5-2015

TRAJECTORIES OF ANXIOUS WITHDRAWAL IN EARLY CHILDHOOD

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by

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A DISSERTATION

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Doctor of Philosophy

Major: Psychological Studies in Education

(Cognition, Learning, and Development)

Under the Supervision of Professors Eric S. Buhs and Kathleen Moritz Rudasill

Lincoln, Nebraska

May, 2015

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University of Nebraska, 2015

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The purpose of this study was to examine the developmental trajectory of anxious withdrawal in a group of 3-year old children in transition to kindergarten. This study also examined the role of high quality classroom environments for children, and the role of multiple risk factors for parents on development of children's anxious withdrawal. The current sample consisted of 1938 3-year old children (49% female) followed across four time points (Fall 2009, Spring 2010, Spring 2011, and Spring 2012) as a part of the Head Start Family and Child Experiences Survey (FACES 2009), 20% of the children were White, non-Hispanic, 35% were African-American, 36% were Hispanic/Latino, and the remaining 8% comprised of American Indian, Asian, and Multiracial. Longitudinal analyses with multilevel modelling (MLM) were employed to explore the developmental trajectory of anxious withdrawal, and associations between classroom quality and socio-economic risk factors for parents on anxious withdrawn behavior in children.

Findings indicated that anxious withdrawn behavior decreased over time when children were in Head Start, and then increased after children transitioned to kindergarten. The effects of either classroom quality or socio-economic risk factors for parents were not significant. Examination of potential gender effects indicated that teachers' ratings of boys' anxious withdrawal were higher at the beginning of Head Start

compared to levels reported for girls. Results highlighted the need for assessments of the possible mediating mechanisms between socio-economic risk factors for parents, quality of child care classrooms, and children's anxious withdrawn behavior.

ACKNOWLEDGMENTS

So, one day back in 2013, after attending yet another SRCD conference, I had this idea about a topic for my Dissertation – which was beginning of a long journey of hard work that is documented here. First, I would like to thank Dr. Eric Buhs, my advisor, and Dr. Kathleen Moritz Rudasill, my co-adviser for their continued support, encouragement, and inspiration. I also want to thank Dr. Lesa Hoffman for constantly challenging me in her advanced classes on multilevel modeling, and for being such a great teacher! Even though it hurt really bad doing all the assignments for Lesa's classes, at the end it paid back when I had the confidence for undertaking my dissertation project. In addition, I want to thank Dr. Jim Bovaird for taking time and mentoring me through the dissertation analyses, and for encouraging my curiosity and critical thinking during our discussions. Also, to Dr. Maria de Guzman, thank you for giving your time and serving on my dissertation committee. At last, I want to thank Dr. Amnon Rapoport, my Fulbright mentor, for revealing the research potential in me long before I saw it, and for supporting me in my decision to apply for a PhD program in the U.S.

Special thanks to my colleagues and graduate students, with whom I shared office along the way, and who laughed and cried with me during the best and the worst times of the graduate school: Betty-Jean Usher-Tate, Emily Griese, Kim Marxhausen, Brandi Berry, Ann Arthur, and Kirstie Bash. You all gave me your support when I needed it. How could I survive without all of you?

Of course, I must thank my fiancée, Amey, for taking care of household chores during all that long weekends when I had to work on my dissertation. To all my friends in Lincoln, who were here with me from the beginning of my journey, I am truly blessed to have your support! Thank you!

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CHAPTER I

Introduction

Anxious withdrawal is defined as a consistent display of solitary behavior across different settings, and around familiar and unfamiliar peers (Rubin & Asendorpf, 1993). Current literature has shown that anxious withdrawal is associated with multiple negative outcomes across childhood and adolescence (Rubin, Coplan, Bowker, & Menzer, 2011). As early as in preschool and kindergarten, anxiously withdrawn children are more likely to withdraw from group activities, feel lonely, have low self-esteem, and experience various internalizing problems (Rubin & Coplan, 2004). Anxious withdrawn children are also often rejected by their peer group and have less stable and less supportive friendships (Gazelle & Ladd, 2003; Rubin, Wojslawowicz, Rose-Krasnor, Booth-LaForce & Burgess, 2006). By middle and late childhood, anxious withdrawal becomes associated with social anxiety, loneliness, depression, and lower self-worth (Boivin, Hymel, & Bukowski, 1995; Prior, Smart, Sanson, & Oberklaid, 2000; Chronis-Tuscano et al., 2009). In this regard, early identification of risk and supportive factors contributing to developmental trajectory of anxious withdrawal is important for our understanding of the etiology of anxious withdrawal.

Recent studies that examined developmental trajectory of anxious withdrawal contributed to our understanding on the role of peer interactions, classroom emotional support, and parent involvement in development of anxious withdrawal in elementary school children (e.g. Booth-LaForce & Oxford, 2008; Oh et al., 2008; Avant, Gazelle & Faldowski, 2011; Booth-LaForce et al., 2012). However the effects of secondary relationships (e.g. with peers and teachers) on anxious withdrawal require further

examination in more diverse socio-economic settings. Moreover the current literature lacks studies examining trajectories of anxious withdrawal in early childhood. The goals of the current study, therefore are (a) to address those gaps in the literature, (b) examine theoretical considerations, and (c) provide an empirical examination of potential joint effects of the classroom quality and socio-economic factors on the developmental trajectory of anxious withdrawal in a sample of 3-year old children through the transition to kindergarten.

The Guiding Theory

Rubin's transactional model outlines developmental pathways to and from anxious withdrawal from infancy throughout adolescence (Rubin, LeMare, & Lollies, 1990). According to this model, various risk and protective factors may contribute to the development and stability of anxious withdrawal across early childhood and adolescence. Thus, certain temperament predispositions (e.g. behavioral inhibition, wariness), parenting styles (e.g. overprotective and intrusive), and social relationships (e.g. peer rejection and victimization) tend to be associated with higher levels of anxious withdrawal. At the same time, certain positive factors (e.g. supportive friendships, peer acceptance, high quality relationships with teachers) are associated with lower levels of anxious withdrawal and fewer negative outcomes (Gazelle, 2006; Avant et al., 2011; Curby et al., 2011; Oh et al., 2008).

This model also suggests that broader socio-economic (e.g. living conditions, financial resources, and employment status) and personal-social factors for parents (e.g. availability of emotional support system, marital/partner status and functioning) may also contribute to development and stability in anxious withdrawal by affecting mothers'

ability to provide sensitive care and respond to children's needs. Over the last few decades this model has been providing a useful theoretical framework for examining the role of biological, social, and cultural factors on development and stability in anxious withdrawal. Since then, the research on anxious withdrawal has accumulated empirical evidence on correlates and outcomes of anxious withdrawal throughout childhood and adolescence. More recently, advanced statistical methods have allowed for longitudinal investigations of the developmental pathways outlined by this transactional model.

Current State of Research

Recent research on anxious withdrawal, conducted within the theoretical framework proposed by Rubin and colleagues (e.g. Rubin, LeMare, & Lollies, 1990; Rubin, Burgess, Kennedy & Stewart, 2003), has focused on examining developmental pathways to anxious withdrawal longitudinally using large samples of school age children. Thus, in one study, the developmental trajectory of anxious withdrawal was examined in a sample of 5th, 6th, and 8th graders (Oh et al., 2008). Three distinct trajectories were identified: increasing, decreasing, and low stable social withdrawal, and a set of covariates was then used to predict the group membership in one of these three classes. The findings revealed that higher levels of peer exclusion, unstable friendships, or a lack of friends predicted membership in the increasing class, while lower levels of peer exclusion predicted membership in the decreasing withdrawal class.

Another study examined the developmental trajectory of anxious withdrawal from first through the sixth grades (Booth-LaForce & Oxford, 2008). The researchers evaluated the role of early precursors (e.g. early temperament, insensitive parenting, and attachment) assessed at 6, 24, and 54 months, and contemporaneous predictors (e.g.

sociometric status, peer exclusion) assessed throughout elementary and middle school on development and stability of social withdrawal. Three distinct classes were identified: increasing, decreasing, and normative social withdrawal. Results revealed that poor inhibitory control contributed to increasing social withdrawal, which was associated with higher loneliness, solitary behavior, and peer exclusion in school.

In addition, the effect of parenting styles (e.g. nurturing or restrictive parenting) on the developmental trajectory of anxious withdrawal from 5th to 8th grade was examined in a study conducted by Booth-LaForce et al. (2012). The researchers hypothesized that parent-child relationships and peer interactions should be considered together as they affect development and change in anxious withdrawal. Three distinct pathways of anxious withdrawal were identified: increasing, decreasing, and low-stable. Similar to the previous studies, results highlighted that greater peer exclusion contributed to higher rates of anxious withdrawal. Moreover, higher parental power, both nurturing and restrictive parenting, and less time spent with a mother also contributed to increase in anxious withdrawal.

The studies reviewed above share certain common trends (and potential limitations) associated with longitudinal research on anxious withdrawal. The first trend is a focus on elementary school children in transition to the middle school. While the developmental model of anxious withdrawal states that transition periods during school are stressful and associated with higher levels of anxious withdrawal, this guiding model does not limit transition periods only to transition to the middle school. Examining other, earlier, transition periods such as transition to kindergarten, would potentially provide additional

information on developmental pathway of anxious withdrawal in younger children, and contribute more empirical evidence to the developmental model of anxious withdrawal.

Consequently, the second trend refers to the choice of predictors associated with the changes in anxious withdrawal. Even though each study reviewed above outlined the importance of considering both risk and protective factors on development of anxious withdrawal, those factors were limited to the peer relationship, friendships, and parenting. Extending the conception of risk and protective factors to effects of sociological settings (e.g. living conditions, employment status, and financial resources for parents) could provide more evidence in support of the developmental model of anxious withdrawal. Moreover, considering different factors in children's school environment (e.g. the quality of teacher-child relationship) may also enrich our knowledge of development and change in anxious withdrawal. The current study will address these limitations by examining the developmental trajectory of anxious withdrawal in younger children through the transition to kindergarten, and evaluate the potential predictive contributions of the high quality teacher-child relationship in combination with possible detrimental effects of socio-economic risk factors for parents.

The Current Study

While the developmental model of anxious withdrawal provides theoretical support for the role of the quality relationships outside of the family, and suggests that we consider broader socio-economic factors that may impact development of anxious withdrawal, the current literature lacks empirical evidence examining influence of distal factors in the first years of children's lives. The current study will focus on a group of

young children in transition to kindergarten and will use data gathered from a large group of families served by Head Start programs.

It has been suggested that socio-emotional adjustment of anxious withdrawn children is particularly stressful during all transition periods throughout children's lives (Rubin et al., 2003). However, compared to elementary school children, who can rely on peer support, parent involvement, and friendships, during their transition to middle school, younger children often do not yet have similar levels of these resources. In the relative absence of these proximal protective factors, it is important to examine the role of more distal factors on the developmental trajectory of anxious withdrawal. Therefore, the current study will examine the potential impact of preschool classroom quality in combination with possible detrimental effects of multiple demographic risk factors on the developmental trajectory of anxious withdrawal across four time points from the beginning of Head Start through the end of kindergarten (see Figure 1).

The current study will also take into account children's gender as a part of the study's aims. Even though current research does not reveal any gender differences in the prevalence of anxious withdrawal (Rubin & Coplan, 2010) or in developmental trajectories and class membership (Oh et al., 2008; Booth-LaForce & Oxford, 2008), it has been suggested that anxiously withdrawn boys might have more adjustment difficulties compared to girls (Rubin & Coplan, 2004). Thus, from prospective of the gender role stereotype theory, shyness and anxious withdrawal may be less socially acceptable for boys than for girls, because anxiously withdrawn behavior in boys violates gender norms of socially assertive behavior in males (Doey, Coplan, & Kingsbury, 2013).

The current study will utilize multilevel modeling in order to examine the effects of the person- (e.g. demographic risk) and group- (e.g. classroom quality) level characteristics on development and change in anxious withdrawal across four time points (see Figure 2). Multilevel modeling allows analyses of multilevel data and will be used to estimate person- and group-level effects simultaneously.

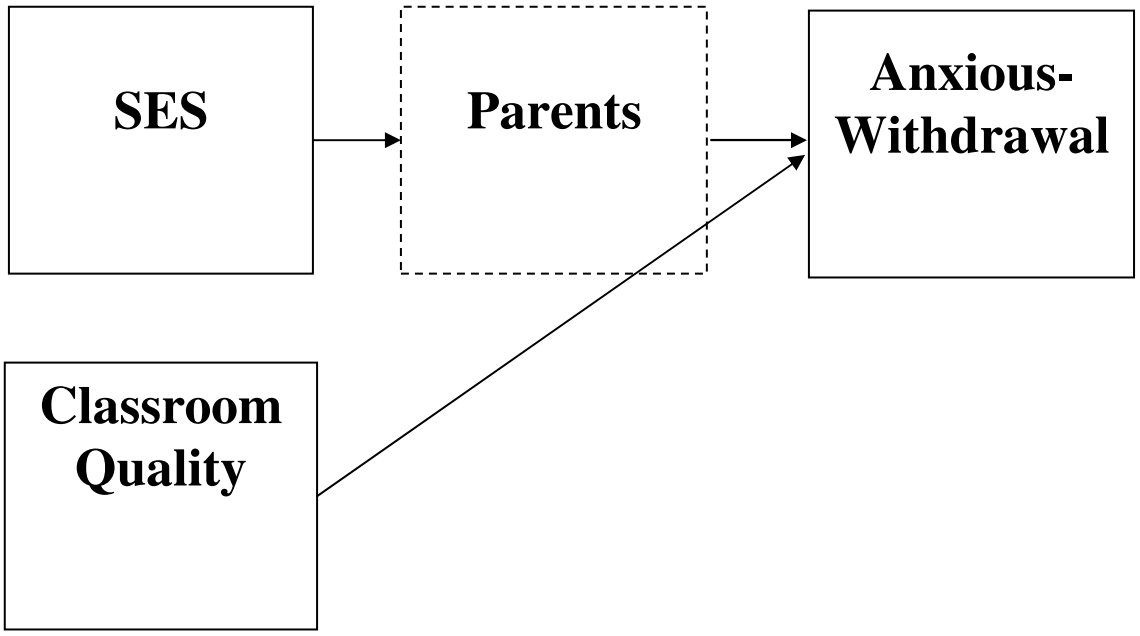

Figure 1. Proposed conceptual model examining the effects of SES and Classroom Quality on Anxious Withdrawal

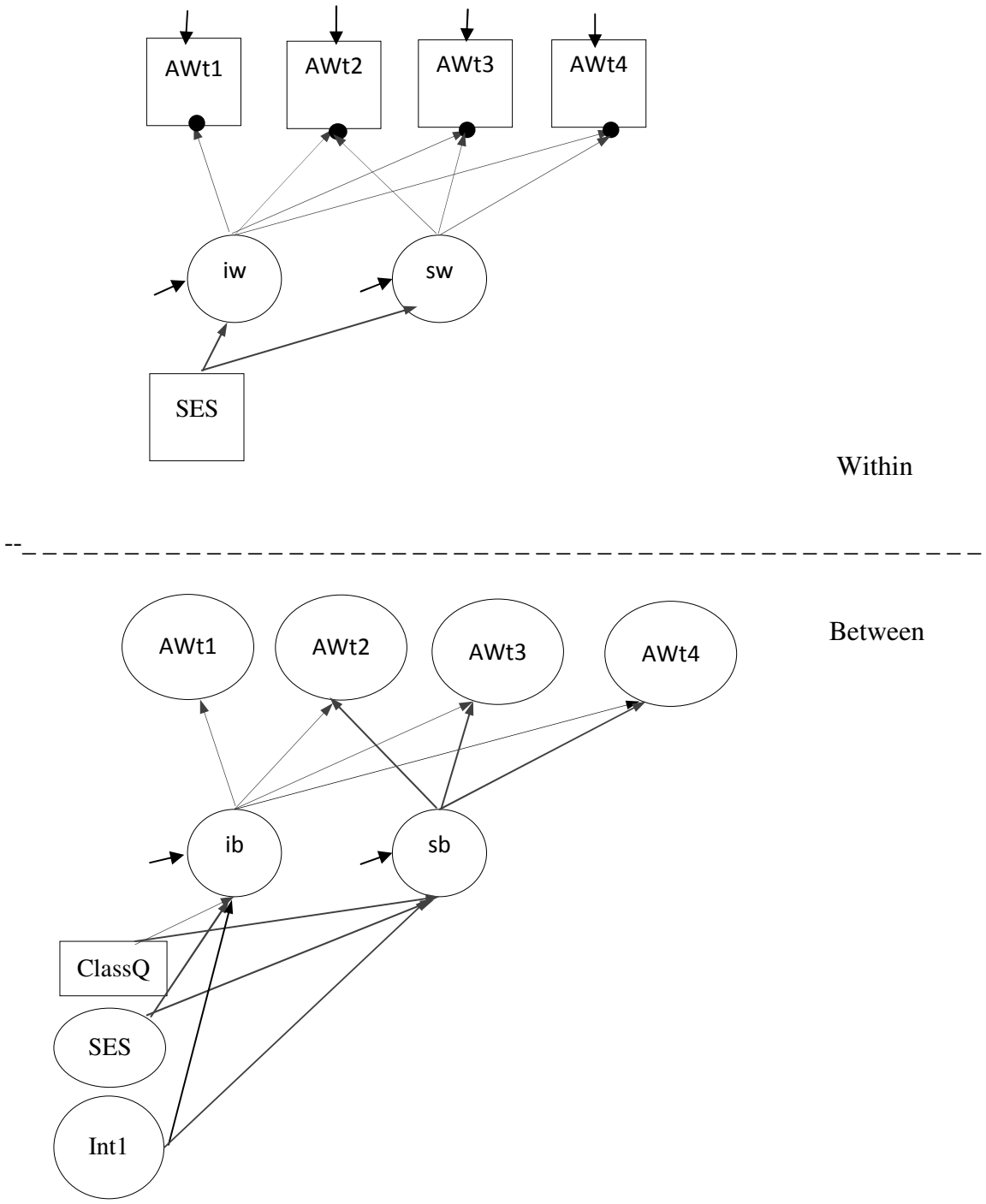

Figure 2. Proposed growth curve model examining the effects of SES and Classroom Quality on Anxious Withdrawal (Three-level Analysis). *Note.* ClassQ = Classroom Quality; Int1 = SES X ClassQ interaction.

CHAPTER II

Literature Review

The purpose of the current study is to contribute to a better understanding of developmental trajectories of anxious withdrawal in early childhood. The current study will investigate the effect of potential protective contributions of the high quality classrooms, and possible detrimental effects of multiple demographic risk factors for parents on developmental trajectory of anxious withdrawal. While prior research has examined effects of multiple risk and protective factors on development of anxious withdrawal, the effect of the combined influences of child characteristics as they interact with environmental risk and protective factors still remains unclear. Expanding research to environmental factors, rather than focusing entirely on child characteristics, would help in identifying the consistent patterns associated with the developmental trajectory of anxious withdrawal. This study will use multilevel modeling (MLM) to examine the possible contribution of high quality classrooms and demographic risk factors on developmental trajectories of anxious withdrawal in Head Start children across the transition to kindergarten.

This review of the current literature will examine theoretical and empirical support for the significance of anxious withdrawal for early childhood development. A transactional developmental model of anxious withdrawal will be reviewed first to provide a theoretical foundation for the study. Next, empirical research on the significance of anxious withdrawal in early childhood will be reviewed with respect to associated adjustment problems. In addition, stability of anxious withdrawal from early childhood through adolescence will be discussed describing research findings on

associations between children's anxious withdrawal and maladjustment problems further in adolescence. Further, research on classroom context as a supportive factor for anxious withdrawn children will be reviewed, focusing on the specific characteristics of high quality classrooms and their effectiveness for supporting children with anxiously withdrawn behavior. Findings from research on the effects of multiple demographic risk factors will also be examined with respect to associations between family risk factors and children's behavioral problems. Finally, specific child characteristics in early childhood will be discussed with respect to the important developmental tasks significant for this period. The current study and analyses will examine the developmental course of anxious withdrawal across four time points from beginning of Head Start care to the end of kindergarten, and will investigate the potential contribution of high quality preschool classrooms in a sample of 3-year old Head Start children.

Transactional Model of Anxious Withdrawal

Rubin and colleagues propose a transactional model outlining developmental pathways of anxious withdrawal from infancy through middle childhood and adolescence (Rubin, LeMare, & Lollies, 1990; Rubin et al., 2003). These researchers suggest that anxious withdrawal is best explained from the perspective that combines biological, interpersonal and sociological constructs. According to this model, behavioral tendencies for anxious withdrawal begin with the infants who have a low arousal threshold, making them difficult to comfort and soothe. Such predispositions can make these babies more fearful and wary as toddlers, and socially reticent as preschoolers. In addition, attachment relationships with mothers at a young age can modify the development of anxious

withdrawal. For example, toddlers with insecure/ambivalent attachment tend to develop more fear of rejection and further withdraw from social interactions.

As further outlined by the transactional model of anxious withdrawal, certain parenting styles (e.g. neglectful or unsupportive parenting) can potentially reinforce children's feelings of insecurity and contribute to the stability of anxious withdrawal in early and middle childhood. For example, experiencing multiple stressors, typical for low SES families, may impede parents' ability to create a safe and secure environment for their children. Socio-economic settings for parents (i.e. financial resources, employment status, and living conditions) combined with personal-social conditions (i.e. mental health status, availability of emotional and social support, marital/partner status and functioning) may potentially complicate parents' ability to respond to their children's needs and demands in a timely manner, and contribute to more withdrawal behavior in children.

Consequently, later in school, peers perceive fearful and anxious children as asocial and unattractive, and tend to exclude them from the group activities, which, in turn, enhances their social isolation, and may lead to further withdrawal. Teachers often perceive these children as insecure or immature which may also potentially contribute to their withdrawal from class interactions (e.g. Coplan, Hughes, Bosacki, & Rose-Krasnor, 2011). At later stages, when anxious withdrawn children learn to recognize their social failures, social withdrawn behavior is associated with internalizing problems (e.g. anxiety, depression, and loneliness) (Rubin et al., 2003).

It is important to note that early identification of the risk vs. non-risk categories of children from temperament, environmental and demographic factors would help our understanding of the developmental trajectory of anxious withdrawal. Expanding

research to environmental and demographic factors, rather than focusing entirely on child characteristics, would help in identifying the consistent patterns associated with increasing, decreasing or stable trajectories of social withdrawal. Anxious withdrawal is a heterogeneous construct that differs in developmental consequences for children with lower vs. higher levels of anxious withdrawal. While lower levels of anxious withdrawal may potentially be decreasing over time once children acquire more social expertise and confidence, higher levels of anxious withdrawal tend to remain stable and associated with social maladjustment both concurrently and longitudinally. In this regard, it is important to determine stable and potentially increasing anxious withdrawal behaviors early in life. The current study will approach anxious withdrawal as a dynamic process that can be modeled over time and is predicted by individual (anxious withdrawal behavior), demographic (socio-economic conditions), and environmental (high quality classrooms) factors.

Significance of Anxious Withdrawal in Early Childhood

Defining anxious withdrawal in childhood

Anxious withdrawal is defined as the consistent display of solitary behavior across different settings, and around familiar and unfamiliar peers (Rubin & Asendorpf, 1993). It is important to note that children's social isolation can be caused by two fundamentally different causes: group rejection or personal decision to withdraw (Rubin & Asendorph, 1993). Therefore, in the recent research, any group decision to reject a child from their activities is referred to as "active isolation"; while a personal decision to withdraw from the group interaction is referred as "social withdrawal' (Rubin & Asendorpf, 1993, p. 266).

However, due to a large variety of possible causes for withdrawal from group activities, current research suggests anxious withdrawal as an "umbrella term" that refers to withdrawn behavior arising from the factors internal to the child (Rubin & Coplan, 2004, p. 516). Many studies have used a large variety of terms referring to anxious withdrawal interchangeably. Such terms include "anxious solitude", "reticence", "social anxiety", "social avoidance", "social phobia", and "social wariness" (Coplan & Rubin, 2010, p. 7). Nevertheless, all of these studies have focused on *fear, wariness, and anxiety* as potential underlying causes for children's anxious withdrawn behavior (Rubin, Coplan & Bowker, 2009, p. 145).

Anxious withdrawal and concurrent adjustment in early childhood

To date, childhood anxious withdrawal is considered a risk factor due to associated difficulties in social and academic adjustment starting in preschool and kindergarten. However, recent research emphasizes that the effect of anxious withdrawal on children's academic achievement is not direct, but rather moderated by underlying anxiety and fear of social evaluations that affect the well-being of shy and anxiously withdrawn children (Croizer & Hostettler, 2003). For example, shy children whose behavior is affected by similar self-conscious concerns performed equally well as non-shy elementary school children on tests of vocabulary and arithmetic when they were placed among their peers in the familiar school settings. However, when shy children were tested individually on a vocabulary test in face-to-face conditions, they tended to perform significantly less well compared to non-shy children (Croizer & Hostettler, 2003).

The hypotheses regarding the underlying effects of social anxiety for shy and anxiously withdrawn children was also supported in a number of studies by Coplan and colleagues. In one study, the associations between different forms of children's nonsocial play behavior and adjustment in kindergarten were examined in a sample of five-year-old children (Coplan, Gavinski-Molina, Lagace-Segun, & Wichmann, 2001). The results revealed that children with reticent behavior, characterized by approach-avoidance conflict and a fear of social interaction, had lower indices of social adjustment and academic achievement. Researchers have suggested that children with temperamental shyness or reticent behavior who do not adapt to social settings are more likely to have higher rates of anxious withdrawn behavior later in life (e.g., Booth-LaForce & Oxford, 2008).

In another study, the relationship between socio-emotional characteristics of children and student-teacher interactions was examined in a sample of four-year-old preschoolers (Coplan & Prakash, 2003). The findings showed that anxious and socially-withdrawn children tended to more frequently interact with teachers, partially due to their fear of interacting with peers. Teacher-dependent behavior may potentially serve as a marker of the lack of social competence that is especially hard to develop for shy and anxiously withdrawn children. Simultaneously, early negative experiences may potentially reinforce shy and anxious withdrawn children to further withdraw from social interactions further in life.

Recent research provides additional evidence that anxious withdrawal, when it is caused by social fear and anxiety, is associated with more severe social outcomes compared to social withdrawal, caused by social disinterest and desire to spend time

alone (Coplan, Prakash, O'Neil, & Armer, 2004). The term "conflicted shyness" was introduced by Coplan and colleagues (Coplan et al., 2004) to describe behavior of those children who are eager to join social interaction but who are inhibited by their fear or social anxiety. It has been hypothesized that frustration associated with fear and anxiety leads to severe social problems as early as in preschool, including low perceived social competence and negative emotions. Such experiences early in childhood may lead to developing negative self-attributions for social failures and potentially cause further withdrawal from social interactions. Other studies also identified positive associations between higher shyness and/or anxious withdrawal, and academic skills in preschool, including expressive vocabulary (Coplan & Armer, 2005), literacy (Spere & Evans, 2009), and mathematics (Normandeau & Guay, 1998; Dobbs et al., 2006). Taken together, these findings suggest that anxiously withdrawn children are concurrently at risk for maladjustment problems both in academic and social domains.

Stability of anxious withdrawal in early childhood through adolescence

Current research also establishes predictive links between anxious withdrawal in early childhood and maladjustment problems later in adolescence and adulthood. A study by Rubin, Chen, McDougall, Bowker, and McKinnon (1995) reported results from the Waterloo Longitudinal Project that followed a sample of kindergarteners through the ninth grade. Results indicated that anxious withdrawal tended to be stable through middle childhood and was significantly associated with adolescent loneliness, insecurity and negative self-regard.

It has also been suggested that early temperament, characterized by high level of behavioral inhibition and withdrawal from novel stimuli, is associated with anxiety

problems in adolescence. Thus, in a study by Prior, Smart, Sanson, and Oberklaid (2000) parents were asked to evaluate children's temperament and anxiety at 10 time points across the study. The results revealed that persistent shyness, as rated on six or more occasions during childhood, was strongly associated with anxiety disorders in adolescence. Similar findings were also reported in a more recent study by Chronis-Tuscano et al. (2009). Recent research also revealed that a lack of support from parents (Gullone, Ollendick, & King, 2006) and the presence of peer exclusion (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004) can potentially intensify withdrawn tendencies in children, and contribute to higher levels of depression and more stable anxious withdrawal behavior in childhood and adolescence.

In summary, the links between anxious withdrawal and later adjustment problems appear to be important indices of psycho-social adjustment. Even though these associations vary in the degree of predictability and strength of the relationship, anxiously withdrawn children have consistently been shown to be potentially more vulnerable to different forms of maladjustment. These findings draw attention to the significance of anxious withdrawal in early childhood.

Our understanding of the development of anxious withdrawal, however, lacks data from longitudinal studies focusing on early childhood. One major drawback in the recent studies examining developmental trajectories of anxious withdrawal is their focus on elementary school children in transition to early adolescence (e.g. Booth-LaForce & Oxford, 2008; Oh et al., 2008; Avant et al., 2011; Booth-LaForce et al., 2012). The current study will address the deficiencies in the previous research by examining developmental model of anxious withdrawal in a younger sample of 3-year old children

Classrooms as Important Context for Children's Social Development

Significance of early childcare for child development

Children's social development is better understood in a context of socialization with significant adults and peers. Bioecological theory emphasizes that social development takes place within a context of larger social systems that include societal influences, cultural values, customs, and norms (Bronfenbrenner & Morris, 2006). For many children, formal or informal child care provides an important socialization context for interactions with non-relative adults and peers. Early child care classrooms contribute to children's social, emotional, and cognitive development, providing children with unique opportunities to interact at individual, dyadic, and group levels (Howes, 2011).

High quality childcare that is consistent, emotionally responsive, and developmentally appropriate is related to positive developmental outcomes in children. Findings from a large longitudinal study by the National Institute of Child Health and Human Development (NICHD) provide evidence that attending high quality day care in the first three years of life is associated with improved self-control, compliance, and decreases in problem behavior (NICHD, 1998). Moreover, children attending day care centers with responsive and sensitive caregivers, and who experienced a lot of language stimulation tended to show better language and cognitive outcomes at three years of age (NICHD, 2000). Findings from a study of childcare emphasized that children in high quality classrooms have better school readiness cores and fewer behavior problems at three years of age (NICHD, 1999). Overall, children who attend high quality early childcare programs tend to display better cognitive and social skills, better interpersonal

relationships, and better self-regulation skills, compared to children in lower quality care (*Quality Early Education*, 2005).

Important characteristics of high quality classrooms

There are certain specific features of high-quality care that may be more consistently linked to positive developmental outcomes in children. Conceptually, classroom quality may be divided into three broad domains: emotional support, classroom organization, and instructional support (Pianta, La Paro, & Hamre, 2008). *Emotional Support* refers to the teacher's ability to create a positive environment, properly respond to students' needs and demands, and encourage students' learning and interaction (Pianta et al., 2008). Teachers in classrooms with high emotional support are respectful, consistently aware of the students' problems and concerns, and effectively address students' needs. Teachers in classrooms with low emotional support are not responsive to the students nor are they aware of the specific students' needs or demands.

Classroom organization refers to the teacher's ability to set and maintain clear behavior expectations in the classroom, emphasize classroom routines, and focus students' attention on the learning goals (Pianta et al., 2008). Teachers in classrooms with high organization are more efficient in their management of the classroom activities, able to better facilitate students' engagement, and use a variety of instructional materials to tie their lessons to students' needs. Teachers in classrooms with low organization are less consistent with their rules and expectations, less successful in redirecting misbehavior, and more often neglected to facilitate students' involvement.

Instructional support refers to the teacher's ability provide high-quality instruction and deliver evaluative feedback to encourage students' participation (Pianta et

al., 2008). Teachers in classrooms with high instructional support promote high order cognitive reasoning by fostering discussions and analysis, or providing frequent feedback to ensure students' understanding. Teachers in the classrooms with low instructional support rarely used discussions or analysis, and tended to rely on close-ended questions. Children's development may take different paths if a child is placed in a high quality or low quality classroom. Anxious withdrawal is associated with intense negative emotions that can make shy children more prone to social fear and anxiety (Eisenberg et al., 1998). Children with early history of anxious solitude tend to have worse adjustment outcomes (i.e. more peer rejection and victimization, and less peer acceptance) in classrooms with lower classroom quality compared to higher quality classrooms (Gazelle, 2006). Overall current evidence suggests that social adjustment in classrooms with low quality is particularly challenging for anxious solitary children.

High quality classrooms as a potential protective factor for anxiously withdrawn children

There is also consistent evidence that children in high quality classrooms tend to have fewer behavioral problems and off-task behaviors. Children in high quality classrooms show more engagement, compliance and cooperation with peers (Rimm-Kaufman, La Paro, Downer, & Pianta, 2005), have greater social competence (Pianta, La Paro, Payne, Cox, & Bradley, 2002), and fewer internalizing and externalizing problems (Buyse, Verschueren, Doumen, Van Damme, & Maes, 2008). A few longitudinal studies have examined the moderating effect of classroom quality on associations between children's anxious withdrawal and school adjustment (Gazelle, 2006; Curby, Rudasill, Edwards, & Perez-Edgar, 2011). The findings from these studies demonstrate that high quality classrooms significantly decrease social and academic risks for children with

temperamental vulnerability, frequently associated with anxious withdrawal, such as social anxiety, wariness, low adaptability, or negative mood.

Current literature suggests that high quality care might be particularly beneficial for children from low-income families because they may lack appropriate cognitive stimulation at home (Bradley & Corwyn, 2002). However studies that examined the effects of high quality classrooms for children with combined behavioral and socio-economic risks did not exclusively focus on anxious withdrawal (e.g. Moiduddin, Aikens, Tarullo, West, & Xue, 2012; Aikens, Klein, Tarullo, & West, 2013). The current study addresses this limitation by examining the potential effect of classroom quality on the development trajectory of anxious withdrawal in a sample of 3-year old Head Start children.

Socio-Economic Risk and its Detrimental Effect on Socio-Emotional Development in Early Childhood

Poverty and child development

Poverty is associated with multiple detrimental effects on child development (Duncan, Brooks-Gunn, Klebanov, 1994). Poverty in early childhood is associated with lower levels of academic achievement (Alexander & Entwisle, 1996; Zill, Moore, Smith, Stief, & Coiro, 1995; Pianta, Egeland & Sroufe, 1990), lower social competence (Mendez, Fantuzzo, & Ciccetti, 2002), and higher rates of emotional and behavioral problems (McLeod & Nonnemaker, 2000; Qi & Kaiser, 2003) later in life. Children from lower SES families tend to have poorer developmental outcomes in cognitive, socio-emotional, and behavioral domains (Bradley & Corwyn, 2002).

The effect of poverty on child development is typically not direct and is often mediated by the effects of economic deprivation on parental practices (NICHD, 2005). According to the *Transactional Model of Development* (Sameroff & Chandler, 1975), child development takes place in interaction with contextual factors, such as sociological settings and socioeconomic factors. For children with developmental difficulties, positive or negative socioeconomic factors, when they interact with parenting practices, might therefore, minimize or amplify the initial child risk factors. Children from low income families who have certain developmental risks, such as behavioral or emotional problems, might be particularly at risk for developing negative developmental outcomes due to the lack of appropriate parental support in early childhood.

In fact, low income parents have less financial security and tend to experience more persistent economic stress that tends to negatively affect their parenting practices (McLoyd, 1994). Parents with lower income typically have less education and tend to live in the neighborhoods with less access to recreational and educational sites (e.g., museums, playgrounds, and libraries). They also tend to provide less cognitive stimulation and learning opportunities at home (e.g. reading, playing, or making a conversation) (Bradley & Corwyn, 2002). Taken together, current evidence suggests that the lack of cognitive stimulation and emotional support in early childhood may have detrimental effects on cognitive, social, and behavioral outcomes later in life (Burchinal, Roberts, Zeisel, Hennon, & Hooper, 2006; Belsky & Fearon, 2002).

Family risk indices and child developmental outcomes

Current research suggests that an aggregate family risk index should be considered to account for both parenting practices and demographic risk factors, since

they often tend to co-occur in low-SES environments (Duncan et al., 1994). Recently, several ways of measuring family risk indices have been proposed by researchers working with national longitudinal datasets (NICHD, 2005; Vortuba-Drzal, 2006). Even though these approaches to family risk indices tend to differ in their measures and assessment, they share similar conceptual understanding of the risk factors that, in most cases, include *mother's characteristics* (age, ethnicity, language, and low education), *family structure* (single parenthood) and *family income*. The rationale of using a composite measure of family risk index implies that demographic risk factors tend to co-occur, and when they are combined, they tend to account for more variance compare to the single indicators (Bradley & Corwyn, 2002).

The combined risks of demographic and behavioral factors on child development

Not all children are affected by poverty to the same degree. Children with combined demographic (e.g. poverty) and behavioral (e.g. anxious withdrawal) risks might be particularly at risk for negative developmental outcomes. Recent statistics indicate that the prevalence rates for problem behavior in children enrolled in Head Start ranged from 7% to 31% for internalizing problems that include depression and anxiety (Qi & Kalser, 2003). However, the research on anxious withdrawal has typically been conducted using data gathered from children from middle class families (e.g. Booth-LaForce & Oxford, 2008; Oh et al., 2008; Booth-LaForce et al., 2012). The current study addresses this limitation by examining the predictive relationship between socio-economic risk factors (present for majority of families and children served by Head Start) and the developmental trajectory of anxious withdrawal in a sample of 3 year-old Head Start children.

Early Childhood as an Important Developmental Period

Early childhood is an important developmental period for developing skills and acquiring experiences that shape developmental trajectories later in life (McCartney & Phillips, 2008). When children transition from toddlerhood into early childhood, they advance their cognitive skills and develop better self-regulation and social competence. For preschool children, play is a central activity that provides multiple opportunities for learning and practicing in collaboration with other children. Collaborative pretend play contributes to children's cognitive, language, and socio-emotional functioning (Vygotsky, 1967). However, collaborative learning might be more challenging for anxious-withdrawn children because they tend to withdraw from social interactions. The present section will briefly review major developmental tasks that take place in early childhood, and focus on individual characteristics of anxious withdrawn children relevant to this study.

Social competence in early childhood

Current research characterizes competent social development as the ability to develop positive relationships with others (Rubin & Rose-Krasnor, 1992). Socially competent children benefit from social interactions that provide them with greater opportunities for practicing their social skills. For example, socially mature (e.g. competent) children are better in both recognizing and responding to variety of play styles and behaviors of peers (Howes, Rubin, Ross, & French, 1988). Between ages 2 and 5 years, children's social interactions with peers become more frequent and more voluntary, compared to social interactions with peers during toddlerhood (Fabes, Gaertner, & Popp, 2008). Preschool children typically have shared interests with their

peers, and get involved in more sophisticated group play (Vandell, Nenide, & Winkle, 2006). Such an increase in social interaction contributes to development of children's "*social cognition"* – an ability to understand people's decisions, and attribute others' actions to their motivations (Papalia, Gross, & Feldman, 2003, p. 263). For example, three-year olds learn to understand that people's beliefs affect their actions. *Social cognitive theory* suggests that children develop better cognitive abilities during social learning, such as observing and imitating the behaviors of the others (Bandura, 1989.).

Social competence in anxious withdrawn children. Children displaying nonsocial behaviors in early childhood might be particularly at risk for missing opportunities for learning during social interactions. Anxious withdrawal in early childhood has been associated with less competence in perspective-taking (LaMare& Rubin, 1987). Rubin and Rose-Krasnor (1992) suggest that s*ocial information processing* in anxious withdrawn children might be affected by underlying fear and anxiety. Thus, anxiously withdrawn children tend to display a negative bias when interpreting social events and anticipate greater negative consequences for their actions. Anxiously withdrawn children are also less likely to meet their social goals (e.g. making friends and maintaining friendships), and more likely to rely on adult interventions in socially demanding situations (LaMare & Rubin, 1987). Taken together, a consistent avoidance and withdrawal from peer activities in early childhood puts anxious withdrawn children at risk for social maladjustment (Rubin & Coplan, 2010).

Emotional development in early childhood

Emotional development in early childhood contributes to children's social competence and a sense of self (Thompson & Lagattuta, 2008). Children's ability to

recognize, appropriately express, and regulate their emotional reactions in early childhood is associated with developing emotional competence later in life. Starting around 3 to 5 years of age, children acquire understanding of the relationship between people's desires, knowledge, and beliefs, and their emotions. For example, preschool children are typically able to continue a statement such as "a character is sad because…", and connect a hypothetical story with emotions of the character (Lagattuta & Wellman, 2001).

The emotional climate at home and preschool classroom is also an important factor for developing young children's emotional understanding and regulation. For preschool children, adults play significant roles in interpreting other people's emotions, explaining the causes of people's feelings, and providing examples of emotional regulation. Therefore, children whose parents talk to them about other people's feelings or teach them self-regulation strategies tend to have better social awareness and emotional self-regulation (Thompson & Lagattuta, 2008). Socially competent children, in turn, are better accepted by their peers and have more opportunities to engage into cooperative play (Rubin et al., 2003). To sum up, current research emphasizes that early emotional socialization contributes to development of emotional competence, self-image, and emotional well-being in later childhood (Thompson & Raikes, 2007).

Emotional development and anxious withdrawal.

Anxious withdrawal in early childhood is frequently correlated with negative emotional states and feelings of depression (Stark, Kaslow, & Laurent, 1993). It has been suggested that high correlations between anxiety and depression in early childhood may potentially arise because both these constructs reflect more general underlying construct

of the negative affectivity (e.g. hopelessness, lower self-esteem, distress, or sadness) (Wolf et al., 1987). Kindergarten children with internalizing problems, such as depressive symptoms or anxiety, appear to be particularly at risk for emotional vulnerability, in part because these symptoms are not as evident to adults, especially to less-sensitive caregivers (Thompson & Lagattuta, 2008). Results from longitudinal studies provide evidence that negative emotionality in early childhood is associated with internalizing difficulties and distress downstream in childhood and adolescence (Putnam, Rothbart, & Gartstein, 2008; Gartstein, Putnam, & Rothbart, 2012). For example, high levels of negative affectivity in infancy (i.e. discomfort, fear, motor activation, frustration, distress, and low falling reactivity) were predictive of preschool negative affectivity (Putnam et al., 2008). Also, early shyness (i.e. discomfort in social situations) and negative affectivity in toddlers has been associated with anxious withdrawal and depression in preschool (Gartstein et al., 2012).

The lack of positive social experiences in early childhood (e.g. lack of caregiver support, friends, or peer acceptance) contributes to higher emotional vulnerabilities in anxious withdrawn children – a group that is already predisposed to negative emotionality. In this regard, positive social environments such as preschool or childcare settings might be particularly important for ensuring positive emotional development in anxious-withdrawn children. Findings from current research emphasize that children have more positive emotions and better self-regulation strategies (for example, attention shifting or distracting oneself from frustration) when they are surrounded by sensitive caregivers and positive emotional climates (Curby et al., 2011; Gazelle, 2006).

Temperament and self-regulation in early childhood

Temperament is defined as "constitutionally based individual differences in reactivity and self-regulation" in emotion, activity, and attention. *Reactivity* refers to excitability and response of the behavioral system, while *self-regulation* refers to regulation of reactivity (Rothbart, Ahadi, & Evans, 2000, p.123). Both reactivity and regulation contribute to development of self-control.

Between ages 2 and 5 years, children's ability to suppress a dominant response (e.g. inhibitory control) and the sophistication of their theory of mind advance greatly (Rothbart, Posner & Kieras, 2008). For example, children's ability to delay responses and wait (e.g. Gift Delay task) or perform conflict tasks (name sun as "night" or moon as "day") increases significantly during the preschool years (Kochnaska, Murray, & Coy, 1996; Gerstadt, Hong & Diamond, 1994). It has been suggested that the relationship between development of theory of mind and inhibitory control in early childhood is reciprocal in nature, because well-developed inhibitory skills are required for successful completion of theory of mind tasks (Carlson & Moses, 2001).

Early temperament and anxious withdrawal. Several sets of findings indicate a longitudinal relationship between early temperament and anxiously withdrawn behavior in early childhood. Thus, previous research has suggested that high distress in response to high-intensity stimuli is associated with later fearfulness and social inhibition (Rothbart, 1988). Four-month-old infants, for example, with high reactivity and high distress (e.g. intense motor arousal in response to novel stimuli) were more likely to become fearful and inhibited in early childhood when compared to low reactive children (Kagan, 1998).

It might also be that children with a low arousal threshold in infancy, who are wary in toddlerhood and are at risk for developing anxious withdrawal, may need more social and environmental support to develop better self-regulations skills (Rubin et al., 2003). Children with better emotion regulation skills tend to have better social competence (Blair, Denham, Kochanoff, & Whipple, 2004), and peer acceptance in the classroom (Sterry et al., 2010). Blair and colleagues (Blair et al., 2004) suggested that an ability to cope and manage emotions is more important for social behavior, compared to temperament.

Findings have demonstrated that children with difficult temperament (e.g. high levels of negative emotionality and low levels of soothability) tended to have better academic and social adjustment in classrooms with better emotional, organizational, and instructional support (Curby et al., 2011). It has been proposed that specific educational programs might contribute to development of executive attention (Rueda, Posner, & Rothbart, 2005) and behavioral engagement (O'Connor, Cappella, McCormick & McClowry, in press) in preschool children. Whether or not Head Start Classrooms might provide necessary environmental and social support to account for temperamental predispositions in anxiously withdrawn children has, however, not yet received due research attention. The current study will examine this assumption.

Transition to kindergarten

The transition to kindergarten is one of the most significant changes in early childhood that requires a child to adjust to the higher social and cognitive demands of a new kindergarten classroom. Pianta and Rimm-Kaufman (2006) suggest that children's transition and readiness for kindergarten can be approached from two different

perspectives. *Skills-only* models emphasize the development of abilities and skills that a child acquires at the time of measurement, but tend to underestimate the importance of social skills and competencies. In contrast, *child x environment* models focus on the role of the risk and supportive factors contributing to child's transition to kindergarten.

The child x environment models of adaptation to school builds upon Sameroff's ecological-contextual model (Sameroff, 1995). It has been suggested that children's academic and socio-emotional adjustment in kindergarten should be considered as an *interaction* between individual characteristics within a child and child's proximal environments (Pianta & Rimm-Kaufman, 2006). However it has been argued that a majority of studies consider the effects of children's internal characteristics separate from environmental attributes (Ladd, Birch, & Buhs, 1999). In this regard it seems necessary to shift towards research designs considering a combination of the risk and protective factors for children's adjustment (i.e. an ecological dynamic model). The current study will address this gap, and examine the developmental trajectory of anxious withdrawn behavior in children through the transition to kindergarten and will take into account the potentially supportive effects of Head start classrooms and possible detrimental demographic risk factors that are frequently present in populations served by Head Start.

Previous studies that approached developmental trajectories of social withdrawal from a *bidirectional* perspective (e. g. considering the joint influence of child characteristics in interactions with the environmental risk and protective factors), tended to focus on older children at the transition from middle childhood to early adolescence (e.g., Oh et al., 2008; Booth-LaForce & Oxford, 2008). Overall, results from such studies provide evidence suggesting that there is heterogeneity in the developmental pathways of

anxious withdrawal from middle childhood through early adolescence. However the current literature lacks studies that apply an *child x environment* perspective in examining developmental trajectories of anxious withdrawal, and focus on *early childhood.*

Purpose of the Proposed Study

Previous longitudinal investigations add to our understanding of the etiology and heterogeneity in anxious withdrawal across middle childhood and early adolescence, and illustrate how children's individual characteristics (e.g. shyness, dysregulated temperament, anxious solitude, anxious withdrawal) may contribute to development of anxious withdrawal when they interact with proximal risk (e.g. group exclusion/victimization) and protective factors (e.g. friendship quality, teacher-child relationships) (Gazelle, 2006; Avant, Gazelle, 2011; Oh et al., 2008; Booth-LaForce & Oxford, 2008; Curby et al, 2011). One strength in the designs of the aforementioned studies is that they have examined individuals as members of relationships and groups and have taken into account multilevel covariates (e.g. parenting, peers, friendships) as predictive of class membership in developmental trajectories of social withdrawal. However, these studies also share a common limitation in their exclusive focus on elementary and middle school children.

The current study will address these limitations and first, will focus on examining the developmental trajectory of anxious withdrawal in a younger sample of children in transition to kindergarten. Even though current research has provided consistent evidence that anxious withdrawn behaviors are likely to remain stable in middle childhood and early adolescence (Gazelle, 2006; Avant, Gazelle, 2011; Oh et al., 2008; Booth-LaForce & Oxford, 2008), limited empirical evidence has been provided in regards to the

developmental trajectory of anxious withdrawal in early childhood. The current study will examine the developmental trajectory of anxious withdrawal in a group of 3-year old children attending Head Start across four time points in transition to kindergarten. Examining the developmental pathways of anxious withdrawal in a younger sample of children will enrich our understanding about stability and change in anxious withdrawal in early childhood and the transition to kindergarten.

Next, the current study will examine the role of classroom environments and children's living environments on developmental trajectories of anxious withdrawal. Even though the guiding theory for this study (e.g. Rubin, Lemare, & Lollis, 1990) provides theoretical support for the contribution of these distal factors, empirical work examining these combined effects longitudinally has been limited. Examining the role of classroom environments and children's living environments will contribute additional empirical evidence examining the validity and utility of a transactional model of anxious withdrawal.

Lastly, the current study will utilize longitudinal analyses that are appropriate for clustered, hierarchical, longitudinal data. Applying multilevel analysis will strengthen the design of the study by distinguishing between several distinct sources of variability and improving estimation of individual- and group-level effects. One of the acknowledged strengths of multi-level modeling (MLM) is the ability to work with hierarchical data with complex patterns of variability (e.g. students are nested in classes). Another strength of MLM is the ability to estimate the effects of the individual- and group-level predictors simultaneously (Raudenbush & Bryk, 2001). Applying multilevel analysis will provide an opportunity to examine longitudinal trajectories of anxious withdrawal while

accounting for the complex multi-stage clustered sampling design of the Head Start Family and Child Experiences Survey (FACES 2009).

The Current Model

The goal of the proposed study is to examine developmental trajectory of anxious withdrawal in a group of 3-year-olds attending Head Start, and investigate predictive relationships between quality of the classroom environments, quality of the family living conditions, and the developmental trajectory of anxious withdrawal in these children.

Early childhood. Early childhood is an important developmental period that is crucial for developing cognitive skills and acquiring social experiences that promote positive adjustment later in life (McCartney & Phillips, 2006). Therefore, higher levels of anxious withdrawal in early childhood are likely to potentially complicate development and acquisition of important developmental tasks for children (Rubin et al., 2009). In this regard, it is important to determine stable and potentially increasing anxious withdrawal behaviors early in life.

Socio-economic factors. It has been proposed in transactional models of anxious withdrawal that the pathway to developing anxious withdrawal behavior begins in early childhood and maybe affected by the joint influence of interpersonal (e.g. relationship with the parents, teachers, and peers) and sociological (e.g. living conditions for parents) factors (Rubin, Burgess, Kennedy, & Stewart, 2003). The hypothesis that is examined here is that children with combined behavioral (e.g. anxious withdrawal) and demographic risks (e.g., families with lower SES, single parenthood, and less education for parents) are potentially at greater risk for developing negative developmental outcomes associated with the higher levels of anxious withdrawal.

High-quality classrooms. Children's social development is better understood in a context of socialization with significant adults and peers. As the setting for a child's first school-like experience, preschool classrooms provide important contexts for children's social, emotional, and cognitive development (Howes, 2011). There is also consistent evidence that children in high quality classrooms tend to have fewer behavioral problems and off-task behaviors (Rimm-Kaufman, La Paro, Downer, & Pianta, 2005). It is hypothesized that anxious withdrawn children who attend higher quality classrooms will tend to display lower levels of anxious withdrawn behavior.

Teacher- and parent- reports. Teacher reports of children's anxious withdrawal behavior will be used in this study. While there are various ways to obtain reports on anxious withdrawal behavior (e.g. self-, peer-, and parent reports), self- and peer-reports are typically used with older children. For very young children teacher- and parent-ratings have been considered as reliable assessments of socio-emotional skills and behaviors (Hartup, 1983). Taking into account the Teachers' reports of children's anxious withdrawn behavior will be utilized in this study. Demographic risk indices will be evaluated using parent reports to create a composite measure of cumulative family risks that consists of an index of level of household poverty, level of maternal education, and single (vs. dual) parenthood.

Classroom observations. Classroom quality is assessed using the Classroom Assessment Scoring System (CLASS; Pianta et al. 2008). CLASS is a standardized validated observational tool that has accumulated multiple empirical evidence in support of associations between the scores on this measure and students outcomes (Mashburn et

al., 2008). Moreover, CLASS allows a description of teacher competencies in relation to social and academic outcomes for children.

Primary research questions and hypotheses. The proposed study will examine the developmental trajectories of anxious withdrawal behavior in a group of 3-year old children in transition to kindergarten. The proposed study will address the following, specific research questions and hypotheses:

1) Is the transition to kindergarten associated with increased levels of anxious withdrawal behavior? I hypothesize that after transitioning to unfamiliar kindergarten environments children will be more likely to display higher levels of anxious withdrawal behavior.
2) Are high-quality classrooms associated with lower levels of anxious withdrawn behavior in children? It is hypothesized that anxious withdrawn children who attend higher quality preschool classrooms will tend to display lower levels of anxious withdrawal behavior.
3) Do socio-economic factors for parents contribute to developmental trajectories of anxious withdrawal? I hypothesize that less positive socio-economic conditions for parents will be associated with higher levels of anxious withdrawal in children.
4) Are the links between high quality classrooms and outcomes stronger for children with more severe demographic risks? I hypothesize that children from families with higher demographic risks should display greater gains when they are located in higher quality classrooms.

CHAPTER III

Methods and Data Analysis

Proposed Participants & Procedure

Participants for this study are drawn from a United States national longitudinal Head Start Family and Child Experiences Survey (FACES 2009). FACES is a series of studies of nationally representative samples of Head Start programs, centers, classrooms, children, and their families. The FACES studies include child assessments, classroom observations, and family interviews for children attending Head Start and followed their transition to kindergarten, with the primary aim to provide information about children and families served by Head Start programs. The FACES 2009 child sample contains data for two cohorts of children: those who began Head Start in 2009 at 3 year old, and those who began as 4 year olds. The study contains four waves of data collection: fall 2009, spring 2010, spring 2011, and spring 2012.

The use of FACES data will allow me to answer questions on 1) the associations between transition to kindergarten and developmental trajectory of anxious withdrawal; 2) the associations between classroom quality and anxious withdrawal behavior; 3) associations between socio-economic factors for parents and children's anxious withdrawal behavior.

Main Analyses Measures

Teacher-Rated Anxious-Withdrawal. At each wave of data collection (fall 2009, spring 2010, spring 2011, and spring 2012) teachers were asked to indicate how often a study child is engaged in anxious, depressed or withdrawn behavior in the last 6 months. A scale of six items was used including items such as "Keeps to herself or

himself; tends to withdraw", "Lacks confidence in learning new things or trying new activities", "Is nervous, high-strung, or tense", "Often seems unhappy, sad, or depressed", and "Worries about things for a long time". The sixth item is copyrighted and not available. Items for this scale were selected from the Personal Maturity Scale (Entwisle, Alexander, Cadigan, & Pallis, 1987) and the Behavior Problem Index (Peterson & Zill, 1986). Teachers were asked to indicate the extent each statement describes a child, using a 3-point scale from 0 ("not true") to 2 ("very true or often true"). The total scores on the anxious-withdrawn measure range from 0 to 12. Descriptive statistics were computed and reported (e.g., means, standard deviations, skewness, kurtosis, and percentage of missing) for each study variable at each relevant occasion (See Table 3.2 for descriptive statistics for the study variables).

Classroom Quality. Classroom observations were conducted in spring of the Head Start years (spring 2010, and spring 2011) using the Classroom Assessment Scoring System (CLASS; Pianta, LaParo, & Hamre, 2008). The CLASS is a measure of student-teacher interactions and classroom quality in terms of *emotional support* (e.g. positive climate), *classroom organization* (e.g. behavior management) and *instructional support* (e.g. concept development). Each domain is rated on a 7-point scale from 1 ("uncharacteristic") to 7 ("highly characteristic"). For this study we used classroom *emotional support scale* that includes indications of positive climate, negative climate, teacher sensitivity, and regard to student perspective. The scores on emotional support scale range from 1 to 7. Higher scores reflect more emotional support.

Family Economic Risk Index. This is a FACES composite measure of cumulative family risk that was constructed by summing scores from three dichotomous

parent-reported measures (1=yes, 0=no): household income below the poverty line, maternal education less than high school, and single parent family. The scores on this measure range from 0 to 3. Higher scores indicate higher risks.

Demographics. Child gender will be used as a control variable in all main analyses.

Sampling Design

"To achieve the goals of an efficient, representative national sample of sufficient size to permit the detection of policy-relevant differences, FACES 2009 used a multistage sample design with four stages: 1) Head Start programs, with programs defined as grantees or delegate agencies providing direct services; 2) centers within programs; 3) classrooms within centers; and 4) children within classrooms." (FACES 2009, p. 28). Sampling with probability proportional to size (PPS) was employed in the first three stages (programs, centers, and classroom). Thus FACES selected 60 Head Start programs, two centers per program, and up to three classrooms per center. At the final stage, equal numbers of children with equal probability were sampled within each classroom. The FACES design accounted for having 10 children with parental consent per classroom. In fall 2009 total 3,349 children were selected across all programs to participate in a study. Full details of the sampling design and procedures can be found at the Child Care and Early Education Research Connections website (http://www.researchconnections.org/childcare/resources/25651?q=FACES+2009).

For the current study, a 3-year old cohort was selected from the FACES 2009 sample (N = 1,938). Children from the three-year old cohort who started Head Start for the first time in fall 2009 spent more time in Head Start classrooms compared to 4-year

old children who also started Head Start for the first time in fall 2009. Data for the 3-year old cohort was collected in Head Start in fall 2009, spring 2010, and spring 2011 assessments, and in kindergarten in spring 2012 assessment. (Please see Table 3.1. for more information).

Data Structure

Number of programs. Actual program N = 60.

Number of centers. Actual center N = 122.

Number of classes. Actual classroom N = 408.

Number of participants. The three-year cohort will be selected from the large FACES 2009 dataset. The three-year longitudinal cohort consists of children who entered Head Start program for the first time in fall 2009, and transitioned to kindergarten in fall 2011. In fall 2009 data was available for N=1938 children.

Number of occasions. Children's anxious withdrawal behavior was assessed with the teachers' reports at each occasion: fall 2009, spring 2010, spring 2011, and spring 2012. Family economic risk index was assessed in fall 2009. Classroom observations were conducted twice at the end of the each Head Start year: in spring 2010 and spring 2011 (See Table 3.1 for summary of the data collection).

Sources of nesting. Two major sources of nesting are present in this study: hierarchical nesting due to the multistage sampling design (e.g. level 1-time, level 2-children, level 3- classrooms, level 4-centers, level 5- programs), and cross-classified nesting due to children's non-consistent membership in the classrooms at level 3.

Sampling weights. Sampling weights were created by Mathematica Policy Group in order to account for variations in the probabilities of selection at each stage of the

sampling (e.g. program, center, classroom, and child) as well as eligibility and cooperation rates among selected units.

Analytic Strategy

For sampling designs involving multiple design features similar to the described above (, weighting, and unequal probabilities of selection) it is important to appropriately account for these complexities in order to obtain trustworthy estimates of population parameters. Using a model-based approach accounts for sample design through model-specification. Model-based parameters correspond to the parameters of the statistical model, and characterize a hypothetical super (*infinite*) population (Sterba, 2009). A model-based approach would account for the features of the sampling design, such as clustering, by incorporating them as an inherent part of the proposed model, and would consider the sampling weights irrelevant (Cai, 2013, p. 180).

Multilevel models incorporate hierarchically structured models to partition the variability in the outcome into multiple sources by estimating person-specific and group-specific effects simultaneously. Predictors can be included at multiple levels, in addition to cross-level interactions, to explain the distinct sources of variability (Raudenbush & Bryk, 2002). More specifically, "A cluster-specific model defines fixed regression coefficients that can be interpreted as the expected change in the outcome associated with a one-unit increase in the relevant predictor, holding constant other predictors and all random effects in the model." (Raudenbush & Bryk, 2002, p. 334). "Multi-level modeling has been widely used in social-science research with the complex sampling features (clustering, stratification, or disproportionate selection)" (Sterba, 2009, p. 731). However the application of multilevel modeling and sampling weights together is complicated (Asparouhov & Muthén, 2006) and not straightforward (Cai, 2013). One

common issue that complicates the use of weighted multilevel modeling is that it requires multiple sets of weights (Pfeffermann et al., 1998), whereas the public-released data files usually contain only unconditional set of weights (Kovačević & Rai, 2003; Stapleton, 2012). The approximation and scaling of necessary weights for the weighted multilevel modeling is complicated and has certain limitations (Stapleton, 2014). Moreover, the work on incorporating sampling weights into multilevel models with cross-classified data structures (as it is in FACES 2009) is non-existent (Carle, 2009, p. 8). Thus, due to these complications, to which there are no clear solutions, the current study will account for the complex sampling design through the model specification and will apply multilevel modeling approach without sampling weights.

Hierarchical nesting. In order to account for the multi-stage sampling design, a set of five empty multilevel models will be estimated in SAS GLIMMIX in which occasions will be modeled as nested within persons. All models will be estimated using full information restricted maximum likelihood. The significance of the random effects will be evaluated via comparison of the -2ΔLL. The critical value of $\alpha = .05$ will be used for all statistical tests. All models will be estimated as depicted in the equations below following the procedures outlined by Snijders and Bosker (1999, pp. 83). The following notation will be used in all equations:

Composite equation: $Y_{tijcp} = C_{00000} + U_i + U_j + U_c + U_p + e_{tijcp}$ (1)

t = level-1 time

i = level-2 person

j = level-3 classroom

c = level-4 center

p = level-5 program

First, a single-level empty model will be estimated as depicted in Equation 1.

$$y_{tijcp} = \beta_{0ijcp} + \beta_1 * time + e_{tijcp} \quad (2)$$

Second, a two-level empty model will be estimated to account for the fact that occasions are nested within persons as depicted in Equation 2.

$$\beta_{0ijcp} = \square_{00jcp} + U_i \quad (3)$$

Third, a three-level empty model will be estimated to account for the fact that children are nested in classrooms as depicted in Equation 3.

$$\square_{00jcp} = W_{000cp} + U_j \quad (4)$$

Then, a four-level empty model will be estimated to account for the fact that classrooms are nested in centers as depicted in Equation 4.

$$W_{000cp} = Z_{0000p} + U_c \quad (5)$$

Finally, a five-level empty model will be estimated to account for the fact that centers are nested in Head Start programs as depicted in Equation 5.

$$Z_{0000p} = C_{00000} + U_p \quad (6)$$

Furthermore, in order to adjust statistical analyses to the goals of the study, the sources of variability will be estimated in order to identify the key sources of variability at each level of the data.

Cross-classified nesting. In order to account for the fact that children are not consistently nested in the classrooms, cross-random coefficients will be created following the procedures outlined by Snijders and Bosker (1999, pp. 155-165) and Raudenbush and Bryk (2001, pp. 373-396). Cross-random coefficients are suitable for educational situations when students have spent part of the time in one classroom, and part of the

time in another classroom (Snijders & Bosker, 1999), or in other terms, had "shared membership" for part of the time (see Table 3.3 for specification of the children's shared membership). One advantage of using models with cross-random coefficients is the ability to estimate variability due to classroom experiences which would otherwise be specified in the regular three-level growth models as variability due to individual differences.

Three sets of dummy codes will be created in order to estimate three possible situations: 1) *cumulative* effect, e.g. the effect of the classroom stays with the students over time, even after they left the classroom; 2) *no-carry-over effect*, e.g. the effect of the classroom operates only when students are in this classroom, and is not carried over after students left the classroom; 3) *decay effect*, e.g. the effect of the classroom decays over time (see Table 3.4. for specification of the dummy codes). Three models will be compared by their deviance tests and decision will be made about best-fitting three-level model with the cross-classified random effects.

Piecewise longitudinal models of change. Piecewise linear models capture overall nonlinearity through the use of additional fixed and random effects designed to model differential trajectories of separate phases of development. As such, a piecewise model representing two phases of development would have one intercept growth factor, and two slope growth factors, each corresponding to separate developmental phase. Piecewise linear models are recommended for longitudinal studies where two distinct developmental periods with a separate phase of growth are hypothesized (Khoo, 2011). In the current study, children transition from Head Start to Kindergarten in Fall 2011, thus

marking two phases of development. The basic piecewise model will be estimated as described in Table 3.5.

Longitudinal growth models for non-normal outcomes. Prior to statistical analysis, preliminary data inspection was conducted by visually inspecting histograms of the dependent variable (anxious withdrawal) at each time point. These analyses revealed that the distribution of anxious withdrawal is positively skewed at each time point (See Appendix A). One explanation is that some children were not rated as anxiously withdrawn (e.g. scale from 0 [“not true”] to 2 [“very true or often true”]), thus resulting in excessive zeros for the outcome. Two possible methods will be used to parameterize the model. The first method will use the *Poisson* distribution function (LINK=LOG DIST=POISSON) in SAS GLIMMIX that assumes that the mean and variance use the same parameter (λ = mean = variance). The second method will use the *Negative Binomial* function (LINK=LOG DIST=NEGBIN) in SAS GLIMMIX that assumes that variance exceeds the mean (λ = mean, k = dispersion). Two models will be compared by their a) Akaike Information Criterion (AIC; Akaike, 1987); b) Bayesian Information Criteria (BIC); and c) a sample-size adjusted BIC (ABIC) to determine the better-fitting model. The recommendation is to choose a model with the smallest AIC, BIC, or ABIC value (Muthen & Muthen, 2010).

Poisson. The univariate Poisson distribution is typically derived as follows: let the random variable $y = 0, 1, 2\ldots$ denote the number of occurrences of an event of interest in a given time interval, and y (t, t + dt) denotes the number of events actually observed in the short time interval (t, t + dt). The number of events in an interval of given length is Poisson distributed with the probability density function:

$$Pr(Y = y) = f(y; \lambda) = \exp(-\lambda)[^{\lambda y}/y!],\ y = 0, 1, 2, \ldots \lambda > 0 \quad (7)$$

Where λ is the mean or expected value of a Poisson distribution, E[Y] = λ, and λ is also the variance of a Poisson distribution, var (Y) = λ.

Poisson is a one-parameter distribution with its mean and variance identical and equal to λ. "The parameter λ may be interpreted as the mean rate at which events occur per unit time; consequently, λ is referred as the mean rate of occurrence of events" (Land, McCall & Nagin, 1996, p. 390). However, the standard Poisson distribution is rarely sufficient due to potential problems: 1) the mean is not equal to the variance (i.e. dispersion); 2) the distribution contains excessive zeros. Each of these problems requires a model adjustment to fix it.

Negative Binomial. To relax the equi-dispersion restriction of the Poisson distribution, researchers use more flexible distribution assumptions, such as negative binomial, that allow for variance to be greater than the mean. The negative binomial distribution is the probability distribution of the random variable Y defined as the number of failures encountered before the Mth success. Its probability density function, as given by Land, McCall and Nagin (1996, p. 390):

$$Pr =[Y = y] = f(y; M, P)= \frac{M+y-1}{M-1}(P/Q)^{y}(1+P/Q)^{M},\ y = 0, 1, 2, \ldots, \quad (8)$$

Where P = (1 - p)/p, and Q = P +1. The mean and the variance of the negative binomial distributions are E[Y] = MP, and var(Y) = MPQ = MP (1 +P) = E[Y](1 + P). Since negative binomial distribution does not force the mean to be equal to the variance, it has greater flexibility for accurately representing the relative frequency patterns of

observed even count data. Whether or not dispersion parameter is needed is answered via a likelihood ratio test.

One practical requirement, as outlined by Snijders and Bosker (1999, p. 157) is to use software that can accommodate the required number of design effects as specified in the models above. Herewith, some adjustments to the models could be made along the way in order to adjust complex sampling design of the original FACES 2009 dataset to the current software. Such adjustments will be reported in the respectful results sections.

CHAPTER IV

Results

This chapter presents the results from the analytic procedures used to answer the four main hypotheses in this study.

Analytic Procedures

Hierarchical piecewise modeling was employed to model the developmental trajectory of anxious withdrawal across four time points. Data analyses were conducted via SAS 9.4 software using the PROC GLIMMIX procedure (www.support.sas.com). The GLIMMIX procedure was chosen because it handles statistical models where the outcomes are not normally distributed; while permitting incorporation of random effects in the model. Based on the structure of the model, the GLIMMIX procedure selects the estimation technique for estimating the model parameters. "The default technique is METHOD= RSPL corresponding to maximizing the residual log pseudo-likelihood with an expansion about the current solutions of the best linear unbiased predictors of the random effects. In models for normal data with identity link, METHOD = RSPL is equivalent to restricted maximum likelihood estimation" (www.support.sas.com). Further, in order to adjust for the complex survey data EMPIRICAL statement was added to the model. Empirical statement requests that the covariance matrix of the parameter estimated be computed as one of the asymptotically consistent estimators, also known as "sandwich" or "empirical" estimators. The sandwich estimator, also known as the robust covariance matrix estimator or the empirical covariance matrix estimator is useful for obtaining inferences that are not sensitive to the choice of the covariance model (www.sas.support.com). Consequently, DDFM = BW was added to the model statement.

Between-within degrees of freedom assigns within-subject degrees of freedom to a fixed effect if the fixed effect changes within a subject, and otherwise it assigns between-subject degrees of freedom. This choice of degrees of freedom accounts for moderately unbalanced design (www.support.sas.com). Overall the goal of the hierarchical piecewise model was to model developmental trajectory of anxious withdrawal through the estimation of latent variables (one intercept and two slopes) based upon these factors at four time points. A total of 1938 cases were included in the overall analyses. Percentage of complete data at each time point ranged from 97% at the beginning of the study to 46% at the last year.

Main analyses were conducted in three stages. In the first stage the key features of the FACES 2009 dataset were examined in SAS 9.4 focusing on the patterns of hierarchical nesting, cross-classified nesting and distribution of the outcome. This allowed for an initial examination of the best-fitting empty multilevel model for the anxious withdrawal outcome.

In the second stage, main predictors and their interactions were added to the best-fitting model from the step above. First, the child-level predictor Family Economic Risk Index was split into Level 1 and Level 2 predictors to reflect the corresponding within and between group variability. Second, the Classroom Quality predictor was mean-centered to reflect between group main effect of having more classroom quality than other classrooms. Third, two interactions were created by multiplying Classroom Quality by Level 1 Family Economic Risk Index and Level 2 Family Economic Risk Index respectively.

In a third stage, the search for the best-fitting model with all predictors continued through testing out the fit of the full model and the key features of the data.

In the final stage, post hoc analyses were employed following the main analyses to examine the potential differences between children coming from the families with the maximum number of socio-economic risks as compared to children coming from the families with two, one or zero risks.

Main Analyses

Examination of the key features of the data set. First set of analyses was conducted in order to examine the patterns of the hierarchical nesting of the data. First, a five-level empty model was estimated where occasions were modeled as nested within persons. Center level variance (e.g., Head Start Centers- level 4) was not estimable. The NOBOUND statement was added to the model to further enable the estimation process. The NOBOUND option requests the removal of boundary constraints on variance parameters. After the NOBOUND statement was added to the model, the Center-level variance estimated negatively (-0.02) and yielded non-significant results ($z = -0.41$). The center-level variance was dropped, resulting in a 4-level model. Thus the best-fitting four-level model accounted for time (level-1), children (level-2), classrooms (level-3), and programs (level-4) (see Table 4.1).

The second set of analyses aimed to examine the patterns of cross-classified nesting of children in the classrooms. Frequency analyses for classroom IDs revealed that during the first Head Start year (e.g. 2009-2010) 87.4 % of children (N = 1694) stayed in the same classroom; 2.7% (N = 54) had changed their classroom ID; and 9.8 % had missing classroom IDs in Spring 2010. During the second Head Start year (e.g. 2010-

2011) 41% of children (N = 795) went on to the different classrooms; 20% of children (N = 379) stayed in the same classroom; and 39% of children (N=764) had missing classroom IDs. During the third year in a study (e.g. 2011-2012) children transitioned to kindergarten, and their classroom IDs are unknown.

Three sets of cross-random intercepts were created following procedures outlined in Chapter 3 (e.g., see Table 3.4) in order to account for the three possible scenarios: cumulative classroom effect, no-carry-over acute effect, and decay effect. All models were compared with their fit statistic to the four-level empty model with no cross-random effects from the step above (see Table 4.2). The best fitting model was the one with the no-carry-over class effect, herewith time was added to this model.

The next set of analyses aimed to examine the pattern of the distribution of the outcome for anxious withdrawal across for time points. Preliminary analyses in SAS using GLIMMIX procedure provided additional evidence for the possibility for the two separate growth trajectories: entry through the Head Start (e.g., fall 2009 to spring 2011) and transition from Head Start to the Kindergarten (e.g., spring 2011 till spring 2012). The differences of occasion least squares means from the four-level model for the time indicated significant mean differences in anxious withdrawal between Fall 2009 (M = 1.57), Spring 2010 (M = 1.41), and Spring 2011 (M = 1.20). However, the mean differences between Fall 2009 (M = 1.57) and Spring 2012 (M = 1.61) were not significant (see Table 4.3.). As shown by the data, anxious withdrawal behavior was significantly decreasing from fall 2009 through spring 2011 (e.g. while children were in Head Start) and then increased again in spring 2012 (e.g. when children transitioned to kindergarten) (see Figure 3). Thus two piecewise slopes were created following

procedures outlined in Chapter 3 (see Table 3.5). Further analyses aimed to evaluate a model fit by estimating possible Poisson or Negative Binomial distributions, and tested a set of simplified two/three-level models using LINK=LOG, DIST=POISSON, but resulted in non-convergence (e.g. were not possible to estimate). At the end, it was not possible to obtain the model fit while simultaneously accounting for the non-normality and piecewise trajectory of change. Herewith, the decision was made to leave out the estimation of non-normality and focus on the piecewise trajectory of change.

Calculating predictors. In order to account for the multilevel structure of the data, child-level predictor Family Economic Risk Index was split into Level 1 and Level 2 to reflect the corresponding within and between group variability. Thus, *Level 1* Family Economic Risk Index was created by subtracting class mean from the personal value. *Level 1* Family Economic Risk Index indicated a child-level main effect of having more risk than other children in the same classroom. Level 2 Family Economic Risk Index was created by subtracting a Constant from the class mean. Level 2 Family Economic Risk Index indicated a classroom-level main effect of having more Family Economic Risk than other classrooms.

Second, the class-level predictor Classroom Quality was mean-centered to reflect the between group main effect of having more classroom quality than other classrooms. Third, two interactions were created by multiplying Classroom Quality by Level 1 Family Economic Risk Index and Level 2 Family Economic Risk Index respectively. The interaction between Level 1 predictor and Classroom Quality addresses the question whether the effect of classroom quality differ *for children* with different levels of risk *within the same classroom*? The interaction between Level 2 predictor and Classroom

Quality addresses the question whether the classroom quality effect differs *between classrooms* with different levels of risk? (Please see Appendix B for the syntax).

Estimation of the best-fitting model with all predictors. In terms of the estimation of the full model (e.g., containing all predictors), two approaches were tested out as suggested by Raudenbush and Bryk (2002). The first approach suggests to begin estimation by building the best-fitting empty level model for the outcome, and then add all predictors; while the second approach suggests to start building the Level-1 model first, including all predictors, and then add up further levels. Consequently, both approaches were tested in model building and estimation here. Following procedures of the first approach, all five predictors (e.g. within-group economic risk index, between group economic risk index, classroom quality, within-group economic risk X classroom quality interaction, and between-group economic risk X classroom quality interaction) were added to the intercept, slope1, and slope2 to the best-fitting four-level empty piecewise model, but this model was not able to converge.

Therefore, the decision was made to employ the second approach, e.g. to keep all predictors, and simplify the model in a search for the best-fitting solution. The first model was set up as a two-level piecewise model with all predictors accounting for time (level-1) and children (level-2). The addition of the classroom level variance (level-3) resulted in significant improvement in model fit, $-2\Delta LL$ ($df = 2$) = 83.86, $p < .001$ indicating there was a significant individual variability at the classroom level. The addition of the program level variance (level-4) resulted in non-significant improvement in model fit, $-2\Delta LL$ ($df = 3$) = 7, $p = .07$. Thus the full final model was simplified to a three-level

piecewise model where time was nested within children within classrooms. The final model parameters can be interpreted as follows (see Table 4.4).

The fixed intercept ($b_0 = 1.23$, $p < .0001$) is the expected level of anxious withdrawal in the beginning of Head Start. The fixed linear slope 1 ($b_1 = -0.07$, $p = .07$) is the expected non-significant linear decrease per year in anxious withdrawal while children are in Head Start (e.g. from fall 2009 till Spring 2011). The fixed linear slope 2 ($b_2 = 0.24$, $p = .001$) is the expected significant linear increase per year in anxious withdrawal after the transition to kindergarten (e.g. from spring 2010 to spring 2011). The simple main effect of level-1 risk ($b_3 = 0.06$, $p = .26$) indicates a non-significant expected increase in anxious withdrawal per year, i.e. with one unit increase in person-level of Family Economic Risk, anxious withdrawal is predicted to increase by 0.06. The simple main effect of level-2 risk ($b_4 = -0.35$, $p = 0.02$) indicates a significant expected decrease in anxious withdrawal per year, i.e. with one unit increase in classroom level of Family Economic Risk, anxious withdrawal is predicted to decrease by .35. The simple main effect of class quality ($b_5 = -0.18$, $p = .13$) indicates a non-significant expected decrease in anxious withdrawal per year; that is, with one unit increase in classroom quality, anxious withdrawal would be predicted to decrease by .18. The significant interaction between slope 1 and Class Quality ($b_8 = 0.11$, $p = .04$) indicates that the rate of change in anxious withdrawal during Head Start (-0.07) becomes less negative by .10 with one unit increase in classroom quality (or the effect of Classroom Quality (-.18) becomes less negative by .10 with one unit increase in the rate of change).

Thus, overall, the rate of change in anxious withdrawal decreased non-significantly over time when children were in Head Start, and then significantly increased

after children transitioned to kindergarten. The simple main effect of Classroom Quality was non-significant, but it was a part of significant interaction with slope 1. One possible explanation for this effect (in the absence of significant main effect for slope 1 and Classroom Quality) is that a decrease in anxious withdrawal while children were in Head Start is conditional on what type of classroom children had attended. Classrooms with the higher quality might have contributed to more significant decrease in anxious withdrawal during Head Start. The significant negative effect of classroom level of Family Economic Risk on anxious withdrawal was somehow surprising, as it was hypothesized that higher levels of Family Economic Risk should increase rather than decrease anxious withdrawn behavior in children.

Finally, based on the findings obtained above, we proceeded to post-hoc analyses. This required a different strategy for modeling the Family Economic Risk variable, and applied a different approach to calculation of the degrees of freedom. This last step was required because the degrees of freedom calculated in the final, best-fitting, model for anxious withdrawal did not reflect between and within level variability).

Post-hoc Analyses

Post-hoc analyses examined the effect of Family Economic Risk on the developmental trajectory of anxious withdrawal, by modeling Family Economic Risk as a categorical variable. The Family Economic Risk variable used by FACES is a composite measure of cumulative family risks from three dichotomous parent-reported measures: household poverty, low maternal education, and single parenthood, and is rated 0 to 3 indicating the presence of zero, one, two, or three different risks. Modeling Family Economic Risk as a categorical variable allowed for comparison of results for children coming from families with different risks, while treating the number of risks as

categories. Also, this type of approach allows for avoiding comprehensive centering at Level-2 (that yielded surprising results in the main analyses), because level-2 centering of categorical variables is meaningless (Raudenbush & Bryk, 2002). For the current study, families with the maximum number of risks (e.g. three risks) were chosen as the reference group providing the study goal of examining the difference between children from "high risk" families, and children from families having two, one or zero socio-economic risks (i. e. "low risk").

Consequently, Family Economic Risk variable was added to the CLASS statement, and its interactions with the slope 1, slope 2, and Class Quality were added to the model statement. The Family Economic Risk variable showed no significant effect as part of the either two-way or three-way interactions with slope 1, slope 2, or Class Quality. Therefore, the model was simplified by dropping theses non-significant interactions (see Appendix B for selected SAS syntax). Lastly, Child Gender was added to the final simplified model.

The final model parameters can be interpreted as follows (see Table 4.5). The fixed intercept ($b_0 = 1.61$, $p < .0001$) is the expected level of anxious withdrawal in the beginning of the Head Start. The fixed linear slope 1 ($b_1 = -0.11$, $p < .0001$) is the expected linear decrease per year in anxious withdrawal while children are in Head Start (e.g. from fall 2009 till Spring 2011). The fixed linear slope 2 ($b_2 = 0.21$, $p < .0001$) is the expected linear increase per year in anxious withdrawal after transition to kindergarten (e.g. from spring 2010 to spring 2011). The simple main effect of class quality ($b_3 = -0.17$, $p = 0.16$) indicates a non-significant expected decrease in anxious withdrawal per year, i.e. with one unit increase in classroom quality, anxious withdrawal is predicted to

be decreasing by .17. The effect of Family Economic Risk was not significant indicating no significant differences in the level of anxious withdrawal between children from the families with the "higher risks" and children from the families with the zero ($b_4 = -0.18$, $p = 0.18$), one ($b_5 = 0.03$, $p = 0.79$) or two ($b_6 = 0.02$, $p = 0.86$) socio-economic risks. Lastly, the main effect of child gender ($b_7 = -0.35$, $p < .0001$) represents a difference in a level of anxious withdrawal between boys and girls in the beginning of Head Start, such that compare to boys, girls have .35 less anxious withdrawal behavior.

Thus, overall, post-hoc analyses provided additional insight on the trajectory of anxious withdrawal from Head Start through the transition to kindergarten. The rate of change in anxious withdrawal decreased over time when children were in Head Start, and then increased after transition to kindergarten. Overall, the effects of two main predictors (e.g. Classroom Quality and Family Economic Risk) yielded non-significant results. Gender had a significant effect indicating higher levels of anxious withdrawal behavior in boys in the beginning of Head Start, but had no significant interactions with the other study variables.

CHAPTER V

Discussion

The present study examined the developmental trajectories of anxious withdrawn behavior in a group of 3-year-old children in transition to kindergarten. The current study also examined the potential impact of preschool classroom quality, as well as possible detrimental effects of multiple socio-economic risk factors for parents on the developmental trajectory of anxious withdrawal behavior in Head Start children. Specifically, the analyses employed a multilevel modeling approach that allowed for investigation of the person-level (e.g. socio-economic risk) and group-level (e.g. classroom quality) characteristics on development and change in anxious withdrawal across four time points. Findings from the current study provide more evidence on the developmental trajectory of anxious withdrawal in early childhood. Results from the study are discussed below, focusing on implications of this study for developmental research on anxious withdrawal. Limitations of the current study are discussed focusing on the drawbacks of the secondary data analyses for large longitudinal studies. Potential directions for future research are highlighted as well.

Developmental Trajectory of Anxious Withdrawal in a Sample of 3-year-old children attending Head Start

The first question proposed by the current study related to the developmental trajectory of anxious withdrawal. Findings indicated that anxious withdrawn behavior decreased while children were in Head Start classrooms, and then increased after the transition to the kindergarten. These findings were consistent with the current theory (Rubin, LeMare, & Lollies, 1990) supporting the statement that transition periods present

additional stress for anxiously withdrawn children, and are associated with the elevated levels of anxious withdrawn behavior. The current study adds to the previous research on anxious withdrawal by examining developmental trajectory of anxious withdrawal in a younger sample of children in transition to kindergarten. The findings from the current study provide more empirical evidence in support of the developmental model of anxious withdrawal in early childhood.

This study also examined the role of gender in the development of anxious withdrawal. The study findings indicated that teachers' ratings of boys' anxious withdrawal were higher at the beginning of Head Start compared to levels reported for girls. Current research suggests that shyness and anxious withdrawn behavior may be "less socially acceptable for boys than for girls, because it violates gender norms related to male social assertion and dominance" (Doey, Coplan, & Kingsbury, 2014, p. 267). Consequently, teachers might have responded differently to anxious withdrawal in boys compared to girls, rating them higher because anxious withdrawn behavior in boys is more salient and contradicts expectations based on gender norms. Results from previous studies suggest that anxious withdrawal in boys is more strongly associated with adjustment difficulties such as peer exclusion and rejection (Coplan et al., 2008; Gazelle & Ladd, 2003). Findings from the current study may help to illuminate underlying mechanisms explaining negative social experiences for anxiously withdrawn males. Thus, it may be that anxious withdrawn behavior in boys is more likely to result in negative interactions with their peers, and they might not be as likely as girls to get support from their parents (Doey, Coplan, & Kingsbury, 2014). Consequently, the lack of

social support for anxious withdrawn boys beginning from early childhood may lead to more severe social problems further in life.

Contribution of Classroom Quality

This study also examined the hypothesis that high quality classrooms should be associated with lower levels of anxious withdrawal in children. Findings indicated that the effect of classroom quality on anxious withdrawal was non-significant. One possible explanation for this non-significant effect may be that classroom quality was not measured consistently for each year that children spend in Head Start care. A more complete measure of the classroom quality would include *time-variant* classroom observations completed consistently for each year in the day care in order to account for the cumulative effect of the Head Start classroom quality on anxious-withdrawal behavior. This more complete measure of classroom quality may make it more possible to examine contributions of Head Start classrooms on developmental trajectory of anxious withdrawal behavior.

Contribution of Socio-Economic Risk Factors for Parents

This study also examined the hypothesis that more severe family socio-economic conditions should be associated with higher levels of anxious withdrawal in children. Researchers have hypothesized in the transactional model of anxious withdrawal that multiple stressors for parents, typical for low SES families, may impede their ability to respond to their children's needs and demands, and potentially contribute to more withdrawal behavior in children (Rubin, LeMare, & Lollies, 1990). However, findings from the current study indicated that there was not a significant relationship between the number of socio-economic risks per family and children's anxious withdrawn behavior.

One possible explanation for the fact that the current study was not able to detect a direct effect between the number of socio-economic risks per family and children's anxious withdrawn behavior may be that we did not test any potential mediating effects for parenting practices. As previously discussed, the effect of family risk indices on child development may not be direct, and is often mediated through the parental practices (NICHD, 2005). It may be that parents experiencing the maximum number of risk factors have less time to high quality parenting, which in turn contributes to more anxious withdrawn behavior in their children. Therefore, including information on parental practices may help to detect mediating mechanism between the socio-economic risk factors for parents and anxious withdrawn behavior in children.

It was also originally hypothesized that the effect of high quality classrooms would be more beneficial for children coming from the lower SES families with higher number of risks. It was previously discussed that children from low-income families are more likely to start prekindergarten with lower behavior regulation, but may experience growth similar to that of their peers due to high quality stimulation in high quality classrooms (Wanless, McClelland, Tominey, & Acock, 2011). However the findings from the current study did not provide any evidence examining the relationship between number of socio-economic risks per family, classroom quality, and children's anxious withdrawn behavior. Several potential explanations for the non-significant associations may be applicable. First, it is possible that classroom quality was not a singular source of socialization for those children. A more complete description of child socialization processes include other constructs (such as the number of siblings or other relatives living at home, contacts with the extended family, etc.) that contribute to decrease in anxious

withdrawal, but are not captured by the current model. Children living with extended families may have more opportunities for socialization, not necessarily associated with the classroom socialization.

It is also possible that the effect of classroom quality on anxious withdrawal in children from families with more socioeconomic risk may be mediated by children's behavioral regulation. Behavioral regulation includes skills such as focusing and maintaining attention on tasks, following instructions, and inhibiting inappropriate actions (Sektnan, McClelland, Acock & Morrison, 2010, p. 466). The findings on the importance of behavioral regulation (specifically working memory, attention, and inhibitory control) for positive academic and social adjustment in children facing early risks, are well documented (e.g., Sektnan, et al., 2010; Wanless et al., 2011). Thus, it is possible that classrooms with higher quality may improve behavioral regulation in children (e.g. Rimm-Kaufman et al., 2005) that, in turn, is associated with more positive adjustment for children with temperamental vulnerabilities, such as anxious withdrawal (Rudasill & Rimm-Kaufman, 2009). Thus, for anxiously withdrawn children, improved behavioral regulation in high quality classrooms appears likely to contribute to more positive social adjustment.

Taken together, it seems that the relationships between family risk factors, classroom quality, and children's anxious withdrawn behavior may be more complex than reflected in the current model. Although a number of studies have documented the links between more proximal factors, such as parenting (e.g. Hastings, Nuselovici, Rubin, & Cheach, 2010), behavioral regulation (Rudasill & Rimm-Kaufman, 2009) and children's anxious withdrawn behavior, less research has examined the mediating

mechanisms between the more distal factors, such as a number of socio-economic risks per family and classroom quality, and children's anxious withdrawn behavior. It may be that the links between distal family risk factors, classroom quality, and children's anxious withdrawn behavior are mediated by other variables that were not included by the current model.

Implications of the Current Study

Results of this study suggest several important implications for developmental research on anxious withdrawal. One purpose of the study was to examine the developmental trajectory of anxious withdrawal in a sample of the 3-year-old children in transition to kindergarten. The current study further contributes to our understanding of development of anxious withdrawn behavior in early childhood and through transition to the kindergarten, as well as to the role of gender differences. The findings from the current study provide additional empirical evidence supporting a developmental model of anxious withdrawal and help to address the deficiencies in previous research by examining a developmental model of anxious withdrawal in a younger sample of 3-year old children. Additional work is necessary to examine longitudinal stability of this behavior and contribution of early anxious withdrawal to social development. The present findings suggest that 3-year old boys tend to be rated higher on anxious withdrawal compared to girls and this may predict more severe adjustment difficulties for males in middle childhood and adolescence. Future longitudinal research should examine these potential associations.

The effect of classroom quality and the cumulative effect of the number of socio-economic risk factors per family on children's anxious withdrawn behavior were not

significant. The current study also did not reveal any differences in anxious withdrawn behavior between children coming from the families with three, two, one, or zero number of socio-economic risks. Similarly, the effect of classroom quality did not differ between children with different numbers of socio-economic risks. These relations raise the question about the mediating mechanism between socio-economic conditions for parents, classroom quality, and children's anxious withdrawn behavior. Whereas it is likely that the effects of socio-economic conditions for parents can be mediated via parental practices, it may also be possible that the effects of the classroom quality can be mediated via children's behavioral regulation and behavioral engagement. Clearly, investigation of the mediation mechanisms between the living conditions for parents, classroom quality, and children's anxious withdrawn behavior should be one of the important future directions.

The results of this study could facilitate research designs of the future longitudinal studies attempting to examine certain aspects of the transactional model for anxious withdrawn behavior. Awareness of the possible indirect effects between the main factors outlined by this transactional model is crucial for our understanding of the pathways to and from anxious withdrawn behavior. More detailed assessments of the possible mediating mechanisms between more distal factors, suggested by this guiding model, such as cultural and socio-economic conditions for parents, and children's anxious withdrawn behavior, may offer valuable insights regarding the nature of these relationships.

Limitations and Future Directions

The current study has a number of strengths. First, the study used multiple informants, such as anxious withdrawal was reported by teachers, family risk indices were reported by parents, and classroom quality information was provided through independent observations. A second strength was the use of multilevel modeling in longitudinal design, that allowed to examine developmental trajectory of anxious withdrawal over four time points. However, although this study addressed an important gap in the current literature, there are also important limitations that should be addressed.

Measure of Anxious Withdrawal Behavior. The measure of anxious withdrawal in the current study was very broadly defined, including items such as "Lacks confidence in learning new things or tying new activities", or "Is nervous, high-strung, or tense", as well as a copyrighted item. Thus, this measure may potentially capture a broader set of behavior problems that are frequently associated with the anxious withdrawal, but not synonymous with it. The fact that the FACES 2009 dataset provides researchers only with the scale scores (e.g. no item-level data was available) prevented me from conducting a Confirmatory Factor Analysis and calculating Cronbach's alpha, that could help me identify how well the items load together and make up the anxious-withdrawn construct. This is a common limitation for studies using secondary data. Nevertheless, the results from the current study provide additional evidence of the transactional model of anxious withdrawal (Rubin et al., 2003) that acknowledges the presence of the multiple processes that are likely to contribute to withdrawn behavior in children.

Complex Sample Design. The complex sample design used by the FACES 2009 dataset presented additional challenges for the data analyses, compared to analyses of the

simple random samples. Thus, because MLM is required, choosing appropriate software able to incorporate the complex sample design into data analyses brings additional questions for consideration. For example, with the HP MIXED procedure in SAS, I was able to incorporate a large number of the fixed and random effects present in the study model, but unable to estimate a distribution of the non-normal outcome. With SAS GLIMMIX, on the other hand, I was able to estimate the model fit for the non-normal outcome, but found it very time-consuming to estimate all fixed and random effects incorporated into the model. Taking into consideration the complexity of the current analyses, I was not able to estimate the time-variant contribution of the classroom quality or test the effects of potential additional mediator variables that were not captured by the current model.

There are multiple opportunities for future research building on the results of the current study. For example, future investigations should include examinations of the utility of the consecutive assessments of classroom quality in order to estimate the cumulative effect of early child care classroom quality on development of anxious withdrawn behavior in children. A related topic of interest for future research includes assessments of the possible mediating mechanisms between socio-economic risk factors for parents, quality of child care classrooms, and children's anxious withdrawn behavior. As addressed previously in the discussion of the study implications, longitudinal analysis of possible mediating mechanisms can yield important information regarding (a) the role of socio-economic living conditions for children's social adjustment, and (b) the quality of early child care on development and change of anxious withdrawal. Longitudinal designs with the structural equation modeling could be used to evaluate multiple possible

pathways to and from anxious withdrawn behavior in early childhood and beyond. Well-designed longitudinal research on this topic would promote further investigation of the additional possible links between the effects of living conditions for children and development of anxious withdrawal. These could include examination of the parental attitudes concerning child rearing practices, availability of the emotional and social support for parents, and the quality of the living conditions.

Inclusion of additional characteristics on child living conditions beyond the ones examined by the current study (i.e. household poverty, low maternal education, and single parenthood) would be another potential direction for future research. Inclusion of parent mental health status, caregiver beliefs regarding positive child development, and other relevant family characteristics in similar models could bring the light on the possible conditions contributing to higher levels of anxious withdrawn behavior in children. Finally, additional results from the possible studies described above could contribute to development of preventive interventions for anxious withdrawn children.

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Tables

Table 3.1.

*Summary of Data Collection Components for 3-year old cohort**

	Fall 2009	Spring 2010	Spring 2011	Spring 2012
3-Year old cohort		Child in Head Start		Kindergarten
Teacher Child Report	X	X	X	X
Parent Interview	X	X	X	X
Classroom Observation		X	X	

*Adapted from Mathematica Policy Research FACES 2009 User Guide, Table III.4

Table 3.2.

Descriptive Statistics Results for Primary Study Variables

Variable	N	Mean	SD	Range		Skewness	SE	Kurtosis	SE
				Potential	Actual				
Primary outcome									
AW, Fall 09	1872	1.55	1.93	0-12	0-10	1.54	0.06	2.26	0.11
AW, Spring 10	1674	1.36	1.88	0-12	0-12	1.81	0.06	3.42	0.12
AW, Spring 11	1118	1.18	1.67	0-12	0-11	1.86	0.07	3.89	0.15
AW, Spring 12	888	1.58	2.10	0-12	0-11	1.61	0.08	2.37	0.16
Primary predictors									
CLASS, Spring 10	1560	5.31	0.50	1-7	3-6	-0.80	0.06	1.77	0.12
Risk Index, Fall 2009	1706	1.46	0.89	0-3	0-3	-0.01	0.06	-0.76	0.12
Risk = 0	261								
Risk = 1	609								
Risk = 2	627								
Risk = 3	209								

Note. AW=Anxious Withdrawal;

Table 3.3.

Specification of the Shared Membership for Children in the Classrooms

Head Start			Kindergarten
Fall 2009	Spring 2010	Spring 2011	Spring 2012
Children are in the same classroom		Different classroom	Unknown classroom

Table 3.4.

Specification of the Dummy Codes for Cross-Random Coefficients

Effect Of The Class Membership	Class 1 (F09/S10)	Class 2 (S11)	Child	Occasion	Time (Occasion-1)
Cumulative	1	0	1	1	0
	1	0	1	2	1
	1	1	1	3	2
	1	1	1	4	3
No-Carry-Over	1	0	1	1	0
	1	0	1	2	1
	0	1	1	3	2
	0	0	1	4	3
Decay	1	0	1	1	0
	1	0	1	2	1
	0.5	1	1	3	2
	0.5	0.5	1	4	3

Table 3.5.

Specification of the Piecewise Slopes for the Study Model

	F 2009	S 2010	F 2010 N/A	S 2011	F 2011 N/A	S 2012
Time	0	1	2	3	4	5
Time in study	X	X		X		X
Slope 1	0	0		3		3
Slope 2	0	0		0		2

Note. F = Fall, S = Spring; N/A = data is not available.

Table 4.1.

Results of the Model Comparison Analyses Conducted for Unconditional Models

	Five level model		Four level model, no center		Four level model, no program	
	Estimate	SE	Estimate	SE	Estimate	SE
Head Start Program	0.11	0.05	0.10	0.04		
Head Start Center	-0.02	0.05			0.10	0.05
Head Start Classroom	0.40	0.07	0.39	0.06	0.39	0.07
Child	0.77	0.06	0.77	0.06	0.77	0.06
Residual (VC)	2.39	0.06	2.39	0.06	2.39	0.06
2LogLik	22137.61		22137.76		22144.07	
AIC	22147.61		22145.76		22152.07	
Degrees of Freedom	4		3		3	
Deviance Test			0.15		6.46	
p-value			0.70		0.01	

Table 4.2.

Results of the Model Comparison Analyses Conducted for the Unconditional Models with Cross-Random Effects

	2LogLike	AIC	BIC
Four level no cross-random	22137.76	22145.76	22154.08
Four level CLASS	22079.74	22089.74	22079.74
Four level NOCLASS	21982.98	21992.98	21982.98
Four level DCLASS	21987.22	21997.22	21987.22

Note. CLASS – Cumulative Effects; NOCLASS – No-Carry-Over Effects; DCLASS – Decay Effects.

Table 4.3

Summary of Least Squares Means Estimates for Anxious Withdrawal

Occasion Least Squares Means

	Estimate	SE	DF	t Value	p value
Fall 2009	1.57	0.06	149.7	25.37	<.0001
Spring 2010	1.41	0.06	164.5	22.21	<.0001
Spring 2011	1.20	0.07	241.2	17.21	<.0001
Spring 2012	1.61	0.07	308	21.65	<.0001

Differences of Occasion Least Squares Means

occasion :1 to 4	occasion :1 to 4	Estimate	SE	DF	t Value	p value
1	2	0.16	0.05	3855	3.05	0.0023
1	3	0.36	0.06	4122	6.06	<.0001
1	4	-0.04	0.07	4198	-0.67	0.5026
2	3	0.21	0.06	3988	3.36	0.0008
2	4	-0.20	0.07	4088	-3.07	0.0021
3	4	-0.41	0.07	3848	-5.82	<.0001

Table 4.4

Results for the Final Best-Fitting Piecewise Model for Anxious Withdrawal With all Predictors

	Model Effects	Three-level model				
		B	SE	DF	t Value	Pr > |t|
	Model for the Means					
b_0	Intercept	1.23	0.10	322	12.18	<.0001
b_1	slope1	-0.07	0.04	3883	-1.84	0.066
b_2	slope2	**0.24**	0.07	3883	3.29	0.001
b_3	RISKL1	0.06	0.05	3883	1.12	0.263
b_4	RISKL2	**-0.35**	0.15	322	-2.34	0.020
b_5	Mclass	-0.18	0.12	3883	-1.53	0.125
b_6	slope1*RISKL1	0.02	0.02	3883	0.71	0.475
b_7	slope1*RISKL2	0.07	0.06	3883	1.27	0.203
b_8	slope1*Mclass	**0.11**	0.05	3883	2.04	0.042
b_9	slope2*RISKL1	0.01	0.05	3883	0.12	0.901
b_{10}	slope2*RISKL2	0.06	0.11	3883	0.58	0.560
b_{11}	slope2*Mclass	-0.02	0.10	3883	-0.24	0.809
	Model for the Variance					
	Random Intercept Variance (classroom)	0.42	0.07			
	Random Intercept Variance (child)	0.80	0.07			
	Residual Variance	2.20	0.06			
	ML Model Fit					
	Number of Parameters	7				
	2LL	16579				
	AIC	16585				
	BIC	16597				

Note. Bold values are $p < .05$.

Table 4.5

Post-hoc Results for the Final Best-Fitting Piecewise Model for Anxious Withdrawal With all Predictors

	Model Effects	Est	SE	DF	t Value	Pr > |t|
	Model for the Means					
b_0	Intercept	**1.61**	0.12	340	13.61	<.0001
b_1	slope1	**-0.11**	0.02	2857	-4.35	<.0001
b_2	slope2	**0.21**	0.04	2857	4.68	<.0001
b_3	Mclass	-0.17	0.12	340	-1.41	0.1606
b_4	Risk 0	-0.18	0.13	1010	-1.34	0.1814
b_5	Risk 1	0.03	0.12	1010	0.26	0.7986
b_6	Risk 2	0.02	0.11	1010	0.18	0.8558
	Risk 3	0.00	.	.	.	.
b_7	Gender 0	**-0.35**	0.07	1010	-4.76	<.0001
	Gender 1	0.00	.	.	.	.
b_8	Slope1*Mclass	0.10	0.05	2857	1.92	0.0553
b_9	Slope2*Mclass	-0.03	0.10	2857	-0.28	0.782
	Model for the Variance					
	Random Intercept Variance (classroom)	0.42	0.07			
	Random Intercept Variance (child)	0.78	0.07			
	Residual Variance	2.21	0.06			
	ML Model Fit					
	2LL	16555				
	AIC	16561				
	BIC	16572				

Note. Bold values are $p < .05$.

Figures

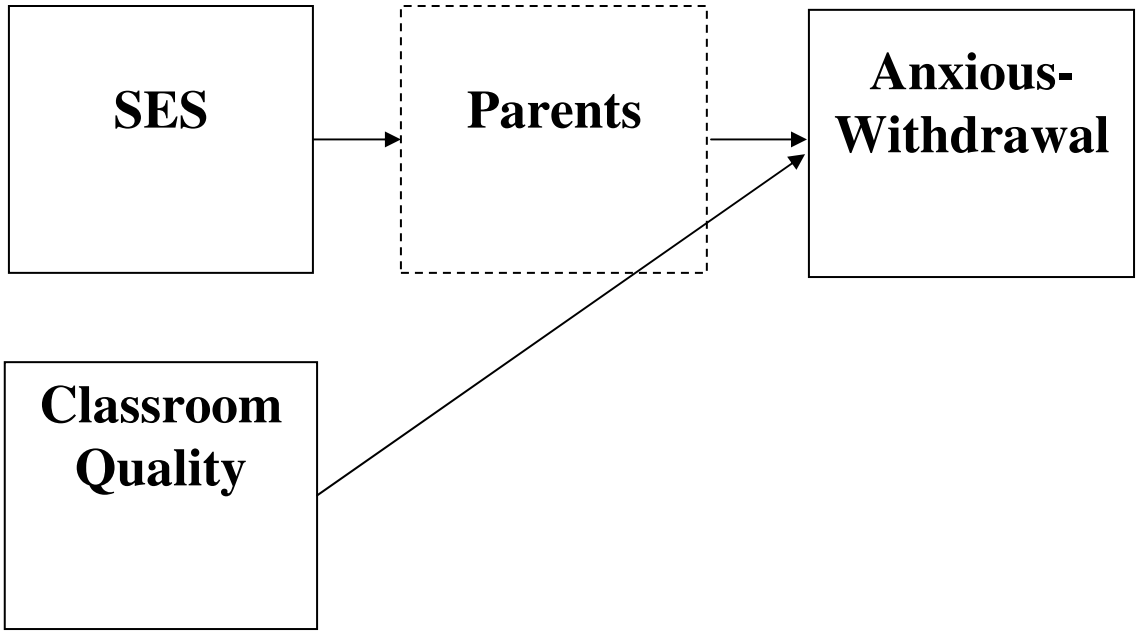


Figure 1. Proposed conceptual model examining the effects of SES and Classroom Quality on Anxious Withdrawal.

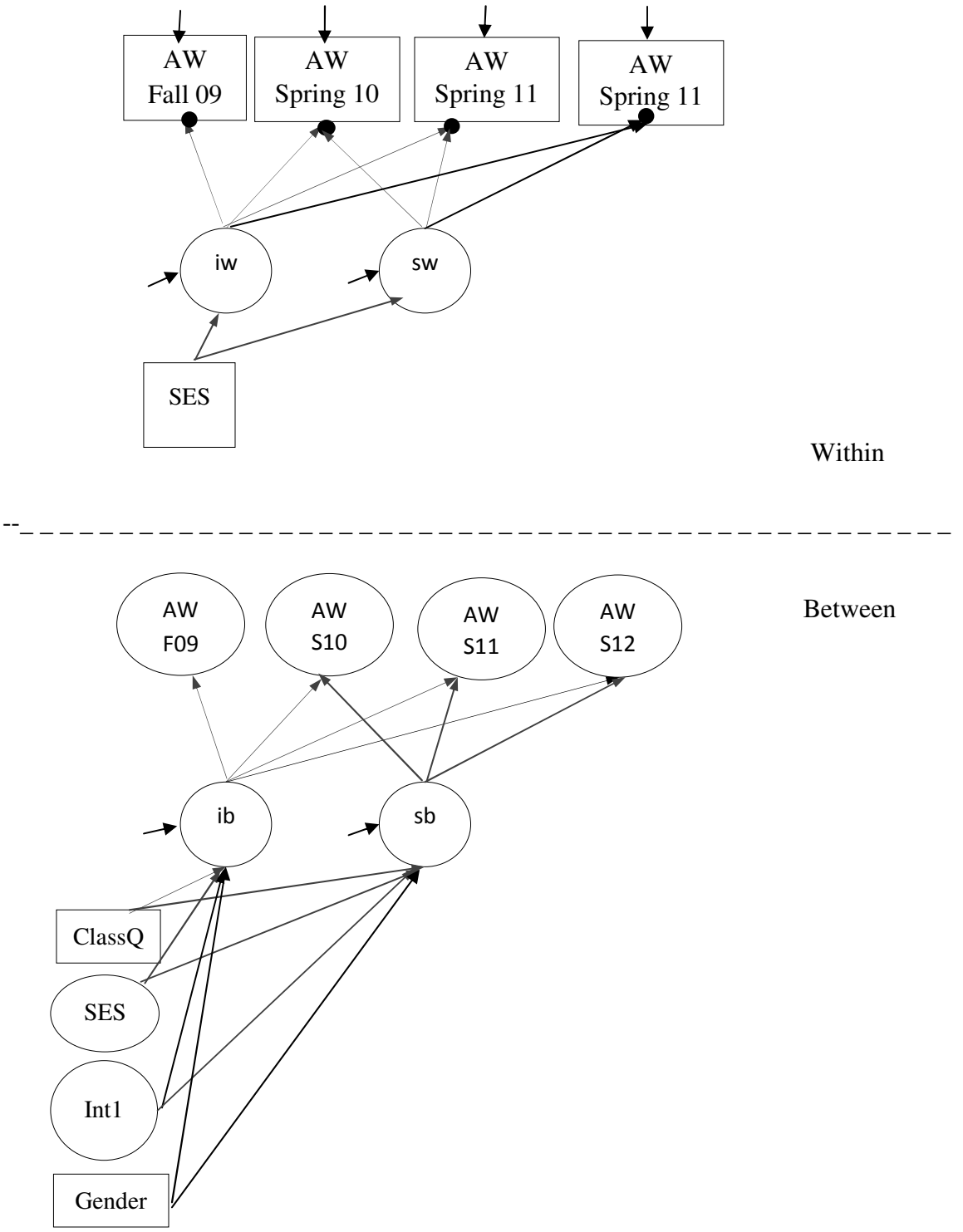


Figure 2. Proposed growth curve model examining the effects of SES and Classroom Quality on Anxious Withdrawal (Three-level Analysis).
Note. ClassQ = Classroom Quality; Int1 = SES X ClassQ interaction.

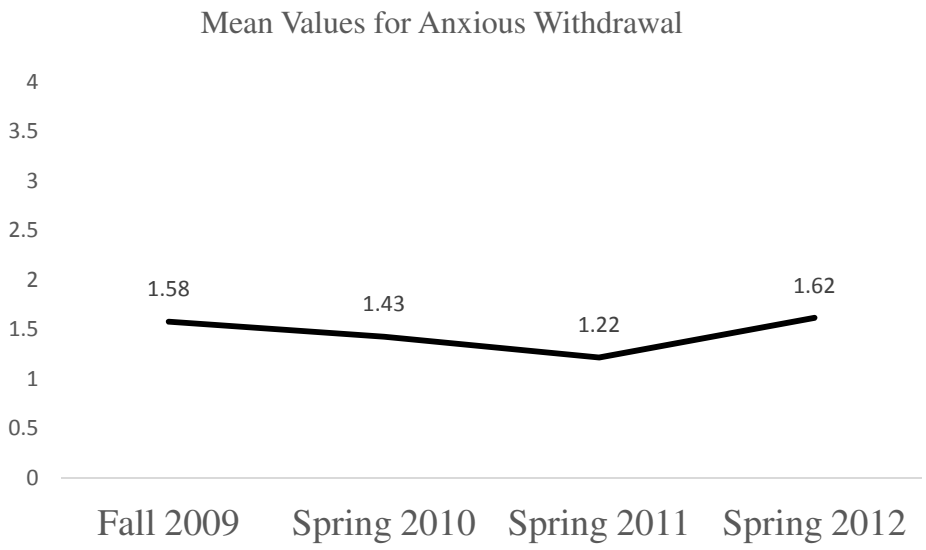
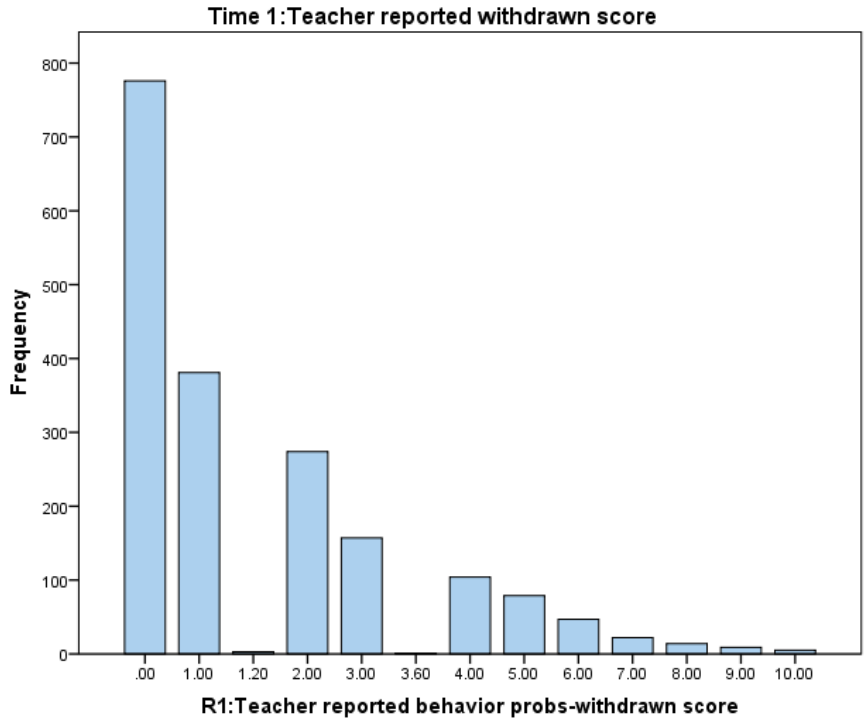


Figure 3. Mean values for anxious withdrawal across the study.

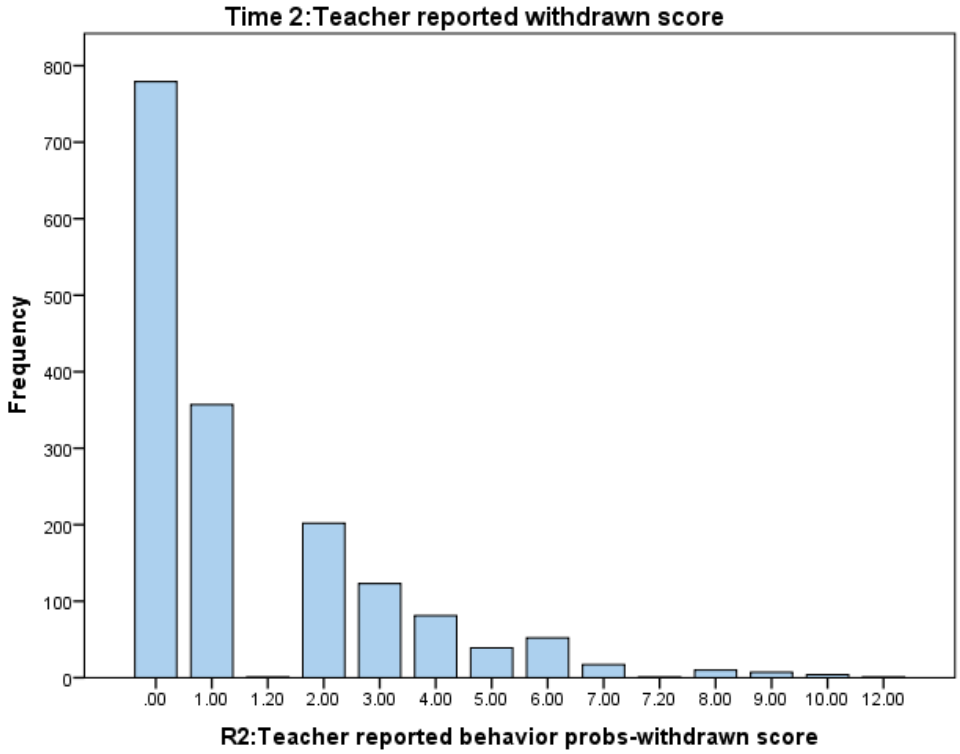
Appendix A

Distribution of Anxious Withdrawal outcome over four time points



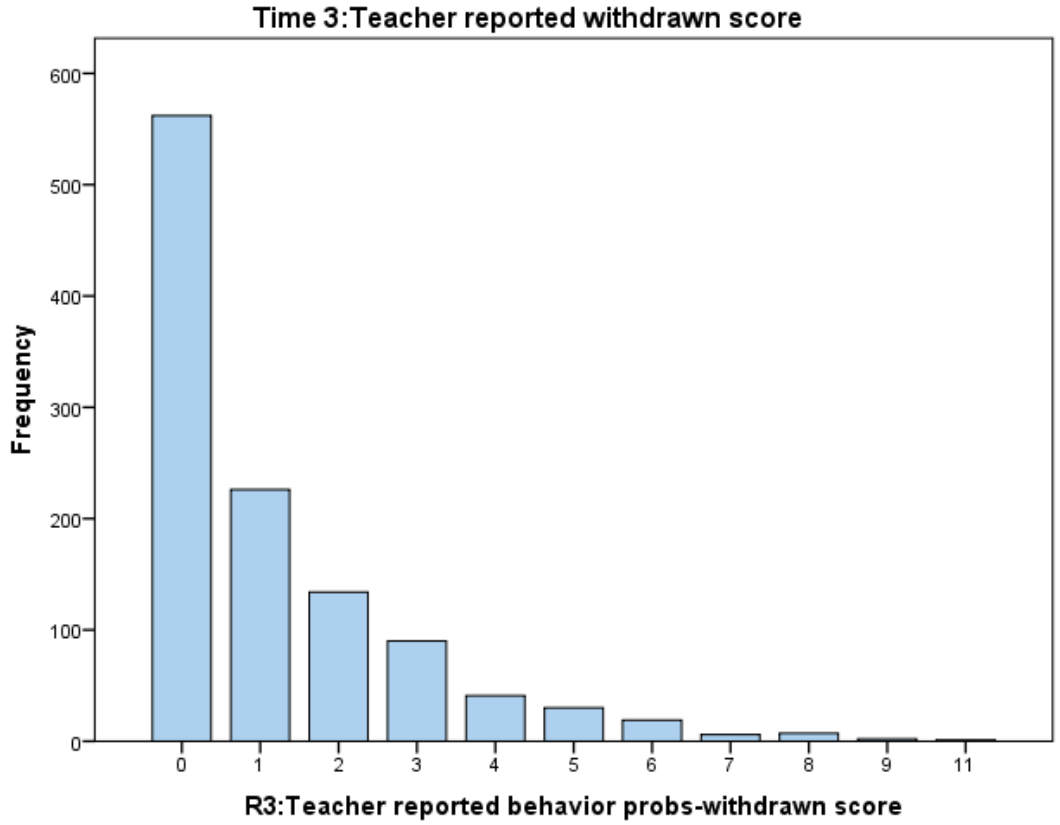
Time1:Teacher Reported Withdrawn Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	776	40.0	41.5	41.5
	1.00	381	19.7	20.4	61.8
	1.20	3	.2	.2	62.0
	2.00	274	14.1	14.6	76.6
	3.00	157	8.1	8.4	85.0
	3.60	1	.1	.1	85.0
	4.00	104	5.4	5.6	90.6
	5.00	79	4.1	4.2	94.8
	6.00	47	2.4	2.5	97.3
	7.00	22	1.1	1.2	98.5
	8.00	14	.7	.7	99.3
	9.00	9	.5	.5	99.7
	10.00	5	.3	.3	100.0
	Total	1872	96.6	100.0	
Missing	System	66	3.4		
Total		1938	100.0		



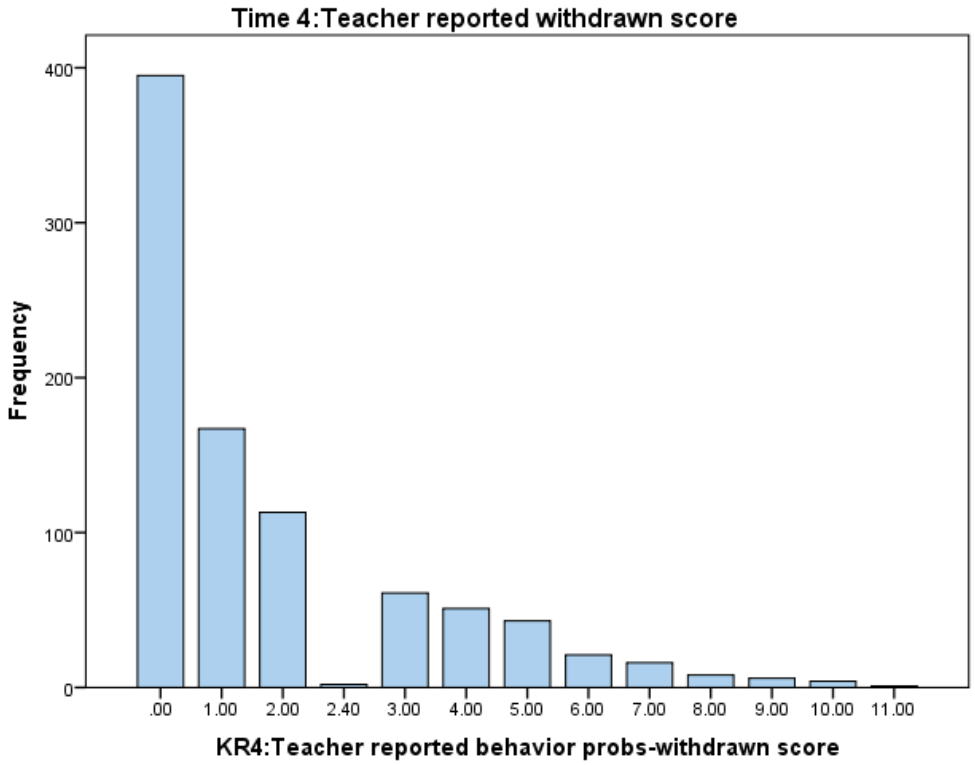
Time 2: Teacher Reported Withdrawn Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	779	40.2	46.5	46.5
	1.00	357	18.4	21.3	67.9
	1.20	1	.1	.1	67.9
	2.00	202	10.4	12.1	80.0
	3.00	123	6.3	7.3	87.3
	4.00	81	4.2	4.8	92.2
	5.00	39	2.0	2.3	94.5
	6.00	52	2.7	3.1	97.6
	7.00	17	.9	1.0	98.6
	7.20	1	.1	.1	98.7
	8.00	10	.5	.6	99.3
	9.00	7	.4	.4	99.7
	10.00	4	.2	.2	99.9
	12.00	1	.1	.1	100.0
	Total	1674	86.4	100.0	
Missing	System	264	13.6		
Total		1938	100.0		



Time 3: Teacher Reported Withdrawn Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	562	29.0	50.3	50.3
	1	226	11.7	20.2	70.5
	2	134	6.9	12.0	82.5
	3	90	4.6	8.1	90.5
	4	41	2.1	3.7	94.2
	5	30	1.5	2.7	96.9
	6	19	1.0	1.7	98.6
	7	6	.3	.5	99.1
	8	7	.4	.6	99.7
	9	2	.1	.2	99.9
	11	1	.1	.1	100.0
	Total	1118	57.7	100.0	
Missing	System	820	42.3		
Total		1938	100.0		



Time 4: Teacher Reported Withdrawn Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	395	20.4	44.5	44.5
	1.00	167	8.6	18.8	63.3
	2.00	113	5.8	12.7	76.0
	2.40	2	.1	.2	76.2
	3.00	61	3.1	6.9	83.1
	4.00	51	2.6	5.7	88.9
	5.00	43	2.2	4.8	93.7
	6.00	21	1.1	2.4	96.1
	7.00	16	.8	1.8	97.9
	8.00	8	.4	.9	98.8
	9.00	6	.3	.7	99.4
	10.00	4	.2	.5	99.9
	11.00	1	.1	.1	100.0
	Total	888	45.8	100.0	
Missing	System	1050	54.2		
Total		1938	100.0		

Appendix B

Selected SAS Syntax for the Dissertation Analyses

SAS syntax for the best-fitting four-level empty model

```
Title "Four-level GLIMMIX model no center";
                proc glimmix data= stacked1 method=RSPL nobound;
                CLASS occasion CHILDID CLS1_ID C1_ID D1_ID;
                model DV=/ solution DDFM=Satterthwaite;
                random intercept /TYPE=UN Subject=D1_ID;*HS Program;
                random intercept / TYPE=UN Subject=CLS1_ID; *classroom;
                RANDOM intercept / TYPE=UN Subject=CHILDID; *child;
                random occasion/ TYPE=VC Subject=CHILDID residual;*time;
                RUN;
```

SAS syntax for creating cross-classified coefficients

```
*dummy codes for cumulative effects of classroom across time *class*;
if time=0 then do; class1=1; class2=0; end;
if time=1 then do; class1=1; class2=0; end;
if time=3 then do; class1=1; class2=1; end;
if time=5 then do; class1=1; class2=1; end;

*Dummy codes if classroom doesn't stay with you *noclass*;
if time=0 then do; noclass1=1; noclass2=0; end;
if time=1 then do; noclass1=1; noclass2=0; end;
if time=3 then do; noclass1=0; noclass2=1; end;
if time=5 then do; noclass1=0; noclass2=0; end;

*Dummy codes for decay effects *dclass*;
if time=0 then do; dclass1=1; dclass2=0; end;
if time=1 then do; dclass1=1; dclass2=0; end;
if time=3 then do; dclass1=.5; dclass2=1; end;
if time=5 then do; dclass1=.25; dclass2=.5; end;
run;

*taking into account missing values;

data work.st_class3;
set work.st_class3;
if CLS1_ID="0" then do; class1=0; noclass1=0; dclass1=0; end;
if CLS3_ID="0" then do; class2=0; noclass2=0; dclass2=0; end;
run;

*class;
Title "Four-level GLIMMIX class";
proc glimmix data= st_class method=RSPL;
```

```
CLASS occasion CHILDID CLS1_ID CLS3_ID C1_ID D1_ID;
model DV= / solution DDFM=Satterthwaite;
random intercept/ TYPE=UN Subject=D1_ID; *level 4;
RANDOM class1 / TYPE=UN Subject=CLS1_ID; *Level3;
RANDOM class2 / TYPE=UN Subject=CLS3_ID; *Level3;
RANDOM intercept / TYPE=UN Subject=CHILDID; *Level2;
random occasion/ TYPE=VC Subject=CHILDID residual; *Level 1;
RUN;

 *noclass;
Title "Four-level GLIMMIX noclass";
proc glimmix data= st_class method=RSPL;
CLASS occasion CHILDID CLS1_ID CLS3_ID C1_ID D1_ID;
model DV= / solution DDFM=Satterthwaite;
random intercept/ TYPE=UN Subject=D1_ID; *level 4;
RANDOM noclass1 / TYPE=UN Subject=CLS1_ID; *Level3;
RANDOM noclass2 / TYPE=UN Subject=CLS3_ID; *Level3;
RANDOM intercept / TYPE=UN Subject=CHILDID; *Level2;
random occasion/ TYPE=VC Subject=CHILDID residual; *Level 1;
RUN;

*dclass;
Title "Four-level GLIMMIX dclass";
proc glimmix data= st_class method=RSPL;
CLASS occasion CHILDID CLS1_ID CLS3_ID C1_ID D1_ID;
model DV= / solution DDFM=Satterthwaite;
random intercept/ TYPE=UN Subject=D1_ID; *level 4;
RANDOM dclass1 / TYPE=UN Subject=CLS1_ID; *Level3;
RANDOM dclass2 / TYPE=UN Subject=CLS3_ID; *Level3;
RANDOM intercept / TYPE=UN Subject=CHILDID; *Level2;
random occasion/ TYPE=VC Subject=CHILDID residual; *Level 1;
RUN;
```

SAS syntax for creating two piecewise slopes

```
data work.st_class3;
set work.st_class3;
if time =0 then do; slope1=0; slope2=0; end;
if time =1 then do; slope1=0; slope2=0; end;
if time =3 then do; slope1=3; slope2=0; end;
if time =5 then do; slope1=3; slope2=2; end;
label slope1="slope1: F09 till S11"
slope2="slope2: S11 till S12"; run;
```

SAS syntax for calculating between- level and within-level predictors

```
*Centering my predictors;
data weightsmeans; set weightsmeans;
*Level1 risk=person-class mean;
RISKL1=P1ECRISK-1.4890540; label RISKL1="RISKL1:RISK(person)-M(class)";
*Level2 risk=class mean-constant;
RISKL2=Class_RISK-2; label RISKL2="RISKL2:RISK (class)-C";
*For L2 predictor(Class Quality), we just need to center it at the mean
(obtained from weighted means in SPSS);
Mclass=O2CLSSES-5.3534; label mclass="mclass: average class quality";
*Creating interactions;
intL1=RISKL1*Mclass; label intL1="intL1: RiskL1*Quality";
intL2=RiskL2*Mclass; label intL2="intL2: RiskL2*Quality";
run;
```

Selected SAS syntax for post-hoc analyses

```
Title "Specify own df - V1";
proc glimmix data=st_class3 method=RSPL empirical;
CLASS occasion CHILDID P1ECRISK CHGENDER CLS1_ID;
model DV= slope1 slope2 Mclass P1ECRISK CHGENDER
slope1*Mclass
slope2*Mclass
/ solution DDF=2857, 2857, 340, 1010, 1010, 2857, 2857;
random intercept / TYPE=UN Subject=CLS1_ID; *level3;
random intercept / TYPE=UN Subject=CHILDID*CLS1_ID; *Level2;
random occasion / TYPE=VC Subject=CHILDID*CLS1_ID residual; *Level 1;
lsmeans/diff=ALL;
RUN;
```