.94 (1.42)
Mean (Total)	1.84 (0.87)	1.89 (0.93)	1.86 (0.89)
Cronbach's Alpha:	0.78	0.80	0.77
Skewness:	1.60	1.56	1.47
Kurtosis:	2.84	2.44	2.22

Table B.11: Non-Physical Aggression

	Mean (SD)		
	Spring 6th	Spring 7th	Spring 8th
Non-Physical Aggression (Last 30 days)			
1. Insulted someone's family	1.94	2.03	2.10
	(1.50)	(1.58)	(1.62)
2. Teased someone to make them angry	2.24	2.31	2.37
	(1.52)	(1.57)	(1.65)
3. Put someone down to their face	1.59	1.67	1.71
	(1.20)	(1.28)	(1.32)
4. Gave mean looks to another student	2.63	2.58	2.55
	(1.67)	(1.73)	(1.71)
5. Picked on someone	2.57	2.55	2.54
	(1.73)	(1.77)	(1.77)
Mean (Total)	2.20	2.23	2.25
	(1.16)	(1.22)	(1.22)
Cronbach's Alpha:	0.81	0.82	0.81
Skewness:	1.27	1.15	1.08
Kurtosis:	1.09	0.63	0.44

Table B.12: Relational Aggression

	Mean (SD)		
	Spring 6th	Spring 7th	Spring 8th
Relational Aggression (Last 30 days)			
1. Didn't let another student be in your group anymore because you were mad at them	1.80 (1.14)	1.70 (1.17)	1.63 (1.11)
2. Told another kid you won't like them unless they did what you wanted them to do	1.25 (0.74)	1.28 (0.84)	1.26 (0.80)
3. Tried to keep others from liking another kid by saying mean things about him/her	1.52 (1.11)	1.47 (1.08)	1.41 (1.01)
4. Spread a false rumor about someone	1.51 (1.07)	1.47 (1.12)	1.40 (0.97)
5. Left another kid out on purpose when it was time to do an activity	1.47 (0.99)	1.47 (1.03)	1.39 (0.94)
6. Said things to another student to make other students laugh	2.75 (1.76)	2.82 (1.80)	2.89 (1.84)
Mean (Total)	1.72 (0.79)	1.70 (0.83)	1.66 (0.77)
Cronbach's Alpha:	0.75	0.78	0.74
Skewness:	2.02	2.21	2.16
Kurtosis:	5.17	6.18	6.44

Table B.13: Overall Aggression

	Mean (SD)		
	Spring 6th	Spring 7th	Spring 8th
Mean (Total)	1.90 (0.84)	1.92 (0.89)	1.91 (0.85)
Cronbach's Alpha:	0.91	0.91	0.90
Skewness:	1.54	1.54	1.37
Kurtosis:	2.67	2.55	2.05

Table B.14: Substance Use

	Mean (SD)		
	Spring 6th	Spring 7th	Spring 8th
Drunk Beer (more than a sip or taste) (Last 30 days)	1.34	1.43	1.49
	(0.92)	(1.02)	(1.12)
Drunk wine or wine coolers (more than a sip or taste) (Last 30 days)	1.34	1.43	1.47
	(0.91)	(1.02)	(1.10)
Cigarette (Last 30 days)	1.22	1.34	1.42
	(0.79)	(0.99)	(1.14)
Been drunk (Last 30 days)	1.16	1.27	1.33
	(0.69)	(0.90)	(0.96)
Drunk liquor (like whiskey or gin) (Last 30 days)	1.17	1.29	1.35
	(0.69)	(0.87)	(0.96)
Marijuana (Last 30 days)	1.13	1.28	1.38
	(0.63)	(0.95)	(1.12)
Mean (Total)	1.23	1.34	1.41
	(0.62)	(0.77)	(0.88)
Cronbach's Alpha:	0.91	0.92	0.93
Skewness:	4.45	3.24	2.99
Kurtosis:	23.70	11.81	9.60
Alcohol Use (Drunk Beer, Wine, Liquor) Total	1.25	1.35	1.41
	(0.68)	(0.82)	(0.92)
Skewness:	4.18	3.24	3.06
Kurtosis:	20.10	11.52	9.96

APPENDIX C

FIT INDICES OF OTHER MIXTURE MODELS CONSIDERED IN THIS STUDY

Table C.1 Fit indices of Other Mixture Models Considered in this Study

Latent Profile Analysis (Continuous Mean Score)

Classes	AIC	BIC	Sample-Size Adjusted BIC	Entropy	LMR-LRT
1 Class	15822.706	15869.324	15843.906	NA	NA
2 Class	13587.676	13663.430	13622.126	0.746	0.001
3 Class	12562.419	12667.310	12610.119	0.776	0.001
4 Class	12100.947	12234.974	12161.897	0.790	0.001
5 Class	11800.223	11963.386	11874.423	0.809	0.001

Latent Profile Analysis (T-Score)

Classes	AIC	BIC	Sample-Size Adjusted BIC	Entropy	LMR-LRT
1 Class	75028.795	75075.394	75049.976	NA	NA
2 Class	73212.035	73287.758	73246.456	0.920	0.001
3 Class	72209.143	72313.990	72256.799	0.812	0.001
4 Class	71676.136	71810.107	71737.030	0.838	0.001
5 Class	71234.713	71397.809	71308.845	0.815	0.001

Latent Class Analysis (Quartile Split Variables)

Classes	AIC	BIC	Sample-Size Adjusted BIC	Entropy	LMR-LRT
1 Class	27768.229	27838.156	27800.029	NA	NA
2 Class	25500.586	25646.267	25566.835	0.843	0.001
3 Class	24991.093	25212.528	25091.792	0.792	0.001
4 Class	24812.185	25109.374	24947.334	0.765	0.001
5 Class	24695.428	25068.372	24865.027	0.797	0.001

Latent Class Analysis (Clinical Categories)

Classes	AIC	BIC	Sample-Size Adjusted BIC	Entropy	LMR-LRT
1 Class	18036.151	18106.049	18067.922	NA	NA
2 Class	17068.168	17213.790	17134.358	0.655	0.001
3 Class	16831.784	17053.128	16932.393	0.688	0.001
4 Class	16752.047	17049.114	16887.074	0.698	0.001
5 Class	16688.834	17061.624	16585.279	0.673	0.001

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