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**Race/Ethnic and Immigration-Related Diversity in Children's Internalizing and  
Externalizing Symptoms in School**

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**Race/Ethnic and Immigration-Related Diversity in Children's Internalizing and  
Externalizing Symptoms in School**

**by**

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**Dissertation**

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## **Dedication**

This dissertation is dedicated to my Mom and Dad who have sacrificed so much by leaving behind the lives they knew so well in their native country, immigrating to the U.S. and having to give their all through physical and mental labor as they learn to navigate and establish a new life in this new country just so that I could have a chance to pursue a higher education. Thank you, Mom and Dad, for instilling in me the unselfishness and greatness of parental love. This dissertation is also dedicated to my husband who have always believed in me even when I didn't. Thank you for having faith in me, seeing the good in everything I do and for your unconditional love for me.

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## **Race/Ethnic and Immigration-Related Diversity in Children's Internalizing and Externalizing Symptoms in School**

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The University of Texas at Austin, 2013

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Using the Early Childhood Longitudinal Study (Kindergarten Class), this research explored the developmental trajectories of internalizing and externalizing behaviors during the elementary school years, with an emphasis on the connections between these behaviors, how they are embedded in social structural settings defined by broad stratification systems, and what their implications are for the future. Specifically, this study was organized around three aims: (1) To estimate trajectories of internalizing and externalizing behaviors (e.g., co-occurrence and dynamic interplay); (2) To explore variations in those trajectories across segments of the population (e.g., race/ethnicity); and (3) To examine the links between children's internalizing and externalizing pathways in elementary school and their 8<sup>th</sup> grade academic functioning, as well as possible group variation in those links. Four analytical techniques—growth curve analysis, latent class growth analysis, cross-lagged modeling and regression analysis—were used. Results

indicated a low incidence of internalizing and externalizing symptoms in the whole sample as well as small incremental changes over time and small differences across groups. More in-depth investigation revealed that children of Black parents and boys were at greater risk for present and future problematic behaviors, and boys and children of immigrants were at greater risk for future academic failure when their earlier overall combined symptom trajectories fell in the risky category. In addition, the general patterns of children's internalizing symptoms serving as protective factors for future externalizing symptoms and of externalizing symptoms serving as risk factors for future internalizing symptoms tended to be most consistent among children of White parents and children of non-immigrants. Moreover, findings revealed that what matters about the symptom trajectories in relation to later school functioning is not just the initial level of symptoms but also the change in levels from kindergarten through fifth grade. Overall, this study suggested that intervention efforts need to take into account both the symptomatic child's initial (and overall) levels of symptoms as well as over-time change of symptoms when putting together a specific intervention plan for the affected individual. Finer prevention and intervention efforts are also needed for boys and for children of immigrants to facilitate positive academic functioning.

## Table of Contents

List of Tables .....	xi
List of Figures.....	xiii
Chapter 1 Introduction .....	01
Overview of Theoretical and Methodological Approaches .....	09
Focusing on Schools .....	14
A Note on Data .....	19
Overview of General Argument and Proposed Execution.....	20
Chapter 2 Literature Review, Conceptual Model, and Study Aims .....	22
Prevalence and Patterns of Problem Behaviors among Children .....	22
Developmental Timing .....	25
Issues of Diversity.....	27
Considering Connections .....	36
Early Symptoms and Later Outcomes .....	42
Study Aims and Hypotheses .....	46
A Final Note on Gender.....	49
Chapter 3 Methods .....	50
Data Source and Sample .....	50
Measurements .....	52
Internalizing and Externalizing Symptoms.....	52
Race/Ethnicity and Immigration Status .....	53
Direct Cognitive Assessments .....	54
Child/Family Controls .....	55

Selectd Sample Characteristics .....	56
Plan of Analyses .....	56
Chapter 4 Results .....	70
Externalizing and Internalizing Trajectories.....	72
Time-Specific Connections.....	74
Diversity in Internalizing and Externalizing Symptoms.....	77
Diversity in Links between Internalizing and Externalizing Symptoms. ....	83
Distal Outcomes.....	86
Chapter 5 Dicussion and Conclusion.....	95
Tables .....	111
Figures .....	132
Appendices.....	140
References.....	145

## List of Tables

Table 1. Descriptive Statistics for Internalizing and Externalizing Symptoms, by Grade .....	111
Table 2. Bi-variate Correlations for Internalizing and Externalizing Symptoms	113
Table 3. Results for Models Predicting Internalizing and Externalizing Symptoms by Race and Immigration Status.....	114
Table 4. Results for Models Predicting Internalizing and Externalizing Symptoms by Race/Ethnicity.....	115
Table 5. Results for Models Predicting Interanlizing and Externalizing Symptoms by Immigration Status.....	116
Table 6. Results for Models Predicting Interanlizing and Externalizing Symptoms by Gender.....	117
Table 7. Results for Models Predicting Interanlizing and Externalizing Symptoms by Prior Symptoms and Race/Ethnicity .....	118
Table 8. Results for Models Predicting Interanlizing and Externalizing Symptoms by Prior Symptoms, Race/Ethnicity and Their Interactions .....	119
Table 9. Results for Models Predicting Interanlizing and Externalizing Symptoms by Prior Symptoms and Immigration Status .....	120
Table 10. Results for Models Predicting Interanlizing and Externalizing Symptoms by Prior Symptoms, Immigration Status and Their Interactions .....	121
Table 11. Descriptive Statistics for Internalizing Pathways in Distal Outcome Models.....	122
Table 12. Descriptive Statics for Externalizing Pathways in Distal Outcome Models.....	123
Table 13. Results from Regression Models Predicting Middle School Reading/Math Scores by Internalizing Pathways .....	124
Table 14. Results from Regression Models Predicting Middle School Reading/Math Scores by Externalizing Pathways .....	125

Table 15. Results from Regression Models Predicting Middle School Reading/Math Scores by Combined Internalizing and Externalizing Pathways ....126

Table 16. Results from Regression Models Predicting Middle School Reading/Math Scores by Combined Internalizing and Externalizing Pathways, with Interactions: Gender x Pathways .....128

Table 17. Results from Regression Models Predicting Middle School Reading/Math Scores by Combined Internalizing and Externalizing Pathways, with Interactions: Immigration Status x Pathways .....130

## **List of Figures**

Figure 1. Conceptual Model Free of Any Coefficients or Statistics .....	132
Figure 2. Associations between Internalizing and Externalizing Symptoms Over Time with Race/Immigration in a Cross-Lagged Model.....	133
Figure 3. Associations between Internalizing and Externalizing Symptoms Over Time with Race/Immigration and Covariates .....	134
Figure 4. Externalizing Symptoms in Third Grade, by Race/Ethnicity and Internalizing Symptoms in First Grade.....	135
Figure 5. Internalizing Symptoms in Third Grade, by Race/Ethnicity and Externalizing Symptoms in First Grade.....	136
Figure 6. Externalizing Symptoms in Third Grade, by Immigration Status and Internalizing Symptoms in First Grade.....	137
Figure 7. Reading Scores in Eighth Grade, by Over-Time Risk Profile and Gender.....	138
Figure 8. Reading Scores in Eighth Grade, by Over-Time Risk Profile and Immigration Status.....	139

## **Chapter 1: Introduction**

Substantial resources have been devoted to combating criminal activities, substance abuse, depression, and other public health concerns. These efforts typically have a contemporaneous approach. That is, much of the efforts have focused on behavioral and psychological patterns that have already been established in the adult population. Yet, as has been demonstrated in efforts to address economic disparities through early school interventions, an early action approach is likely to produce greater returns than intervening after the emergence of some crisis or symptoms (Heckman, 2006). In other words, targeting the origins of public health crises enhances efforts to remedy them. Collaborations of developmental researchers with practitioners, educators, and policy makers on developmentally appropriate efforts to improve the behavioral and emotional well-being of children, therefore, are important both theoretically and for practice (Masten, 2003).

Many of those efforts focus on two well-known indicators of psychopathology (Walker & Roberts, 2000). Behavioral features marked by withdrawal, dysphoria, and anxiety are called *internalizing* symptoms, while behavior patterns termed *externalizing* are marked by defiance, impulsivity, disruptiveness, aggression, and overactivity (Achenbach & Edelbrock, 1978). Studies consistently show that adolescents and young adults with either form of problematic behaviors are at greater risk for unplanned pregnancy, academic failure, sexually transmitted diseases, suicide ideation/attempt, substance abuse, violence, and criminality (e.g., Ingoldsby, Kohl, McMahon, & Lengua, 2006; McLeod & Kaiser, 2004). In the aggregate, these disrupted trajectories can have

pervasive and sometimes chronic consequences not only for the individual but also for the individual's family members, peers, teachers, and society at large. An examination of the adolescent and adult psychopathology literature generally reveals that many problematic young adult outcomes are linked to mental health disruptions in adolescence. These disruptions are, in turn, linked to internalizing and externalizing symptoms earlier in life. As such, early childhood is a potentially valuable entry point for understanding etiology and designing prevention and intervention programs (Masten, 2003; Noam & Hermann, 2002; Walker, Stiller, Severson, Feil, & Golly, 1998).

Previous research has also shown that internalizing and externalizing symptoms can co-occur within the same individual, even among children (Oland & Shaw, 2005). Of even greater concern is that individuals who exhibit both internalizing and externalizing symptoms are at much greater risk for negative life outcomes than those who exhibit single-form behavior (Ingoldsby, et al., 2006). In fact, the two problematic behaviors typically feed off each other to increase the stability of both (Wiesner & Kim, 2006). As such, in order to fully understand how individuals are being affected by internalizing and/or externalizing symptoms and the etiology and course of these symptoms, these two problematic behaviors need to be studied as interrelated elements of a behavioral-emotional health profile rather than in an either/or way.

One way to study the interrelations between internalizing and externalizing symptoms is through the study of co-occurrence, as mentioned above. In this kind of study design, researchers investigate whether symptomatic behaviors of both types of symptoms co-occur within the same individual at one particular time point. For example,

what form does co-occurrence take (e.g., high internalizing/low externalizing or low internalizing/low externalizing)? Another way to study interrelations is looking at the dynamic interplay between internalizing and externalizing symptoms across waves and examining their links concurrently and across time. For example, are internalizing and externalizing symptoms reinforcing each other or one symptomatic form cancel out the other? The stability of internalizing and externalizing symptoms across waves can also be studied. As growth curve analysis and group-based modeling have the capacity to provide a general picture of population trends of levels of symptom trajectories, cross-lagged analyses can offer a more in-depth look at the different pieces of children's internalizing and externalizing symptom levels across time, how both forms of symptoms are linked, and which group(s) of children is more at risk at different points during childhood.

Although empirical studies on children's early problematic behaviors (especially boys' externalizing symptoms) have been growing, the current child development and developmental psychopathology literature is lacking on the studies of children's early co-occurring and interrelated symptoms, especially those that focus on population diversity. A challenge facing researchers today is to understand how and why internalizing and externalizing symptoms are linked within the same individual and across time. In addition, an important goal is to identify individuals at risk for high and continuous internalizing and externalizing symptoms early in development before small or moderate symptoms worsen.

Certainly, children's internalizing and externalizing behaviors vary from very low levels all the way past clinical thresholds (Furniss, Beyer, & Guggenmos, 2006).

Moreover, a number of children who manifest such behaviors have persistent symptoms across life (Moffitt, 2006). As such, early problematic behaviors are entry points for addressing later, often more dangerous, symptoms. What may seem like a moderate issue early on can build into something more serious over time. Indeed, recognizing that the range of early internalizing and externalizing behaviors accounts for variations in the severity and chronicity of maladjustment into adulthood, researchers are renewing their focus on young children and advocating for prevention and intervention efforts in elementary schools (Masten, 2003; McLeod & Kaiser, 2004). In doing so, more attention needs to be paid to how such patterns vary across different groups of children.

Gender is one example of a disparity in children's internalizing and externalizing behaviors that needs to be better understood. Although young boys' externalizing behaviors have been extensively studied (e.g., Beyers & Loeber, 2003; Nagin & Tremblay, 2001), only a handful of longitudinal studies have collected data on samples sufficiently large to study externalizing behaviors among girls (Cotes, Zoccolillo, & Tremblay, 2001). In addition, a survey of PsycINFO showed that early internalizing behaviors attract less conceptual and empirical attention than early externalizing behaviors. This greater interest in externalizing behaviors likely stems from societal concerns about the dangers and costs of aggressive behaviors, yet, previous studies have shown that internalizing symptoms can and do occur among young children. Moreover, longitudinal studies have made it clear that children who exhibit internalizing symptoms have a greatly increased risk of a recurrence as adults (Masten, Roisman, Long, & Burt, 2005). Given increasing evidence of a link between externalizing and internalizing

behaviors, understanding the etiology, timing, and course of both problematic behaviors for young girls and boys is important (see Keiley, Bates, Dodge, & Pettit, 2000; Masten, et al., 2005; Wiesner & Kim, 2006).

Race/ethnicity—and related factors like immigration—represents another kind of disparity that demands more attention in this field of research and practice. Much of what we currently know about children's early internalizing and externalizing symptoms is based on study samples in which the majority was native-born non-Latino/a Whites and/or native-born Blacks. Those studies that used large sample sizes (especially national data sets) sometimes included children of Latino/a background when testing models. This pattern is becoming more common as more data sets that include Latino/as are made available. In addition, as the Latino/a population is growing rapidly in the U.S., many researchers have been showing great interest in better understanding this group of children. Despite growing efforts to include Latino/as in empirical studies, however, many researchers still do not take population diversity into consideration. That is, they make the assumptions that all Latino/as behave very similarly to each other in the U.S., even across generations. Research on children from immigrant families, however, has certainly demonstrated that recent immigrants differ from long-time U.S. residents in many domains of life despite common racial/ethnic backgrounds (see Chiu, Feldman, & Rosenthal, 1992; Clark, Glick, & Bures, 2009; Glick, 2010; Scopilliti & Iceland, 2008). Compared to Latino/as, children and families of Asian background are even much less studied. They are much smaller in number compared to Latino/as in the U.S., although growing. Studies that have investigated cross-group comparisons have seldom included

Asians in their samples, even those that included Latino/as. Only recently have some data sets started recruiting Asians in numbers large enough to warrant focused analyses. Other immigrant groups are even much less visible in studies of children.

As a result of lack of data on children of Latino/a and Asian backgrounds until recently, little is known about the developmental trajectories of internalizing and externalizing symptoms of these children, especially in relation to gender. Taking into account population diversity defined by race/ethnicity and immigration status is one way to deepen the study of child psychopathology (e.g., Glick, 2010). Much of what we learned about the developmental trajectories on internalizing and externalizing symptoms of these children came from the Early Childhood Longitudinal Study Kindergarten Cohort (ECLS-K), one of the first nationally representative samples of children that included large numbers of children of Latino/a and Asian backgrounds. Importantly, ECLS-K also allows the study of children from immigrants of other race/ethnicities, such as White immigrants from Europe and Black immigrants from Africa and the Caribbean, which serve as nice points of comparison to Latino/a and Asian immigrant families. Although some conclusions have been made from studies using the ECLS-K in terms of the early socio-emotional outcomes of children from diverse families, those trends are far from conclusive and do not touch on the co-occurrence or dynamic interplay of girls' and boys' internalizing and externalizing symptoms across the elementary school years.

This dissertation primarily focuses on children of Latino/as and Asians backgrounds as they represented the largest racial/ethnic populations of immigrants in the U.S. Yet, it also examines the internalizing and externalizing trajectories of children of

immigrant Whites and Blacks. Census data certainly shows that these two latter groups are becoming more and more visible in the United States. In 2009, about 1.5 million Black immigrants resided in the United States. As for White immigrants, of the 31.1 million foreign born in the United States in 2000, 4.9 million were born in European countries. Hence, this dissertation focused on eight mutually exclusive categories: children from Latino/a immigrant families, children from Asian immigrant families, children from Black immigrant families, children from White immigrant families, native-born non-Latino/a Blacks, native-born Asians, native-born non-Latino/a Whites and native-born Latino/as.

Using a range of quantitative methods to investigate internalizing and externalizing symptoms over the course of childhood in the ECLS-K., this study specifically examined the co-occurring patterns and interrelations of children's internalizing and externalizing symptoms. In the analyses investigating co-occurrence, the goal was to study how individual children deviate from "normal" development and follow trajectories of pure or co-occurring internalizing and externalizing symptoms over the course of elementary school. In the analyses examining interrelations, the goal was to understand how children's internalizing and externalizing symptoms are linked across time. These models did more to identify when different behaviors could exacerbate each other than to identify when both behaviors were simultaneously high, but the former information was important for understanding timing. It could shed light on whether internalizing behavior was at the root of externalizing behaviors during the transition to

school and, in doing so, suggest the importance of targeting early internalizing behaviors as a way of curtailing later intensification of externalizing behavior.

All analyses aforementioned paid special attention to demographic diversity. One way to study demographic diversity was through the use of group modeling techniques within Mplus, and compared children's trajectories and levels of internalizing and externalizing symptoms across grades based on the groups they fell in. Another way was doing pair-wise comparisons, and examined whether differences among all groups were significant or not. One last attempt in the current study looking at demographic diversity was testing for interaction effects. For instance, in cross-lagged modeling, interaction models could test for demographic variations in how internalizing and externalizing symptoms might be related over time (e.g., from one time point to another), and not just demographic differences in internalizing and externalizing symptoms on their own. These demographic patterns could reveal important information regarding the influences between internalizing and externalizing symptoms—in general and across groups—for each stage of childhood, detecting when one factor mattered to the other and identifying potentially critical periods for prevention and intervention purposes.

Another focus of the current study shifts from a consideration of the trajectories of internalizing and externalizing symptoms and the factors underlying these symptom levels (and their inter-relations) across elementary school to the implications of internalizing and externalizing symptom trajectories (individually and combined) in elementary school for academic experiences in middle school. The specific issue concerns whether children who followed different trajectories of internalizing and

externalizing symptoms (individually and combined) during elementary school also had different levels of achievement scores in middle school. This last inquiry was undertaken to show how mental health issues can filter into other domains of adjustment and functioning in ways that serve as a channel for long-term inequalities—education is a foundation component of many life course trajectories into adulthood, and so one reason that differences in mental health matter across the life course is that they disrupt educational experiences in the short term.

In this chapter, I discuss the theoretical and methodological approaches that guided this dissertation. In the next chapter, I review the relevant literature and the conceptual model that helped organize analyses of ECLS-K, which will be presented in subsequent chapters.

### **Overview of Theoretical and Methodological Approaches**

The conceptual framework for this study was derived from developmental psychopathology and from the ecological perspective. The developmental psychopathology approach leads to research questions about developmental change and psychopathology and, hence, integrates research and theories from a variety of psychological fields, such as the methods and approaches used by developmental psychologists to investigate dynamic change and perspectives from psychiatry and clinical psychology about the origins and course of mental health issues (see Masten, 2003; Masten, et al., 2005; Rutter & Sroufe, 2000). Another key argument of developmental psychopathologists is that individuals vary in the life trajectories they take, so that conceptualizing and studying development as a single universal progression

that varies only in its timing would be misleading. Of note is that the ECLS-K is a non-clinical sample. Yet, central to developmental psychopathology is the argument that the study of psychopathology in a non-clinical sample can shed light on normative development as well as on the etiology and course of psychopathology (Masten, 2003; Rutter & Sroufe, 2000).

The ecological perspective views development as occurring within a system of overlapping contexts. These contexts exert independent influences on children's adjustment and functioning and also interact with each other in complex ways to shape children. Importantly, children's own traits, characteristics, and behaviors also dynamically interact with their settings in ways that then create unique developmental spaces for each child (Bronfenbrenner, 1977, 1979). As such, gaining a fuller understanding of children's internalizing and externalizing symptoms requires that we pay attention to the unique ecological circumstances that children face. Ecological contexts can be concretely identifiable and proximate to the child, such as families and schools. They can also take more abstract and distal forms, such as stratification systems. The discussion above on the need to better understand racial/ethnic and gender diversity in internalizing and externalizing symptoms reflects the value of ecological approaches. Girls and boys growing up in immigrant and/or racial/ethnic minority families likely have certain characteristics that differentiate them from their peers growing up in non-immigrant and racial/ethnic majority families, and these characteristics can influence their developmental trajectories, either directly or indirectly (see Garcia Coll, Crnic, & Lamberty, 1996). That diversity in developmental trajectories can be mined to better

understand how the development of child psychopathology works. Hence, wherever possible, the current study paid special attention to demographic diversity and investigated demographic variations of children's adjustment and functioning in the school setting, as this setting has importance implications for their future adjustments (e.g., Masten, Roisman, Long & Burt, 2005).

Integrating these two perspectives, the conceptual framework of this dissertation is, in short, that different forms of symptoms of psychopathology develop dynamically over time, in relation to each other, and embedded within broad social contexts. More specifically, internalizing and externalizing symptoms each fluctuate on their own as children age, co-occur and influence each other as they fluctuate, and differ—on their own, combined, and mutually influencing each other—across racial/ethnic, immigration, and gender lines.

Although theoretically grounded, this conceptual framework poses many challenges when it comes to empirically studying it (see Garcia Coll, et al., 1996; Rutter & Sroufe, 2000). Like many issues identified by the developmental psychopathology and ecological perspectives, studying this conceptual model requires analytic methods to (1) take into account individual differences and possibly identify different classes of individuals exhibiting either pure or interrelated symptoms, (2) investigate both normative and non-normative development to understand the link between them, (3) investigate the course of interrelations within a dynamic framework by taking trajectories of change into account, and (4) consider the origins and outcomes of interrelations. These analytic requirements are beyond the capability of many data sources and analytic

techniques until recently. In this dissertation, I triangulated among three methods—growth curve analysis, latent class growth analysis (LCGA), and cross-lagged modeling—to study the dynamic, interrelated, and contextualized trajectories of children's internalizing and externalizing symptoms.

First, growth curve analysis is one method that has been used extensively in the developmental literature. A major advantage of this method is that it models change over time and generate population trends (Willett & Bub, 2004). In this dissertation, growth curve analysis is used to accomplish three goals: (a) to provide a picture of population trajectories of children's internalizing and externalizing symptoms at four different points (initial levels, rates of change, and shapes of the trajectories); (b) to determine whether the starting points and rates of change of one trajectory (of internalizing symptoms, for example) are related to the starting points and rates of change of another (of externalizing symptoms, for example); and (c) to investigate group differences of internalizing and externalizing trajectories and the connections between them.

Second, latent class growth analysis (LCGA) identifies heterogeneous groups of individuals who might vary on the age of onset, progression, and course of developmental trajectories—do certain types of individuals tend to have distinctive developmental trajectories? Although the field of psychology has a long tradition of using group-based method to study or theorize about development (e.g., personality development, drug use, learning) (see Nagin, 1999), only recently have researchers begun to use group-based methods to study children's problematic behaviors. Nagin and Tremblay (1999, 2001) were one of the first to analyze developmental trajectories with a

group-based approach. In several studies, they provided convincing evidence that there are distinctive groups of individual trajectories of boys' physical aggression, opposition, and hyperactivity on the path to different types of offending profiles (see Nagin, Farrington, & Moffitt, 1995; Nagin & Tremblay, 1999). They concluded that the identification of different trajectories (e.g., increasers, decreasers, no changers) of behavior is an important step toward designing and developing more refined prevention and intervention efforts to protect and assist those who are at risk. Here, LCGA was used to identify latent classes of internalizing and externalizing symptoms, to determine which groups of individuals follow trajectories of normative, pure, or co-occurring symptoms, and then use these identified trajectories to predict distal outcomes. As the name implies, LCGA follows a latent variable modeling framework and identifies heterogeneous trajectories representing latent classes of children by modeling a mixture of distinct multivariate normal distributions. The general idea is that each latent class corresponds to a subpopulation that has its own set of parameter values.

Third, cross-lagged analyses in structural equation modeling (SEM) enable the examination of timing issues in the interrelation of children's internalizing and externalizing symptoms concurrently and across time. In SEM, internalizing behavior at each point was used to predict externalizing behavior and internalizing behavior at the following time point while externalizing behavior at each time point was used to predict internalizing behavior and externalizing behavior at the following time point (see Quintana & Maxwell, 1999). Thus, I could examine influences between internalizing and

externalizing symptoms—in general and across groups—for each stage of childhood, detecting when one factor matters to the other and identifying potentially critical periods.

Each of these three methods allowed me to examine different pieces of conceptual model. Both growth curve analysis and group-based modeling provide a general picture of population trends, and cross-lagged analyses offered a more in-depth look at the different pieces of children’s internalizing and externalizing symptoms across time, and how both forms of symptoms are linked, and which group(s) of children is more at risk at different points during childhood. All three methods offered the option to investigate group differences, tapping into population diversity. Thus, the triangulation of these methods covers the three main components of the conceptual model on children’s internalizing and externalizing symptoms: dynamic, interrelated, and contextualized.

With regard to studying whether children who followed different trajectories of internalizing and externalizing symptoms (individually and combined) during elementary school also had different levels of achievement scores in middle school, regression techniques were used in Mplus. This part of the dissertation was motivated by a research area in the developmental psychopathology literature that is interested in cascading, snowballing, and/or spillover effects (see Masten, et al., 2005; Moilanen, Shaw, & Maxwell, 2010; Walker, et al., 1998). These research methods and models all suggest a link between early adjustment behaviors and later outcomes.

### **Focusing on Schools**

One important characteristic of this study is that it considers internalizing and externalizing symptoms unfolding over the school career as observed by teachers in

school settings rather than a more general consideration of each kind of behavior across contexts and as observed by different kinds of people. One reason for this focus is data availability. The ECLS-K is a school-based sample, and the primary observers are teachers. Importantly, however, this school focus is also theoretically motivated and policy relevant. The argument is that internalizing and externalizing symptoms within schools are worthy to study in their own right, regardless of what happens outside of schools. Teachers may or may not be better than parents or other adults at assessing the symptomatology of children, but their assessments do matter in and of themselves whether they agree or disagree with others' assessments. This argument is rooted in two basic realities of education in the U.S. First, education is a major trajectory of the life courses affected by and affecting mental health, behavior, and other domains. Second, schools have long histories as major sites of prevention/intervention efforts.

In general, substantial research has demonstrated that children's mental health (e.g., internalizing and externalizing symptoms) is linked to school readiness, achievement, and positive interactions with teachers and peers (Raver & Knitzer, 2002; Rimm-Kaufman & Chiu, 2007). How children do academically in school at any one point can have cascading effects, as academic preparation, pedagogy, curricular placements, and teacher expectations and perceptions are all highly cumulative, so that even small differences in academic and cognitive skills can compound into much larger differences over time (Arum, 2000; Entwistle, Alexander, & Olson, 2005). These differences have taken on far greater meaning as the lifelong returns to educational attainment have rapidly increased due to global economic restructuring (Goldin & Katz, 2008). Thus,

anything that affects schooling in the short term can have long-term consequences.

Assessing and understanding children's internalizing and externalizing behaviors within the school context is essential, as they have the power to disrupt the official mission of schools—instruction and learning—and to derail children's life course trajectories into adulthood. (Buchanan, Gueldner, Tran & Merrel, 2009; Roeser & Eccles, 2000).

Schools are natural ecologies where children grow up and learn to master many developmental domains (e.g., intellectual, social, emotional and physical). Moreover, children spend a significant part of their day in school. This reality makes the school environment a common point of entry to provide services to children across many ages and racial/ethnic groups, identifying those in need of mental health services and providing them with the services they need. This role of schools is especially important for children who may not have regular access to a doctor or other health care providers or those families who simply just are not aware of or are lacking information on mental health services for children (as might be the case for many children growing up in immigrant families and/or those living in poverty). Studies have demonstrated that teacher referral is an essential link in helping children at risk for mental health problems get the services and support they need (Buchanan, Gueldner, Tran, & Merrell, 2009). In addition, children with mental health needs identified in school are more likely to enter and receive treatment when mental health services are offered in school rather than when services are offered within the community. In general, about 60-70% of children who receive any mental help services receive them in school. For example, Farmer and colleagues (2003) found that more than half (60.1 percent of 1,346) of all youths who

received services at some time during their lives entered the mental health service system by first receiving services in the education sector.

Those results are not surprising given that children spend a large amount of time in schools and that many of them are entering formal school unprepared for the demands of schooling and, in many cases, also showing early signs of developing internalizing and/or externalizing behaviors (Furniss, et al., 2006; Pianta & Walsh, 1996). For a large number of young children, school entry might be the first time when they are formally evaluated by their teachers and peers (Noam & Hermann, 2002; Raver & Knitzer, 2002; Walker, et al., 1998). It might also be a time when many children first learn to understand that being able to successfully complete certain tasks or do certain things is important. Researchers who have long been interested in the interplay between age-salient domains of competence (e.g., academics, peer functioning, rule-abiding conduct) and internalizing and externalizing symptoms suggest that normative development is likely to be a series of interlocking social, emotional, and cognitive competencies, and failure in any age-salient domains could lead to aggressive and disruptive behaviors, as well as experiencing loneliness, anxiety, and/or depression (see Masten, et al., 2005). As such, young children can be at risk for developing internalizing and/or externalizing behaviors, and, for those already showing signs as they enter school, their symptoms can become worse if left unnoticed/untreated. Thus, ratings by school staff members have their place in the identification of children with mental health needs, service delivery (in a more timely manner), and treatment outcomes (e.g., higher success rates when school staff members

also pay attention to other domains of child development when helping children with mental health problems).

Much of children's development and competencies during the elementary school years take place under the supervision of teachers. At the same time, teachers' perceptions of children matter regardless of their accuracy. Moreover, schools host many of the interactions that influence the course of child development during those years. Given these factors, examining children's internalizing and externalizing trajectories and their co-occurrence in the school setting is important in understanding how these trajectories unfold over time and what consequences they might have for other domains of child development, now or in the future. During school hours, no other adult is more qualified and/or in a better position to evaluate a child than teachers. They are in great positions to describe/rate a child's behavior in the classroom, the child's interaction with peers, other adults in the school, and the child's relationship with the teachers (Baker, 2006; Birch & Ladd, 1997). Again, even if teachers' perceptions are wrong or inaccurate, they matter to the extent that they affect how they treat children and the opportunities they provide them. Research on teacher-child relationships and children's classroom adjustments consistently show that teachers are less likely to invest their time and efforts in students who they perceive to be shy, difficult, and/or defiant. In other words, differential treatments of students can occur in the classroom as a result of teachers' perceptual biases, and children who exhibit internalizing and/or externalizing symptoms are likely to be disadvantaged in the classroom (Buchanan, et al., 2009; Hoglund & Leadbeater, 2004; Pianta & Walsh, 1996; Rimm-Kaufman & Chiu, 2007).

Although not explored in this dissertation, substantial research (e.g., the cascade model of development) has demonstrated that children's internalizing and externalizing symptoms are related to other domains of development, such as peer relations, social skills, self-control, self-esteem and academic achievement, all which are often fostered within the school setting. These domains and developmental trajectories are interrelated in ways that change(s) in one domain can affect or alter the courses of others. Gaining a better understanding of children's internalizing and externalizing symptoms in the school setting as rated by their teachers, therefore, might also further advance the study of other domains of child development that also take place within the school context along with children's socio-emotional competence.

### **A Note on Data**

The ECLS-K, a longitudinal school-based sample with children's internalizing and externalizing symptoms assessed by teacher ratings over the course of elementary school, posed both benefits and challenges to the research goals outlined below for this dissertation. I argue that the former outweigh the latter.

First, as noted in the study aims below and detailed more extensively in the next chapter, this study explored internalizing and externalizing symptoms with an eye towards demographic variability, especially concerning race/ethnicity and immigration. ECLS-K is one of the only available data sources with information on internalizing and externalizing symptoms that has sufficient demographic coverage to allow that kind of variability to be explored.

Second, I have already discussed at length the theoretical and applied motivation of focusing on internalizing and externalizing symptoms within school settings, but I want to add to that discussion here in terms of the actual measurement of these symptoms in schools. I agree that independent observations or professional evaluations are certainly preferred. Such methods, however, are often too costly and time-consuming for national data collections. Despite the obvious flaws, therefore, teacher ratings are widely used in large-scale studies (see Brand, Felner, Seitsinger, Burns, & Bolton, 2008 e.g.). I am not aware of other large-scale childhood data sets with adequate representation of immigrant and non-immigrant children from diverse racial/ethnic groups that measure behavioral-emotional functioning beyond teacher or parent ratings. To the extent that sampling is important, therefore, I argue that such measurement in ECLS-K is acceptable as a supplement/complement to smaller-scale studies with better measurement. Although the ECLS-K data set is not perfect and narrows down the scope of this study to a school-based sample, investigating a public health concern injected with population diversity in the child population during a critical period of childhood in a setting where children have great potentials for growth is an area worthy of scientific research.

### **Overview of General Argument and Proposed Execution**

In sum, drawing on a developmental psychopathology perspective and Brofenbrenner's ecological systems theory, this study explored the developmental trajectories of internalizing and externalizing behaviors during the elementary school years, with an emphasis on the connections between these trajectories, how they are

embedded in social structural settings defined by broad stratification systems, and what their implications are for the future.

Specifically, this study was organized around three aims:

1. To estimate trajectories of internalizing and externalizing behaviors (including their co-occurrence and dynamic interplay) from kindergarten through fifth grade in a representative sample of typically developing American children.
2. To explore variations in those trajectories across segments of the population defined by gender, race/ethnicity, and immigration status.
3. To examine the links between children's internalizing and externalizing pathways (individually and combined) in elementary school and their 8<sup>th</sup> grade academic functioning, as well as possible group variation in those links.

These aims were pursued by applying various longitudinal structural equation modeling techniques (e.g., cross-lagged modeling, latent growth curve modeling, latent class growth analysis) as well as regression techniques to the ECLS-K. This approach emphasized the dynamic nature of developmental trajectories as well as the potential for these trajectories to take basic forms that distinguish some groups of children from others in the short- and long-term.

## **Chapter 2: Literature Review, Conceptual Model, and Study Aims**

Much of our knowledge on internalizing and externalizing symptoms derives from research on adolescents and adults. Possibly, this research topic is studied less often in young children because the consequences of such symptoms in this group are not as costly to society as those that occur in the adolescent and adult populations. For instance, the probability of a young child committing a crime or abusing drugs is minuscule when compared to his/her older counterparts. In addition, studying young children's internalizing and externalizing symptoms is challenging for several reasons. One challenge concerns the difficulty of distinguishing whether some child behaviors are truly problematic and thus have severe consequences for the symptomatic child and society or, instead, that those behaviors are just the norm throughout different stages of child development (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Foster & Kalil, 2005; Oland & Shaw, 2005). Another challenge is that, although some child behavioral symptoms appear obvious to observers and raters, many forms of child internalizing symptoms are difficult to observe (see Kendall & Clarkin, 1992; Lilienfeld, 2003; Rubin, 1998). Finally, researchers have also struggled to define and measure children's problematic behaviors to the equivalent forms observed in adult and adolescent populations (Moffitt, 2006).

### **Prevalence and Patterns of Problem Behaviors among Children**

Despite the challenges mentioned above, in recent years we have seen a growing number of developmental researchers, practitioners, and policymakers who are concerned with child outcomes and disparities making attempts to understand children's

internalizing and externalizing symptoms and conceptualize the processes by which such problems develop, change, and might be prevented (e.g., Crosnoe, 2006a; Foster & Kalil, 2005; Masten, 2003; Noam & Hermann, 2002). Certainly, progress has been made. Many studies have concluded that childhood internalizing and externalizing symptoms are real and are of great concern for society due to their possible linkage to adolescent and adult mental health disorders in the absence of intervention. For instance, several prospective community studies have documented that internalizing and externalizing symptoms are observed among young children at increasing rates (e.g., Ford, Goodman, & Meltzer, 2003; Furniss, et al., 2006; Hinshaw & Lee, 2003; Ingoldsby, et al., 2006). These studies have also found that children's internalizing and externalizing symptoms vary from very low levels to all the way past clinical thresholds (Furniss, et al., 2006). In the political realm, the Center for Mental Health Services in the U.S. and the U.S. Surgeon have documented that one in five children and adolescents in the U.S. has a mental disorder that interferes with daily functioning and that, if left unattended, childhood mental disorders could lead to school failure, family conflicts, substance abuse, violence, and even suicide. (Substance Abuse and Mental Health Services Administration--Center for Mental Health Services, 2005).

At the global level, Roberts, Attkisson, Rosenblatt (1998) did a comprehensive review of 52 studies conducted over the past four decades in 20 plus countries that attempted to estimate the overall prevalence of psychopathology among children and adolescents. The authors reported prevalence rates for preschool children (ages 1 to 5 or 6 years) between 3.6% and 24% with a mean of 10.2%. The prevalence rates in samples

between the ages of 6–13 years were in the range of 1.4% to 30.7% with a mean of 13.2%. The authors did not specify the psychiatric disorders studied. According to them, all studies under review focused on clinically meaningful definitions of disorders, and the reported prevalence rates were based on overall psychiatric disorders. Many of the studies under review in this report used either Rutter's classification procedure, DSM-III, or DSM-III-R to generate prevalence rates.

Costello and colleagues' Great Smoky Mountains Study in the U.S. (2003) also provided an important longitudinal perspective on psychiatric disorders from age 9 to 16 years. This sample was designed for the study of the development of psychiatric disorders and need for mental health services among rural and urban children and adolescents. It included three cohorts of children aged 9, 11, and 13 years at the start of assessment. Approximately 8% of the sample was African American, and less than 1% was Hispanic. The researchers found an average 3-month prevalence of 13.3% but a much higher risk of 36.7% of having at least one psychiatric disorder by age 16. In this study, psychiatric disorders were those defined under the DSM-IV. The researchers also included serious emotional disturbance. In another study using the same sample, lagged analyses showed that children with a history of psychiatric disorder were three times more likely than those with no previous disorder to have a diagnosis at any subsequent wave (William, Shanahan, Costello, & Angold, 2011). The researchers also suggested that risk from a previous diagnosis was high among both girls and boys but significantly more so for girls. In other words, girls were more at risk for developing severe psychiatric disorders than boys if they had a history of psychiatric disorder. With a younger sample from the

NICHD Study of Early Child Care and Youth Development (a study of 1,364 children), researchers found evidence that children as young as 54 months exhibited both internalizing and externalizing symptoms rated using the Child Behavior Checklist (CBCL) and Social Skills Rating System (SSRS) (Burt & Glen, 2010).

Longitudinal studies and extensive reports such as those mentioned above are valuable in providing evidence that there is justifiable professional and community concern about rates of internalizing and externalizing symptoms in young children. More importantly, those studies and reports help orient researchers, practitioners, and policy makers toward crafting research questions and policy agendas that will advance our understanding of children's internalizing and externalizing symptoms and inform us how to best help those who are at risk. In sum, then, the relatively limited previous research that has been conducted in this area has yielded a great deal of insight into the occurrence of children's problematic symptoms during the early life course.

Yet, gaps in this knowledge base remain. This study attempted to fill in some of these gaps—the need for dynamic, interrelated, and contextualized approaches to internalizing and externalizing symptoms in childhood. In the sections that follow, I touch on each of these points—separately as well as together—by discussing the need for more thorough considerations of timing and development, diversity, connections across domains, and short- and long-term implications.

## **Developmental Timing**

Central to the developmental psychopathology framework and, to a lesser extent, the ecological perspective is the notion that adjustment and functioning are best viewed

as evolving over time. Getting a better sense of the evolution of internalizing and externalizing symptoms as children age, therefore, is a fundamental task of research on children's mental health.

In general, externalizing symptoms in the form of physical aggression, temper tantrums, defiant, irritable, and argumentative behaviors have been detected in children as early as during the second year of life. Most of those studies have investigated young boys. With the development of cognitive abilities and skills to regulate emotions, the majority of children in the studies became more prosocial and cooperative when they entered elementary school. Usually, however, a subgroup of individuals do not outgrow the temper tantrums and the defiant, irritable, and argumentative behaviors exhibited during the toddler years and early childhood, and these individuals go on to exhibit more dangerous externalizing behaviors as they age. According to Moffitt (1993) and Patterson (1982), these individuals (typically about 5 to 7% of the population) follow a life-course persistent trajectory of externalizing symptoms, and they are likely to be responsible for the majority of crimes committed by adolescents and adults.

Nagin and colleagues, using the semiparametric group-based method, also identified heterogeneous subgroups of individuals who exhibited chronic, moderate desisting, high desisting, and low externalizing problem trajectories. Those differences were already noticeable in childhood. In accordance with the normative development of externalizing symptoms, a majority of the children exhibited low levels of externalizing behaviors early in development that declined over time, or they exhibited moderate to high levels of externalizing behaviors early in development that decline over time. The

subgroup that brings the most concern for researchers, educators, and policymakers is the high and chronic individuals who started high on externalizing behaviors and continued to follow the same developmental trajectory. The chronic group identified by studies using LCGA might be the same group as the life-course persistent group identified by Moffitt (1993) and Patterson (1982). As for internalizing symptoms, unfortunately, much less is known about their developmental course in the early years of life.

As already noted, a survey of PsycINFO showed that early externalizing symptoms have attracted far more conceptual and empirical attention than early internalizing symptoms. This greater interest in externalizing symptoms likely stems from societal concerns about the costs of aggression and delinquency. In addition, externalizing symptoms show considerable longitudinal stability, especially for boys. Findings on the continuity of internalizing symptoms are less consistent for either gender. The issue of gender differences is one that cuts through this large literature. For example, externalizing symptoms are typically studied among boys rather than girls, but attention to internalizing symptoms tends to be more equal across genders (Beyers & Loeber, 2003; Cotes at l., 2001). Research that look at the unfolding nature of both symptoms in both genders would bring us a step closer to designing more refined prevention and intervention efforts to help both young children. This focus on gender leads to the next issue of consideration, which is diversity in internalizing and externalizing symptoms.

### **Issues of Diversity**

The ecological emphasis on contexts of development and the interplay among these contexts speaks to the need to better understand variations in developmental

processes across groups of children. Here, I focus on variation in the form of demographic locations; specifically, where children fit into the racial/ethnic stratification system of the U.S. In doing so, I also pay attention to a factor that is different from but closely related to race/ethnicity: immigration status.

The use of small and/or unrepresentative samples in previous research, despite the many insights they have revealed, makes generalizing findings to more diverse contexts questionable. For instance, Masten and colleagues' longitudinal research on young people's externalizing and internalizing symptoms (2005) used a study sample ( $n = 176$ ) comprised of over 70% White children and 18% Black children. As another example, the participants ( $n = 405$ ) in Keiley and colleagues' study on children's externalizing and internalizing behaviors were 82% White and 18% Black (2000). Many other existing studies in this line of research followed similar patterns, even those aiming to elucidate racial/ethnic differences (Kistner, David, & White, 2003).

Despite the limitations I mentioned, those studies have revealed some valuable preliminary knowledge of children's problematic behaviors, particularly for native-born Whites and Blacks. Much of the research found that children of native-born Whites fared much better than children of native-born Blacks on both indicators of mental health well-being. The most cited reasons for such patterns are the higher rates of poverty and prevalence of social stressors in the Black population. About one in three Black children lives below the official federal poverty line (see ASPE Office of Human Services Policy, 2011). Families coping with poverty and its related stressors were more likely to live in stressful environmental conditions characterized by low socioeconomic status,

deteriorating housing, community violence, interpartner/family conflict and maternal depression/distress (McLoyd, 1997, 1998; Scott, London, & Myers, 2002). In one study, inner-city Head start children who witnessed or heard about violent neighborhood events (e.g., crime and drug activity) exhibited more emotional distress and aggression than did peers with less violence exposure (Farver, Xu, Eppe, Fernandez, & Schwartz, 2005; Oravec, Koblinsky, & Randolph, 2008). In addition, exposure to interpartner conflict and poverty has been associated with many symptoms of psychological distress among children, including anxiety, depression and sadness (Harden & Koblinsky, 1999). Not surprisingly, then, Black children are at high risk for internalizing and externalizing symptoms considering their overrepresentation in unhealthy environments. Certainly, these at-risk children do not leave their mental health symptoms at home when they attend school. When their symptoms are carried into the classroom, they are at greater risk for a host of developmental problems as they experience difficulty while navigating their role as students and the school environment (Furniss, et al., 2006; Hoglund & Leadbeater, 2004; Oravec, et al., 2008; Pianta & Walsh, 1996; Walker, et al., 1998).

Although much has been learned about the internalizing and externalizing symptoms of children of native-born Whites and Blacks, such findings generally do not represent the demographic diversity of the U.S. young population—racial/ethnic diversity but also diversity in terms of immigration. This limitation is especially problematic not just because immigration is such a major policy issue today. Immigration is closely linked to racial/ethnic and socioeconomic disparities in the U.S. but also taps into a more general isolation from the mainstream. Social stratification deriving from segregation,

prejudice, and discrimination can influence immigrant families and children of immigrants to adapt goals, behaviors, and values that differentiate them from mainstream families (e.g., parenting and family practices that differ from what might be expected in American society), and in turn, differences in family processes in immigrant families can shape socialization processes and have profound impact on children's developmental trajectories. Hence, much is going on that is captured or proxied by immigration status that could condition well-documented patterns of child development in the extant literature and, in the process, generate new theoretical insights and better inform intervention efforts by targeting specific groups in need of attention. Thus, the fact that racial/ethnic minorities in general and immigrants in particular are underrepresented in this literature is problematic to the extent that they may differ from other children in ways that challenge universalistic or generalized assumptions about the development of internalizing and externalizing symptoms (Crosnoe, 2010; Garcia Coll, et al., 1996)

National statistics show that the children of immigrants now make up 23 percent of the U.S. school-age population and that Latino/a and Asian American children—the vast majority of whom are foreign-born or have foreign-born parents—constituted 19 percent and 4 percent of American students, respectively (Tienda, 2009). Certainly, a handful of studies on child mental health have looked at children and families of Latino/a backgrounds (e.g., Crosnoe, 2006a; Hill, Bush, & Roosa, 2003), but these studies are underrepresented in the developmental literature. Children of Asian backgrounds have, for decades, been labeled as the “model minority”. Having this label might make them appear to others as being immune to social and mental health problems (Gupta,

Szymanski, & Leong, 2011). Yet, a number of studies of Asian American children have documented that they do exhibit internalizing and externalizing symptoms as well as other forms of psychological distresses (e.g., Gupta, et al., 2011; Kim, Chen, Huang, & Moon, 2009; Lowinger, 2009; Takeuchi, Alegría, Jackson, & Williams, 2007; Uba, 2003). With the ECLS-K, a limited number of preliminary studies have shown that children of Asian backgrounds tend to score lower on both internalizing and externalizing symptoms compared to other racial/ethnic groups (e.g., Crosnoe, 2006a). Despite the model minority label and mixed findings, we do not have sufficient evidence to conclude that children of Asian Americans do not need help. That is, we cannot overlook the needs of Asian American children.

As for studies of children's mental health from Black and White immigrant families, they are almost non-existent. Meanwhile, census statistics showed that these two groups have been growing in visibility in the U.S. Today, about 813,000 children from birth to age 10 reside with a Black immigrant parent, making up for roughly 12% of all young black children in the U.S. (Hernandez, 2012; McCabe, 2011). Although the perceived skin color of Black immigrants may be similar to Blacks born in the U.S., the two groups have different social and economic characteristics (Scopilliti & Iceland, 2008). On average, Black immigrants have higher levels of education and income than native-born Blacks, are more likely to be married (71% vs. 39%), experience significantly better health, and are more likely to be employed and actively participating in the labor market (McCabe, 2011). Research has also found that Black immigrants live in higher quality neighborhoods than their native-born peers. When looking at the well-

being of Black immigrants' offspring, their children tend to fall in the middle, comparable to children of native-born Whites, with children of native-born Blacks and Latino/a backgrounds faring the worst (McCabe, 2011). In addition, research has shown that Black immigrants' health will likely erode as they are exposed to the harmful effects of discrimination and racism (Benson, 2006; Read & Emerson, 2005). That is, over time, adopting a Black racial identification and experiencing cumulative exposure to stressful life events associated with being Black can often lead to downward rather than upward social mobility for Black immigrants. Hence, despite doing better than their native U.S.-born counterparts shortly after immigration, Black immigrants and their children can become an at-risk group the longer they reside in the U.S. due to their shared racial status with native-born Blacks. Thus, examining children of Black immigrants and native-born Blacks separately is important because in some ways they represent different groups in the U.S. population.

In the early 21<sup>st</sup> Century, European immigrants make up roughly 16 percent of the U.S.' immigrant population (Dixon, 2005; Russell & Batalova, 2012). Certainly, young children in this immigrant group are visible in the U.S. school system. Similar to Black immigrants and their native-born counterparts, White immigrants and their native-born counterparts also represent different cultures and nationalities. Whereas many native-born White parents have origins in the western parts of Europe, most White immigrant parents (in recent years) came from the eastern parts of Europe (Dixon, 2005; Robila, 2007). Compared to immigrants from other regions, European immigrants tend to have higher educational attainment, are more likely to occupy professional positions in the U.S. labor

market, and are more fluent in English (Robila, 2007; Russell & Batalova, 2012). Despite the many advantages that European immigrants have over other immigrant groups, many also face similar struggles associated with the acculturation process and economic and social mobility (Fuligni, 1998; Glick, 2010; Hernandez, 2004). How this immigrant group and their offspring will do as they settle into their new home is unclear. As not much research is available to form hypotheses, one can only speculate. Given that White immigrants share the same racial status as native-born Whites, they are probably less likely to experience much discrimination and prejudice from social institutions in the U.S. than immigrants of color. Over time, this group can blend in and enjoy similar social status as native-born Whites, resulting in similar or better well-being compared to their native-born counterparts (e.g., immigrant selection effect, which I discussed below).

In general, children growing up in immigrant families face risks that are tied to economic hardships and social mechanisms derived from their relative positions in the mainstream society (e.g., discrimination, segregation, and prejudice) but also have resources to draw on to undercut or even reverse some of those risks. Ample research suggests that immigrants are positively selective on good health and that cultural factors tend to encourage healthy behaviors, particularly among recent immigrant generations (Beiser, Hou, Hyman, & Tousignant, 2002; Hummer, Powers, & Pullum, 2007). This phenomenon is known as the immigrant paradox, given the high rates of socioeconomic disadvantage and poverty among immigrants that should reduce their health overall (Beiser, et al., 2002). For immigrants of Latino/a background, the mechanisms that seem to hold the most promise for explaining these children's low ratings (by school teachers)

on internalizing and externalizing behaviors include strong family and community ties that protect them from potentially negative psychological experiences and support resilience within disadvantaged social structure backgrounds (Crosnoe & Lopez Turley, 2011). Similarly, Asian families are often embedded in cohesive communities that share many collective characteristics that encourage family unity, support, and assistance (Fuligni, 1998; Uba, 2003).

Yet, despite these ecological resources, children of immigrants also face psychosocial risks that add to the risks associated with their class and racial/ethnic positions and that might chip away at the benefits of these ecological resources. The process by which immigrant families become more embedded in American society may deteriorate the positive health outcomes over time and across generations, thereby exposing children of immigrants to the more corrosive effects of the extensive racial/ethnic and socioeconomic stratification of the U.S. (Gonzales, German, Kim, & George, 2007; Gonzales, Pitts, Hill, & Roosa, 2000; Kao, 1999; Suarez-Orozco & Suarez-Orozco, 2001). As just one example, consider research on intergenerational differences in immigrant adaptation within families (e.g., Park, Kim, Chiang, & Chu, 2010; Schofield, Parke, Kim, & Coltrane, 2008). Unlike their parents, children of immigrants have much greater opportunities to learn the English language and become accustomed to the American culture as they attend formal schooling. While in school, they are likely to learn from teachers, peers, and schooling about the norms of living in the U.S. (e.g., what is acceptable/appropriate and vice versa) (see Kao, 1999). On the other hand, immigrant parents are often more isolated and feel less comfortable for longer

periods of time (e.g., Chiu, et al., 1992). Tension and conflicts are likely to rise when the experiences between immigrant parents and children do not match, tensions that are related to family conflict (see Telzer, 2010). Considering the importance of family unity, support, and cohesion (as previously mentioned) for children and families of immigrants, the deterioration of these protective factors within the family context can have detrimental consequences for children (e.g., Garcia Coll, et al., 1996; Kim, et al., 2009; Ramirez, Crano, & Quist, 2004; Uba, 2003).

These issues illustrate why considering race/ethnicity in tandem with immigration status is important. Immigration qualifies well-documented racial/ethnic disparities in mental health, and, within the immigrant population, a family's story can differ from one generation to the next (even within the same racial/ethnic group) as they try to build a life in the U.S. (see Chiu, et al., 1992; White & Glick, 2000 for example).

Despite this mix of risks and resources, an immigrant paradox in children's mental health does seem to exist. Evidence from national data, including ECLS-K, as well as community samples indicate that the children of Latino/a and Asian immigrants are better adjusted (mental health rated by school teachers and parents) than children of U.S.-born White, Asian, Hispanic, and African American parents, especially after but even before socioeconomic factors are controlled (Crosnoe, 2006a). In one study, Beiser and colleagues (Beiser, et al., 2002) used data from a national survey of Canadian children (subsample of children ages 4 through 11) and found that foreign-born children were more than twice as likely to live in poor families but that they had lower levels of internalizing and externalizing symptoms compared to their native-born peers. Yet, the

immigrant advantage may also fade over time; not just across generations, but also the longer immigrant parents have been in the U.S. (Crosnoe, 2006b; Glick, 2009), as well as when children move through school. Thus, we would expect a general immigrant advantage (i.e., less internalizing and externalizing symptoms and lower co-occurrence) among the children of immigrants relative to their peers from other groups but one that is strongest among younger children and in families in which parents are more recently arrived (analytically, this can be done by controlling for parents' length of residency in the host country, which is their age if born here or time since arrival if not). This variability is important because it suggests that the standard story about racial/ethnic minorities' mental health disadvantage is far more nuanced.

What is necessary moving forward, therefore, is research that leverages samples that allow for comparisons within and across segments of the child population. This dissertation attempts to do so. In ECLS-K, race/ethnicity and immigration status can be combined to identify groups in which internalizing and externalizing symptoms are most pronounced. In doing so, various elements of acculturation, such as parent and child language use, need to be controlled. For the most part, acculturation cannot be studied directly. Looking at immigration status does not allow for testing of acculturation effects on child outcomes but instead merely divides up the child population to identify critical targets of intervention as well as success stories that can be studied more closely.

### **Considering Connections**

Another limitation of the extant literature is that much of the research on children's internalizing and externalizing symptoms has been studied independently in an

“either-or” way. That is, studies have often focused on *either* the externalizing or internalizing patterns of young children but not the connections between them (Campbell, Pierce, March, & Ewing, 1994; Capaldi & Stoolmiller, 1999). Those connections, however, are integral to both the developmental psychopathology framework, which emphasizes links among different symptoms of maladjustment, and the ecological perspective, which connects processes within and across contexts of development. To address this issue, this dissertation focuses on two forms of connection. First, *co-occurrence* refers to the simultaneous presence of both internalizing and externalizing symptoms within the same individual at one time point. Second, *interrelation* is about the study of the effect(s) of one form of symptoms influencing another form of symptoms in the same individual, whether that effect is concurrent or over time.

A handful of studies have documented significant co-occurrence between child internalizing and externalizing symptoms and the increased risk posed by dual behaviors over single-form behavior (Ingoldsby, et al., 2006; Rohde, Lewinsohn, & Seeley, 1991; Wiesner & Kim, 2006; Zahn-Waxler, Klimes, & Slattery, 2000). Internalizing and externalizing behaviors can and often do co-occur at every point in development in which they have been measured. As such, these childhood problematic behaviors need to be studied as interrelated elements of a behavioral-emotional health profile rather than viewing them as manifestations of the same symptoms or as something individuals only experience in one form or the other.

An appreciation of the concept of co-occurrence is essential for understanding the etiology and course of internalizing and externalizing symptoms. Previous studies

reported that, compared to children who displayed either internalizing or externalizing symptoms, children with co-occurring symptoms had more severe outcomes in adulthood, including higher rates of psychopathology, substance abuse, and suicidality (Oland & Shaw, 2005). By determining when and how children embark on pathways toward high and chronic internalizing and externalizing behaviors and their co-occurrence, researchers can lay the groundwork for more timely and effective intervention. Unfortunately, although two decades have passed since Kendall and Clarkin (1992 p. 833) made their statement regarding the study of co-occurrence in child psychopathology as the “premier challenge facing mental health professions in the 1990s”, important questions remain unanswered (see Oland & Shaw, 2005).

For example, why some children develop co-occurring symptoms and others do not is unclear, as is how the course of development for co-occurring internalizing and externalizing symptoms may vary across different groups of children. Moreover, little attention has yet been paid to gender differences in co-occurrence. A large number of existing studies used samples that assessed boys but not girls. Given what is known about their co-occurrence in adolescence (Ge, Best, Conger, & Simons, 1996), gender differences in co-occurrence trends are likely to occur earlier in life. Indeed, although the few direct comparisons of young girls and boys have not revealed a strong consistent pattern, this line of research does suggest a general tendency for feedback between internalizing and externalizing symptoms to be more pronounced for girls (Wiesner & Kim, 2006; William, et al., 2011; Windle, Miller-Tutzauer, & Domenico, 1992). The

challenge facing researchers today is to unpack this highly consequential early co-occurrence, with special attention paid to population diversity.

Although hypotheses have been proposed regarding the development and causes of co-occurrence over time, the limited research in this field with young children makes it difficult for researchers to make any definite conclusions. The child psychopathology literature would benefit from longitudinal designs that examine the timing and progression of the trajectories of childhood internalizing and externalizing symptoms, as well as their co-occurrence within the same individual. This particular line of research would be informative as it assesses early onset of problematic behaviors, as well as monitor continuity/discontinuity in symptoms over time.

Of course, issues of demographic variability are not only important to consider in terms of trajectories of internalizing and externalizing symptoms but also in terms of their co-occurrence. Although co-occurrence can be plausibly thought of as a distinct syndrome (individuals who exhibit co-occurring internalizing and externalizing behaviors are likely to differ from those who exhibit only one form of problematic behaviors), previous research has proposed that individuals exhibiting co-occurring problematic behaviors are likely to share some of the same risk factors that expose individuals to single-form behavior (e.g., Keiley, et al., 2000; Lilienfeld, 2003; Masten, et al., 2005). That is, co-occurrence might be a result of a greater number or heightened levels of risk factors associated with internalizing and/or externalizing behaviors compared to single-form (pure) problematic behavior.

Research testing this claim has found that pure and co-occurring internalizing and externalizing symptoms are affected by similar developmental processes, although children with co-occurring internalizing and externalizing symptoms were found to differ from pure internalizing and externalizing symptoms in that they experienced the highest level of risk factors (Keiley, et al., 2000; Lilienfeld, 2003). The logic underlying the examination of racial/ethnic and immigration-related variability in co-occurrence of internalizing and externalizing symptoms is the same as the motivation for studying racial/ethnic and immigration-related variability in the occurrence of each. Specifically, I have speculated that—across race/ethnicities—children from immigrant families will be less likely to experience internalizing and externalizing symptoms. The same is likely true for co-occurrence, where the risk is not developing internalizing or externalizing symptoms but instead having internalizing symptoms lead to externalizing symptoms and vice versa.

As important as it is to further advance the study of co-occurring internalizing and externalizing symptoms in children, the current developmental psychopathology literature also encourages the study of interconnections between internalizing and externalizing symptoms in children (Lilienfeld, 2003; Masten, et al., 2005; Moilanen, et al., 2010). Increasing evidence suggests that internalizing and externalizing symptoms can be mutually reinforcing and that individuals who are either at risk of developing or already showing one form of symptoms are also at risk for the other form of symptoms (Beyers & Loeber, 2003; Keiley, et al., 2000; Nagin & Tremblay, 2001). This association between the two forms of symptoms can occur concurrently or in subsequent time points.

In addition, there is some evidence of stability in internalizing and externalizing symptoms across time (e.g., Ingoldsby, et al., 2006; Masten, et al., 2005). As a result, prevention and intervention efforts have been devoted to look into early identification of the onset of symptoms in order to prevent the development or amplification of internalizing and externalizing symptoms in children (Noam & Hermann, 2002; Raver & Knitzer, 2002; Rimm-Kaufman & Chiu, 2007; Walker, et al., 1998).

Although much has been done to study the dynamic interplay between children's internalizing and externalizing symptoms, the current literature can benefit from empirical studies that focus on population diversity. For instance, on the one hand, the literature has ample evidence to suggest that symptoms of one form of problematic behavior likely undermine child functioning in other domains of development (e.g., Arnold, 1997; Masten, et al., 2005; Miles & Stipek, 2006; Moilanen, et al., 2010; Ollendick, Weist, Borden, & Greene, 1992). Little is known, however, about whether these patterns (e.g., positively reinforcing) are similar for all groups of children, which group(s) of children is most at risk (and at which time point and for which form of problematic behavior), or why some groups of children are at greater risk than others, among many other research questions related to population diversity. This dissertation aimed to unravel the dynamic interplay between the development of children's internalizing and externalizing symptoms while underscoring the importance of taking population diversity into account when study children's problematic behaviors.

In the extant developmental psychopathology literature, I am unaware of studies that have examined racial/ethnic or immigration-related variations across groups in the

dynamic interplay of children's internalizing and externalizing symptoms. Identifying groups of children who are at risk for developing reinforcing problematic behaviors across time is as important as identifying those who have co-occurring symptoms. Both are a great public health concern. I am speculating that those children whose developmental contexts with the largest number of risk factors (e.g., social stratification, length of residency in the U.S. for immigrant families) are at greatest risk for developing reinforcing problematic behaviors. In the absence of intervention, this group of children would become more vulnerable (experiencing higher levels of symptoms) as they move through elementary school as a result of poor social relationships and school performance (Baker, 2006; Birch & Ladd, 1997; Buchanan, et al., 2009; Hoglund & Leadbeater, 2004; Pianta & Walsh, 1996).

### **Early Symptoms and Later Outcomes**

Children's socio-emotional development, particularly their internalizing and externalizing symptoms and trajectories, is not separate from other important developmental domains. These symptoms can increase the symptomatic child's future vulnerability, leading to more negative "distal" outcomes later in the life course. In the developmental psychopathology literature, cross-domain analysis, transactional modeling, developmental cascade modeling, snowballing effects, spillover effects, and dual-failure modeling all suggest that this link between early maladaptive behaviors and later outcomes exist.

The general basis behind these arguments is that distinct domains of adaptive functioning are believed to relate to one another in a meaningful way through the course

of development, and that functioning in one domain of behavior/development spreads to other domain(s) (e.g., see Keiley, et al., 2000; Lilienfeld, 2003; Masten, et al., 2005). For instance, intervention efforts with at-risk children have demonstrated that reduction in levels of internalizing and/or externalizing symptoms were at least partially accounted for by improvements in peer relations and academic achievement (Raver & Knitzer, 2002; Rimm-Kaufman & Chiu, 2007; Ringeisen, Enderson, & Hoagwood, 2003; Rones & Hoagwood, 2000). In addition, researchers, practitioners and educators who underscore the importance of early identification and prevention and intervention efforts with children who demonstrate elevated symptoms of internalizing and/or externalizing behaviors have been emphasizing the value of implementing programs aimed at increasing behavioral and emotional competence in the early elementary school years (Noam & Hermann, 2002; Rimm-Kaufman & Chiu, 2007; Walker, et al., 1998). The argument is that such early efforts can prevent the development or amplification of internalizing and/or externalizing and other negative child outcomes across later adolescence and into adulthood.

The transition to middle school is a critical developmental period to look at how children do at major developmental tasks, especially those who demonstrated elevated levels of internalizing and/or externalizing symptoms while in elementary school. The literature on this school transition suggests that it can be a vulnerable and challenging time for many children (Ringeisen, et al., 2003). Those who are not equipped with the skills to adapt to a new environment may be especially at risk. As mentioned above, considering that symptoms in one area of development can jeopardize the execution of

other developmental tasks and hinder the development of associated competence, investigating how the group(s) of children who are at elevated levels of internalizing and/or externalizing symptoms while in elementary school do as they transition to middle school is critical. Such research would also benefit prevention efforts because targeting domains of adjustment that will likely lead to problems in other areas later on may be cost effective in preventing more pervasive psychopathology and/or child maladjustment.

In line with my emphasis on internalizing and externalizing symptomatology within school contexts and following a long tradition of research on the link between problematic behaviors and academic competence (see e.g., Moilanen, et al., 2010), the dissertation looks at the implications of adjustment problems in elementary school for *academic* functioning in middle school. The ECLS-K 8<sup>th</sup> grade wave provided many ways to study such middle school outcomes, including standardized test scores. Those scores are valuable for this line of research because they tap what has been learned in school up to the middle school years (thereby providing the opportunity to examine how behavioral problems in school might have impeded learning and skill development) and forecast future educational trajectories through middle school and beyond (thereby providing the opportunity to understand how short-term effects of behavioral problems might have cascading effects into early adulthood).

The extant literature suggests that early internalizing and/or externalizing symptoms reduce later academic competence by eroding cognitive functioning or by interfering with attentional focus and participation during classroom activities (Maguin & Loeber, 1996; Roeser, van derWolf, & Strobel, 2001). Internalizing symptoms may also

discourage the use of adaptive learning strategies, resulting in poorer academic self-efficacy and performance. In one study, Roeser, Eccles, and Sameroff (2000) found that seventh-grade students experiencing high levels of emotional distress demonstrated poorer academic performance in eighth grade and poorer perceived academic confidence in the ninth grade. In another study, highly anxious first-grade students were disproportionately likely to show very low levels of reading and mathematics achievement in the eighth grade (Grover, Ginsburg, & Ialongo, 2007). As for externalizing symptoms, research has found that children who exhibit externalizing behaviors have relatively low academic motivation as well as fewer opportunities to learn in the classroom (Miles & Stipek, 2006; Schwartz, Gorman, Nakamoto, & McKay, 2006). For instance, Coie and Dodge (1998) found that first- and third grade students who were aggressive were more likely to be observed being reprimanded by the teacher and spent less time performing classroom tasks than other children. Aggressive children may also develop negative relationships with teachers and peers or negative feelings about school and, as a consequence, be less inclined to exert effort on academic work (Arnold, 1997). In addition, physically aggressive children have been found to have a relatively high incidence of learning difficulties (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Ollendick, et al., 1992). Hence, I hypothesize that children's internalizing and/or externalizing pathways while in elementary school can impede their academic competence (in the absence of intervention) while in middle school.

In looking at their implications for later youth functioning in school, early problem behaviors need to be considered in terms of overall level as well as over-time

change. Such an approach is in keeping with my focus on trajectories that, in turn, is rooted in the basic principles of developmental psychopathology and the ecological perspective, which contend that the courses of developmental domains (in this case, their internalizing and externalizing symptoms) can vary in relation to their developmental contexts (Bronfenbrenner, 1979; Elder, 1998). Here, risk refers to high levels of symptoms but also whether such symptoms are increasing over time. Thus, having generally high and escalating symptoms would be the riskiest profile, especially when occurring in both internalizing and externalizing domains. This hypothesized connection between unfolding early behavioral problems and later academic functioning is also likely to vary across in much the same ways that the basic connections between internalizing and externalizing behaviors were expected to vary, with children of immigrants and girls doing better in general and being more immune to risks.

### **Study Aims and Hypotheses**

**Aim 1: Estimating developmental trajectories of internalizing and externalizing symptoms and their interrelations.** The first aim is to identify the timing and trajectories of childhood internalizing and externalizing symptoms. A mixture of longitudinal growth curve and regression approaches elucidates how the full range of internalizing and externalizing symptoms play out over time in conjunction with each other and when the give and take between these trajectories was most pronounced. My hypothesis is that distinct groups of children will be identified based on their unfolding symptoms, including those who appear to be internally consistent (e.g., chronically high, consistently low) and those who appear to be internally inconsistent (e.g., declining,

increasing) in terms of their changing symptoms across the course of elementary school.

After testing the individual trajectories of internalizing and externalizing symptoms, I proceed to testing whether and how internalizing and externalizing symptoms tend to co-occur. The hypothesis is that the child population will be characterized by pure symptomatology (i.e., one or the other) as well as co-occurring (high on both). To study the dynamic interplay between internalizing and externalizing symptoms across the four waves, cross-lagged analyses are used. My hypothesis is that children's internalizing and externalizing symptoms will be stable across waves and positively influence each other from one point to the next. Much less certainty can be said about the cross effects of the two forms of symptoms. On one hand, some research suggested that internalizing symptoms could serve as protective factors for children at risk for developing externalizing symptoms (see Masten, et al., 2005). Other research suggested that internalizing symptoms are risk factors for children developing externalizing symptoms and vice versa (e.g., Bornsteina, Hahn, & Haynes, 2010; Moilanen, et al., 2010). Thus, rather than posing directional hypotheses, I will view the examination of cross-effects between the two as a more exploratory attempt to adjudicate between past disparate findings from past research.

**Aim 2: Examining group differences in children's problematic behaviors.**

This aim investigates group differences in trajectories and timing of children's internalizing and externalizing behaviors across diverse segments of the population defined by race/ethnicity and immigration status. Organizing cross-lagged model and group modeling is the hypothesis that children of immigrants will have fewer

internalizing and externalizing symptoms early on than the general population and, as a result, will experience less co-occurrence between the two problematic behaviors over time (Beiser, et al., 2002). This immigrant advantage is expected to wear off and even reverse in later generations of children. With regard to studying the dynamic interplay between the two forms of symptoms, my working hypothesis is similar. In addition to using group modeling technique, I also estimate interaction models to investigate diversity in links between internalizing and externalizing symptoms or levels. In testing these hypotheses, I take into account other demographic and socioeconomic factors that may go along with race/ethnicity and immigration status.

**Aim 3: Investigating the implications of children's early pathways of internalizing and externalizing symptoms (individually and combined effects) on later school outcomes.** Once children's pathways of internalizing and externalizing symptoms have been identified, regression analyses will estimate their associations with children's 8<sup>th</sup> grade math and reading assessment scores. To do so, I will categorize children into categories of over-time patterns of internalizing symptoms and externalizing symptoms based on starting levels and cross-grade change, use these categories to predict middle school test scores, and then repeat the analyses with a set of categories combining information on both internalizing and externalizing symptoms, using interactions to test for differences across groups. My working hypothesis is that children with high levels of internalizing/externalizing symptoms when they entered school who follow path of increasing symptoms over the course of elementary school are most at risk for academic

failure in middle school, especially when symptoms co-occur over time. Examination of group diversity will be exploratory.

**A final note on gender.** Although not explicitly part of the conceptual model leading to the three study aims, the potential for gender differences in the patterns being examined is strong and, therefore, are explored. Previous research suggests that young boys are more likely to exhibit externalizing symptoms and that girls are more likely to have internalizing symptoms. As for co-occurring and inter-related symptoms, the limited literature on young children has mostly investigated boys, yielding very little or no information on girls. Considering what little we know, I expect that co-occurring and inter-related behaviors will be greater among boys than girls because there is evidence that girls tend to develop more mature emotional regulation skills at earlier ages than boys. The literature is even more limited in relation to immigration, making any strong hypotheses or expectations unclear. Do boys and girls from immigrant families display similar levels of internalizing and externalizing behaviors as their peers from native families, such that boys from immigrant families are more likely to exhibit externalizing symptoms and their girl counterparts more likely to exhibit internalizing symptoms? What about co-occurrence and inter-relation among girls and boys from immigrant families? Currently, we have more questions than answers, and so these analyses will be exploratory (Orellana, 2001; Uba, 2003).

## **Chapter 3: Methods**

The research design and methodology are explained in three sections. In the first, an overview of the Early Childhood Longitudinal Study: Kindergarten Class of 1998-1999 (ECLS-K) is provided, with a focus on its sample design, data collection, and data availability. In the second, key variables that are used in the current study are described. The statistical analysis plan is presented in the final section.

### **Data Source and Sample**

The ECLS-K was designed by the National Center for Education Statistics (NCES) to provide nationally representative data on children for policy research. The data set provides multifaceted and longitudinal data on children's physical, cognitive, and social-emotional development as well as children's home and school environments.

Sampling for the ECLS-K involved a dual-frame, multistage sampling design. In the first stage of sampling, 100 primary units—typically counties—were randomly selected. In the second, NCES randomly sampled approximately 1,000 schools within these units, with separate frames for public and private schools. Finally, about 22,000 children set to be enrolled in kindergarten in the 1998-1999 school year (approximately 23 per school) were randomly selected from these schools (Rathbun & West, 2004). Asians and Pacific Islanders were over-sampled to ensure sample sizes large enough for subgroup analyses, with sampling weights available to correct for the impact of this oversampling on sample representativeness.

Data collection began in the fall of 1998. Materials and procedures were developed to maximize the inclusion of children and families whose primary language

was not English and children with special needs. Translators were utilized when available. One parent had an in-depth interview over the phone or at home in her/his chosen language about the target child's socio-emotional competence and parent/family characteristics. One of the target child's teachers also completed surveys about the child, her/his own background, teaching experience and style, and classroom environment, and one school administrator completed a survey about the school's structural and environmental characteristics. The target child also had to take diagnostic tests in several subject areas (e.g., reading skills and math knowledge). To date, the ECLS-K has finished seven waves of data collection, which were conducted in the kindergarten year (fall of 1998 and spring of 1999), the first grade (fall of 1999 and spring of 2000), the third grade (spring of 2002), the fifth grade (spring of 2004), and the eighth grade (2007). For the internalizing and externalizing scale measurements, five waves measurements were used (kindergarten through fifth grade, all spring data collections). Teacher reports on these scales were not available in eighth grade.

The original sample of kindergarten children selected for the ECLS-K constituted a nationally representative sample of 21,260 children enrolled in 1,277 kindergarten programs during the 1998-1999 school year (West, Denton, & Germino Hausken, 2000). When this sample of kindergarteners entered first grade the following year, however, the sample size was reduced to 17,209 through attrition. Approximately three-fourths of families participated through each stage. Both restricted- and public-use data are available. This study uses data files available for restricted use, with sample weighting and multiple imputation employed to reduce sampling biases (e.g., attrition, missingness).

## **Measurement**

Most of the demographic measures/control variables were based on parent reports during the fall kindergarten wave. The question regarding whether the child was born in the U.S. or outside of the U.S. was only asked during the first grade wave (parent reports). Children's internalizing and externalizing symptoms in each wave were measured accordingly, during the spring semester. The distal outcome measures were only assessed when the participants were in eighth grade (reading and math assessment scores). For a list of items, please see Appendix A.

**Internalizing and externalizing symptoms.** Teachers completed a set of social ratings about each child in the fall of kindergarten. Items were adapted from Gresham and Elliott's Social Rating Scale (SRS) (1990). The two problem behavior scales reflect behaviors that may interfere with the learning process and with the child's ability to interact positively in the classroom. Both exploratory and confirmatory factor analyses were used to create the SRS. NCES conducted extensive field trials of their adaptation of the SRS and concluded that it is a reliable, valid measure of children's social development. Reliability for teacher ratings is high (alphas = .77-.90). The internalizing scale gauged the extent to which teachers observed signs of anxiety, loneliness, low self-esteem and sadness (alpha = .80). The externalizing scale gauged the extent to which they observed signs of acting-out behaviors, including instances in which the child argued, fought, got angry, acted impulsively, or disturbed others' activities (alpha = .90). The items were rated on a scale of one (Never) to four (Very often). The same procedures were repeated every wave. Teacher reports on these two scales were not available during

the eighth grade assessment. No measurement reliability across racial/ethnic groups is provided because the items are copyrighted. For means and standard deviations of internalizing and externalizing symptoms in each wave, please refer to Table 1.

**Race/ethnicity and immigration status.** NCES created a scale of race/ethnicity based on reports of parents in the fall of kindergarten, which broke into four categories representing the largest racial/ethnic populations in the U.S. (U.S. Census Bureau, 2006): non-Latino/a Whites, non-Latino/a Blacks, Asian-Americans (included both categories of Asians and Native Hawaiian or other Pacific Islander), and Latino/as. The small number of children not in these populations (e.g., Native American) was eliminated.

I pulled out subsets of children based on parents' reports of birthplace. Specifically, all children born outside the U.S. were categorized as first-generation Americans. Children born in the U.S. to at least one foreign-born parent were categorized as second-generation. The third generation sample comprised of children who were born in the U.S. (parents reported on whether the child was born in the U.S. or outside of the U.S.) and at least one parent who was also born in the U.S. Following conventions in research on young children (as opposed to adolescents), the key distinction for this project was between children with immigrant parents (the first and second generation) and those without (the third generation and higher). This distinction should be acceptable for young children because of the small differences in exposure to U.S. or foreign educational systems between children who were born in the U.S. to foreign-born parents and children who were born outside the U.S. but migrated here when they were very young, as all foreign-born children in ECLS-K did (Suarez-Orozco & Suarez-Orozco,

2001). Thus, I focused on eight mutually exclusive categories: children from Latino/a immigrant families, children from Asian immigrant families, children from Black immigrant families, children from White immigrant families, native-born non-Latino/a Blacks, native-born Asians, native-born non-Latino/a Whites, native-born Latino/as. The analyses controlled for language use in the homes for both the child and parent. Of all the children (sample weight accounted for), 5,719 were White (509 were foreign-born), 1,149 were Black (224 were foreign-born), 1,804 were Hispanic (1,103 were foreign-born), and 796 were Asian (607 were foreign-born).

**Direct cognitive assessments.** The ECLS-K eighth-grade direct cognitive assessment battery was designed to assess children's academic achievement in spring of eighth grade. Reading, mathematics, and science were the three cognitive domains assessed. This study only used participants' reading and math assessment scores. In spring-eighth grade, groups of ECLS-K sampled children who attended the same school were assessed in a single, proctored group administration. All children were given separate routing assessment forms to determine the level (high/low) of their reading, mathematics, and science assessments. The two-stage cognitive assessment approach was used to maximize the accuracy of measurement and reduce administration time by using the child's responses from a brief first-stage routing form to select the appropriate second-stage level form. For the reading and mathematics routing forms, children read items in a booklet and recorded their responses on an answer form. These answer forms were then scored by the test administrator. Based on the score of the respective routing forms, the test administrator then assigned a high or low second-stage level form of the

reading and mathematics assessments. For the second-stage level tests, children read items in the assessment booklet and recorded their responses in the same assessment booklet. The routing tests and the second-stage tests were timed for 80 minutes.

The eighth-grade reading assessment focused on four aspects of reading comprehension skills including forming a general understanding of the text, developing a more complete understanding of what was read, making connections from the text with personal background knowledge, and critically evaluating, comparing and contrasting, and understanding the effect of literary devices or the author's intentions. The minimum score for reading was 86.63, and the maximum was 208.90, with a mean score of 171.38 (whole sample statistics). The standard deviation was 27.42.

The eighth-grade mathematics assessments addressed the following content strands: number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and pattern, algebra, and functions. The cognitive processes (conceptual, procedural, and problem solving) were assessed in each of the strands. Some of the items drew upon knowledge from more than one strand. For example, an item might require that a child apply knowledge about geometry, measurement, and number operations to answer the question correctly. The minimum score for math was 66.17, and the maximum was 172.20, with a mean score of 142.40. The standard deviation was 21.93.

**Child/family controls.** To account for demographic variability and to protect against spuriousness, I measured child age (in months), child gender (0 = male, 1 = female), family poverty (0 = above poverty level, 1 = below poverty level), household

size (based on parent-reported household rosters, with 2 being the minimum or 17 being the maximum number of people in a household), parent education (less than high school, high school, and college and beyond), family structure (dummy variables for intact and non-intact families), maternal employment (dummy variables for full time, part time, and not working), maternal age (in years), geographic location (dummy variables for south, west, northwest and Midwest), urbanicity (dummy variables for city center, small city, and small town), child's language use in the home (0 = non-English spoken, 1 = English spoken), and mother's language use in the home (0 = non-English spoken, 1 = English spoken). Both time varying (e.g., family structure, maternal education) and invariant covariates (e.g., child gender), were used as appropriate. See Appendix B for descriptive statistics of the covariates.

**Selected sample characteristics.** In the weighted sample used for this study, 65% of the children were living in two-parent households. Nearly 14% of the children's mothers did not complete high school; 56% had a high school degree; 21% attained a bachelor's or higher degree. About 21% of the participating families had household incomes below the poverty threshold. Most of the children in the study (88.2%) were attending a public school at the time of assessment.

### **Plan of Analyses**

The analyses for this dissertation proceeded in three stages, each tackling one of the three study aims outlined in Chapter 1. The bulk of analyses focused on identifying trajectories of internalizing and externalizing symptoms, their co-occurrence/co-development, and their interrelations.

In the *first stage*, longitudinal growth curve modeling was applied to ECLS-K to elucidate how the full range of internalizing and externalizing behaviors play out over time in conjunction with each other and when the give and take between these trajectories is most pronounced. Kindergarten, 1st, 3rd, and 5th grade internalizing/externalizing ratings were used to estimate children's behavioral trajectories. The purpose was to investigate the average trajectories for internalizing and externalizing symptoms. The function took the form (Singer & Willett, 2003)

$$Y_{it} = \alpha_0 + B_1 \text{Age}_{it} + B_2 \text{Age}_{it}^2 + \epsilon$$

where  $Y_{it}$  is a latent variable which characterizes the level of internalizing or externalizing symptoms for participant  $i$  at time  $t$ .  $\text{Age}_{it}$  is participant  $i$ 's age at time  $t$  and  $\epsilon$  is a disturbance assumed to be normally distributed. The model's coefficients,  $B_1$ , and  $B_2$ , determined the average shape of the trajectory, and  $\alpha_0$  is the intercept. For this type of analysis, the intercept and the linear slope are assumed to take on a normal distribution (Singer & Willett, 2003). The residual intercept and linear slope were used to suggest whether there is variability in terms of the initial levels of the variables and in terms of change over time. Next, group modeling techniques were used to test group differences (e.g., by race) in the intercept and slope of internalizing and externalizing trajectories. Lastly, to get at inter-relations, I simultaneously estimated growth curves for internalizing and externalizing behaviors. Specifically, whether the intercept and slope of one growth curve predicted the intercept and slope of the other was examined. Growth curve models were estimated in Mplus, which employed full information maximum likelihood to estimate missing data and avoid the common biases associated with listwise deletion (L.

Muthen & Muthen, 1998-2010). Model fit was evaluated using comparative fit index and the root mean square error of approximation.

Given that the ECLS-K employed a multistage probability sample design to select a nationally representative sample of children attending kindergarten in 1998–99 (in the base year the primary sampling units (PSUs) were geographic areas consisting of counties or groups of counties; the second stage units were schools within sampled PSUs; the third- and final-stage units were children within schools), sample weight was used to account for the ECLS-K design effects (e.g., clustering of cases within units, attrition, oversampling). Children who participated in the spring-round data collection in kindergarten, first grade, third grade, fifth grade and eighth grade were used for the current study. Mplus also used a robust standard error estimator in order to account for the clustering of observations within schools in the ECLS-K. For more information regarding the ECLS-K’s sample design and implementation, please refer to the ECLS-K’s user’s manual, Chapter 4.

Although conventional growth modeling approaches, such as latent growth curve modeling, have allowed researchers to successfully analyze many developmental questions using longitudinal data, these methods have their short-comings. First, they usually assume that individuals come from a single population and that a single growth trajectory can adequately approximate an entire population under study. Second, these methods also assume that covariates that affect the growth factors influence each individual in the same way. Yet, the assumption that everyone is increasing (or decreasing) in any form of problematic behaviors is likely untenable. The reality is that

many people will never exhibit problematic behavior; others will always be under the radar, while some will grow out of or into certain problematic behaviors as they age. Both theoretical frameworks and existing studies on problematic behaviors also recognize that these developmental trajectories vary greatly across population subgroups both in terms of the level of behavior at the outset of the measurement period and in the rate of growth and decline over time (see Moffitt, 1993; Nagin, 1999; Nagin & Tremblay, 2001; Patterson, DeBaryshe, & Ramsey, 1989). Despite their short-comings, analyses in stage one of this study will serve as one method to examine the trajectories of behavior across time. Still, more needs to be done.

To address the limitations of conventional growth modeling approaches when studying problematic behaviors in a population, the next set of analyses introduced growth mixture modeling (GMM) strategy as another approach to study internalizing and externalizing behaviors, and their co-occurrence. GMM relaxes the assumption that all individuals drawn from a single population have common growth parameters and allows for differences in growth parameters across unobserved subpopulations. This is accomplished using latent trajectory classes (i.e., categorical latent variables), which allow for different groups of individual trajectories to vary around different means. The results are growth models for each latent class, each with unique estimates of variances and covariate influences (B. Muthen & Muthen, 2000).

A special type of GMM is latent class growth analysis (LCGA), performed in Mplus (B. Muthen, 2004). The focus of LCGA is on the associations among individuals, and the goal is to classify individuals into distinct groups or categories based on

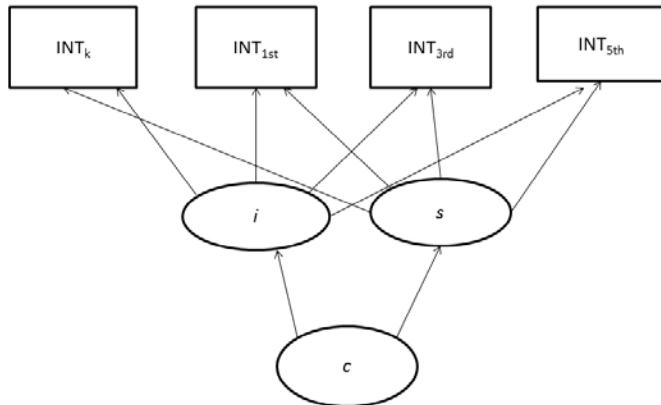
individual response patterns so that individuals within a group are more similar than individuals between groups. Hence, in LCGA modeling, the variance and covariance estimates for the growth factors within each class are assumed to be fixed to zero. By this assumption, all individual growth trajectories within a class are homogeneous. In terms of computation, it was easy to specify in Mplus and the zero constraints on the variance estimates allowed for faster model convergence. From there, LCGA would identify the shape of trajectory for each group and the proportion of the population that constitute each subgroup.

Similar to hierarchical and latent curve modeling, a polynomial relationship was used to model the association between an attribute, in this case, internalizing and externalizing symptoms (and their co-occurrence), and age. The function takes the form (Nagin, 1999):

$$Y_{it}^j = B_0^j + B_1^j Age_{it} + B_2^j Age_{it}^2 + \varepsilon$$

where  $Y_{it}^j$  is a latent variable which characterizes the level of internalizing or externalizing symptoms for participant  $i$  at time  $t$  given membership in group  $j$ .  $Age_{it}$  is participant  $i$ 's age at time  $t$ ,  $Age_{it}^2$  is the square of participant  $i$ 's age at time  $t$ , and  $\varepsilon$  is a disturbance assumed to be normally distributed with zero mean and constant variance. The model's coefficients,  $B_0^j$ ,  $B_1^j$ , and  $B_2^j$ , determine the shape of the trajectory. The coefficients are superscripted by  $j$  to denote that they are not constrained to be the same across  $j$  groups and are free to vary, which allows for cross-group differences in the shape of developmental trajectories. The absence of constraints, therefore, captures mixtures of developmental trajectories in the population and also allows each group's trajectory to

have a distinct shape. Furthermore, the model does not permit individual variability in the intercepts or slopes within classes, and children within a class share a single trajectory of change over time, as previously mentioned. The diagram depiction below is another way to demonstrate the LCGA approach (B. Muthén, 2004). The intercept and linear slope terms are based on the different time points of internalizing or externalizing symptoms. The intercept indicates the average of problem behavior when children enrolled in kindergarten. Furthermore, as shown in the figure, the intercept and slope were to be used to classify children in the sample into different classes.



The LCGA model estimation in Mplus results in two outputs. The first is the shape of the trajectory for each group, which is based on the parameter estimates. The second is the posterior probability of group membership, which estimates the probability of each child in the sample belonging to each of the trajectory groups. One caveat to keep in mind is that Mplus does not automatically specify the number of distinct groups that

exists in a dataset. Researchers typically begin with specifying a single-class growth model, and then move along into specifying more latent classes based on model fit indices, the research question on hand, and the existing literature on the subject.

Assuming that there are multiple trajectory groups, how does one determine how many there are? Objective criteria for doing so have been a matter of controversy. For some time, methods for determining the number of components in a GMM consisted of finding the model with the smallest Bayesian information criteria (BIC) value and a significant Lo, Mendell, and Rubin (Lo, Mendell, & Rubin, 2001) likelihood ratio test (LMR-LRT) statistic. More recently, however, further simulations have demonstrated that, although the BIC performed the best among the information criteria-based indices, the bootstrap likelihood ratio test (BLRT) proved to be a better indicator of classes across all of models considered. Instead of assuming that the difference distribution follows a known distribution (e.g., chi-square), the BLRT empirically estimates the difference distribution. The BLRT provides a  $p$ -value that can be used to test a  $k-1$  class model against a  $k$ -class model. In this sense the BLRT can be interpreted like the traditional likelihood ratio test, only that bootstrap sample distribution replaces the chi-square distributional assumption. All of these fit indices are available in Mplus (L. Muthen & Muthen, 1998-2010).

For this study, I planned to use the LMR statistic and the BIC at first to determine model fit. The BIC is based on a maximization of a log likelihood function. If  $L$  is the maximized log likelihood,  $p$  is the number of free parameters in the model, and  $N$  is the number of cases, the BIC can be written as follows (Schwartz, 1978):

$$\text{BIC} = -2 \log L + p \log(N),$$

with a smaller value indicating a better fit. The BIC does a good job identifying the true model in large samples, but the BIC is biased in small samples by choosing models that are too simple (Barron & Cover, 1991).

In addition, because the BIC criterion tends to favor models with fewer classes by penalizing for the number of parameters, likelihood statistics based on the sum of chi-square distributions were used. The usual likelihood ratio chi-square difference test, however, can only be applied to compare nested models with the same number of classes, so that this type of test cannot be applied to mixture modeling with different number of classes (Lo, et al., 2001; B. Muthen, 2004). Lo, Mendell, and Rubin adjusted the likelihood ratio test in order to be used in mixture modeling, to compare models with different number of classes, and to enable the comparison of non-nested models. In the current study, therefore, the LMR fit statistic will also be used to compare mixture models with different number of latent classes. The LMR statistic tests  $k-1$  classes against  $k$  classes. Thus, it can be considered as a likelihood ration test between models with different number of latent classes. A significant chi-square value ( $p < .05$ ) indicates that the  $k-1$  class model has to be rejected in favor of the  $k$ -class model. A non-significant chi-square value ( $p > .05$ ) suggests that a model with one fewer class is preferred. For example, in the case where 2- and 3-class models are compared, the null hypothesis states that a random sample was drawn from a mixture distribution with two classes, and the alternative hypothesis states that the sample has been drawn from a mixture distribution with 3-classes.

Posterior probabilities would have provided another way to examine whether the classes in the final model are distinctive. Posterior probabilities determine the most likely class for each child. For a classification in a specific class to be reliable, children must have high posterior probabilities for belonging to a specific class and low posterior probabilities for belonging to the other classes. In addition, the entropy value, which is a standardized summary measure based on the posterior class membership probabilities derived from each model, can also be used to judge the classification accuracy of placing participants into classes and the degree of separation between classes (B. Muthen & Muthen, 2000). Entropy can be represented as follows (Ramaswamy, Desarbo, Reibstein, & Robinson, 1993):

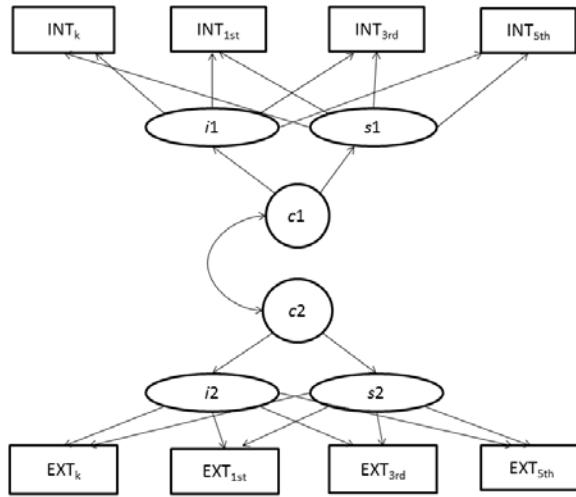
$$E_k = 1 - \left( \sum_i \sum_k - p_{ik} \ln p_{ik} \right) / n \ln k$$

Where  $p_{ik}$  is the estimated conditional probability for individual  $i$  in class  $k$ , and  $n$  is the sample size. Entropy can range from zero to one, and a higher entropy value is preferred because it indicates clear classification and greater power to predict class membership. Furthermore, entropy is a function of the number of classes, which suggest that a model with as many classes as observations would have an entropy value of one.

Once internalizing and externalizing groups/classes are identified with LCGA, those groups can be combined in a parallel process model in Mplus to investigate for joint probabilities between the two types of behavioral symptoms (B. Muthen & Muthen, 2000; Nagin & Tremblay, 2001). The parallel process model, which is a generalization of LCGA, provides joint probabilities that assign membership in trajectory groups across behaviors (Nagin & Tremblay, 2001). The joint probabilities place each child in either a

co-occurring group or a group characterized as higher in one behavior and lower in the other. In Mplus, the intercept and liner slope terms derived from the final latent classes for internalizing and externalizing symptoms specify different classes. For example, to specify a chronic co-occurring group, the intercept and slope terms from the high internalizing group and the intercept and slope terms from the high externalizing group can be combined to specify one combined class. Children who share common growth parameters for both high internalizing and externalizing symptoms, therefore, would be identified in the chronic co-occurring class.

Thus, the parallel process model is based on the same principles as LCGA and assigns group membership taking into account longitudinal change over time (B. Muthen & Muthen, 2000). The diagram depiction below demonstrates how this approach works:



After identifying the classes based on the intercept and slope terms for internalizing and externalizing symptoms, the same growth parameters were to be used to combine the different classes derived for internalizing and externalizing symptoms (B.

Muthen & Muthen, 2000). As shown in the diagram above, this model uses all longitudinal measurements and links the two behaviors of interest across the entire period of observation. Furthermore, this type of procedure is preferred over simple cross-tab analysis because it is based on latent classes and also provides posterior probabilities (B. Muthen & Muthen, 2000; Nagin & Tremblay, 2001), which can be used to measure entropy and also to indicate which groups exhibit low probability. In short, this approach enables the identification of specific groups of individuals based on the combined level of problematic behaviors they exhibit over time. Cross-tab analysis is part of the plan to be performed to compare results.

Once latent classes for pure internalizing and externalizing symptoms and co-occurring symptoms have been identified, the plan was to move to *stage two* of analyses and investigate how variations in pure (individual) trajectories and their co-occurrence might vary across segments of the population defined by gender, race/ethnicity, immigration status, and race/ethnicity in tandem with immigration. To do so, the latent classes (both pure and co-occurring) serve as endogenous variables, each regressed on gender, race/ethnicity, and immigration status dummy variables and control variables (basic regression models). That is, for example, I cross-classify race/ethnicity and immigration status to test possible generational differences (1<sup>st</sup> and 2<sup>nd</sup> vs. third/native-born) within each racial/ethnic group. First, I use non-Latino/a Whites as the reference category for race/ethnicity. Then, I rotate the reference category with each racial/ethnic and immigration status group in order to get a full set of all possible pair-wise

comparisons for whether differences among all categories are significant or not. The plan was to examine group differences by looking at the significance of coefficients.

To further explore aim 2, I also look at the pieces of a trajectory. The motivation for doing so is that, although the growth curve approach may be effective at giving the general picture of how trends in two behaviors inter-relate over time, it provides less insight into timing. At what point in development does one behavior most factor into the other? To answer this question, I draw on cross-lagged modeling. In the structural equation modeling framework in Mplus, internalizing behavior at each point predicts externalizing behavior and internalizing behavior at the following time point while externalizing behavior at each time point was predicts internalizing behavior and externalizing behavior at the following time point (see Curran, Stice, & Chassin, 1997 e.g.). Results can then identify at which point internalizing behaviors predict a subsequent increase in externalizing behaviors (and vice versa), at which time point such predictions are strongest, and whether there is a consistent developmental trend in such prediction (e.g., steadily increasing). In addition to testing unconditional models, I also test models with covariates. From there, I dissect the model further and look at group differences. To further explore diversity in the link between internalizing and externalizing symptoms, interaction models with demographic factors and symptom levels were also estimated. Admittedly, these models do more to identify when different behaviors could exacerbate each other than to identify when both behaviors were simultaneously at high levels, but the former information is important for understanding timing. It can shed light on whether internalizing behavior is at the root of externalizing

behaviors during the transition to school and, in doing so, suggest the importance of targeting early internalizing behaviors as a way of curtailing later intensification of externalizing behavior.

The next set of models in *stage three* tested the association between identified trajectories/pathways of internalizing and externalizing symptoms (individually and combined) when the participants were in elementary school and their academic functioning (math and reading assessments) when they were in eighth grade. One approach is to use the identified pure and co-occurring trajectories of internalizing and externalizing symptoms generated in LCGA as predictors of the eighth grade test scores.

An alternative approach is to generate categories of pathways of internalizing and externalizing symptoms by combining starting points and over-time change of internalizing and externalizing symptoms across the elementary school years. Following Crosnoe and Huston (2007), first, I can categorize children according to whether they had low ( $1\text{ SD}$  below the mean), medium (the mean), or high ( $1\text{ SD}$  above the mean) internalizing symptoms when they entered elementary school. Second, I can categorize children according to whether they had substantial decreases ( $1\text{ SD}$  below the mean) in internalizing symptoms between kindergarten and fifth grade, stability (the mean) in internalizing symptoms during this period, and substantial increases ( $1\text{ SD}$  above the mean) in internalizing symptoms during this period. Third, I cross-tabulate these two sets of categories to create the final group of nine categories representing pathways of levels of internalizing symptoms. Fourth, I repeat the same steps for externalizing symptoms. Performing those steps results in mutually exclusive categories for internalizing and

externalizing symptoms; for example, low, decreasing internalizing/externalizing; low, stable internalizing/externalizing; low, increasing internalizing/externalizing; medium, decreasing internalizing/externalizing; medium, stable internalizing/externalizing; medium, increasing internalizing/externalizing; high, decreasing internalizing/externalizing; and high, stable internalizing/externalizing. Fifth, I can then regress 8<sup>th</sup> grade math and reading assessment scores on these internalizing and externalizing pathways, controlling for kindergarten assessment scores and socio-demographic factors.

To test the combined contribution of early internalizing and externalizing trajectories on participants' 8th grade academic functioning, I combined the internalizing symptom trajectory dummy variables described above with the externalizing symptom trajectory dummy variables to create combined longitudinal symptom profiles of internalizing/externalizing symptoms pathways and then used those profiles (collapsed into a smaller number of meaningful categories) to predict 8<sup>th</sup> grade academic functioning. From there, I estimated interaction models to explore gender, racial/ethnic, and immigration-related differences in the links between elementary social adjustment and middle school academic functioning. In addition, group modeling techniques were used to investigate demographic diversity in children's trajectories of individual and combined symptom profiles on reading and math scores.

## **Chapter 4: Results**

Table 1 reports the means and standard deviations for internalizing and externalizing symptoms from kindergarten through fifth grade. These statistics are reported for the whole sample, by race, by immigrant status, by race/immigrant status, and by gender. Table 2 reports the bivariate correlations between internalizing and externalizing symptoms across the waves.

Overall, these descriptive statistics reveal a low incidence of internalizing and externalizing symptoms in the sample as well as small incremental changes over time and small differences across groups. The large and heterogeneous sample of ECLS-K likely reduces the magnitude of levels, changes, and differences, but these patterns also indicate that children are doing well in general, which is good in terms of policy and practice. Still, they could pose analytical challenges.

To look closer at these descriptive statistics, scores on both internalizing and externalizing scales are between 1 and 2 across waves and groups. Recall that a 1 on these scales indicated that teachers *never* observed signs of internalizing or externalizing symptoms on a particular child and that a 2 indicated that teachers *sometimes* did, with a 3 being *often* and 4 being *very often*. The average number of symptoms tended to increase with age, but only slightly. For internalizing symptoms, this increase was fairly steady over time. On average, the magnitude of change in internalizing between the lowest (kindergarten) and high (fifth grade) value was .09 (in the whole sample), which represented 5.92 % of change on the kindergarten internalizing scale. For externalizing, the increase peaked in third grade and leveled off in fifth. The change in externalizing

symptoms between the lowest (kindergarten) and high (third grade) value was .10 (in the whole sample), which represented 5.73% of the total change on the kindergarten externalizing scale.

When looking at gender differences, on average, boys scored higher on both internalizing and externalizing symptoms from kindergarten through fifth grade than girls. The magnitude of difference between boys and girls in internalizing symptoms ranges from .02 when the children were in kindergarten to .05 when boys and girls were in fifth grade, with boys being higher in levels. The magnitude of differences in externalizing ranged from .25 in first grade to .26 in fifth grade between boys and girls, with boys being higher in levels.

When looking at the averages by race, children of Asian backgrounds scored the lowest and children of Black backgrounds the high on both forms of symptoms across waves. The magnitude of this Asian-Black difference in internalizing ranged from .04 in first grade (2.68% of a difference, with Blacks being higher in levels) to .15 in fifth grade (9.87% of a difference, with Blacks being higher in levels). The magnitude of this difference in externalizing ranged from .20 in kindergarten (13.25% of a difference, with Blacks being higher in levels) to .41 in third grade (27.63% of a difference, with Blacks being higher in levels). As for immigration, differences fluctuated across waves for internalizing symptoms (e.g., children of U.S.-born parents did better when they were in kindergarten but worse when they were in fifth grade). Immigration-related differences in externalizing symptoms, however, always pointed to more symptoms for children of U.S.-born parents than children of immigrant parents. For example, the magnitude of

difference in kindergarten, third, and fifth grades was .05, with children of U.S.-born parents having higher levels. When immigration status was taken into account in tandem with race/ethnicity, children of Asian immigrants fared the best, on average, across waves on both forms of symptoms while children of Black immigrants fared the worst. The magnitude of this difference between the two groups in internalizing symptoms was .16 (10.60% of a difference, with children of Black immigrants having higher levels) in third grade and .51 (35.17 % of a difference, with children of Black immigrants having higher levels) in externalizing symptoms when the children were in fifth grade.

### **Externalizing and Internalizing Trajectories**

To further investigate the average trajectories of externalizing symptoms, growth curve models were estimated. Model fits were good, with CFI = 0.974 and RMSEA = .029. Result trends for the whole sample were similar to those in Table 1.

For externalizing symptoms, the mean of the intercept was 1.68 ( $SE = .014, p < .000$ ), and the mean of the slope was .17 ( $, SE = .005, p < .001$ ). These values indicate a low average level of externalizing symptoms in kindergarten that slowly increased from grade to grade during the time frame considered. The rate of change over time was so low that many years of change would have to occur before the average child moved from the 1 to 2 category on the scale. The variance estimates for both intercept and slope were statistically significant, meaning that children in the sample varied significantly around the mean values of the intercept and slope. That variation could map onto systematic group differences (e.g., by gender, race/ethnicity, or immigration) in intercept and slope.

Results were similar for internalizing symptoms ( $CFI = 0.981$  and  $RMSEA = .015$ ). The mean value for the intercept was  $1.58$  ( $SE = .011$ ,  $p < .000$ ), indicating a low level of symptoms at the start of school. The slope mean was  $.034$  ( $SE = .005$ ,  $p < .001$ ), indicating a shallow increase across grades. This increase, however, was somewhat smaller than the rate of change for externalizing symptoms. Again, variance estimates were significant, leaving open the possibility of demographic differences in the functional form of the growth curves for internalizing symptoms.

A major aim of this study was to understand how trajectories of internalizing and externalizing symptoms varied across racial/ethnic and immigration groups. Consequently, I turned to group modeling to simultaneously estimate intercepts and slopes across the eight race/immigration categories and test for significant group differences in the means and variances of the latent factors. Unfortunately, the models did not terminate normally due to complications with estimating the slope. Similar problems occurred when trying to estimate the connections between internalizing and externalizing growth curve models; i.e., whether the intercept of one growth curve predicted the slope of the other and vice versa. Again, the slope appeared to be difficult to estimate in relation to other factors, for the whole sample and then especially across groups.

In the next step of analyses, I turned to latent class growth analysis (LCGA) to further explore children's internalizing and externalizing trajectories. In doing so, I had hoped to identify different groups of children based on their unfolding internalizing and/or externalizing symptoms, including those who appeared to be internally consistent (e.g., chronically high, consistently low) and those who appeared to be internally

inconsistent (e.g., declining, increasing) across elementary school. Unfortunately, those models did not converge through multiple specifications. The slope terms once again appeared to be the problem. The amount of change in symptoms over time within the sample did not seem to be sufficient to support these more complex analyses.

Thus, two key components of this dissertation (cross-effects, diversity) could not be adequately considered with the two growth analysis in SEM. The issue seems to be the combination of low level and high stability in both types of symptoms, as illustrated by both the descriptive statistics and the initial growth curves, which makes modeling relations between changes in each kind of symptom—and detecting group differences in these changes and their relations—difficult.

### **Time-Specific Connections between Internalizing and Externalizing Symptoms**

In the next set of analyses, I moved away from latent growth modeling and turned to structural equation modeling (SEM) in Mplus to further examine the association between internalizing and externalizing symptoms across four waves. The difference was that, instead of looking at relations between two general trajectories (as in growth curve modeling), I looked at relations between time-specific measures of internalizing and externalizing symptoms used to make up those trajectories. In SEM, internalizing behavior at each point was used to predict externalizing and internalizing behavior at the following time point while externalizing behavior at each time point was used to predict internalizing behavior and externalizing behavior at the following time point.

First, I estimated a cross-lagged model in which only the race/immigration dummy variables (seven groups, with native-born Whites as the omitted reference

category) were used to predict each of the time-specific measures of internalizing and externalizing symptoms, with, of course, each  $t$  internalizing variable predicted by the  $t-1$  externalizing variable and vice versa. Figure 1 depicts this model free of any coefficients or statistics.

The goal was simply to examine how internalizing and externalizing symptoms differed across groups defined by race and immigration and how each was related to the other concurrently and over time. In doing so, concurrent associations between the two forms of symptoms at the same wave (e.g. correlations between kindergarten internalizing and kindergarten externalizing), cross-lagged associations between the two forms of symptoms over time (e.g., kindergarten internalizing to first grade externalizing), and autoregressive associations (e.g., kindergarten internalizing to first grade internalizing) were estimated..

The fit of this estimated model to the data was evaluated using the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean residual (SRMRs). Good model fit is represented by CFI values of 0.95 or above, RMSEA values of 0.06 or below, and SRMR values of less than or equal to 0.08 (Hancock & Freeman, 2001), with 0.90 representing the lower bound for an acceptable CFI value and 0.08 representing the upper bound for an acceptable RMSEA value (Quintana & Maxwell, 1999). According to the fit indices, model fit was good for this particular estimated model (CFI = .965, RMSEA = .029, SRMR = .022).

The results of this cross-lagged model are presented in Figure 2. In this figure, I only present the coefficients for the paths among the internalizing and externalizing

variables. I have not included coefficients for the race/ethnicity and immigration status variables just yet in order to ease the presentation. I will get to those coefficients shortly.

In this model, all *autoregressive* associations for both internalizing and externalizing symptoms—any link between a symptom in one grade and the same symptom in the next time grade—were significant and positive, as expected. As in all prior analyses, the two forms of symptoms were highly stable over time. Similarly, *concurrent* associations between the two forms of symptoms—any link between internalizing and externalizing symptoms in the same grade—were significant and positive in all four waves. Within a grade period, how a child rated on the internalizing scale was related to how she or he rated on the externalizing scale. The two symptoms seemed to go together at any one point.

As for *cross-lagged* associations, internalizing symptoms and externalizing symptoms appeared to be related across grades and not just within grades. For internalizing symptoms predicting externalizing symptoms at the next grade, the associations were significant and negative across grades. These results suggested that children's levels of internalizing and externalizing symptoms had an inverse association across grades, with internalizing symptoms at a prior grade putting the child at lower risk for externalizing symptoms in the next grade. This cross-grade pattern was opposite from the within-grade correlation.

For externalizing predicting internalizing symptoms at the next grade, the associations were significant and positive across grades. These positive associations indicated that children who started off with externalizing symptoms were at greater risk

for developing internalizing symptoms at the next time of point of study. This cross-grade period was similar to the within-grade correlation.

Thus, there appeared to be two different stories going on in the cross-lagged associations. At the start of kindergarten, internalizing symptoms seemed to protect children from developing externalizing symptoms when they attended first grade. Children's externalizing symptoms at the start of formal school, however, put them at greater risk for developing internalizing symptoms at the following time point.

### **Diversity in Internalizing and Externalizing Symptoms**

Next, I investigated racial/ethnic and immigration status differences within the same model. The goal was to determine which group(s) was most at risk for developing or exhibiting internalizing/externalizing symptoms at each wave. To do so, I examined the unstandardized coefficients of each group for internalizing and externalizing symptoms at each wave and compared the coefficients to each other. Table 2 presents the coefficients for the seven race/ethnicity and immigration status variables (with native-born Whites the reference group) for internalizing symptoms and externalizing symptoms in each grade. Of note is that I estimated this model multiple times, rotating the reference group for the race/ethnicity and immigration status variables from model to model so that each group served as the reference group (only selected model results are presented in Table 3). For example, in one model, children of native-born Blacks served as the reference, and in another the children of Hispanic immigrants did. Once all pair-wise comparisons were made, I cataloged all of the results in order to get a better sense of

where each group “ranked” on the two symptom scales in each grade—in terms of absolute effect sizes and significant relative differences.

These patterns were highly complex. In fact, they were too complex for easy discussion in detail. As a result, I decided to summarize across the models and make some broad generalizations about what they suggest:

- In *kindergarten*, children of Asian immigrants had the lowest levels of internalizing and externalizing symptoms, while children of native-born Asians had the highest levels of internalizing symptoms and children of native-born Blacks had the highest levels of externalizing symptoms.
- In *first grade*, children of native-born Asians and Hispanic immigrants fared the best on internalizing symptoms and those of native-born Whites fared the worst, while children of Hispanic and Asian immigrants fared the best on externalizing symptoms and children of native-born Asians fared the worst.
- In *third grade*, children of Hispanic and Asian immigrants had the lowest levels of both internalizing and externalizing symptoms, while children of White and Black immigrants and children of native-born Blacks had the highest levels of both internalizing and externalizing symptoms.
- In *fifth grade*, the children of native-born Whites and Black fared the worst on both internalizing and externalizing symptoms, while children of native-born Asians fared the best on externalizing symptoms.

Overall, there was no specific racial/ethnic or immigrant effect (e.g., sometimes children of Asian immigrants fared well, but their native-born counterparts did not). In general, children of Asian and Hispanic immigrants tended to have lower levels of internalizing and externalizing symptoms across the four waves, and children of native-born Whites and Blacks had the high levels. The other racial/ethnic and immigration status groups fell in between. These patterns referred to grade-specific differences in symptoms, but, given the autoregressive and cross-lagged relations among symptoms across grades, they also speak to divergence in symptoms across groups and across time.

Looking at race/ethnicity and immigration status together has many advantages in that it gives a finer-grained picture of population diversity. At the same time, this detailed approach might obscure more general racial/ethnic and immigration-related patterns. As a result, I followed up with examination of differences in internalizing and externalizing symptoms by race/ethnicity *and* immigration status with separate examinations of differences in internalizing and externalizing symptoms by race/ethnicity (regardless of immigration status) and differences in internalizing and externalizing symptoms by immigration status (regardless of race/ethnicity).

First, I tested the same model from Figure 1, including only race/ethnicity as predictors of internalizing and externalizing symptoms in each grade. There were three comparison groups (Blacks, Latino/as, and Asians), with Whites as the reference group. Table 4 presents partial results of this model, which had good fit according to the aforementioned criteria. Once again, I estimated this model multiple times, rotating the reference group for the race/ethnicity variables from model to model so that each group

served as the reference group (only selected model results are presented in Table 4). For example, in one model, children of Black parents served as the reference, and in another the children of Hispanic parents did. This cataloging of significant differences across the different models allowed several generalizations to be made:

- In *kindergarten*, the risk for developing or exhibiting internalizing symptoms was the same for all four racial/ethnic groups, but, for externalizing symptoms, Asians were lowest and Blacks the highest.
- In *first grade*, Blacks appeared to have the lowest levels of internalizing symptoms but the highest levels of externalizing symptoms, and the other three groups were about the same.
- In *third grade*, Hispanics, followed by Asians, had the lowest levels of internalizing symptoms while Asians had the lowest levels of externalizing symptoms, with children of Blacks high on both forms of symptoms.
- In *fifth grade*, Whites had the highest levels of internalizing symptoms, with the other groups being similar to each other, and Hispanics and Asians had the lowest externalizing symptoms, with Blacks higher.

In general, children of Black parents were at greater risk for developing and/or exhibiting externalizing symptoms compared to other groups of children when they were in elementary school. As the cross-lagged relationships indicated, the significant and positive association between externalizing at one time point and internalizing symptoms at the next time point could put this group of children at greater risk for developing

internalizing symptoms at a later time point. Children of Asian parents appeared to have the lowest risk of developing and/or exhibiting either form of symptoms, with children of Hispanic and White parents falling in between Asians and Blacks.

Next, I re-estimated the basic cross-lagged model from Figure 1, this time substituting the set of dummy variables for race/ethnicity with a binary marker of immigration status (1 = children of immigrant parents, 0 = children of native-born parents) to predict internalizing and externalizing symptoms in each grade. Table 4 presents partial results from this model, which had good fit and the same basic autoregressive and cross-lagged relations as the original model in Figure 1.

As there were only two (rather than four or eight) comparison groups, the model presented in Table 5 was the only one estimated; i.e., I did not have to run multiple models while rotating reference groups. In general, the results showed that, from kindergarten through third grade and for both internalizing and externalizing symptoms, the immigrant and non-immigrant groups were very similar to each other. In fifth grade, however, a difference emerged. Children of immigrant parents were rated lower than their peers by teachers on both forms of symptoms.

Lastly, I re-estimated the basic cross-lagged model from Figure 1, this time substituting the set of dummy variables for race/ethnicity with a binary marker of gender (1 = girls, 0 = boys) to predict internalizing and externalizing symptoms in each grade. Table 6 presents partial results from this model, which had good fit and the same basic autoregressive and cross-lagged relations as the original model.

Again, as there were only two (rather than four or eight) comparison groups, the model presented in Table 5 was the only one estimated. In general, the results showed that from kindergarten through fifth grade boys and girls were very similar in their levels of internalizing symptoms. In terms of levels for externalizing symptoms, however, girls were much lower than boys from the start to the end of elementary school.

None of the models presented so far—whether including race/ethnicity and immigration status separately or combined as predictors of internalizing and externalizing symptoms in each grade—took into account other socioeconomic or demographic factors that could be associated with both race/ethnicity and immigration status on one hand and internalizing and externalizing symptoms on the other. Thus, I also re-estimated each set of models to include the standard list of covariates described in the prior chapter. See Appendix B for a list of covariates and sample descriptive statistics for the covariates.

The newly estimated models (for gender, race, immigration status, and race and immigration) with the added covariates were similar to their respective unconditional forms in many ways. For instance, adding covariates to the model in Figure 2 did not change the significance levels (with regard to the  $p$  values) for all estimated pathways (concurrent, autoregressive, and cross-lagged) (see Figure 3). As for the magnitude of  $B$  coefficients for the estimated pathways, the values only changed very slightly for all pathways, with the  $B$  coefficients being somewhat stronger in the unconditional models, as expected. Where we saw major differences between the conditional and unconditional models involved the demographic dummy variables (gender, race, immigration status, and race and immigration). The observed differences did not follow any particular pattern

(results not reported). For example, some demographic groups were significant in the unconditional model, but not in the conditional model (and vice versa). In addition, the magnitude of *B* coefficients for the demographic dummy groups also varied between the unconditional and their respective conditional models, following no particular pattern. In general, results from the conditional models showed that certain covariates (e.g., gender, family structure, maternal education) mattered more (by their significance level) for children's internalizing and/or externalizing symptoms than others (e.g., family poverty, household size). Lastly, as already mentioned, the addition of covariates to prior internalizing or externalizing symptoms in predicting following wave symptom outcomes certainly influenced the effects that demographic factors (gender, race, immigration status, and race and immigration) had on those symptom outcomes. See Appendix C for a sample list of covariates and their *B* Coefficients (*b* Coefficients) for respective models in Tables 3 to 6.

### **Diversity in Links between Internalizing and Externalizing Symptoms**

The cross-lagged models discussed above looked at cross-grade relations among internalizing and externalizing symptoms and then incorporated race/ethnicity and immigration status by looking at differences in each grade-specific measure of internalizing and externalizing symptoms. Doing so revealed a great deal about how such symptoms differ across groups at specific points in the educational career but said little about how groups might differ in inter-relations between internalizing and externalizing symptoms across grades.

To explore this other kind of diversity, various sets of interaction terms were added to the original cross-lagged model. I created interaction terms for race/ethnicity x internalizing symptoms at one grade to predict externalizing symptoms in the next grade and then created interaction terms for race/ethnicity x externalizing symptoms at one grade to predict internalizing symptoms in the next grade. I then did the same for immigration status (replacing race/ethnicity) and gender. Doing so with the combined race/ethnicity and immigration status dummy variables (as opposed to race/ethnicity and immigration separately) was not easily feasible given the extensive parameters involved. Estimating one such model was attempted, but the model was unidentifiable as suggested by a warning message in the Mplus program. An interaction model with gender x internalizing/externalizing symptoms was also attempted without success. In that particular model, several regression coefficients were 1.000 with very small SEs and large Z-scores. After having consulted with the creators of the Mplus program and looked into why those coefficients might become 1.000, it was suggested to me that the model tested might be empirically non-identified.

Starting off with the race/ethnicity-focused model (see Table 7 for main effects and Table 8 for interaction effects) there were several significant interactions, suggesting racial/ethnic variations in how internalizing and externalizing symptoms were related over time (not just racial/ethnic differences in internalizing and externalizing symptoms on their own). To interpret these interaction terms, I calculated the predicted odds of the outcome based on selected values of race/ethnicity and the prior symptom. As one example, Figure 4 depicts the interactions between Asian status (vs. White) x

internalizing symptoms in first grade (+ or – 1 standard deviation from the mean) predicting externalizing symptoms in third grade. It shows that the tendency for internalizing symptoms to protect against later externalizing symptoms—seen in the original cross-lagged model—only held for White children. For Asian children, higher levels of internalizing symptoms tended to lead to greater externalizing symptoms. As a result, the disparity in externalizing symptoms between White and Asian children (with Asian children lower) shrunk as internalizing symptoms earlier on in school increased. The other significant interactions in the model (not shown in graphical form) showed a similar pattern, with the apparent protective effect only occurring for whites in the early grades and not for the minority groups.

More interactions were seen with first grade externalizing symptoms predicting internalizing symptoms in third grade. Figure 5 depicts the interaction between Black status (vs. White) x externalizing symptoms in first grade (+ or – 1 standard deviation from the mean) predicting internalizing symptoms in third grade. The tendency for early externalizing symptoms to predict more internalizing symptoms later on was only true for White children, but not for Black children. As a result, the disparity in externalizing symptoms between White and Black children grew as prior internalizing symptoms increased. The same pattern—with externalizing symptoms serving as risk factors for White children more than children of color—was similar for Latino/a and Asian children too during the first grade-third grade window as well as when looking across groups during the kindergarten-first grade window (graphs not shown).

Next, I estimated the immigration-focused model for children's internalizing/externalizing symptoms across waves, including interactions between immigration status x  $t-1$  internalizing symptoms to predict  $t$  externalizing symptoms and interactions between immigration status x  $t-1$  externalizing symptoms to predict  $t$  internalizing symptoms. Only two interactions were significant (see Table 9 for main effects and Table 10 for interaction effects)—immigration status (1 = children of immigrants, 0 = children of U.S.-born parents) x kindergarten internalizing symptoms predicting first grade externalizing symptoms and immigration status x first grade internalizing symptoms predicting third grade externalizing symptoms. Again, I graphed the interaction effects for ease of interpretation. Figure 6 uses the latter to illustrate the basic pattern. The general protective effect of prior internalizing symptoms on later externalizing symptoms seen in the original cross-lagged model (Figure 2) only held for children of U.S.-born parents. The two symptoms did not seem to be associated with each other over time among children of immigrants. Thus, the immigration-related gap in externalizing symptoms shrunk as prior internalizing symptoms increased in the first grade-third grade window period.

For the most part, the tendencies for internalizing symptoms to protect against later externalizing symptoms and for externalizing symptoms to serve as a risk factor for later internalizing symptoms were most consistent among children from the most historically advantaged segments of the population (e.g., they tended to hold for White children and children of U.S.-born parents) rather than those from historically disadvantaged segments (e.g., children of color and children of immigrant parents).

## **Distal Outcomes**

The final aim of this dissertation shifted from a consideration of the factors underlying internalizing and externalizing symptoms (and their inter-relations) across elementary school to the implications of internalizing and externalizing symptoms in elementary school for academic experiences in middle school. The specific issue was whether children who followed different trajectories of internalizing and externalizing symptoms (individually and combined) during elementary school also had different levels of achievement scores in middle school.

The original plan was to use the categories of internalizing and externalizing trajectories (individually and co-occurring) generated from the LCGA analyses of K-5<sup>th</sup> grade data as predictors of standardized test scores in 8<sup>th</sup> grade. As already explained, the LCGA models did not converge, and so no such categories were created. As an alternative, I followed the lead of Crosnoe and Huston (2007) who created categorical variables of developmental and parenting trajectories based on standard deviation cut-points and cross-wave difference scores and used these categories to predict end-of-high-school coursework sequences. Here, I used standard deviation cut-points to identify low, medium, and high internalizing (and externalizing) symptoms in kindergarten—mimicking the intercept in latent growth curves. I then estimated difference scores by subtracting the fifth grade internalizing (and externalizing) value from the kindergarten value and used the sign to identify increasing symptoms, decreasing symptoms, and no change—mimicking the slope in latent growth curves. From there, I cross-tabulated the two sets of variables to create nine mutually exclusive “trajectory” categories for

internalizing symptoms and then for externalizing symptoms (See Appendix D for the categories and sample sizes for each). For subsequent analyses, I combined the high, stable and high, increasing categories into one single category for both internalizing and externalizing symptoms. The reason behind this was that the sample sizes for high, increasing in both forms of symptoms were very small ( $n = 20$  and 23) and might not be meaningful in subsequent analyses and model interpretations. The result was a final set of eight mutually exclusive “trajectory” categories for internalizing symptoms and then for externalizing symptoms.

Once I have those categories, I went a step further and combined the eight mutually exclusive “trajectories” categories for internalizing symptoms and the eight for externalizing symptoms to create longitudinal profiles of combined internalizing/externalizing pathways. The interest here was *not only* to learn about how children who follow different and *individual* paths of internalizing or externalizing symptoms during elementary school go on to perform academically toward the end of middle school, *but also* to learn about how the combined contribution/effect of both early internalizing and externalizing pathways might have on later academic functioning. At the same time, these calculations and analyses also somewhat tapped into the co-development or co-occurrence of internalizing and externalizing symptoms, and allowed me to examine the interactive effects of these two symptom forms on later academic functioning. Combing the two sets of dummy variables for internalizing and externalizing pathways resulted in 64 profiles, many with small sample sizes (e.g., 34 of the 64 categories had sample sizes less than 50). Rather than running subsequent analyses with

all 64 categories, I focused on a specific set of seven profiles that are theoretically meaningful. See Appendix E for the seven profiles, sample sizes for each, and the categories that made up each profile. Categories (of the 64) that did not meet the criteria to be in the seven profiles were combined to form the “Other” profile, making a total of eight profiles. Descriptive statistics for the eight profiles are reported in Table 11 and Table 12.

With eight mutually exclusive categories for internalizing and externalizing symptoms, as well as the eight combined symptom profiles created, the next step was to use standard regression techniques to regress the 8<sup>th</sup> grade test scores on these dummy variables as well as kindergarten test scores and a host of socioeconomic and demographic controls. First, I ran regression analyses with the eight mutually exclusive categories for internalizing and externalizing symptoms on 8<sup>th</sup> grade outcomes (rotating the reference category) to capture pair-wise comparisons. Models were run separately with the internalizing trajectory dummy variables as the focal independent variables and with the externalizing trajectory dummy variables as the focal independent variables. Results are presented in Table 13 for internalizing trajectories and in Table 14 for externalizing trajectories.

In general, children with *high, stable* pathways (high starting symptoms followed by stable levels of symptoms throughout the elementary school years) scored the lowest on the 8<sup>th</sup> grade reading and math assessments. This pattern held for both the internalizing pathways and the externalizing pathways. Scoring just above this group were children with *low, increasing* pathways (for internalizing symptoms only) as well as children with

*medium, increasing* pathways (for externalizing symptoms only). Children with *low, stable* pathways (low starting symptoms that remained stable throughout elementary school) scored the highest on the 8<sup>th</sup> grade reading and math assessment. This pattern held for both the internalizing pathways and the externalizing pathways. Between these two poles—high/stable and low or medium/increasing on the low end of achievement, low/stable on the high end of achievement—patterns were harder to sort out overall. As seen in Tables 13 and 14, children with *medium, stable* pathways (for internalizing symptoms only) and *high, decreasing* pathways (for externalizing symptoms only) fell in between these poles.

In sum, these analyses first showed that children's starting levels of internalizing or externalizing symptoms on their own did not determine their 8<sup>th</sup> grade reading and math assessment scores. For instance, being in the low, increasing symptoms category was more of a disadvantage for children's later academic achievement than being in the low, stable symptoms category—children with the same starting position ultimately differed in achievement because their trajectories from that similar starting point differed. At the same time, high starting levels did not automatically put children at the greatest risk of academic failure. When symptoms decreased across elementary school, children did better academically in middle school than their peers with similar starting points in behavioral problems. Tables 13 and 14 also showed the ranking for internalizing and externalizing categories, for both math and reading assessment scores.

Next, I moved on to run analyses with the combined internalizing and externalizing profiles. As interesting as the mutually exclusive categories each on their

own on later academic functioning (as shown in Tables 13 and 14), I wanted to orient the main focus of this section on the combined symptom profiles. Following one of the overarching objectives of this study, the goal here was to learn more about the co-development of children's internalizing and externalizing symptoms, and the consequences these combined symptom profiles might have for later domains of development (in this case, academic functioning). In addition, focusing on the early interactive effects of internalizing and externalizing pathways on children's later academic functioning makes a much greater contribution to the extant literature than focusing on symptom trajectories individually for the two forms of symptoms. With the eight symptom profiles in hand, I ran three different sets of analyses, each set regressing end of middle school reading (and math) assessment scores on these combined symptom profiles, covariates/socio-demographic factors, and kindergarten reading (and math) test scores. For the first set of models, I tested one model focusing on gender, one focusing on immigration status, and another one focusing on race/ethnicity. For the second set of analyses, I tested models in the first set by adding interaction terms to each respective model. In the last set of analyses, I tested group differences by gender, by immigration status, and by race/ethnicity.

In the first set of analyses focusing on gender (see Table 15), girls did better than boys (reference group) in reading, but worse than boys in math. Only the low- and high-overall symptom profiles were significant in both the reading and math models, with those falling in the low-overall symptom profile performing better than those in the medium-overall (reference group) symptom profile, however, the story seemed to be

reversed with those in the high-overall symptom profile. In the model involving immigration status, the immigration dummy variable was not significant in either the model with reading or math scores. Similar to the model with gender, only the lowest- and high-overall symptom profiles were significant in both the reading and math models, with those in the low-overall symptom profile doing better than the reference group, and those in the high-overall symptom profile doing worse. In the model involving race, children of Black parents scored lower on both reading and math than children of White parents. Once again, only the lowest- and high-overall symptom profiles were significant in both the reading and math models, with those in the low-overall symptom profile doing better than the reference group, and those in the high-overall symptom profile doing worse.

For the most part, children of immigrants and children of U.S.-born parents were similar in their reading and math scores when other variables in the models were taken into account. Girls did better than boys in reading, but worse than boys in math. When race was a concern, children of White parents did better in both math and reading than children of Black parents. Children of Asian and Hispanic parents did not differ from those of White parents. In terms of combined symptom profiles, children in the medium-overall profile did better than those in the high-overall profile, but worse than those in the low-overall symptom profile, as expected.

In the second set of analyses, I added interaction terms to the models to investigate whether the link between children's assessment scores and their combined symptom profiles vary across the three focal demographic groups (gender, immigration,

and race). To explore this kind of diversity, I created interaction terms for gender x the eight combined symptom profiles (e.g., girls x low-overall symptom profile). I then did the same for immigration status and race (replacing gender). I did not test models with the race by immigration status groups because doing so would have been too taxing on the modeling.

Performing such analyses revealed four significant interaction effects (see Table 16 and Table 17). Three interactions were for girls, two for reading (gender x high overall, gender x low internalizing and high externalizing) and one for math (gender x low overall). I graph one gender interaction to give a better idea (see Figure 7). When boys and girls were in the medium-overall symptom profile their reading scores were very similar (only a 5 points difference, with boys on the lower end). Being in the high-overall symptom profile, however, was more detrimental for boys than for girls. In fact, reading scores for girls in the high-overall symptom profile were basically the same as those in the medium-overall profile, whereas, for boys, the difference was about 18 points drop for being in the high-overall category. In other words, the gender gap widened for boys and girls in the high-overall combined symptom profile. Other interactions indicated that girls tended to be more affected by having externalizing symptoms absent of internalizing symptoms.

Figure 8 depicts the interaction between immigration status (1=children of U.S.-born parents, 0=children of immigrants) and the high internalizing, low externalizing profile in the reading model, the only significant interaction for immigration status in either model. When children of U.S.-born parents and children of immigrants were in the

medium-overall profile, their reading scores were very similar. Being in the high internalizing, low externalizing profile was associated with stable reading scores' for children of U.S.-born parents, but declining scores for their immigrant counterparts. That is, the immigration gap widened for children in the profile marked by high internalizing and low externalizing levels of symptoms.

In general, therefore, boys and immigrant children appeared to be more negatively affected by risky profiles of over-time combined internalizing and externalizing symptoms. Worth noting, however, is that these significant interactions represented only a small fraction of possible interactions. Thus, the general conclusion is that the role of combined internalizing and externalizing symptoms in middle school achievement did not vary all that much across diverse groups of youth.

## **Chapter 5: Discussion and Conclusion**

This dissertation set out to accomplish the following aims: (1) to estimate trajectories of internalizing and externalizing behaviors (including their co-occurrence and dynamic interplay) from kindergarten through fifth grade in a representative sample of typically developing American children; (2) to explore variations in these trajectories across segments of the population defined by gender, race/ethnicity, and immigration status; and (3) to examine whether children's internalizing and externalizing pathways (individually and combined) in elementary school forecasted their 8<sup>th</sup> grade academic functioning, as well as possible group variation in those links.

To accomplish *Aim 1*, I intended to combine longitudinal growth curve and regression modeling to elucidate how the full range of internalizing and externalizing symptoms play out over time in conjunction with each other and when the give and take between these trajectories would be most pronounced. My hypothesis was that distinct groups of children would be identified based on their unfolding symptoms, including those who appear to be internally consistent (e.g., chronically high, consistently low) and those who appear to be internally inconsistent (e.g., declining, increasing) in terms of their changing levels of symptoms across the course of elementary school. In terms of co-occurrence, I also hypothesized that the child population would be characterized by pure symptomatology (i.e., one or the other) as well as co-occurring (high on both). To accomplish *Aim 2*, I planned to use cross-lagged and group modeling techniques to test the hypothesis that children of immigrants would have fewer internalizing and externalizing symptoms early on than the general population and, as a result, would

experience less co-occurrence between the two forms of symptoms over time but that this immigrant advantage would wear off and even reverse in later generations of children. To accomplish *Aim 3*, I planned to use regression analyses to test the hypothesis that children who had high levels of internalizing/externalizing (and combined) symptoms when they started formal schooling and followed paths of increasing symptoms over the course of elementary school would be most at risk for academic failure.

In execution, this plan faced many complications that reflected the difficulties of modeling dynamic change of internalizing and externalizing symptoms in the general child population. These complications led to a greatly simplified set of analyses and aims. As discussed in detail in the “Results” section, estimating trajectories of internalizing and externalizing symptoms in growth curves modeling showed that rates of change for these two trajectories were very small, overall, over the course of elementary school.

Descriptive statistics of children’s internalizing and externalizing symptoms from kindergarten through fifth grade also revealed that both forms of symptoms were very low overall and that levels appeared to be highly stable across grades. Given that both latent growth curve modeling and LCGA are concerned with growth (or rate of change), high stability of symptom levels (small slopes) presents modeling challenges in more complex models. For instance, LCGA assumes that there exist heterogeneous groups of individuals in the sample that might vary on the age of onset, progression, and course of symptom trajectories. When initial levels of symptoms are highly similar and rates of change are highly stable in the whole sample, however, heterogeneous groupings are less common or harder to identify. As such, modeling problems occurred when attempting to

test group variability in the initial level and rate of change of symptoms in growth curve modeling. Likewise, conducting latent class growth analysis was problematic.

The complications were not evident in many of the studies motivating this dissertation, but these studies also were different from what I was trying to do here in several ways. For example, when Nagin and Tremblay (1999, 2001) successfully identified different groups of boys with distinctive trajectories of physical aggression, opposition, and hyperactivity on the path to different types of offending profiles, they used a sample of high-risk boys. The ECLS-K sample, on the other hand, is a representative population sample of American children. As the developmental psychopathology literature suggests, most young children exhibit low levels of problematic behaviors early in development that decline over time or they exhibit moderate to high levels of externalizing behaviors early in development that decline over time (Costello, et al., 2003; Furniss, et al., 2006; Roberts, et al., 1998). Only a small percent of individuals (typically about 5 to 7% of the population) follow a life-course persistent trajectory of externalizing symptoms. The problematic trajectories of interest, therefore, might have been overwhelmed by the far less problematic trajectories of the general population. Moreover, Nagin and Tremblay's studies only focused on boys' externalizing behaviors and said nothing about internalizing behaviors or girls' externalizing behaviors.

Consequently, heterogeneous groups of children who follow distinctive trajectories of problematic behaviors are much harder to identify in a large representative sample like ECLS-K. Even if heterogeneous groups did exist in the sample, they

probably do not occur in sufficient numbers to be detected at the level of specificity (4 of them) that Nagin and Tremblay described. Notably, the symptom measurements used in the ECLS-K and Nagin and Tremblay's studies were also not equivalent, with ECLS-K (as a general study) going into much lesser detail.

With all that being said, LCGA should still be considered in future research studying children's problematic behaviors in different population samples. As discussed in details in previous sections, it is a powerful method for studying developmental domains. In order to use this approach, future studies need to draw on more refined measurements of children's problematic behaviors. The two symptom measurement batteries in the ECLS-K each only assessed four aspects of children's problematic behaviors using a 1 to 4 Likert-scale. Future research might need to include more questions for each measurement and/or have a more refined Likert-scale. Another possibility might come up with a different method to study distinct trajectories of children's problematic behaviors, such as the alternative method by Crosnoe and Huston (2007) that I eventually turned to in this study.

In practice, results from this study generally revealed that American children are doing well. Mean levels of internalizing and externalizing symptoms from kindergarten through fifth grade were low, and that most children went through small incremental changes overtime. In addition, children's internalizing and externalizing symptom levels were moderately correlated across time, as seen in Table 2. These study findings are generally in line with existing research in the child development literature. In a typical child population study, only 5 to 7 percent of the study population is at risk for high

internalizing and/or externalizing symptom levels and require professional mental health services (see Moffitt, 1993; Patterson, 1982). The other children generally do not follow a life-course persistent symptom trajectory, and rather stay at low symptom levels.

The items that made up the two internalizing and externalizing scales in the current study were descriptive and subjective. Teachers' rating responses were definitely subjective. Future research can look into alternative data collection methods (e.g., direct observations by trained research assistants) and assess if American children indeed have low levels of internalizing and/or externalizing symptom in elementary school.

Moving away from latent growth modeling, I focused on cross-lagged modeling as a means of studying the interrelations of children's internalizing and externalizing symptom levels. Results generally indicated that children's internalizing symptom levels from kindergarten through fifth grade were significantly and positively related (as seen in stability associations). The same was true for their externalizing symptom levels. In addition, children's levels of internalizing and externalizing symptoms at each grade were also significantly and positively related. These patterns revealed that there was stability for both internalizing and externalizing symptom levels from kindergarten through fifth grade. Future research can look into whether this stability would carry over into middle and high school grades, and beyond. Results from concurrent associations confirmed the importance of considering both internalizing and externalizing symptom levels when studying children's socio-emotional adjustments in the school setting. These two forms of symptoms are certainly interrelated. If feasible, future research can look into other models/techniques to test these interrelationships.

Cross-lagged modeling results also revealed interesting patterns about how prior levels of internalizing symptoms were related to levels of externalizing symptoms at the next time point (and vice versa). First, children who were rated by teachers as having higher levels of prior internalizing symptoms were likely to be rated by the same teachers as having lower levels of externalizing symptoms at the next time point. A possible interpretation is that most children consciously or subconsciously chose to internalize their feelings, thoughts, or emotions, rather than acting out. These children were probably aware that externalizing behaviors, such as acting impulsively, becoming angry, or engaging in fights were much less acceptable in the school setting, they would more likely to receive punishment by their teachers if they would to engage in such behaviors, and internalizing their feelings was less noticeable and “safer”. Second, children who were rated by teachers as having higher levels of prior externalizing symptoms were likely to be rated by the same teachers as having higher levels of internalizing symptoms at the next time point. A possible explanation is that children who engaged in externalizing behaviors were less likely to have positive relationships with peers and teachers and/or do poorly in school, resulting in higher levels of internalizing symptoms, such as showing signs of loneliness, sadness, and low self-esteem.

These study findings are important because they shed light on how prior levels of internalizing and future levels of externalizing symptoms might be related (and vice versa) and suggest the value of examining possible mediation models to further explore these associations. For instance, future research can look into positive teacher-child

relationship and/or positive peer relationship in mediating the association between prior levels of externalizing and future levels of internalizing symptoms.

As for group differences in children's internalizing and externalizing symptom interrelations, there was generally no specific immigrant effect on either symptom. In fact, the moderating differences we saw were mostly a result of racial/ethnic effects. Children of Black parents, regardless of immigration status, were at the greatest risk for developing and/or exhibiting internalizing and externalizing symptoms compared to other groups of children when they were in elementary school. These results suggest that, despite Black immigrant families faring somewhat better early on than their native counterparts as they settle into life in the U.S. (Benson, 2006; Read & Emerson, 2005; Scopilliti & Iceland, 2008), they became an at-risk group shortly thereafter. One possibility is that due to the similarity of their skin color, children of Black immigrants, just like their native-born counterparts, encountered and/or witnessed social stratification related to racial/ethnic and socioeconomic disparities in the U.S. Hence, their adjustment was very similar to those of their native-born counterparts. As the cross-lagged associations indicated, the significant positive relationship between externalizing at one time point and internalizing symptoms at the next could put this group of children at much greater risk of also developing internalizing symptoms later on. Future research can investigate the moderating effect of factors related to social stratification (e.g., discrimination, prejudice) when studying racial/ethnic and immigration-related variations of children's internalizing and externalizing symptoms.

In addition, future research can use Monte Carlo simulations (see Muthen, 2002; Muthen & Muthen, 2002) to generate sufficient sample sizes to determine how children of Black immigrants do compared to children of U.S. native-born and immigrants from the Caribbeans. Monte Carlo simulations generate repeated random sampling to obtain patterns of data based on those simulated samples. This way, the small sample sizes of Black immigrants from European/Africa and those from the Caribbeans wouldn't be an issue. These models would be within group comparisons for Black children. As stated in Chapter 2, Black immigrants from Europe and Africa tend to do better economically and socially shortly after having immigrated to the U.S. than Black immigrants from the Caribbean (Read & Emerson, 2005; Scopilliti & Iceland, 2008).

C Children of Asian backgrounds tended to have relatively low levels of internalizing and externalizing symptoms across the four waves, followed by Latino/a children. These patterns, however, should be interpreted cautiously. The sample size for children of Asian immigrants was about three times greater than that of their native-born counterparts, while the sample size for children of Latino/a immigrants was similar to that of their native-born counterparts. This piece of information is important for interpreting results in few ways. When racial/ethnic differences were taken into account in tandem with immigration status, children of Asian immigrants mostly appeared to fare the best on both indicators of symptoms across the four waves, but their native-born counterparts was not necessarily the second best group. In fact, in a few instances (e.g., kindergarten internalizing symptoms and first grade externalizing symptoms), children of Asian backgrounds who had at least one parent who was born in the U.S. fared the worst,

relative to the other groups. Yet, despite this specific counter example, children of Asian backgrounds as a group were low on internalizing and externalizing symptoms relative to other racial/ethnic groups.

One possible explanation as to why children of native-born Asians might be doing worse than their foreign-born counterparts is through the process of acculturation. As mentioned in Chapter 2, the process by which immigrant families become more embedded in American society may deteriorate the positive health outcomes over time and across generations, thereby exposing children of immigrants to the more corrosive effects of the extensive racial/ethnic and socioeconomic stratification of the U.S. In addition, more acculturated families might have less family cohesion than families of recent immigrants. The deterioration of these protective factors within the family context can have detrimental consequences for children of Asian backgrounds (see Uba, 2003), leading them to be rated by teachers as having higher levels of internalizing and/or externalizing symptoms than their foreign-born counterparts. Future research can examine within group comparisons of Asian children (those of foreign-born parents and those born in the U.S.) and include family and cultural factors in mediational models to fully assess what effect(s) these factors might have on children's levels of internalizing and externalizing symptoms.

Exploring the interaction effects of race/ethnicity and immigration status with children's prior internalizing and externalizing symptoms on next wave symptom levels revealed that some general patterns were particular to specific groups. Within the scope of this study, why higher levels of prior internalizing symptoms were associated with

higher levels of externalizing symptoms at the next time point for children of color (for children of Asian, Latino/as and Black backgrounds), but not for White children is unclear. That is, later levels of externalizing symptoms for children of color only became a concern when their prior levels of internalizing symptoms were high but not when levels were low. As for White children, later levels of externalizing symptoms only became a concern when their prior levels of internalizing symptoms were relatively low. Based on these results, prior levels of internalizing symptoms appeared to “feed” into later externalizing symptoms for children of color. These results have important implications for future prevention and intervention research. Future research can investigate processes that might mediate this association, possibly suggesting ways to intervene with children of color before their internalizing symptoms reach relatively high levels that put them at greater risk for higher levels of externalizing symptoms in the future. Some potential mediational factors to consider are family process and cultural variables, as well as social stratification-related factors, as these factors are likely to differ for the two groups in the U.S.

Likewise, why higher levels of prior externalizing symptoms posed greater risk for later internalizing symptoms among children from White families but not for children of color (Asians, Latino/as, and Blacks) is unclear. Possibly, White children were more affected by higher levels of externalizing symptoms because they were concerned about their relationships with their peers and teachers the more they engaged in externalizing behaviors. One interesting avenue of future research would be to examine the mediational

effect of peer and teacher relationships when studying how children's internalizing and externalizing symptom levels are related.

The final aim of this dissertation explored distal outcomes in 8<sup>th</sup> grade (reading and math assessment scores) in relation to children's internalizing and externalizing pathways individually and when combined when the children were in elementary school. First, I focused on the individual trajectories (there were 8 categories for each form of symptoms). Study findings indicated that these symptom trajectories mattered to middle school achievement, which is one way that early problematic behaviors could have implications for future life course trajectories through adolescence and into adulthood. When considering the significance of early school achievement not only for later achievements and vocational pathways but also present and future health and well-being (see Doll & Robyn, 2001; Heckman, 2006; Knudsen, Heckman, Cameron, & Shonkoff, 2006; Resnick, Bearman, Blum, Bauman, & Harris, 1997), the symptom trajectories that children follow early on are a public health concern. This research further contributed to the extant literature and highlighted the importance of prevention and intervention efforts focusing on children's internalizing and/or externalizing symptoms to also take into account of salient domains of development (e.g., school performance, peer relations). Increasingly, research is showing that such holistic and early efforts can prevent the development or amplification of internalizing and/or externalizing and other negative child outcomes across later adolescence and into adulthood (e.g., Masten, 2003; Noam & Hermann, 2002; Rones & Hoagwood, 2000).

The findings also revealed that what matters about the symptom trajectories in relation to later school functioning is not just the initial level of symptoms but also the change in level from kindergarten through fifth grade. For instance, two individuals could start out with the same level of symptoms but then have different trajectories depending on how much their levels of symptoms changed over the course of elementary school (was the trajectory low, increasing or low, stable?). In general, children with *high, stable* pathways (high starting symptoms and stable levels throughout elementary school) scored the lowest on 8<sup>th</sup> grade reading and math assessments. This pattern held for both internalizing and externalizing pathways. In addition, those in the increasing categories (e.g., low, increasing and medium, increasing) were also at greater risk for low academic performance. Why the group of children who were in the high, decreasing category for internalizing symptoms actually did better in both math and reading scores is unclear and warrants more attention. As for the same group in externalizing trajectories, this group ranked 5 out of 8 for both reading and math outcomes. What was it about the “drop” in levels of internalizing symptoms through the course of elementary school that allowed this group of children who started off with high levels while attending kindergarten to do fine in middle school? When interpreting these results, I should note that the rankings were generalizations made based on pair-wise comparisons in which I “ranked” each category relative to others in terms of absolute effect sizes and statistically significant relative differences. Future research can certainly investigate why the change in levels of symptoms mattered more for school achievement in certain situations than initial levels of symptoms. It is possible that initial levels were only temporary conditions, and as

children settled into their formal school routines their adjustment levels from there mattered more than the initial levels. Future research can test this possibility by looking at initial levels at different time points (e.g., from first grade, third grade), and not just at the beginning of formal school.

Having explored the effects of individual internalizing and externalizing symptom trajectories on 8<sup>th</sup> grade reading and math scores, the last set of analyses investigated the effects of combined internalizing and externalizing pathways (interrelations) on 8<sup>th</sup> grade academic functioning. Interaction effects with demographic variables (e.g., gender, immigration status) and combined symptom profiles revealed that boys' and immigrant children's academic performance appeared to be more negatively affected by risky (e.g., overall high risk, overall medium risk) profiles of over-time combined internalizing and externalizing symptoms than girls and children of non-immigrants, respectively, in the same profiles. One possible explanation as to why boys were more affected by being in the overall high risk trajectory than girls is that girls might have better coping strategies than boys. Future research can test this possibility by investigating the mediational effect of emotional regulation skills for both boys and girls in relation to children's combined internalizing and externalizing trajectory and academic functioning.

When interpreting these findings, however, the fact that the categorical trajectories/pathways used in the regression models were researcher-imposed and did not actually exist in the data must be kept in mind. Thus, the identified trajectories might or not might have any clinical significance. At the same time, the relations of elementary school internalizing and externalizing trajectories with 8<sup>th</sup> grade reading and math scores

certainly have implications as to how this group of children did in school; however, teacher reports of children's symptom levels are limited to interpretation and might not necessarily tell the whole story of these children's overall symptom levels while in elementary school. Future research should investigate these relations using parent reports of symptom levels.

Looking back across the three aims, I want to stress that the ECLS-K, despite the challenges it posed here, is a valuable data set for studying children's internalizing and externalizing symptoms across the elementary school years while taking population diversity into account. It is currently one of very few available data sources that has this kind of sufficient demographic coverage. Certainly, as mentioned throughout this dissertation, the data set also posed challenges that prevented me from accomplishing part of the study aims I originally set out to investigate. Despite the limitations, this research furthered our understanding of children's internalizing and externalizing symptoms and the various pathways that these symptoms could take throughout elementary school and what implications these individual and combined trajectories or profiles might have for future outcomes. More importantly, the current investigation encouraged future research on development to study developmental domains with an eye on demographic diversity.

To close, this dissertation highlighted three take-home messages for future research. These three messages are relevant to developmental researchers who are concerned with child outcomes and disparities as they continue to make attempts to understand children's internalizing and externalizing symptoms and trajectories

(individually and combined) and conceptualize the processes by which such problematic behaviors develop, change, and might be prevented.

The first message concerns data and method of study. This dissertation revealed the difficulties of modeling dynamic changes of internalizing and externalizing trajectories in the general child population when initial symptom levels are highly similar and rates of change are highly stable in the study population. Future research interested in heterogeneous groups of children who follow different trajectories of symptom levels (both initial levels and rates of change) as well as the mechanisms and processes that place certain children in different trajectory groups need to consider the data sources with extra care and explore various available analytical techniques to accomplish study aims.

The second message pertains to the importance of studying mediational models/processes to further our understanding of the interrelations between children's internalizing and externalizing symptoms. The findings of this dissertation are just a beginning step exploring the dynamic interrelations of these two forms of symptoms in children, with a focus on population diversity. Much remains unknown about how these two forms of symptoms are interrelated when demographic diversity is taken into account. Mediational models are one way to further explore those variations.

The final message concerns prevention and intervention efforts for children's internalizing and externalizing symptoms. This dissertation revealed some groups of children who were at greater risk for problematic behaviors than others (or their relative counterparts). In general, children of Black parents and children who were boys were at greater risk for present and future problematic behaviors, and that children who were

boys and children of immigrants were at greater risk for future academic failure when their earlier overall combined symptom trajectories fell in the risky category (e.g., high, stable). This study suggests that intervention efforts need to take into account both the symptomatic child's initial (and overall) level of symptoms as well as over-time change of symptoms when putting together a specific intervention plan for the affected individual. Future intervention research can investigate whether children who started off with high initial levels of symptoms and maintained consistent levels throughout the course of treatment make more improvements based on treatments or those who started at low levels but with consistent increasing levels, for example. Such research would inform finer intervention strategies for children's problematic behaviors. Similarly, researchers can look more into the over-time change of symptoms and investigate how different groups of children are being affected by the different trends of change (stable, decreasing, and increasing). This dissertation is certainly one of very few studies that looked into overall level as well as over-time change of children's internalizing and externalizing symptoms from kindergarten through fifth grade and the consequences these different patterns might have for future academic functioning.

## Tables

**Table 1**  
*Descriptive Statistics for Internalizing and Externalizing Symptoms, by Grade*

	M (SD) for Internalizing Symptoms				M (SD) for Externalizing Symptoms				<i>n</i>
	K	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	K	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	
All Children	1.52 (.52)	1.57 (.50)	1.61 (.52)	1.63 (.54)	1.57 (.60)	1.62 (.61)	1.67 (.59)	1.64 (.58)	9,468
<b>Race/Ethnicity</b>									
Whites	1.50 (.51)	1.56 (.49)	1.60 (.52)	1.63 (.55)	1.55 (.59)	1.58 (.59)	1.63 (.57)	1.61 (.55)	5,719
Blacks	1.53 (.53)	1.63 (.57)	1.67 (.58)	1.66 (.54)	1.71 (.66)	1.83 (.71)	1.94 (.71)	1.89 (.67)	1,149
Hispanic	1.55 (.53)	1.58 (.51)	1.61 (.51)	1.65 (.55)	1.56 (.60)	1.59 (.59)	1.67 (.57)	1.63 (.59)	1,804
Asian	1.49 (.49)	1.50 (.44)	1.52 (.43)	1.56 (.47)	1.51 (.56)	1.53 (.55)	1.52 (.52)	1.48 (.52)	796
<b>Immigration Status</b>									
Child of Non-immigrant	1.51 (.51)	1.56 (.50)	1.61 (.52)	1.63 (.55)	1.58 (.61)	1.62 (.61)	1.67 (.60)	1.64 (.58)	7,025
Child of Immigrant	1.52 (.53)	1.56 (.50)	1.58 (.50)	1.61 (.51)	1.53 (.58)	1.58 (.60)	1.62 (.57)	1.59 (.58)	2,443
<b>Race and Immigration</b>									
Native born-Whites	1.50 (.50)	1.55 (.49)	1.60 (.51)	1.63 (.55)	1.54 (.59)	1.57 (.59)	1.63 (.56)	1.60 (.54)	5,210
Native born-Blacks	1.52 (.51)	1.63 (.55)	1.66 (.58)	1.66 (.53)	1.71 (.66)	1.84 (.70)	1.94 (.72)	1.87 (.66)	925
Native born-Hispanic	1.56 (.53)	1.58 (.51)	1.61 (.50)	1.68 (.58)	1.62 (.64)	1.62 (.60)	1.72 (.60)	1.69 (.64)	701
Native born-Asian	1.56 (.54)	1.54 (.43)	1.55 (.43)	1.57 (.49)	1.59 (.64)	1.65 (.50)	1.62 (.57)	1.60 (.56)	189
Immigrant Whites	1.55 (.55)	1.65 (.55)	1.65 (.53)	1.66 (.56)	1.58 (.60)	1.66 (.62)	1.70 (.61)	1.66 (.58)	509

Table 1 continued on next page

Table 1 continued

	<u>M (SD) for Internalizing Symptoms</u>				<u>M (SD) for Externalizing Symptoms</u>				<i>n</i>
	K	1st	3rd	5th	K	1st	3rd	5th	
Immigrant Blacks	1.58 (.59)	1.63 (.62)	1.67 (.59)	1.66 (.56)	1.68 (.66)	1.80 (.75)	1.97 (.68)	1.96 (.69)	224
Immigrant Hispanic	1.54 (.53)	1.58 (.50)	1.61 (.52)	1.61 (.52)	1.53 (.57)	1.58 (.59)	1.64 (.55)	1.59 (.56)	1,103
Immigrant Asian	1.47 (.48)	1.49 (.44)	1.51 (.43)	1.56 (.47)	1.49 (.54)	1.49 (.53)	1.48 (.49)	1.45 (.50)	607
Gender									
Males	1.53 (.52)	1.59 (.52)	1.63 (.54)	1.66 (.56)	1.69 (.65)	1.74 (.66)	1.79 (.63)	1.77 (.62)	4,758
Females	1.51 (.51)	1.55 (.49)	1.59 (.50)	1.61 (.52)	1.45 (.53)	1.49 (.54)	1.55 (.53)	1.51 (.50)	4,710

Table 2  
*Bivariate Correlations for Internalizing and Externalizing Symptoms*

		Pearson Correlation Coefficients							
		Internalizing				Externalizing			
		K	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	K	1 <sup>st</sup>	3 <sup>rd</sup>	5th
Internalizing	K	1.00	.253	.239	.208	.276	.107	.068	.072
	1 <sup>st</sup>	.253	1.00	.257	.222	.128	.308	.119	.088
	3 <sup>rd</sup>	.239	.257	1.00	.312	.159	.182	.315	.158
	5 <sup>th</sup>	.208	.222	.312	1.00	.173	.174	.154	.308
Externalizing	K	.276	.128	.156	.173	1.00	.547	.486	.457
	1 <sup>st</sup>	.107	.308	.182	.174	.547	1.00	.538	.478
	3 <sup>rd</sup>	.068	.119	.315	.154	.486	.538	1.00	.534
	5th	.072	.088	.158	.308	.457	.478	.534	1.00

Table 3  
*Results for Models Predicting Internalizing and Externalizing Symptoms by Race and Immigration Status*

	B Coefficients ( <i>p</i> -values)							
	INTERNALIZING				EXTERNALIZING			
	K	1 <sup>ST</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	K	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>
NB Black	.02 (.74)	-.11** (.006)	.02 (.63)	-.10* (.035)	.16 (.002)	.13** (.004)	.18*** (.000)	.05 (.27)
NB Hispanic	.02 (.70)	-.01 (.88)	-.04 (.35)	-.03 (.55)	.07 (.20)	.05 (.32)	.02 (.61)	-.09* (.03)
NB Asian	.17* (.02)	-.10* (.02)	-.05 (.53)	-.17* (.03)	-.11 (.26)	.22 (.11)	.03 (.80)	-.22** (.005)
Hispanic Imm	.02 (.70)	-.10* (.016)	- .15*** (.005)	-.11** (.001)	-.06 (.22)	-.02 (.52)	-.01 (.79)	-.11** (.005)
Black Imm	.07 (.53)	-.04 (.68)	.06 (.63)	-.14 (.18)	.13 (.20)	.06 (.57)	.07 (.44)	-.15 <sup>+</sup> (.09)
Asian Imm	-.10* (.03)	-.04 (.47)	-.09* (.02)	-.13*** (.000)	-.12* (.02)	-.002 (.97)	- .17*** (.001)	-.09* (.016)
White Imm	-.01 (.90)	.10 (.46)	-.08 (.17)	-.14** (.003)	-.06 (.30)	-.012 (.85)	.18 (.20)	-.01 (.74)

Children of native-born White parents were used as reference group.

For a list of covariates and their *B* coefficients, please refer to Appendix C.

Models controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, and mother's and child's language use in the homes.

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001, <sup>+</sup> *p* < .10.

*n* = 8,552; CFI = .948, SRMR = .035, RMSEA = .027

Table 4

*Results for Models Predicting Internalizing and Externalizing Symptoms by Race/Ethnicity*

	B Coefficients ( <i>p</i> -values)							
	INTERNALIZING				EXTERNALIZING			
	K	1 <sup>ST</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	K	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>
Black	.02 (.61)	-.08* (.04)	.04* (.037)	-.09* (.049)	.16*** (.001)	14*** (.001)	.15** (.002)	.02 (.66)
Hispanic	-.09* (.049)	-.04 (.31)	-.09* (.016)	-.06 <sup>+</sup> (.09)	.01 (.86)	.03 (.39)	-.01 (.88)	-.11** (.003)
Asian	.005 (.91)	-.06 (.18)	-.07 <sup>+</sup> (.11)	-.13*** (.001)	-.11* (.027)	.09 (.17)	-.11* (.048)	-.15*** (.000)

Children of White parents were used as reference group. For a list of covariates and their *B* coefficients, please refer to Appendix C.

Models controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child immigration status and mother's and child's language use in the homes.

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001, <sup>+</sup> *p* < .10. Model has good fit indices.

*n* = 8,262; CFI = .951, SRMR = .034, RMSEA = .026

Table 5

*Results for Models Predicting Internalizing and Externalizing Symptoms by Immigration Status*

	B Coefficients ( <i>p</i> -values)								
	INTERNALIZING					EXTERNALIZING			
	K	1 <sup>ST</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	K	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	
Children of Immigrants	.000 (.999)	.024 (.70)	-.083 (0.203)	-0.13** (.004)	-0.013 (.0835)	-.015 (.72)	-.005 (.927)	-0.13*** (.001)	

Children of native-born parents were used as reference group.

For a list of covariates and their *B* coefficients, please refer to Appendix C.

Models controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child race and mother's and child's language use in the homes.

\* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001, + *p* < .10.

*n* = 8,060; CFI = .998, SRMR = .005, RMSEA = .007

Table 6

*Results for Models Predicting Internalizing and Externalizing Symptoms by Gender*

	B Coefficients ( <i>p</i> -values)							
	INTERNALIZING				EXTERNALIZING			
	K	1 <sup>st</sup>	3 <sup>rd</sup>	5th	K	1st	3rd	5th
Girls	-.05 (.22)	-.04 (.30)	-.04 (.38)	-.09 <sup>+</sup> (.06)	-.22*** (.000)	-.16*** (.000)	-.15*** (.000)	-.08** (.01)

Boys were used as reference group.

For a list of covariates and their *B* coefficients, please refer to Appendix C.

Model controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child race, child immigration status and mother's and child's language use in the homes.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , <sup>+</sup>  $p < .10$ .

*n* = 8,060; CFI = .998, SRMR = .006, RMSEA = .007

Table 7  
*Results from Models Predicting Internalizing and Externalizing Symptoms  
 by Prior Symptoms and Race/Ethnicity*

	B Coefficients (p-values)					
	EXTERNALIZING			INTERNALIZING		
	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	
Black	.190** (.002)	.151* (.028)	.142* (.027)	.031 (.557)	-.034 (.707)	.068 (.348)
Hispanic	.049 (.409)	.057 (.378)	-.05 (.219)	.001 (.980)	-.054 (.244)	-.031 (.521)
Asian	.123 (.141)	-.124 (.086)	-.034 (.517)	.007 (.956)	-.198** (.006)	-.042 (.429)
Prior symptoms	-.131*** (.000)	-.139** (.002)	-.024 (.611)	.131** (.002)	.179*** (.001)	.023 (.558)

Children of White parents were used as the reference group.

Model had good fit indices and controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child immigration status, and mother's and child's language use in the homes.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , +  $p < .10$

$n = 8,750$ ; CFI = .979, SRMR = .031, RMSEA = .026

Table 8

*Results from Models Predicting Internalizing and Externalizing Symptoms by Prior Symptoms, Race/Ethnicity and their Interaction*

	B Coefficients (p-values)					
	EXTERNALIZING			INTERNALIZING		
	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>
Black	-.66*** (.000)	-.75*** (.000)	.01 (.945)	-1.21*** (.000)	-1.33*** (.000)	.66** (.006)
Hispanic	-.78*** (.000)	-.74*** (.000)	-.17 (.178)	-1.27*** (.000)	-1.40*** (.000)	.03 (.863)
Asian	-1.05*** (.000)	-.86*** (.000)	-.25 (.085)	-1.17*** (.000)	-1.39*** (.000)	-.09 (.678)
Prior symptoms	-.10* (.05)	-.14** (.003)	-.04 (.355)	.08 (.128)	.12* (.029)	.04 (.39)
Black x prior	.04 (.43)	.08 (.139)	.07 (.402)	-.15** (.008)	-.17** (.01)	.02 (.823)
Hispanic x prior	.07 (.21)	.09 (.068)	.10 (.223)	-.16** (.01)	-.13* (.023)	-.04 (.649)
Asian x prior	-.08 (.41)	.22*** (.000)	.14 (.098)	-.18** (.002)	-.18** (.009)	.04 (.727)

Children of White parents were used as the reference group.

Model had good fit indices and controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child immigration status and mother's and child's language use in the homes.

\* p < .05, \*\* p < .01, \*\*\* p < .001, + p < .10

n = 6,827; CFI = .959, SRMR = .022, RMSEA = .027

Table 9

*Results from Models Predicting Internalizing and Externalizing Symptoms by Prior Symptoms and Immigration Status*

	B Coefficients (p-values)					
	EXTERNALIZING			INTERNALIZING		
	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup> grade
Prior symptoms	-.143*** (.000)	-.127** (.006)	-.028 (.473)	.100** (.012)	.125** (.006)	-.006 (.905)
Child of an immigrant parent	-.015 (.716)	-.005 (.927)	-.127*** (.001)	.024 (.700)	-.083 (.203)	-.134** (.004)

Children of non-immigrants were used as the reference group.

Model had good fit indices and controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child race and mother's and child's language use in the homes.

\* p < .05, \*\* p < .01, \*\*\* p < .001, + p < .10

n = 8,060; CFI = .997, SRMR = .001, RMSEA = .003

Table 10

*Results from Models Predicting Internalizing and Externalizing Symptoms by Prior Symptoms, Immigration Status, and their Interaction*

	B Coefficients (p-values)					
	EXTERNALIZING			INTERNALIZING		
	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	1 <sup>st</sup>	3 <sup>rd</sup>	5 <sup>th</sup>
Prior symptoms	-.39** (.011)	-.11* (.02)	-.01 (.757)	-.10 (.195)	.10* (.03)	.01 (.909)
Child of an immigrant parent	1.59*** (.000)	-.66*** (.000)	-.10 (.512)	-1.57*** (.000)	-1.40*** (.000)	.19 (.273)
Child of an immigrant parent x prior	.046** (.004)	.11* (.041)	-.04 (.634)	-.01 (.946)	-.10 (.063)	-.18 (.065)

Children of non-immigrants were used as the reference group. Model had good fit indices and controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, child race and mother's and child's language use in the homes.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , +  $p < .10$

$n = 5,978$ ; CFI = .985, SRMR = .002, RMSEA = .011

Table 11

*Descriptive Statistics for Internalizing Pathways in Distal Outcome Models*

Pathways	M (SD) for Internalizing Pathways			
	K	1st	3rd	5th
Low, decreasing	1.535 (.487)	1.537 (.481)	1.612 (.543)	1.653 (.593)
Low, stable	1.322 (.051)	1.390 (.396)	1.428 (.403)	1.309 (.243)
Low, increasing	1.614 (.052)	1.748 (.512)	1.657 (.541)	2.25 (.393)
Medium, decreasing	1.754 (.287)	1.600 (.510)	1.594 (.522)	1.135 (.127)
Medium, stable	1.511 (.276)	1.552 (.484)	1.581 (.492)	1.558 (.389)
Medium, increasing	1.454 (.252)	1.695 (.553)	1.872 (.591)	2.752 (.496)
High, decreasing	2.607 (.434)	1.762 (.583)	1.766 (.592)	1.464 (.366)
High, stable	2.410 (.259)	1.870 (.598)	1.966 (.624)	2.289 (.421)
High, increasing	2.404 (.167)	1.895 (.608)	2.294 (.663)	3.621 (.252)

Table 12

*Descriptive Statistics for Externalizing Pathways in Distal Outcome Models*

Pathways	M (SD) for Externalizing Pathways			
	K	1st	3rd	5th
Low, decreasing	1.527 (.049)	1.498 (.557)	1.626 (.564)	1.668 (.631)
Low, stable	1.173 (.302)	1.218 (.322)	1.298 (.334)	1.180 (.181)
Low, increasing	1.528 (.392)	1.417 (.432)	1.566 (.487)	1.955 (.333)
Medium, decreasing	1.812 (.281)	1.580 (.517)	1.570 (.496)	1.150 (.149)
Medium, stable	1.607 (.311)	1.603 (.543)	1.664 (.531)	1.583 (.384)
Medium, increasing	1.543 (.334)	1.856 (.626)	2.005 (.627)	2.557 (.525)
High, decreasing	2.958 (.482)	2.256 (.728)	2.126 (.652)	1.826 (.480)
High, stable	2.697 (.382)	2.368 (.683)	2.375 (.697)	2.571 (.509)
High, increasing	2.589 (.218)	2.664 (.482)	2.840 (.810)	3.503 (.246)

Table 13  
*Results from Regression Models Predicting Middle School Reading/Math Scores by Internalizing Pathways*

	B Coefficients ( <i>p</i> -values)							
	Reading		Math		Reading		Math	
	Model 1		Model 2		Model 3		Ranking	
Low decreasing internalizing	.137 (.972)	.620 (.858)	-1.657 (.686)	-2.272 (.531)	8.364 <sup>+</sup> (.109)	4.253 (.333)	3	3
Low stable internalizing	1.849 (.388)	2.871+ (.102)	-	-	10.049** (.013)	6.490 <sup>+</sup> (.060)	2	1
Low increasing internalizing	-5.305 (.155)	-3.089 (.137)	-7.072 <sup>+</sup> (.077)	-5.945** (.010)	2.830 (.575)	.483 (.891)	7	7
Medium decreasing internalizing	-1.824 (.510)	-1.401 (.467)	-3.587 (.229)	-4.251* (.041)	6.365 (.120)	2.214 (.512)	5	5
Medium stable internalizing	-	-	-1.762 (.406)	2.873 <sup>+</sup> (.100)	8.290* (.030)	3.703 (.270)	4	4
Medium increasing internalizing	-2.840 (.476)	-2.243 (.365)	-4.792 (.284)	-5.269* (.048)	5.543 (.305)	1.569 (.689)	6	6
High decreasing internalizing	4.928 (.177)	1.713 (.539)	3.153 (.416)	-1.133 (.699)	13.515** (.006)	5.722 (.139)	1	2
High stable internalizing	-8.676* (.037)	-4.119 (.269)	-10.791* (.017)	-7.207 (.067)	-	-	8	8

Dashes indicated that the category was used as reference group for each respective model.

All models controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, mother's and child's language use in the homes, child race, child immigration status and kindergarten reading/math assessment scores.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , <sup>+</sup>  $p < .10$

*n* = 7,831 (reading); CFI = 1.000, SRMR = .000, RMSEA = .000; *n* = 7,690 (math); CFI = 1.000, SRMR = .000, RMSEA = .000

Table 14  
*Results from Regression Models Predicting Middle School Reading/Math Scores by Externalizing Pathways*

	B Coefficients ( <i>p</i> -values)							
	Reading		Math		Reading		Math	
	Model 1		Model 2		Model 3		Ranking	
Low decreasing externalizing	-2.097 (.590)	-3.006 (.369)	-6.771 (.127)	-5.366 (.162)	7.274 (.158)	7.418 (.076)	6	6
Low stable externalizing	5.737* (.026)	3.486 (.205)	-	-	15.098*** (.001)	13.927*** (.000)	1	1
Low increasing externalizing	5.033 (.234)	-.380 (.842)	.370 (.927)	-2.776 (.401)	14.522** (.004)	10.063** (.002)	2	4
Medium decreasing externalizing	2.673 (.246)	.682 (.695)	-2.003 (.520)	-1.698 (.543)	11.983** (.005)	11.064*** (.000)	3	2
Medium stable externalizing	-	-	-4.316 <sup>+</sup> (.107)	-1.979 (.470)	9.607** (.013)	10.712*** (.000)	4	3
Medium increasing externalizing	-3.491 (.214)	-3.219 (.115)	-8.095** (.014)	-5.516 (.067)	5.754 (.197)	7.092* (.034)	7	7
High decreasing externalizing	-1.802 (.618)	-2.259 (.282)	-6.363 (.126)	-4.549 (.139)	7.342 (.139)	7.957** (.012)	5	5
High stable externalizing	-7.023* (.047)	-7.597** (.005)	-11.60** (.008)	-9.892** (.007)	-	-	8	8

Dashes indicated that the category was used as reference group for each respective model.

All models controlled for maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, mother's and child's language use in the homes, child race, child immigration status, and kindergarten reading/math assessment scores.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , <sup>+</sup>  $p < .10$

*n* = 7,831 (reading); CFI = 1.000, SRMR = .000, RMSEA = .000; *n* = 7,690 (math); CFI = 1.000, SRMR = .000, RMSEA = .000

Table 15

*Results from Regression Models Predicting Middle School Reading/Math Scores by Combined Internalizing/Externalizing Pathways*

	B Coefficients ( <i>p</i> -values)					
	Gender		Immigration Status		Race	
	Reading	Math	Reading	Math	Reading	Math
Kindergarten reading score	1.05*** (.000)	-	1.05*** (.000)	-	1.03*** (.000)	-
Kindergarten math score	-	1.04 (.000)	-	1.42*** (.000)	-	1.38*** (.000)
Girls (gender)	4.08* (.02)	-3.61** (.005)	4.08* (.02)	-3.57** (.006)	3.56* (.03)	-3.91*** (.000)
Native-born children (immigration)	-	-	.03 (.99)	-3.00 (.07)	-	-
Children of Black parent (race)	-	-	-	-	-11.12*** (.000)	-7.81*** (.000)
Children of Hispanic parent (race)	-	-	-	-	1.21 (.61)	1.70 (.38)
Children of Asian parent (race)	-	-	-	-	-4.03 (.18)	.98 (.71)
Lowest risk	6.71** (.003)	5.86* (.02)	6.71** (.003)	5.89* (.02)	6.46** (.004)	5.57* (.02)
Highest risk	-10.53* (.041)	-10.07* (.03)	-10.53* (.04)	-10.09* (.02)	-9.12* (.05)	-8.95 <sup>+</sup> (.06)
Decreasing overall	-1.47 (.53)	-1.37 (.41)	-1.47 (.53)	-1.31 (.42)	-.56 (.80)	-.94 (.57)
Increasing overall	-5.74 (.27)	-4.07 <sup>+</sup> (.10)	-5.74 (.27)	-3.65 (.15)	-4.40 (.37)	-2.80 (.28)
Low internalizing, high externalizing	-1.95 (.61)	-1.34 (.58)	-1.95 (.61)	-1.23 (.64)	1.22 (.76)	.71 (.78)
High internalizing, low externalizing	3.82 (.48)	3.96 (.30)	3.82 (.49)	4.13 (.28)	2.70 (.63)	3.36 (.36)
The others	-.89 (.59)	-.56 (.71)	-.89 (.59)	-.36 (.81)	-.48 (.77)	-.30 (.84)

Table 15 continued on next page

Table 15 continued.

All models controlled for kindergarten reading/math scores, maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, mother's and child's language use in the homes, and kindergarten reading/math assessment scores.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , <sup>+</sup>  $p < .10$

$n = 7,831$  (reading); CFI = 1.000, SRMR = .000, RMSEA = .000

$n = 7,690$  (math); CFI = 1.000, SRMR = .000, RMSEA = .000

Table 16  
*Results from Regression Models Predicting Middle School  
 Reading/Math Scores by Combined Internalizing/Externalizing  
 Pathways, with Interactions: Gender x Pathways*

	B Coefficients ( <i>p</i> -values)	
	Reading	Math
Kindergarten reading score	1.03*** (.000)	-
Kindergarten math score	- (.000)	1.40*** (.000)
Girls	4.57 (.07)	-2.54 (.168)
Native-born children	4.608 <sup>+</sup> (.085)	5.814** (.002)
Children of Black parent	-11.11*** (.000)	-8.182*** (.000)
Children of Hispanic parent	-.536 (.822)	-1.161 (.545)
Children of Asian parent	-6.781* (.049)	-2.719 (.347)
Lowest risk	1.77 (.63)	-1.10 (.68)
Highest risk	-17.84** (.01)	-14.56* (.05)
Decreasing overall	-1.76 (.56)	.16 (.94)
Increasing overall	-2.25 (.74)	-1.98 (.49)
Low internalizing, high externalizing	4.82 (.30)	.20 (.96)
High internalizing, low externalizing	-4.31 (.66)	.85 (.87)
Other groups	.52 (.82)	.86 (.66)

Table 16 continued on next page

Table 16 continued

	B Coefficients ( <i>p</i> -values)	
	Reading	Math
Lowest risk x gender	7.08 (.12)	9.53* (.03)
Highest risk x gender	17.60* (.03)	10.87 (.20)
Decreasing overall x gender	.55 (.90)	-3.62 (.22)
Increasing overall x gender	-11.84 (.32)	-6.64 (.28)
Low internalizing, high externalizing x gender	-12.38 <sup>+</sup> (.08)	-2.90 (.55)
High internalizing, low externalizing x gender	12.08 (.31)	4.58 (.51)
Other x gender	-2.66 (.50)	-2.79 (.36)

All models controlled for kindergarten reading/math scores, maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, mother's and child's language use in the homes, child race, child immigration status and kindergarten reading/math assessment scores.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , +  $p < .10$

n = 7,831 (reading); CFI = 1.000, SRMR = .000, RMSEA = .000  
7,690 (math); CFI = 1.000, SRMR = .000, RMSEA = .000

Table 17

*Results from Regression Models Predicting Middle School  
Reading/Math Scores by Combined Internalizing/Externalizing  
Pathways—Interaction Effects: Immigration Status x Pathways*

	B Coefficients (p-values)	
	Reading	Math
Kindergarten reading score	1.05*** (.000)	-
Kindergarten math score	- (.000)	1.42*** (.000)
Girls	4.12* (.02)	-3.47** (.007)
Native-born children	1.23 (.67)	-.89 (.67)
Children of Black parent	-11.20*** (.000)	-8.07*** (.000)
Children of Hispanic parent	1.14 (.639)	.53 (.778)
Children of Asian parent	-4.678 (.17)	-1.33 (.631)
Lowest risk	4.18 (.42)	9.63 (.21)
Highest risk	-13.88** (.004)	-11.61 (.28)
Decreasing overall	1.04 (.84)	1.09 (.68)
Increasing overall	-12.06 (.37)	-6.94 (.35)
Low internalizing, high externalizing	4.54 (.57)	-1.06 (.88)
High internalizing, low externalizing	-17.41*** (.000)	9.44 (.17)
Other groups	2.22 (.64)	3.31 (.21)

Table 17 continued on next page

Table 17 continued

	B Coefficients ( <i>p</i> -values)	
	Reading	Math
Lowest risk x immigration	3.08 (.61)	-5.05 (.54)
Highest risk x immigration	4.81 (.58)	2.14 (.86)
Decreasing overall x immigration	-3.26 (.57)	-3.31 (.32)
Increasing overall x immigration	7.59 (.59)	3.87 (.63)
Low internalizing, high externalizing x immigration	-7.83 (.38)	-.41 (.96)
High internalizing, low externalizing x immigration	22.97** (.003)	-7.26 (.37)
Other x immigration	-3.84 (.44)	-4.81 (.14)

All models controlled for kindergarten reading/math scores, maternal education, family poverty, maternal age, child age, child gender, geographic location, urbanicity, family structure, household size, maternal employment, mother's and child's language use in the homes, child race, and kindergarten reading/math assessment scores.

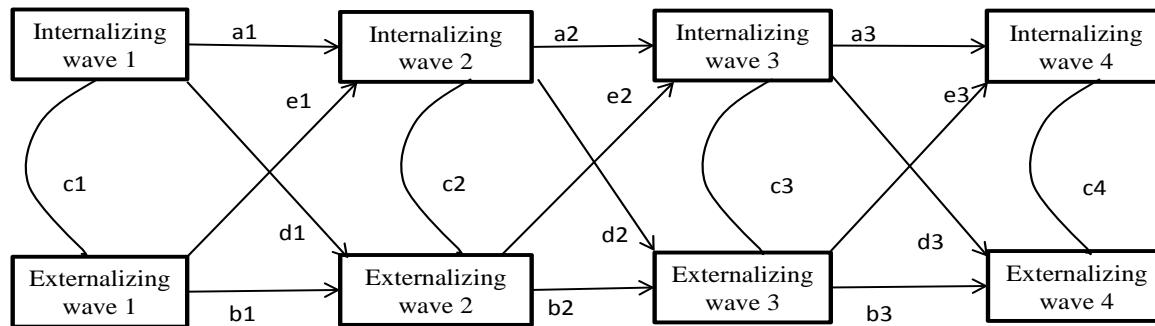
\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ , +  $p < .10$

n = 7,831 (reading); CFI = 1.000, SRMR = .000, RMSEA = .000

n = 7,690 (math); CFI = 1.000, SRMR = .000, RMSEA = .000

## Figures

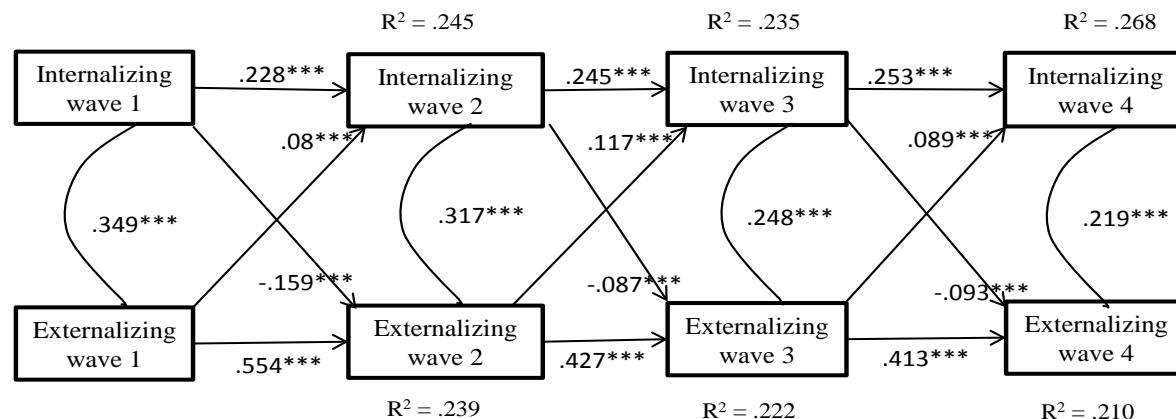
Figure 1. Conceptual Model Free of any Coefficients or Statistics



*Note:*

- a and b: stability pathways
- c: concurrent pathways
- d and e: cross-lagged pathways

Figure 2. Associations between Internalizing and Externalizing Symptoms Over Time with Race/Immigration in a Cross-lagged Model



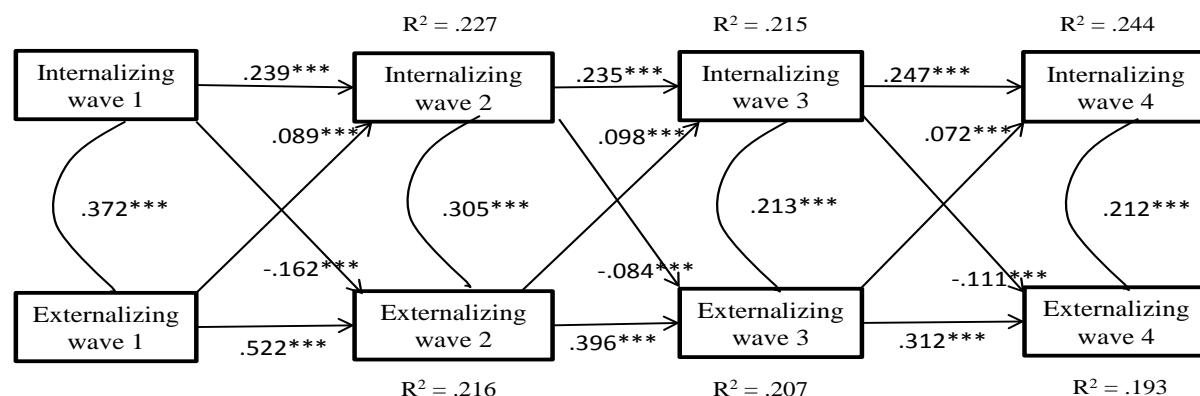
*Note.* See Table 3 for  $B$  coefficients for the race/ethnicity and immigration status variables.

Children of native-born White mothers were used as reference group.

$CFI = .98$ ,  $RMSEA = .03$

\*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$

Figure 3. Associations between Internalizing and Externalizing Symptoms Over Time with Race/Immigration and Covariates



*Note.* *B* coefficients for the race/ethnicity, immigration status variables, and covariates are not included here. See Appendix C for list of covariates and their *B* coefficients.

Children of native-born White mothers were used as the reference group.

*CFI* = .98, *RMSEA* = .03

\*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$

Figure 4. Externalizing Symptoms in Third Grade, by Race/Ethnicity and Internalizing Symptoms in First Grade

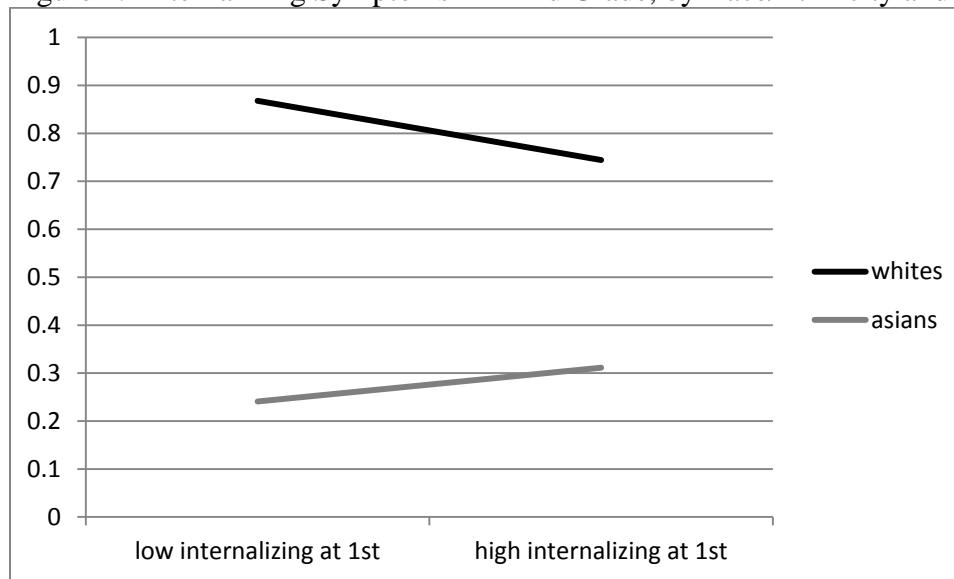


Figure 5. Internalizing Symptoms in Third Grade, by Race/Ethnicity and Externalizing Symptoms in First Grade

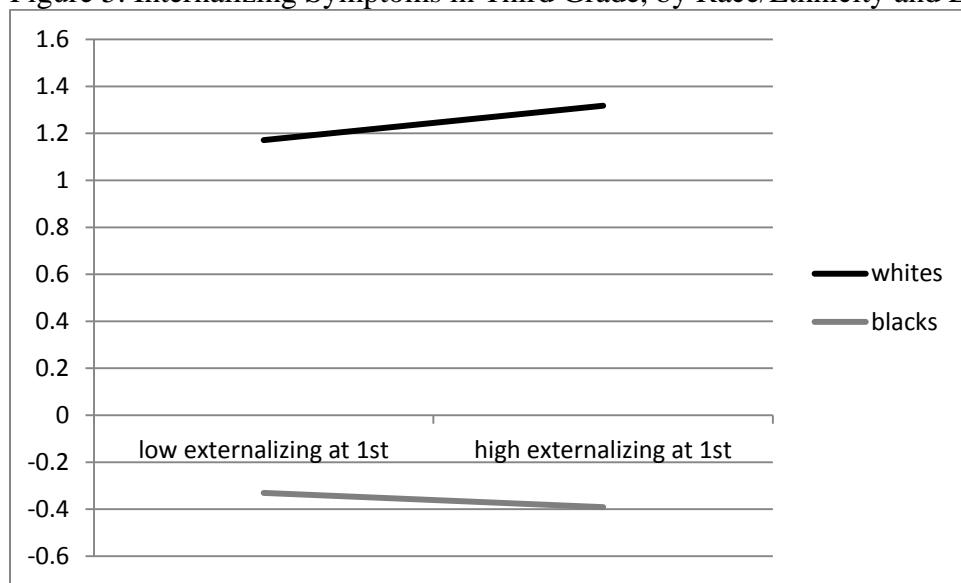


Figure 6. Externalizing Symptoms in Third Grade, by Immigration Status and Internalizing Symptoms in First Grade

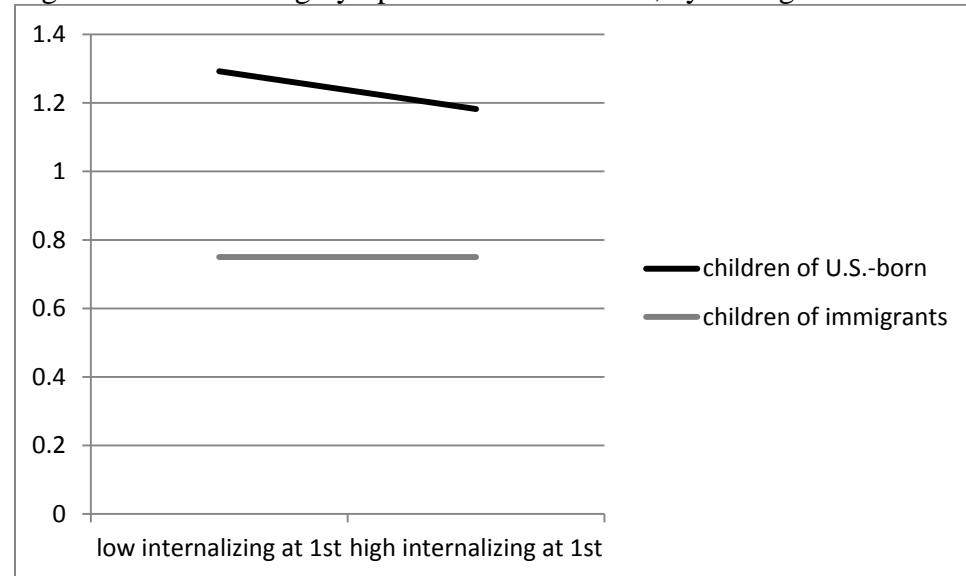


Figure 7. Reading Scores in Eighth Grade, by Over-Time Risk Profile and Gender

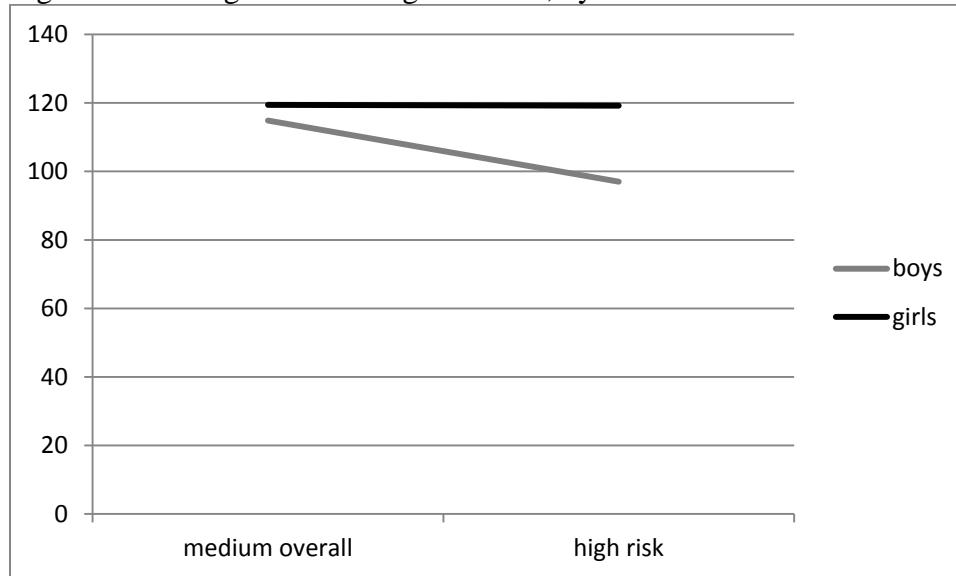
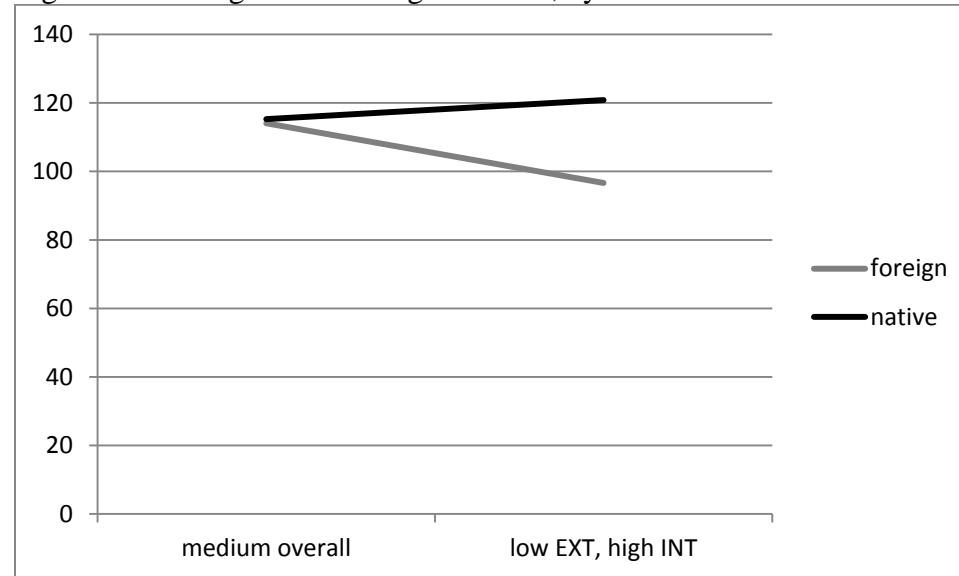


Figure 8. Reading Scores in Eighth Grade, by Over-Time Risk Profile and Immigration Status



## Appendices

### Appendix A

#### Measurement

##### *Externalizing symptoms*

On a scale of one (Never) to four (Very often), please rate the frequency to which child:

- Argued
- Fought
- Got angry
- Acted impulsively
- Disturbed ongoing activities in the classroom

##### *Internalizing symptoms*

On a scale of one (Never) to four (Very often), please rate the frequency to which child showed signs of:

- Anxiety
- Loneliness
- Low self-esteem
- Sadness

##### *Child race/ethnicity and immigration status*

What is the race/ethnicity of your child?

- 1=White, non-Hispanic
- 2=Black or African American, non-Hispanic
- 3=Hispanic, race specified
- 4=Hispanic, race not specified
- 5=Asian
- 6=Native Hawaiian, other Pacific Islander
- 7=American Indian or Alaska Native
- 8=More than one race, non-Hispanic
- 1=Not applicable
- 9=Not ascertained

Was child born in this country, that is, in any of the fifty states or the District of Columbia?

- 1=yes
- 2=no
- 1, -7, -8 = missing/no response

Where was your place of birth (to the parent)?

Response was open-ended.

##### *8<sup>th</sup> grade reading and math test scores*

The 8<sup>th</sup> grade reading assessment focused on four aspects of reading comprehension skills including forming a general understanding of the text, developing a more complete understanding of what was read, making connections from the text with personal background knowledge, and critically evaluating, comparing and contrasting, and understanding the effect of literary devices or the author's intentions. The minimum score for reading was 86.63, and the maximum was 208.90, with a mean score of 171.38 (whole sample statistics). The standard deviation was 27.42.

The 8<sup>th</sup> grade mathematics assessments addressed the following content strands: number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and pattern, algebra, and functions. The cognitive processes (conceptual, procedural, and problem solving) were assessed in each of the strands. Some of the items drew upon knowledge from more than one strand. For example, an item might require that a child apply knowledge about geometry, measurement, and number operations to answer the question correctly. The minimum score for math was 66.17, and the maximum was 172.20, with a mean score of 142.40. The standard deviation was 21.93.

**Appendix B**  
**Sample of Descriptive Statistics of Covariates Used in the Study**

	<i>M (SD)</i> K	<i>M (SD)</i> 1 <sup>st</sup> grade	<i>M (SD)</i> 3 <sup>rd</sup> grade	<i>M (SD)</i> 5th grade
Household characteristics				
Family structure	.65 (.43)	.61 (.44)	.59 (.43)	.68 (.41)
Family poverty	.21 (.44)	.21 (.37)	.20 (.36)	.21 (.39)
Household size	4.52 (1.41)	4.58 (1.39)	4.56 (1.42)	4.51 (1.36)
Geographic location				
Northeast region	.18 (.39)	.18 (.39)	.17 (.39)	.16 (.38)
South region	.37 (.46)	.37 (.46)	.38 (.45)	.35 (.46)
Midwest region	.23 (.45)	.23 (.45)	.25 (.43)	.22 (.47)
West region	.22 (.41)	.22 (.41)	.23 (.41)	.22 (.40)
Urbanicity				
Large city	.37 (.48)	.36 (.48)	.36 (.48)	.38 (.47)
Midsize city	.42 (.48)	.41 (.48)	.40 (.49)	.41 (.48)
Small town	.21 (.43)	.21 (.43)	.23 (.43)	.22 (.44)
Child characteristics				
Child's age	74.69 (4.40)	-	-	-
Child gender	.49 (.50)	-	-	-
Child's language use in the home	.86 (.35)	.87 (.32)	.89 (.31)	.89 (.32)
Kindergarten reading score	33.22 (10.31)	-	-	-
Kindergarten math score	59.20 (8.86)	-	-	-
Maternal characteristics				
Mother's age	33.04 (6.37)	-	-	-
Mother's language use in the home	.78 (.41)	.80 (.40)	.80 (.40)	.78 (.42)
Maternal employment				
Full time	.38 (.48)	.41 (.49)	.45 (.46)	.49 (.43)
Part time	.18 (.38)	.19 (.39)	.19 (.38)	.19 (.38)
Not working	.27 (.45)	.26 (.44)	.22 (.47)	.25 (.45)
Maternal education				
Less than high school education	.14 (.32)	.13 (.29)	.13 (.31)	.12 (.29)
High school education	.56 (.49)	.56 (.50)	.57 (.50)	.57 (.51)
College education	.21 (.44)	.21 (.45)	.22 (.44)	.24 (.46)

## Appendix C

### Sample list of covariates and their B Coefficients (b Coefficients) for Respective Models in Tables 3 to 6

	Gender	Race	Immigration	Race/Immigration
	B Coefficients (b Coefficients)			
<b>Maternal education</b>				
Less than high school education	.01 (.92)	.08 (.13)	-.03 (.62)	.03 (.54)
High school education	-	-	-	-
College education	-.12 (.003)	-.06* (.02)	-.11* (.03)	-.02 (.42)
<b>Household characteristics</b>				
Family structure	-.08* (.04)	-.04 (.19)	-.03 (.59)	-.07* (.03)
Family poverty	.04 (.49)	-.03 (-.38)	.03 (.62)	-.03 (.37)
Household size	.23 (.67)	.03 (.49)	.31 (.47)	.14 (.31)
<b>Geographic location</b>				
Northeast region	-.07 (.18)	-.05 (.09)	-.03 (.60)	.04 (.14)
South region	-	-	-	-
Midwest region	-.06 (.29)	-.02 (.60)	.04 (.57)	.10** (.002)
West region	.03 (.68)	-.01 (.89)	-.04 (.46)	.01 (.73)
<b>Urbanicity</b>				
Large city	-	-	-	-
Midsize city	-.02 (.67)	-.06* (.02)	-.10 (.08)	.04 (.14)
Small town	-.10 (.07)	-.11*** (.001)	-.10* (.05)	.06 (.10)
<b>Child characteristics</b>				
Child's age	-.01 (.15)	.01* (.03)	-.00 (.66)	-.00 (.38)
Child gender	-	-.10*** (.000)	-.09 <sup>+</sup> (.06)	-.14*** (.000)
Child's language use in the home	.11 (.39)	-.05 (.09)	-.08 (.80)	-.02 (.58)
<b>Maternal characteristics</b>				
Mother's age	.004 (.34)	-.005 (.54)	-.001 (.71)	-.004* (.05)
Mother's language use in the home	.13 (.88)	-.02 (.30)	.18 (.97)	-.26 (.72)
Mother's length of residency in U.S.	.26 (.14)	.05* (.04)	.03* (.05)	.01 (.06)
<b>Maternal employment</b>				
Full time	-	-	-	-
Part time	.001* (.05)	.04 (.71)	.21 (.62)	.11 (.76)
Not working	.11 (.72)	.23 (.49)	.18 (.79)	.06 (.82)

**Appendix D**

**Frequency Count for Internalizing and Externalizing Symptoms Pathways Individually**

	Internalizing Symptoms			Externalizing Symptoms		
	Low (n)	Medium (n)	High (n)	Low (n)	Medium (n)	High (n)
decreasing	701	994	553	666	1,191	625
stable	1,417	4,537	341	1,703	3,708	361
increasing	415	460	20	508	644	23

**Appendix E**  
**Description of Eight Focal Combined Internalizing/Externalizing Pathways and Sample Sizes for Each Pathway**

Combined pathway groups	n	Internalizing pathway	Externalizing pathway
Lowest risk	472	Low, decreasing	Low, stable
		Low, stable	Low, decreasing
		Low, stable	Low, stable
Highest risk	205	Medium, increasing	High, stable/increasing
		High, decreasing	High, stable/increasing
		High, stable/increasing	Medium, increasing
Decreasing overall	1,442	High, stable/increasing	High, decreasing
		High, stable/increasing	High, stable/increasing
		High, stable/increasing	Low, decreasing
Increasing overall	257	Low, decreasing	Low, decreasing
		Low, decreasing	Medium, decreasing
		Low, decreasing	High, decreasing
Medium overall	3,419	Medium, decreasing	Low, decreasing
		Medium, decreasing	Medium, decreasing
		Medium, decreasing	High, decreasing
Low internalizing, high externalizing	143	High, decreasing	Low, decreasing
		High, decreasing	Medium, decreasing
		High, decreasing	Low, increasing
High internalizing, low externalizing	101	Low, increasing	Medium, increasing
		Low, increasing	Medium, stable
		Low, increasing	Medium, increasing
All Others	3,388	Medium, increasing	Medium, stable
		Medium, increasing	Medium, stable
		High, stable/increasing	High, stable/increasing

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