Developmental Changes in Anxiety and Social Competence in Early Childhood:

Exploring Growth and the Roles of Child Temperament and Gender

by

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ABSTRACT

This dissertation examined how anxiety levels and social competence change across the course of early elementary school, as well as how individual differences at the transition to kindergarten may influence these trajectories. Previous research has supported unidirectional relations among anxiety and social competence, but few studies explore how inter- and intra-individual changes in social competence and anxiety may be related across time. From a developmental perspective, studying these trajectories following the transition to kindergarten is important, as cognitive and emotion regulation capacities increase markedly across kindergarten, and the relative success with which children navigate this transition can have a bearing on future social and emotional functioning across elementary school. In addition, given gender differences in anxiety manifestation and social competence development broadly, gender differences were also examined in an exploratory manner. Data from parent and teacher reports of a community sample of 291 children across kindergarten, 1st, and 2nd grades were analyzed. Results from bivariate growth models revealed steeper increases in anxiety, relative to peers in the sample, were associated with steeper decreases in social competence across time. This finding held after controlling for externalizing behavior problems at each time point, which suggests that relations among anxiety and social competence may be independent of other behavior problems commonly associated with poor social adjustment. Temperament variables were associated with changes in social competence, such that purportedly "risky" temperament traits of higher negative emotionality and lower attention control were associated with concurrently lower social competence in kindergarten, but with relatively steeper increases in social competence across time.

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Temperament variables in kindergarten were unrelated with changes in anxiety across time. Gender differences in relations among anxiety in kindergarten and growth in social competence also were revealed. Findings for teacher and parent reports of child behavior varied. Results are discussed with respect to contexts that may drive differences between parent and teacher reports of child behavior, as well as key developmental considerations that may help to explain why kindergarten temperament variables examined herein appear to predict changes in social competence but not changes in anxiety levels.

DEDICATION

To David and Gram.

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CHAPTER 1

INTRODUCTION AND BACKGROUND LITERATURE

Anxiety is a normal emotional experience, but for some children anxiety reaches a level of frequency and intensity that interferes with daily functioning and adaptive development (Angold et al., 1999). Anxiety problems tend to emerge in early childhood (Beesdo-Baum & Knappe, 2012; Merikangas et al., 2010), and if left untreated, anxiety in childhood appears to be associated with life-long difficulties, especially given that it is relatively stable over long periods of time and comorbidity rates among anxiety disorders are high (Bittner et al., 2007; Essau et al., 2000; Keller et al., 1992). In particular, childhood anxiety problems are associated with increased risk for subsequent anxiety disorder and depression diagnoses in adolescence, as compared to those without any prior anxiety disorder diagnoses (Bittner et al., 2007; Cole et al., 1998). Furthermore, untreated anxiety during adolescence can be a risk factor for anxiety disorder development and depression in adulthood, with disorders like specific phobia and social anxiety disorder demonstrating strong continuity into early adulthood (Pine et al., 1998). Additionally, anxiety interferes with adaptive socio-emotional functioning, and is associated with increased risk for academic and physical issues over time, including sleep related difficulties (Alfano, Ginsburg, & Kingery, 2007; Mychailyszyn, Mendez, & Kendall, 2010).

Although it is well established that children with heightened anxiety are at risk for social maladaptation, little is known about the relations among anxiety and social adjustment from a developmental perspective. In other words, understanding *processes* involved in how within-person changes in anxiety and social competence may occur

together over time is needed for several reasons. Theoretically, mechanisms that maintain anxiety symptoms may also foster poor social competencies, which in turn, can reinforce and exacerbate anxiety, creating a cyclical and mutually-reinforcing system that leads to the co-occurrence of marked social deficits and anxious tendencies. Given the prevalence of anxiety, and the fact that anxious tendencies may be especially common in young children, it is possible that these factors are related even at subclinical levels of anxiety within community samples (Egger & Angold, 2006). However, the timing, directionality, and extent to which anxious tendencies and social adjustment change together over time is not clear and represents a gap in the literature. Using developmental psychopathology as a guiding theoretical framework (Cicchetti, 1984; Cicchetti & Toth, 2009) the aims of the current dissertation are to (1) understand and describe relations among inter- and intra-individual trajectories in anxiety symptoms and social competence across kindergarten, 1st, and 2nd grade; (2) explore whether temperament predicts anxiety and social competence trajectories; and (3) examine differences in these trajectories and relations as a function of child gender.

Overarching Theoretical Framework: Developmental Psychopathology

The developmental psychopathology perspective provides a framework for understanding pathology as a dynamic developmental process with complex and myriad factors that can lead to deviations from typical developmental trajectories (Cicchetti, 1984; Cicchetti & Toth, 2009; Rutter & Sroufe, 2000). Four of the overarching principles of the developmental psychopathology framework are relevant for the current dissertation. First, the developmental psychopathology perspective focuses explicitly on understanding processes involved in both developmental continuity and discontinuity,

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rather than on whether the presence or absence of a risk factor leads to maladaptation. In this sense, any given child's trajectory is dependent on prior and ongoing histories and experiences. In order to better understand relations among anxious emotions and social competence development, the current dissertation will focus on examining how these factors change together over time, as well as directionality and how initial levels of anxiety in kindergarten predict changes in social competence and vice versa. This will allow for a better understanding of how certain individual differences in anxiety and social competence at one time point can predict trajectories or changes over time. In keeping with the developmental psychopathology framework, these experiences of social competence issues and anxiety are cyclical and mutually reinforcing over time, and are therefore inherently imbedded within the system as a whole and are intertwined. This is important because social competence and internalizing problems are often viewed as outcomes in the literature (e.g., Bornstein, Hahn, & Haynes, 2012; Eisenberg et al., 2009; Kochanska, Murray, & Harlan, 2000), and are rarely examined as processes themselves. By examining both between and within person growth in social competence and anxiety we can better understand these variables as they develop over time, rather than strictly as outcomes and risk factors. Second, the idea that the relative impact of any given risk factor depends on individual differences is relevant to this project. For instance, temperamental vulnerabilities, like behavioral inhibition, low effortful control, and negative emotionality, could make certain children more vulnerable to both anxiety problems as well as poor social skills during the transition to kindergarten. The cyclical relations among anxiety and poor social competence are likely especially strong for those with existing temperamental vulnerabilities or tendencies toward arousal and withdrawal.

Third, the idea that the timing of specific events can have a bearing on the extent to which they impact development also is relevant here. The developmental psychopathology perspective contends that risk factors have different ontological relevance depending on when they occur during the lifespan, as well as the duration of upset. In this dissertation, I highlight the transition to kindergarten as a potentially vulnerable point, during which changes in expectations for social interaction and emotion regulation may interact with existing temperamental facets to create problems with both anxious arousal and social competence. As children transition to formal school settings in kindergarten, they are expected to spend more time with peers than ever before (Feiring & Lewis, 1989). This transition period presents a salient period during which environmental influences interact with individual differences, such as temperament, and can have a bearing on future adaptation (Rimm-Kaufman & Pianta, 2000). Children with predispositions toward reticence or fear may be less able to socially adapt to these changes in environment during kindergarten, which could set the stage for further cyclical maladaptation in these domains over subsequent school years. Moving beyond the notion that maladaptation elicits further maladaptation, the transition to kindergarten is a sensitive period during which important social competencies and emotion regulation capabilities emerge from day to day social interactions and pressures, and present opportunities to influence future skills. Indeed, findings suggest that peer adjustment is associated with both concurrent and future emotional control, such that temperament (emotional control) at the individual level during this transition provides affordances that can either enhance or mitigate future social adjustment (Eisenberg, Valiente, & Eggum, 2014; Olson & Lifgren, 1988).

Fourth, the notion of equifinality is important for the current dissertation. Equifinality refers to the idea that there are many different complex risk factors operating and interacting across time that can alter the course of development toward a given outcome. In this sense, there are many other influences missing from this dissertation, ranging from molecular level (including genetic predispositions and complex bi-directional relations between environmental stressors and physiological reactivity to stress) to the cultural level (including cultural beliefs about the relative acceptability of shy or reticent behavior) that could be associated with maladaptive social functioning and anxiety development. However, models that attempt to account for all the levels of complexity are of little heuristic or explanatory value and will therefore not be examined in this dissertation. The current dissertation aims are meant to be a parsimonious description of possible socioemotional processes involved in relations among changes in anxiety and social competence over time.

Defining Social Competence using Developmentally-Grounded Frameworks

Definitions and conceptualizations of social competence vary considerably in the literature and need to be understood within a developmentally informed framework. More specifically, definitions of social competence vary on the extent to which emotional competence is considered (Halberstadt, Denham, & Dunsmore, 2001), as well as in terms of the specific behaviors or skills that constitute competence. Denham and Brown (2010), drawing on seminal work from Rose-Krasnor (1997), postulate that outcomes associated with skillful social behavior, including effectiveness in social interaction and the ability to make and maintain friendships, are of central importance when defining social competence. For the purposes of this dissertation, *social competence* is defined as the

ability to adaptively and flexibly engage in social behaviors, react to social stimuli, and communicate in a way that facilitates peer acceptance and mitigates peer dislike (Ladd, 1999; Rose-Krasnor, 1997). For children in early childhood, this includes competent play, adaptive and effective peer group entry, appropriate emotion regulation, and conflict resolution, all of which culminate in peer acceptance and the development/maintenance of positive peer relationships (Cillessen & Bellmore, 2004; Fabes, Gaertner, & Popp, 2006). In short, social competence consists of behaviors that enhance peer relationships and allow children to reach their social goals.

Social competencies change and take on different properties as children develop, and they build on each other over time, setting trajectories into motion and making future adaptive development more or less probable. Therefore, definitions of social competence need to be developmentally grounded. Indeed, Bornstein et al. (2010) found that developmentally-relevant social skill tasks were stable over time, such that those who were among the most and least socially competent at age 4, as measured by developmentally appropriate markers like parent and teacher reports on play behavior, maintained a similar rank-ordering on social skill tasks across ages 10 and 14, which increasingly focused on personal interpretations and understanding of social standing in peer climates. This continuity in developmentally appropriate social competences is supported in the literature, and is often referred to as Developmental Task Theory (Bosquet & Egeland, 2006; Luthar, 1995; Masten & Coatsworth, 1998). This highlights the importance of understanding relations among social competencies/adjustment and anxiety in early childhood, as the relative success with which children navigate their social developmental tasks is likely to have a bearing on future adjustment.

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In keeping with the developmental psychopathology framework, it is important to note that poor social competence is predicted by a number of diverse risk factors and could be associated with a wide array of different outcomes beyond anxiety, in the context of differences in temperament and individual circumstances or ongoing environments. Indeed poor social competence is associated with aggression and externalizing difficulties (Crick & Dodge, 1996; Dodge, Laird, Locheman, & Zelli, 2002; Richard & Dodge, 1982), behavioral problems (Larsson & Fisk, 1999), and depression (Shah & Morgan, 1996). For example, Bornstein et al. (2010) found that social competence prospectively predicts internalizing and externalizing symptoms throughout middle childhood. Although social skills in general are associated with many distinct pathologies, the aspects of social competence that are associated with anxiety and other internalizing disorders may differ from those associated with externalizing. For example, Strauss et al. (1989) compared social competence among children with anxiety problems, children with externalizing problems, and non-referred children, and found that anxious children were more withdrawn and shy, whereas the externalizing clinic-referred sample was more aggressive, inappropriately assertive, and negative in their social interactions, as indicated by teacher and parent reports. Despite these different patterns of social deficit, children with both anxiety and externalizing problems were more socially inappropriate and awkward in social interaction than the non-referred sample. This suggests that there is both overlap and unique deficits among internalizing and externalizing problems, and that more research is needed to elucidate a clear pattern of anxiety-related social deficits, especially given some findings that suggest social problems in middle childhood can uniquely predict

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internalizing problems, but not externalizing problems, in adolescence (Pedersen et al., 2007).

Theories of Anxiety Development and Maintenance

In order to build a conceptual understanding of how anxiety and social competence are related, a brief description of relevant anxiety development theories is needed for context. Individual temperamental vulnerabilities, like behavioral inhibition, can place children at risk for pathological anxiety, as well as increased negative emotions and anxious arousal (Biederman et al., 1993; Kagan et al., 1988). With regard to emotion theory, natural fear reactions that serve to orient to threats in the environment can become maladaptive over time through failed efforts to regulate emotions and dampen emotional arousal. Other temperamental factors, like effortful control and negative emotionality, also can decrease ability to cope with emotional arousal. From a learning theory perspective, and in keeping with emotion theories, avoiding anxiety-provoking situations leads to short-term reductions in anxious arousal and negatively reinforces avoidant behavior. Over time, avoidance (1) leads to lost opportunities to extinguish fear responses through exposure and experience with feared situations, and (2) minimizes future adaptation and ability to learn adaptive behavior (Kendall, 1992). Turning to cognitive theory, worry thoughts typical in anxious children are exacerbated over time and create negative schemas through which children filter information. These schemas, in turn, increase anxious interpretations that lower the threshold for anxious arousal, and make children sensitive to perceived threats in the environment (Bogles & Zigterman, 2000; Epkins, 2000; Schniering & Rapee, 2004). In middle childhood and at later periods of development, thoughts regarding (in)ability to handle emotions and heightened attention to emotional arousal can lead to avoidant

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emotion regulation strategies, which in turn leads to patterns of anxiety relief upon avoidance and negative reinforcement of that avoidance (Barlow, 2000). Although this is not an exhaustive discussion of anxiety development theories, it provides insight into some of the relevant mechanisms for how anxious emotions can become maladaptive over time.

Theories of anxiety development have historically underemphasized the importance of social competence and adjustment. Some empirical evidence suggests that the relation between negative emotionality and anxiety symptoms is mediated by peer competence, even after controlling for shyness and other temperamental vulnerabilities (Brumariu & Kerns, 2013). These findings suggest that for children with predispositions toward negative emotionality, maladaptive social skills may help to explain subsequent anxiety levels above and beyond other influences. Theoretically, proclivities for anxious emotional arousal may interfere with social development in a cyclical and mutually-reinforcing manner over time. Underlying anxious sensitivity or tendencies may interfere with the ability to meet increasingly complex social demands throughout development by interfering with social information processing, self-regulation, and reduced friendship quality/poor peer responses to anxious emotion (Daleiden & Vasey, 1997). Subsequent avoidance of social situations could mitigate opportunities to learn social competencies from more socially adept peers, leading to more avoidance and fewer exposures to developmentally-relevant social contexts, and thus perpetuating both anxious arousal and poor social adaptation over time (Kendall, 1992).

Building the Theoretical Framework linking Anxiety and Social Competence

Anxiety and social competence could theoretically be related over time through patterns of social information processing errors and social avoidance. This section will

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serve as a rationale for the dissertation and to provide an explanatory model and review of relevant literature for why anxiety and social competence are related over time, but these cognitive factors are not tested explicitly.

The complex ways in which social cues are encoded, interpreted, and acted upon could be greatly influenced by tendencies for emotional reactivity and can help to inform the current dissertation, given that 1) social behaviors do not exist in a cognitive vacuum (Crick & Dodge, 1994; Halberstadt et al., 2001), and 2) anxious emotions are commonly associated with general cognitive errors that may extend to social situations. A *Social Information Processing (SIP)* perspective is useful here, as it provides theoretical basis for how children interpret social cues and enact social behaviors, and provides a useful framework for examining pathology development, although not tested herein (Bijttebier, Vasey, & Braet, 2003). Briefly, the SIP model includes six steps outlining how children select and carry out social behaviors: Steps 1 through 2 involve encoding and interpreting social cues by selectively attending to relevant and irrelevant social information, steps 3 to 4 involve clarifying social goals, and steps 5 through 6 involve drawing on previous behavioral repertoires and self-efficacy for enacting behaviors necessary to reach said social goals (Crick & Dodge, 1994). Although this theory has been widely conceptualized and studied with aggressive and externalizing children, these steps appear to mirror cognitive errors commonly documented in anxious youth, and could provide a useful means for explaining anxiety-related social competence.

Anxiety is associated with general cognitive distortions and biases in cognitive interpretation that are likely to extend to social situations during times of stress. Anxiety includes both behavioral manifestations of anxiety (avoidance and arousal), as well as

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cognitive components related to worry and rumination about future events (Beck & Clark, 1997). Cognitive theories of anxiety maintain that schemas associated with perceived future threat maintain anxious arousal and make avoidance of anxiety provoking situations more likely (Beck & Clark, 1997). Anxious children worry more frequently and intensely than non-anxious children, and worry frequency and intensity can discriminate between high and low anxiety symptoms in community samples (Silverman, La Greca, & Wasserstein, 1995), as well as anxiety diagnoses among clinical samples (Weems, Silverman, & La Greca, 2000). *Therefore, these cognitive facets are likely relevant for understanding anxiety levels in community samples as well as clinical samples of children.* Cognitive distortions regarding relative risk and harm maintain and reinforce worry (Kendall, 1985). For example, those who worry also are more likely to view neutral events as threatening, and to judge both threatening and neutral events as having a greater probability of occurrence (Suarez & Bell-Dolan, 2001; Suarez-Moralez & Bell, 2006). Furthermore, anxious children show greater biases for attending to threat-related words than children with depression and other mood disorders (Dalgleish et al., 2003), and also interpret ambiguous situations as being more negative and dangerous and estimate lower abilities to handle anxiety-provoking situations, compared to children with externalizing disorders and non-clinical controls (Bogles & Zigterman, 2000). Children with anxiety problems also tend to endorse cognitive avoidance strategies to cope with anxious arousal more often than typically developing children, including poor attention to specific emotional arousal and low levels of emotional re-appraisal (Barrett, Rapee, Dadds, & Ryan, 1999). It also appears to be the case that anxious children attend away from threat under conditions of extreme stress or recent threat exposure (Pine et al., 2005). This

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suggests that anxious children attend to threat cues, but that under extreme threat they suppress this hyper-vigilance and avoid cues that may lead to further anxious responses. This unique patterns of cognitive distortions and avoidance associated with anxiety may make anxious youth especially vulnerable to social information processing problems and poor social competence, especially given combined tendencies to avoid emotional attention and also to attend to threatening information.

Cognitive errors extend to social information processing, creating distorted social information processing profiles that may maintain anxiety and social skill deficits. Anxious emotions could lead to errors in social information processing. Although most research examining specific socially-related cognitive biases focus on socially anxious youth (e.g. Banerjee & Henerson, 2001; Rheingold, Herbert, & Franklin, 2003), an emerging body of work suggests that the general cognitive biases in children with anxiety symptoms interfere with social information processing, regardless of whether anxiety symptoms are socially-focused. With respect to interpreting social cues (steps 1 and 2 of SIP), children with anxiety appear to show hostile attribution biases in which they view relatively neutral social events as being personally or physically threatening (Bell-Dolan, 1995; Bell, Luebbe, Swanson, & Allwood, 2009; Luebbe et al., 2010). Given the tendency for children with anxiety to endorse avoidance as a valid coping strategy, hostile attributions may lead to avoidance rather than aggressive/retaliatory behavior, indicating distortions in both social goal setting and clarification (steps 2 and 3 of SIP; Bell et al., 2009; Luebbe et al., 2010). With regard to self-efficacy and cognitive selection of social behaviors (steps 5 and 6 of SIP), anxious children report reduced self-efficacy for social problem solving (Daledin & Vassey, 1997), as well as increased endorsements of maladaptive responses to both neutral

and threatening social situations, like enlisting adult help, and reduced endorsement of adaptive social problem solving strategies (Bell-Dolan, 1995).

In response to these threat appraisals and errors in social information processing, children may be more likely to use avoidant coping strategies to handle their arousal. Theoretically, as anxious children continuously avoid social situations over time, their repertoire of appropriate social reactions from which to select becomes increasingly less nuanced and developmentally appropriate, thus leading to reduced problem solving capabilities and fewer socially adept behaviors. Additional research has found relations between negative self-statements about social situations and anxiety symptoms among clinically anxious youth with and without social phobia, thus supporting distortions regarding social self-efficacy and response selection among children with a range of anxiety symptoms (Schniering & Rapee, 2004). In addition to specific deficits in the steps of social information processing, general levels of emotionality and anxious arousal could interfere with the cognitive processing power available for effective social interaction. This is supported by findings suggesting that social information processing deficits partially mediate relations between negative emotionality and anxiety symptoms (Luebbe et al., 2010).

These patterns linking anxious arousal to lower self-efficacy and social information processing deficits likely span across development and are one mechanism through which anxious arousal can lead to avoidance of social situations and subsequent poor social skills. Social information processing is theorized to become increasingly complex across development, given increases in cognitive capacity, processing speed, and exposure to social experiences (Crick & Dodge, 1994). However, most research on cognitive biases in

anxiety focuses on broad age ranges, expanding from early childhood through early adolescence, making specific hypotheses about age differences difficult. This, coupled with evidence that there are no age differences across childhood and adolescence in negative self-statements related to social threats (Schniering & Rapee, 2004) or between social worries from 2nd to 7th grade (Silverman et al., 1995), suggests that social cognitive distortions may demonstrate continuity over time, and is an important anxiety-related social competence facet across childhood development.

Aim 1

The first aim of the current dissertation is to explore the extent to which increasing anxiety trajectories are associated with decreasing social competence trajectories across kindergarten, 1st, and 2nd grade. Building on the theoretical links among anxiety and social competence explicated above, research must establish to what extent anxiety symptoms and social competence change together over time. There are three broad gaps in the literature on relations among social skills and anxiety symptoms that are important to note here. First, there has been a disproportionate focus on social competencies of socially anxious youth, to the detriment of fully exploring these factors across all anxiety disorder types and patterns of symptom manifestation. Research evidence suggests that regardless of primary anxiety disorder diagnosis, children with anxiety disorders endorse social-evaluative fears and concerns (Ginsburg, La Greca, & Silverman, 1998). It is possible that these fears extend to those with elevated anxiety symptoms in community settings, therefore a greater focus on links among social competencies and anxiety symptoms is needed in the literature. Second, literature on the specific social skill deficits associated with anxiety is sparse and constructs are generally poorly integrated across areas of

research. For example, anxious solitude (also commonly referred to anxious withdrawal, social withdrawal, shyness, and behavioral inhibition) is a well-documented area in developmental literature, but is rarely explored in clinical reports of anxiety disorder etiology and usually focuses on general adjustment correlates rather than anxiety symptoms and diagnoses, specifically (Gazelle, Olson & Allan, 2010; Ladd, 2006; Stewart & Rubin, 1995). Anxious solitude is generally defined as being ineffective when joining social interactions, tending to play alone, weariness in social situations, and generally unassertive and reticent behaviors, despite a desire to socially engage (Gazelle & Ladd, 2003; Gazelle, Olson, & Allan, 2010; Ladd, 2006). Social withdrawal also has definitional overlap with anxiety symptoms (weariness/nervousness, apprehension, and avoidance), as well as similar etiologies and risk factors (e.g., behavioral inhibition; Broberg, Lamb, & Hwang, 1990; Rosenbaum et al., 1988), which makes conclusions regarding relations between anxiety and social skills difficult to ascertain from this literature. A more specific and nuanced exploration of how poor social competence and adjustment and anxiety symptoms change over time could help to unpack some of these problems.

The third major problem with integrating across the extant literature is that most studies showing social deficits of anxious youth do not focus on how these problems may *develop* over time (for exceptions see Burt et al., 2008). That is, most studies do not focus on change, per se, or whether within-person change in socially competent behavior may be related with change in anxious symptoms. One cascade model suggests that social competence is a more meaningful predictor of later internalizing problems than internalizing is for social competence (Burt et al., 2008). This provides some insight into longitudinal relations among these variables, but only speaks to between-person or rank

order differences over time. This means that those who had poor social competence in relation to others in the sample were also higher in internalizing in relation to others in the sample. This does not provide information with respect to *growth.* In other words, this model cannot explain how individuals increase or decrease relative to their own previous experiences of anxiety or social competence. This is important to explore, as variability and within person change could be masked by cascade models that explore only rank order stability and change. Other longitudinal models have found that fearfulness at 18 months (i.e. anxious emotions) is related with shyness (social withdrawal) at 30 months (Eggum et al., 2009), but growth in these variables was not explored and replication of findings with older children who are exposed to more diverse and complex social environments in school is warranted. Only one study to date has examined the co-growth among internalizing and social competence over time with a specific focus on the transition to kindergarten (Reynolds, Sander, & Irvin, 2010). As expected, they found that increases in internalizing problems over time were associated with decreases in social competence. However, they focused only on broad teacher reported internalizing problems, and did not focus explicitly on anxiety. This is especially important in this developmental context given that anxiety may be more developmentally relevant problem for young children than depression or other internalizing difficulty (Brady & Kendall, 1992). This study also used only teacher reports of problem behavior, which does not allow for a nuanced examination across contexts.

Within aim 1, I also examine whether higher anxiety in kindergarten is related with decreasing social competence trajectories across kindergarten, 1st, and 2nd grade (aim 1b). With respect to exploring directionality, there is evidence to suggest that anxiety may be a

risk factor for the development of poor social adjustment. As discussed above, specific cognitive distortions and biases common in anxiety disorders could interfere with adaptive social functioning. Additionally, cross-sectional findings suggest that anxious youth suffer from social difficulties. For example, studies suggest that clinically anxious youth are rated by parents and teachers as being less sociable (i.e., engaged and communicative) and more withdrawn (less assertive) than children with externalizing disorders (Strauss et al., 1989) and non-clinical controls (Chansky & Kendall, 1997; Ginsburg et al., 1998). Children with elevated anxiety levels also communicate less and engage in a less positive manner with familiar and unfamiliar peers during observed social interactions than children with externalizing problems and normal controls (Panella & Henggler, 1986). Similarly, anxiety symptom severity has been linked with mother, father, and teacher reported social competence (Settipani & Kendall, 2013).

Although there are general inconsistencies in the literature with regard to defining anxious withdrawn/solitary behavior versus anxiety symptoms, children who are nominated by peers as being anxious-solitary (including, shyness, trouble joining in on conversations, weariness, and reticence) are more likely to meet criteria for an anxiety disorder (Gazelle, Olsen, & Allan, 2010). Specifically, 30% met clinical criteria for social phobia, compared with 12% of non-anxious solitary controls, and 15% met criteria for other anxiety disorders, compared with only 5% of controls, as measured by structured clinical interviews (Gazelle et al., 2010). This suggests that anxiety levels in kindergarten may be associated with steeper declines in social competence across time, but between and within person changes have not been explored in the literature. Some longitudinal evidence does suggest that anxious solitude is an individual vulnerability that is associated with

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relatively higher levels of peer exclusion over time as compared to those who are not anxious (Shell, Gazelle, & Faldowski, 2014). However, researchers also found that within person peer exclusion trajectories for those who were highly anxious decreased over the transition to middle school at a *steeper* rate than those who were not anxious, which suggests that anxious youth may have higher overall rates of social difficulty, but that these may actually decrease over time during periods of transition and change. It is possible that differences in classroom structure and changes specific to middle school transitions may be conducive to those with anxious solitude because they are able to have a more diverse social setting in which to make friends, which is not likely the case for younger children as they transition to kindergarten classrooms that are more homogenous in terms of social settings and opportunities (Shell, Gazelle, & Faldowski, 2014). Berry and O'Connor (2010) similarly found that those with internalizing problems showed relatively steeper increases in social competence across kindergarten and 1st grade, compared with those with no internalizing problems, but relatively flatter plateaus across 2nd through 5th grades following this increase. This suggests that children with internalizing problems may show normative increases in social competence early in the transition to formal schooling, reflecting normative growth in social functioning and cognitive abilities, but that internalizing problems compound over time and lead to relatively flatter growth over time. This study looked only at broad internalizing problems and did not focus explicitly on anxiety, which may have earlier and more punctuated influences on social competence, given that anxiety problems tend to emerge earlier than other internalizing problems. These findings highlight the importance of understanding within person changes in social

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difficulty and anxiety across time, as well as the specific relations among anxiety at the kindergarten time point on growth in social competence.

Within aim 1, I also examine whether lower social competence in kindergarten is related with increasing anxiety trajectories across kindergarten, 1st, and 2nd grade (aim 1c). In keeping with both developmental task theories for social development, as well as dynamic systems theories, social competencies in early childhood have a bearing on future adaptation, in terms of both social and psychological adjustment. Socio-emotional competence in kindergarten is crucial for school readiness, and has a bearing on a number of important adjustment facets and academic functioning (See Denham, 2008 for a review). Therefore, understanding and assessing the extent to which social competencies could predict anxiety development is important. In fact, Burt et al. (2008) postulate that social competence is a theoretically strong predictor of internalizing problems, but that internalizing problems are less likely to be predictors of social competence. Similarly, Settipani and Kendall (2013) found that children with poor social competence did not respond as well to cognitive behavioral interventions for anxiety as did those with social competence. This suggests that social competence could have a bearing on how children's coping strategies change over time, and make children with social deficits more vulnerable to deterioration of anxiety symptoms.

Examining social competence in kindergarten as a predictor of anxiety development is especially important given the developmental context of the current dissertation. The transition to kindergarten is marked by changes in expectations for social interaction. Lacking the appropriate social competencies during this transition could tax children's emotion regulation capabilities, and make them more vulnerable to future

adjustment problems. In fact, recent evidence suggests that poorer social competence at age 4 is associated with an increased risk of experiencing clinical anxiety symptoms at age 6, which supports the possibility that social competence prior to entering kindergarten is especially critical for understanding increases in anxiety across the transition to school (Wichstrom, Belsky, & Berg-Nielsen, 2013). Other longitudinal findings support the notion that social competence at this developmental juncture is related with increases in internalizing problems over time. For example, Karevold et al. (2011) found that shyness was associated with growth (increases) in internalizing symptoms from 1.5 to 8.5 years. Although researchers used growth models to assess changes in internalizing, they did not assess relations between initial shyness (at age 1.5) and growth in internalizing explicitly. Rather, researchers examined shyness as a time varying covariate, and thus could only speak to average shyness across time as a predictor of growth in internalizing.

The literature leaves three important unanswered research avenues. First, it cannot speak to the extent to which *initial levels* of social competence can influence the rate of change for internalizing problems, which would shed light on the extent to which social competencies during important developmental transition points, like the transition to kindergarten, can have a bearing on anxiety development over time. Similarly, these findings focus on early childhood as the first time point of assessment, which glosses over the important transition to kindergarten as a possible stressor that could facilitate or bring about anxiety for those who enter kindergarten with poor social competencies. Third, the use of global internalizing measures precludes an exploration of how social competence may relate with changes in anxiety specifically.

Aim 2

  The second aim of this dissertation is to examine to what extent temperament (negative emotionality and attention control in kindergarten) predicts anxiety and social competence trajectories across kindergarten, 1st, and 2nd grade. Shared temperamental vulnerabilities, in combination with stressful social transitions like the transition to kindergarten, could lead to both anxiety and poor social competence. In keeping with developmental psychopathology approaches to understanding risk and resilience, individual differences, such as temperament, can create vulnerabilities for maladaptive development. Anxiety symptoms and social skills appear to be the product of similar temperamental vulnerabilities. Rothbart (1989) conceptualizes temperament as existing across three domains: effortful control (which includes attentional control, inhibitory control, and activation control), surgency (including, activity level, extraversion, and impulsivity), and negative affectivity (which refers to the tendency to experience negative emotions, including anger, frustration, and fear, often called negative emotionality). It is important to briefly note that other theories of temperament are centered around Behavioral Inhibition (BI), defined as the tendency toward social reticence, avoidance, emotional arousal, and reactivity to novelty (Biederman et al., 1993; Kagan et al., 1988). Children can be categorized as either inhibited or not, or along an inhibited-uninhibited continuum. The utility of behavioral inhibition as a temperamental trait is widely debated because the extent to which behavioral inhibition should be considered temperament or whether it is best conceptualized as a marker for pathology development and risk is not clear. This is especially true in light of findings that suggest as many as 40% of children are not classified as inhibited or non-inhibited (Kagan et al., 1988). Because of this debate, behavioral

inhibition will not be considered within this dissertation. The two facets of temperament that are most relevant to this dissertation that will be considered are effortful control (specifically, attention control) and negative affectivity (emotionality). There is ample literature linking these temperament traits to anxiety and to poor social competence.

The emotion-related mechanisms that maintain anxiety and social competence overlap in a clear and meaningful way. With respect to social competence and development, emotions act as a medium through which children communicate and guide social interactions (Eisenberg, 2001; Eisenberg, Hofer, & Vaughn, 2007; Halberstadt et al., 2001). Emotion regulation, therefore, can be seen as a tool set that children use to navigate social situations. In short, patterns of emotion regulation are likely to be either adaptive or maladaptive in social contexts. Ideal emotion regulation for social interaction would be associated with lower reactivity (emotionality) coupled with greater emotional modulation (Kochanska, Murray, & Harlan, 2000). In this sense, good social competence partially lies in the ability to appropriately regulate emotions based on specific nuances in a given context. Evidence suggests that greater tendencies to experience physiological arousal, as well as lower ability to modulate arousal, is longitudinally related to social competence (Leguna, 2003). Additionally, the tendency to experience negative emotions appears to hinder social competence (Daugherty, 2006; Leguna, 2003), as does effortful control and the ability to manage emotion expression (Eisenberg et al., 1995; 2003; McDowell et al., 2008). A meta-analysis of 59 studies examining emotionality and social acceptance (including, parent, teacher, and peer reports of social acceptance, rejection, and popularity) found that negative emotionality was associated with large effect sizes in predicting social acceptance, and positive emotionality accounted for moderate to small effect sizes

(Daugherty, 2006). This supports the notion that the relative frequency with which children experience positive and negative emotion has a bearing on their social competence and social adjustment, and that children who experience negative emotions frequently may be especially vulnerable to social isolation or rejection. These heightened emotions may interfere with other regulatory processes, like social information processing, which could lead to inappropriate or distorted social interpretations, thus further hindering social adaptation (Crick & Dodge, 1994). Emotion regulation and modulation also is longitudinally associated with social competence (Eisenberg et al. 1997; 1995; McDowell et al., 2008). In sum, emotion regulation impacts social competence both by interfering with social processing, and by creating overly reactive and sensitive emotional responses during social situations that peers may find off putting (Hodges & Perry, 1999; Kilmes-Dougen et al., 2013).

With respect to anxiety, Barlow's (2000) emotional model of anxiety highlights the role of emotions in priming, orienting, and mediating fear responses. Like anxiety, emotions in general are normal experiences, but extreme emotional experiences can create vulnerabilities for pathology. Emotions, therefore provide a useful means for organizing and understanding pathology development (Cicchetti, Ackerman, & Izard, 1995). According to this model, emotional labiality can set anxiety development in motion by making people more aware and sensitive to potential threats in the environment. These emotional reactions to threat can lead to feelings of inadequacy for handling emotional arousal and cognitive distortions regarding both the imminence of threats in the environment as well as the ability to handle those threats. Emotion regulation, including efforts to dampen the frequency, intensity, and duration of emotional arousal (Gross, 2007)

can therefore become deficient over time, and also lead to heightened anxious emotionality and arousal in future situations. Thoughts regarding (in)ability to handle emotion can lead to avoidant emotion regulation strategies, which leads to patterns of anxiety relief upon avoidance and negative reinforcement of that avoidance.

Empirical evidence supports the role of emotionality and regulation in anxiety development. For example, the tendency to negative emotions is associated with anxiety levels (Leguna, 2003; Suveg & Zeman, 2004), as is trouble regulating emotional arousal and coping with intense emotional experiences (Southam-Gerow & Kendall, 2000). This is further supported by physiological findings that suggest anxious children tend to have greater cardiovascular responses during stressful laboratory tasks, coupled with right frontal asymmetry on EEGs, which is a generally well known marker of poor emotion regulation (Hannesdottir et al., 2010). In general, children with greater negative affectivity and lower effortful control are at greater risk for anxiety symptoms and attention to threat stimuli (Lonigan & Vasey, 2009). Children with anxiety symptoms also report lower self-efficacy for handling anxious emotion than non-anxious controls, and mothers of anxious children reported that they were more emotionally reactive and less flexible in emotion expression than non-clinical children (Suveg & Zeman, 2002). Children with anxiety problems also appear to endorse more avoidant strategies rather than emotional re-appraisal than non-anxious children (Carthy et al., 2010), and lower levels of emotion understanding/clarity have been shown to predict anxiety symptoms in children (Fernandez-Berrocal et al., 2006). Emotionality also impacts anxious cognitions, in that anxiety control beliefs have been shown to predict anxiety symptoms (Weems et al., 2007),

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and enhancing control beliefs, self-efficacy, and emotional awareness may predict better response to anxiety treatments (Muris et al., 2009; Suveg et al., 2009).

Children's effortful control, in particular, may impact the anxious arousal feedback loop. Effortful control is stable across development and appears to be a key temperamental variable in anxiety development (Kochanska & Knaack, 2003). Effortful control is typically viewed as a greater risk factor for externalizing than internalizing problems (e.g., Eisenberg et al., 2009), however there is some evidence that specific facets of EC are relevant to internalizing problems. Effortful control in early childhood consists of attention control and inhibitory control factors. The relations between attention control and anxiety development seems relatively clear in the literature, whereas the link between inhibitory control and anxiety development is less well-established. *Attention Control* refers to the ability to shift and focus attention. Lower attention control is associated with greater anxiety symptoms (Muris, de Jong & Engelen, 2004; Trosper & May, 2011). Theoretically, deficient attention control could inhibit the ability to shift attention from anxiety arousing situations, thus enhancing focus on anxious emotion and intensifying feelings of under-control. Relations between threat attention and anxiety symptoms appear to be moderated by attention control, such that those who are anxious and have low attention control are less able to disengage from threatening stimuli, whereas those who are anxious but have higher attention control abilities are better able to shift attention away from threats (Derryberry & Reed, 2002). This is similarly conceptualized within Barlow's (2000) emotion theory of anxiety as attention shift. Longitudinal findings support the role of attention control in predicting anxiety (Eggum et al., 2009; Derryberry & Reed, 2002).

Inhibitory control, on the other hand, refers to the ability to plan and suppress inappropriate responses. This facet of effortful control is most often viewed as a risk for externalizing problems, as it is thought to play a role in reducing impulses and aggression (e.g., Eisenberg, Fabes, Guthrie, & Reiser, 2000; Kochanska & Knaack, 2003), and findings with regard to relations between inhibitory control and anxiety are mixed. Some research indicates that *high* levels of inhibitory control are associated with greater internalizing symptoms (Eisenberg et al., 2004; Murray & Kochanska, 2002), as this leads to inflexible and rigid behaviors. Low impulsivity may indeed be a risk factor for anxiety, as it may suggest over regulation of emotions and dampened emotional expressivity (Eisenberg, Sadovsky et al, 2005)**.** For example, Eisenberg et al. (2009) found that those who had initially high internalizing at age 6 but decreasing internalizing symptoms at 8 and 9 years of age were lower in inhibitory control than those who demonstrated increasing internalizing problem trajectories. This suggests that too much inhibitory control or overly controlled behaviors could be associated with overly rigid behaviors that serve to exacerbate anxiety over time. Contrary to these findings, other research suggests that there are no differences in inhibitory control among anxious and non-anxious youth (Oosterlaan & Sergeant, 1996; Suveg & Zeman, 2004; Zalewski et al., 2011). And still other findings suggest that greater inhibitory control is a protective factor against internalizing symptoms, as it allows for more efficient emotion regulation and also dampens anxious expression (Leguna, 2003). Given the mixed findings in the literature with respect to inhibitory control and anxiety development, the focus in the current dissertation will be on attention control.

With respect to the development of social competence and anxiety together, some literature suggests that children with anxious symptoms in community samples are over-

controlled, and that this inability to be spontaneous or moderately impulsive may inhibit smooth social interaction (Eisenberg et al., 2004; Murray & Kochanska, 2002). Contrary to these findings, however, Booth-LaForce and Oxford (2008) found that *lower* inhibitory control at 54 months was associated with increasing trajectories of social withdrawal and more instances of peer rejection, but was not associated with aggression or acting out behaviors. It could be that poor inhibitory control is associated with awkward or poorly regulated social interactions, which in turn lead to more rejection and subsequent withdrawal over time.

Aim 3

The third aim of this dissertation is to examine whether relations among anxiety and social competence trajectories differ as a function of child gender. It is possible that relations among social competence and anxiety are different for boys and girls. Indeed, differences in anxiety manifestation and symptom presentation among boys and girls in early childhood is apparent. For example, research with community samples indicates that there are sex differences in endorsement of anxiety symptoms (Greco & Morris, 2005), and incidence rates during early and middle childhood (Lewinsohn et al., 1998; Whitaker et al., 1990), with girls endorsing more anxiety symptoms and earlier onset of diagnoses than boys (Roza et al., 2003). For example, some epidemiological evidence suggests that girls are more likely than boys to be diagnosed with generalized anxiety disorder (Whitaker et al., 1990), social anxiety disorder (La Greca & Stone, 1993), separation anxiety disorder (Costello et al., 1989), and panic disorder (Whitaker et al., 1990), and this gender gap in prevalence rates increases across development, with more adolescent girls and women diagnosed with anxiety disorders than adolescent boys and men (Roza et al., 2003).

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There are several factors that could account for these gender gaps in diagnosis and symptom counts. First, measures of anxiety disorders may not be invariant across gender. That is, anxiety may manifest differently in boys and girls, and it is possible that measures are more relevant to girl's anxiety symptoms. This could imply that prevalence rates are underestimated for boys. More specifically, socialization practices for boys may dictate different ways of expressing, experiencing, and handling anxiety, and our measures may be more sensitive to detecting anxiety among girls than among boys. Similarly, given the socialization tendency for boys to suppress emotional reactivity and responses, boys may be less likely or willing to report anxiety symptoms than girls, despite the fact that they may suffer from anxious arousal at equal rates to girls. For example, evidence suggests that there are more social sanctions and peer rejection when boys express emotions than when girls express emotion (Perry-Perrish & Zeman, 2011). Evidence also suggests that feeling like an inadequate member of ones gender can have powerful implications for adjustment, especially when there are high levels of felt pressure to conform to gender roles (Egan & Perry, 2001). Social sanctions regarding emotion expression in boys, coupled with feelings of gender inadequacy elicited by greater emotional arousal, could lead to greater reluctance to report anxiety symptoms and to lower prevalence rates among boys (Ollendick et al., 1995). Indeed, endorsement of masculine gender role orientation, rather than biological sex, has been associated with lower anxiety symptom endorsement (Carter, Silverman, & Jaccard, 2011; Muris, Meesters, & Knoops, 2005).

A second possibility is that anxiety actually is more common in girls than in boys, and recent findings regarding measurement equivalence across gender suggest that gender differences in symptom endorsement may be due to real differences rather than

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measurement bias (Holly, Little, Pina, & Caterino, 2014). Together, these findings suggest that girls may be more at risk for anxiety symptoms, but that the social consequences of anxiety symptoms may be greater for boys than for girls.

In addition to differences in anxiety manifestation, the behaviors that constitute competent social behavior may differ for girls and boys, such that displays of gender non-normative behavior, like being good at games for girls and neurotic or emotional behavior for boys, is associated with increasing levels of maladjustment (Pelligrini, 1994; Rose & Rudolph, 2006). For example, girls are often rated as being higher in socially appropriate behavior than boys (e.g., Spinrad et al., 2006), which could suggest that gender normative behavior for girls could be perceived as being more socially adept than gender normative behavior for boys. Girls are also rated by teachers as having better social competencies in kindergarten as well as more positive growth in social competence across time than boys (Chan, Ramey, Ramey, & Schmitt, 2000). This suggests that deficits in certain gender-normative behaviors could be associated with greater social isolation, peer rejection, and avoidance depending on gender, with boys experiencing greater rejection and isolation because of anxious behaviors. For example, some findings suggest that emotional reactivity is negatively associated with ratings of sociability and weariness for boys but not for girls (Henderson, Fox, & Rubin, 2001). In short, withdrawn or anxious behaviors may be more socially detrimental for boys than for girls (e.g., Eggum et al., 2009). This could mean that anxiety is associated with steeper declines in social competence over time for boys than for girls, for whom peer reactions to their anxious behavior may be less problematic and elicit fewer instances of rejection and negative social adaptation. Therefore, it is expected that relations proposed in aim 1b will be stronger for boys than for girls, such that higher anxiety

in kindergarten will be associated with steeper declines in social competence across k, 1st, and 2nd grades for boys. Contrastingly, girls appear to be more emotionally reactive to maladaptive peer interactions (Morrow, Hubbard, Barhight, & Thompson, 2014). Daily diary data suggest that girls experience greater instances of negative emotions following reports of relational aggression (social manipulation) than boys. This could mean that girls are more susceptible to increases in anxiety over time following repeated instances of maladaptive social interactions brought about by poor social competence (Morrow, Hubbard, Barhight, & Thompson, 2014). Therefore, it is expected that relations proposed in aim 1c will be stronger for girls than for boys, such that lower social competence in kindergarten will be more strongly associated with steeper increases in anxiety across k, 1st, and 2nd grades for girls.

One study to date has examined gender differences in the co-growth of anxiety and social competence, but this study looked only at gender differences in rate of growth for internalizing and social competence, but did not examine specific gender differences in the magnitude of the relations among social competence and anxiety (Reynolds, Sander, & Irvin, 2010). Researchers found that girls were rated by teachers as having higher social skills than boys in kindergarten, and that their social skills decreased less steeply than for boys. This finding has been supported by other studies that examine growth in social competence across early childhood (Chan et al., 2000). While this provides important information about general differences in teacher reports of social competencies, this does not provide information with respect to how relations among anxiety and social competence may differ for girls and boys. This is especially important to consider, because social competence and anxiety could have different consequences for boys and girls, and

therefore the relations among them would also likely differ (Reynolds, Sander, & Irvin, 2010). Given the relatively small body of literature from which these hypotheses are drawn, this aim is largely exploratory in nature.

Despite these clear differences in social behaviors and anxiety symptoms, the magnitude of these gender differences likely varies across development. Theoretically, gender differences in social competence and social adjustment become stronger as children age and approach puberty, and are less established for children in early childhood (Rose & Rudolph, 2006). For example, gender differences among social variables are clear during middle childhood, when social networks become more gender-segregated and social demands regarding gender conformity become more distinct (Pellegrini, 1994; Perry-Perrish & Zeman, 2011). Additionally, advanced pubertal status is associated with increased risk for social anxiety disorder in girls, but not boys, possibly due to differences in hormonal development, body dissatisfaction, and self-esteem during puberty for girls (Carter et al., 2011; Deardroff et al., 2007). These differences in physiological development could lead to heightened awareness and self-consciousness in social settings, leading to heightened social anxiety. Indeed, girls tend to endorse more social evaluative concerns and fears, which may lead to greater feelings of inadequacy and anxious arousal in social and other situations over time, leading to more pronounced anxiety symptoms as girls age (Rudolph & Conley, 2005). Less information is available for children in early childhood. Given developmental considerations and the focus on early childhood, these moderating effects for gender are exploratory and preliminary in nature.

It is important to note there also could be gender differences in the relations between temperament and anxiety/social competence growth (i.e. gender differences

within aim 2), but there is little research examining this question. One study found that relations between effortful control and internalizing may be stronger for boys than for girls, and that boys tend to have lower overall ratings of effortful control and higher ratings of negative emotionality (Eisenberg et al., 2001). A meta-analysis also supports overall mean differences in some temperament facets, with boys demonstrating generally higher levels of negative emotionality and lower levels of inhibitory control (Else-Quest et al., 2006). This could suggest that temperamental risk factors for the development of anxiety and social competence differ altogether for boys and girls, with impulse control perhaps playing a greater role for boys than for girls. However, mean differences alone cannot inform our understanding of how attention control and negative emotionality are related with growth in anxiety and social competence. Future research should examine the role of a broader range of temperamental variables, including specific aspects of negative emotionality like anger and sadness, as well as inhibitory control, to get a fuller picture of how these temperament differences may operate differently for boys and girls within the developmental context. This is, however, beyond the scope of the current dissertation.

Additional Factors to Consider in the Development of Anxiety and Social Competence

  Externalizing. Poor social competence is often linked with externalizing problems, as issues with self-regulation and aggression will naturally interfere with adaptive social interaction (Crick & Dodge, 1996; Dodge, Laird, Locheman, & Zelli, 2002; Richard & Dodge, 1982). Indeed, low social competence at age 4 has been prospectively linked with higher externalizing problems in middle childhood (Bornstein, Hahn, & Haynes, 2010). The social problems experienced by those with externalizing

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difficulties, like inappropriate negativity and aggression, appear to be somewhat

qualitatively distinct from those of children with anxiety, like withdrawal and reticence

(Strauss et al., 1989). Additionally, social problems during middle childhood may be a

better predictor of future internalizing than externalizing difficulty in adolescence

(Pedersen et al., 2007). Nevertheless, problems with social information processing

deficits and biases in attention seem to cut across social problems within internalizing

and externalizing behavior problems (Schultz, Izard, & Ackerman, 2000). Furthermore,

and with respect to anxiety problems, children who experience difficulty with anxiety

could also experience co-occuring externalizing difficulties (e.g., Franco et al., 2007),

which further complicates the exploration of specific relations among anxiety levels and

social competence.

This dissertation includes externalizing levels at each time point as a time-varying

covariate in all substantive analyses, in an effort to isolate specific relations among

anxiety and social competence above and beyond the influence of possible existing issues

with aggression or self-control at each time point.

CHAPTER 2

METHOD

Participants

The sample was 291 children (46.4% girls, 74.6% white, 12.4% Hispanic/Latino, 8.2% Asian American, 2.1% African American, and < 1% American Indian), their parents, and teachers recruited from two cohorts in regular education classroom at local public schools. Children, parents, and teachers completed measures in the fall of kindergarten, 1st, and 2nd grades. The average age at the first wave was 5.66 years old ($SD = .29$). Participants were highly educated, with 94% of primary caregivers reporting a 2-year college degree or higher at the first wave. Annual income ranges ranged from $10,000-$19,000 per year to +$100,000 per year, with an average annual income range of $70,000-$80,000. Approximately 89% of children lived in two parent homes at the first time point.

Procedure

Procedures were approved by the university institutional review board. Parents were recruited from two cohorts (in the 2006-2007 and 2007-2008 academic school years) of incoming kindergarten classrooms at 6 schools through letters describing the study. Research assistants then presented more information and enrolled interested parents in the study during kindergarten orientation in each of the 29 classrooms. Parents consented and children provided assent. Parents, and teachers filled out questionnaires during the Fall of Kindergarten, 1st, and 2nd grade academic years. At each assessment point, parents and teachers were provided a small monetary incentive for participation, and children were given a toy. Primary caregivers were asked to provide data on their children at each wave, and the mother was the primary caregiver for most families in this sample (94%). Parents

and teachers reported on the child's temperament, anxiety, social competence, and externalizing behavior problems. Parents and teachers returned questionnaire packets via postal mail.

Parent and Teacher Reports. For all substantive analyses, the intention was to estimate models using teacher reported anxiety and social competence separately from models using parent reported anxiety and social competence. Examining parent and teacher reports separately allows for a nuanced examination of trajectories of child behavior across different contexts. Differences are expected between parent and teacher report models because teachers and parents provide different perspectives, and agreement between parent and teacher reports of child behavior is generally low (Achenbach, McConaughy, & Howell, 1987). More specifically, teachers appear to be less aware of problems of an internalizing nature, as they tend to report lower levels of internalizing problems than parent and self-reports (Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Parent and teacher agreement on ratings of social competence tend to be somewhat higher than for internalizing problems, but parents and teachers still likely report on different sources and instances of social information and tap different facets of the child's behavior, which may be masked by using a single composite (Armstrong, Goldstein, and the MacArthur Working Group on Outcomes and Assessment, 2003). Findings from growth models suggest that parents and teachers provide reports that suggest different patterns of change in social competence across early childhood, with parents rating generally higher and more stable social behaviors, and teachers tending to provide ratings pf more steeply decreasing social competence trajectories across time (Chan et al., 2000). In addition, because teachers reporting on each child change from

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year to year, it is possible that within person change could be confounded with differences in reporter variance across time. These differences in reporter could alter or cloud actual change that is occurring over time. Nonetheless, parents and teachers likely provide valuable insight into different facets of child behaviors. For instance, Chan et al. (2000) postulate that teachers may be more likely to indicate that social skills decrease over time because they are expecting increasingly more complex and compliant behaviors as classroom structures become more structured and formal, thus taxing social competence and providing greater opportunities for deviation from "good" social behavior. Parents, on the other hand, may be more likely to report higher social competences across time because of social desirability and a general bias toward wanting to portray their children in a positive manner (Chan et al., 2000). Because of these differences, teachers and parents likely provide important sources of information about different facets of children's social behaviors (i.e. social behavior at home versus social behavior at school). Issues with model estimation for teacher reported anxiety specifically and issues with differences in teacher reporters across wave more generally (discussed in greater detail below) precluded the estimation of models with teacher reported anxiety.

Measures

Anxiety. Anxiety levels were measured using the 12-item (for parents) and 8-item (for teachers) overanxious subscales from the MacArthur Health Behaviors Questionnaire (HBQ; Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment, 2003). Parents and teachers rated children's anxious behavior over the previous six months using a 3-point scale, ranging from 1 (never or not true) to 3 (often or very true). Example items include, "worries about things in the future," and "nervous, high strung or tense".

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Alphas from the current sample, averaged across cohorts 1 and 2, for parent report are α = .72 (K), α = .76 (1st), α = .77 (2nd), and for teacher report are α = .70 (K), α = .79 (1st), α = .77 (2nd). Short term test-retest reliability among community samples is high (r = .78 [parent report] and r = .71 [teacher report]; Armstrong, Golstein, & the MacArthur Working Group on Outcome Assessment, 2003). Findings also suggest that the scales on the HBQ are able to differentiate among clinic-referred and community samples. The parent and teacher scales contain different numbers of items because the parent scales include 4 additional items about specific physiological anxiety symptoms (e.g., aches and pains, headaches, nausea, and stomach aches), whereas the teacher scale includes only 1 item about physiological anxiety symptoms (stomach aches). Parent and teacher reports will be analyzed separately because agreement among parent and teacher reports of internalizing problems are generally low (Youngstrom, Loeber, & Stouthamer-Loeber, 2000), and parent and teacher reports of anxiety on the HBQ specifically show somewhat low agreement among mothers and teachers (*r* = .20) and very low agreement among fathers and teachers (*r* = .08; Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment, 2003). Evidence suggests that this overanxious subscale shows similar patterns of relations with social adjustment and other internalizing and externalizing disorders across gender, suggesting that items are appropriate for boys and girls (Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment, 2003).

Social Competence. Social competence was measured using a seven-item scale, adapted from Harter's Perceived Competence Scale for Children (Eisenberg et al., 1993; Eisenberg et al., 1995; Eisenberg, et al., 1997; Harter, 1982). Parents and teachers rated

children's social behavior using a 4-point scale, ranging from 1 (really untrue) to 4 (really true). Four items assessed socially appropriate behavior (e.g. "my/this child is usually well behaved"), and three items assessed popularity (e.g., "my/this child finds it hard to make friends"(r)). Alphas from the current sample for parent report are $\alpha = .75$ (K), $\alpha = .78$ (1st), $\alpha = .75$ (2nd), and for teacher report are $\alpha = .91$ (K), $\alpha = .91$ (1st), $\alpha = .87$ (2nd). Validity data are not available for this measure because it is an adapted measure with no published psychometric properties. However, previous research that has used this adapted measure demonstrated that parent and teacher reports are related to peer-rated sociometric status, which is thought to be conceptually related with social competence (Eisenberg et al., 2000).

Externalizing. Externalizing behavior levels were measured in the fall of kindergarten using the mean composite of 4 subscales, including the oppositional defiant (9 items for parents and teachers), conduct problems (11 items for teachers and 12 items for parents), overt hostility (4 items for parents and teachers), and relational aggression (6 items for parents and teachers) subscales of the HBQ (Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment, 2003). Parents and teachers rated children's externalizing behavior over the previous six months using an 3- point scale, ranging from 1 (never or not true) to 3 (often or very true). Example items include "destroys his/her own things" and "argues a lot with adults". Alphas from the current sample for parent report are $\alpha = .89$ (K), $\alpha = .88$ (1st), $\alpha = .91$ (2nd), and teacher report are $\alpha = .93$ (K), $\alpha = .95$ (1st), $\alpha = .92$ (2nd). Short term test-retest reliability among community samples is high ($r = .76$ (parent report) and $r = .87$ (teacher report); Armstrong, Golstein, & the MacArthur Working Group on Outcome Assessment, 2003). Findings suggest that this scale is stable across kindergarten and 1st grade, and as mentioned with the anxiety subscale

of this measure, the externalizing subscale is also is also able to differentiate among clinic-referred and community samples (Armstrong et al., 2003).

Temperament. Children's negative emotionality and attention control in kindergarten were measured using the 25-item negative emotionality (a mean composite of 13 items measuring anger/frustration and 12 items measuring sadness) and the 13-item attention focusing subscales of the *Children's Behavior Questionnaire* (*CBQ;* Rothbart, Ahadi, Hershey, & Fisher, 2001). Parents reported on children's behavior during the last 6 months, using a 7-point scale, ranging from 1 ("extremely untrue of your child") to 7 ("extremely true of your child"). The attention control subscale included items that specifically measured attention focusing (e.g., "has difficulty leaving a project he/she has done"). The negative emotionality subscale included items that measured tendencies to experience anger/frustration (e.g., "becomes easily frustrated when tired") and sadness (e.g., "sometimes appears downcast for no reason"). Alphas from the current sample for the parent report attention control scale are $\alpha = .80$ (K), $\alpha = .81$ (1st), $\alpha = .78$ (2nd), and for teacher reported attention control $\alpha = .92$ (K), $\alpha = .93$ (1st), $\alpha = .92$ (2nd). Alphas for parent report negative emotionality subscale are $\alpha = .83$ (K), $\alpha = .88$ (1st), $\alpha = .86$ (2nd) and for teacher reported negative emotionality, $\alpha = .91$ (K), $\alpha = .92$ (1st), $\alpha = .94$ (2nd). This measure has demonstrated temporal stability and is valid for children ages 3 to 7 years old (Rothbart et al., 2001).

CHAPTER 3

DATA ANALYSIS AND RESULTS

Preliminary Analyses

Descriptive Statistics. Descriptive statistics and skew/kurtosis estimates for all substantive variables are presented in Table 1. Values exceeding conventional cut offs that indicate issues with normality (|2| for skewness and |7| for kurtosis) were found for teacher reported externalizing at kindergarten, 1st, and 2nd grade and for parent reported externalizing at 2nd grade (Curran, West, & Finch, 1996). Further examination of the distributions revealed that these variables are positively skewed and 1-inflated, such that most children are rated as having no externalizing behavior problems (corresponding to average ratings of "never or not true" on the HBQ). This is not unexpected, given previous literature suggesting that most children in normal community samples do not experience behavior problems (e.g., Grimm et al., 2010). Externalizing behavior problems were, therefore, dichotomized using dummy codes (with 1 indicating externalizing behavior problems and 0 indicating no behavior problems). Given the absence of established cut scores for this measure, those above 1 SD from the mean of externalizing behavior were categorized as having externalizing problems (1) and all others below this point were categorized as having no externalizing problems (0). As expected, the frequencies for those above the cut score were low and are presented in Table 1 (about 10% of the sample at each wave).

Bivariate Correlations. Correlations for all parent and teacher report variables at each wave are presented in Tables 2a through 2c. Correlations are broken up for ease of presentation, with correlations among focal variables presented in table 2a, correlations

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between focal variables and covariates presented in table 2b, and correlations among covariates presented in table 2c. As expected, parent and teacher reported social competence were significantly positively correlated within rater across time (i.e. TR social competence in K with TR social competence in G1 and G2), with higher correlations between adjacent (more proximal) time points. Parent and teacher reports of social competence also were significantly positively correlated with each other both within and across wave, suggesting moderate agreement between parents and teachers on social competence ratings. As expected, parent and teacher reported social competence were significantly negatively correlated with externalizing both within and across wave, as well as within and across reporter. Also as expected, parent and teacher reports of social competence were negatively correlated with negative emotionality and positively correlated with attention focusing.

Parent reports of anxiety were significantly correlated across waves, with higher correlations between more proximal waves. This was not the case for teacher reported anxiety. Teacher reported anxiety at G1 was significantly positively correlated with teacher reported anxiety at G2, but relations among teacher reported anxiety at other waves were not significant. Additionally, kindergarten teacher reports of anxiety were not significantly related with parent reports of anxiety in kindergarten and were positively correlated with G1 and G2, but these correlations were small (.26 and .30, respectively). These correlations suggest instability in teacher reported anxiety across waves (or lack of consistency between teacher ratings of anxiety year-to-year), as well as possible lack of agreement between reporters within year. The apparent lack of rank-order stability between waves and agreement for teacher-parent reports of anxiety are addressed in

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greater detail in the substantive analyses below (in the Results for Aim 1). As expected, teacher reported anxiety and social competence were significantly negatively correlated within wave, but not across waves, which fits the patterns observed in these data suggesting lack of consistency in teacher ratings of anxiety. Parent reported anxiety and social competence were significantly negatively correlated within and across waves. Parent reported anxiety and externalizing also were significantly positively correlated within and across waves. Relations between teacher reported anxiety and externalizing were less consistent, and were only significantly correlated at G1 and G2. Parent reported anxiety was significantly positively related with negative emotionality, but not attention focusing across waves. Teacher reported anxiety was positively correlated with negative emotionality and negatively correlated with attention focusing within but not across waves.

As expected, parent and teacher reported externalizing and temperament variables were somewhat stable, with significant correlations within and between raters across time. Correlations between parent and teacher reports of temperament appeared to be somewhat higher for attention focusing than for negative emotionality.

Attrition and Missing Data

Teacher Report. Attrition rates for teacher reported data were low. A total of 5 children were lost at G1 (i.e. they were present for the K wave only), and a total of 9 children were lost at G2 (were present for the K and G1 but not G2 waves), leaving a total of 14 children with missing teacher reported data at G2. Those with missing teacher reported data at any one time point (i.e. those with missing data for at least one time of the three waves, $n = 16$) were compared with those who had complete teacher reported

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data ($n = 277$). Those with and without missing teacher reported data did not differ on gender ($\chi^2(1) = 3.40$, $p = .07$), or ethnicity ($\chi^2(4) = 4.74$, $p = .31$). Independent samples t-tests revealed that those with and without missing data differed significantly on SES (t (287) $= 3.10$, $p = .002$), such that those with missing data had significantly lower SES ($M = -.75$, $SD = .89$) than those without missing data ($M = -.003$, $SD = 1.11$; note that SES was calculated using z-scores, with scores closer to 0 suggesting values closer to the mean and negative value suggesting values below the mean).

Parent Report. Attrition rates and missing data were generally higher for parent than for teacher report. A total of 29 children had missing parent reported data at all 3 waves. A total of 17 children were lost at G1 (i.e. they were present for the K wave only), and a total of 27 children were lost at G2 (were present for the K and G1 but not G2). In total, 43 children had missing parent data at K, 63 had missing parent data at G1, and 78 had missing parent data at G2. Given the different missing data patterns, those with missing parent reported data at any given wave (i.e. those with missing data for at least one of the three time points, $n = 98$) were compared with those who had complete parent reported data at all three waves ($n = 193$). Those with and without missing parent reported data significantly differed by gender ($\chi^2(1) = 5.63$, $p = .01$), and ethnicity ($\chi^2(4)$ $= 7.57$, $p = .005$), such that Asian American and African American students were more likely to have missing data (45.8% and 33.3%, respectively) than Caucasian (29%) and Hispanic/Latino (52%) students. Those with and without missing data also differed on SES ($t(287) = 5.29$, $p < .001$), such that those with missing data had significantly lower SES ($M = -.43$, $SD = 1.06$) than those without missing data ($M = .15$, $SD = .77$).

To account for these patterns of missing data, SES and dummy codes for ethnicity categories (4 total to account for 5 ethnicity categories) were included as auxiliary variables in the estimation of missing data within the maximum likelihood framework for all parent report models, and SES was included as an auxiliary variable for all teacher report models (Graham, 2009). This approach uses all present data, including auxiliary variables, to estimate model parameters, rather than using only the data present or "filling in" missing values. Maximum likelihood is a robust method for handling missing data that is generally better than traditional methods for handling missing data, such as listwise deletion or mean imputation, and tends to yield similar results as other complex missing data handling methods, like multiple imputation (Baraldi & Enders, 2010). Missing data were handled using Maximum Likelihood estimation with robust standard errors (MLR).

Intraclass Correlations (ICCs)

Given the possibility of nested data structure as a function of classroom membership for teacher reported variables (children nested within teacher/classroom, with 29 total kindergarten classrooms), ICCs were calculated to assess the variance in all teacher reported variables (anxiety, social competence, externalizing, attention focusing, and negative emotionality) attributable to kindergarten classroom membership (kindergarten teacher). ICCs ranged from .03 (for social competence) to .31 (for negative emotionality). The *complex* command within the Mplus framework, which uses a sandwich estimator to adjust standard errors for clustering at the kindergarten classroom level, was used in all teacher report models.

Substantive Analyses

In order to address questions with regard to inter- and intraindividual changes in anxiety and social competence together over time, parallel process latent growth curves were employed. Models were estimated using Mplus version 7.12. As mentioned, the *complex* command was used to estimate teacher report models to account for the nested data structure, and Maximum Likelihood with Robust Standard Errors (MLR) was used as the estimator, which handles missing data, accounts for non-normality, and is the preferred estimator for the complex command (Muthén & Asparouhov, 2002). For consistency between parent and teacher report models, MLR was used in both teacher and parent report models (Muthén & Muthén, 2013). Note that traditional tests of incremental fit, like χ^2 difference tests, are not appropriate for MLR estimator, so all χ^2 difference tests assessing relative model fit reported herein are scaled using the Satorra-Bentler Scaled χ^2 difference test.

Aim 1 Overview and Analytic Plan

There were three steps to estimating the final parallel process models. In strep one, univariate unconditional latent growth curves were examined separately for anxiety and social competence without covariates, in order to establish adequate model fit for these variables individually. In each model, a latent intercept factor (with loadings fixed to 1) and a linear latent slope factor (with factor loadings set to 0, 1, and 2 for each time point, representing linear change and equal spacing between measurement occasions) were estimated from anxiety and social competence variables at K G1, and G2. Estimated means for latent slope and intercept factors represent average model-estimated rates of change and average model-estimated values at kindergarten, respectively. Estimated

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variances for latent slope and intercept factors represent the extent to which individual model-estimated trajectories vary from the mean. Note that if non-linear change was apparent from visual inspection of plots of raw data, then latent basis models were run in place of linear change models. These models estimate a latent growth factor, for which loadings at the first and last time point are fixed to 0 and 1, and loadings at the second time point are freely estimated. This would allow for potentially nonlinear rates change, while also remaining within the bounds of possibility given that there are only 3 time points (Ram & Grimm, 2007).

In step two, parallel process growth models were run in which covariances (presented herein as correlations) among intercept and slope factors for both variables were included (See Figure 1). To address aim 1a, the correlation between latent slope factors was examined (i.e. relations among variability in growth in anxiety and growth in social competence across k, 1st, and 2nd grade). Aim 1c was addressed by examining the correlation between the intercept anxiety factor (model-estimated average anxiety at kindergarten) and the slope social competence factor (growth in social competence) addressed aim 1b. Illustratively, a significant negative correlation between the anxiety intercept and a negative average social competence slope suggests that higher relative anxiety at time 1 is associated with steeper declines (more decreasing slopes) in social competence across time. Aim 1c was similarly addressed by examining the correlation between the intercept factor for social competence (model estimated average social competence at kindergarten) and the slope factor for anxiety (growth in anxiety).

Finally, step three was to include externalizing as a time varying covariate within the parallel process growth model (see Figure 2 for a visual representation of how this

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model is specified). In this model, time specific effects of the binary externalizing

problems variable (where 1 = externalizing problems ≥1 SD from the mean, and 0 =

externalizing reports below 1 SD above mean) on social competence and anxiety at each

time point are specified (i.e. anxiety at K, G1, and G2 predicted by externalizing at K,

G1, and G2, respectively) and covariances among the time varying covariates and the

intercept/slope growth factors are also estimated. Therefore, growth among anxiety and

social competence factors in this model are interpreted as controlling for time-specific

effects of externalizing (and alternatively, time-specific effects of externalizing on

anxiety and social competence at each time point are interpreted as controlling for the

growth and co-growth in anxiety and social competence). Including this covariate allows

for examination of specific relations among anxiety and social competence growth

factors above and beyond the influence of possible existing issues with aggression or

self-control *at each time point.*

Aim 1 Results

 Step 1: univariate growth curves for social competence. Visual inspection of plots

of raw individual values for parent and teacher reports of social competence across waves

suggested that linear models were appropriate to model these data. Estimates, correlations

among latent factors, and fit statistics for linear growth models for parent and teacher

reported social competence are presented in Table 3. To assess model fit, the linear model

was compared to an intercept only model, in which the loadings for the latent slope factor

were constrained to zero (i.e. a model with no change). The parent reported linear model

fit significantly better than the intercept only model, and the linear teacher reported

model fit marginally significantly better than the intercept only model. CFI values for

parent and teacher report models suggest good fit (CFI values >.95 indicate good fit; Hu & Bentler, 1999).

Average model estimated means for the latent slope factors were not significant in the parent or teacher report models, suggesting that, on average, children's social competencies did not change significantly over time. However, there was significant variability in the model estimated trajectories (intercept and slope estimates) for both parent and teacher reported models, which suggests that although the average slope estimates were not significant, there was significant individual variation in the rate of change, as well as in the model estimated average social competence levels in kindergarten (i.e. the intercepts). Correlations between latent intercept slope factors for parent reported models were not significant, which suggests that average model estimated social competence levels in K are not associated with the rate of change in social competence across K, G1, and G2. The intercept slope covariances (correlations) for teacher report models were negative and significant, suggesting that lower average model estimated social competence relative to peers in kindergarten are associated with relatively steeper increases in social competence across time (that is, children with lower social competence in kindergarten tend to increase at a steeper rate than those with relatively higher social competence in kindergarten). Note that these interpretations of correlations between latent growth factors were aided by observing a random selection of 200 model-estimated mean trajectories for social competence. These plots are presented in Appendices A and B.

Univariate growth curves for anxiety. Plots of observed individual values for teacher reported anxiety appeared non-linear and suggested considerable variability in

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trajectory, with some increasing between k and 1st grade but decreasing between 1st and 2nd grade, and others showing decreases between k and 1st grade and subsequent increases from 1st to 2nd grade. There also appeared to be considerable variability in intercept (K anxiety levels). A latent basis model was run to account for this non-linearity, however both linear and latent basis models either failed to converge or converged on inappropriate solutions, likely due to variability in trajectory magnitude and direction. To address this issue, teacher reports of social competence will be examined with parent reports of anxiety in the parallel process models, rather than having a pure teacher report model, as originally intended. Social competence is theoretically easier for teachers to assess, and is likely more consistent across reporters, given that it is easier for teachers to observe. Evidence from multitrait-multimethod assessments suggest that there is stability in social competence ratings over time after controlling for variance specific to reporter (Blandon et al., 2010).

For parent reported anxiety, visual inspection of plots of raw individual values across waves suggested that a linear model was appropriate to model parent reported anxiety. Estimates and fit statistics for the linear growth model are presented in Table 3. Comparison with the intercept-only model was significant, suggesting that the model estimating linear change fits better than a model does not estimate change. The average model estimated mean for the slope factor was significant and positive, suggesting that on average, parent reported anxiety levels increased over time. Note that the slope estimates may appear attenuated, but this is because models were estimated using mean scores for anxiety rating items, so although the range may appear small, variability was significant. There also was significant variability in the intercept and slope estimates, which suggests

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that there is significant variation in model-implied individual trajectories (a random selection of 200 individual plots of model-estimated trajectories are presented in Appendices B through D for illustration). The correlation between latent intercept and slope estimates was not significant, which suggests that average model estimated anxiety levels in K are not associated with the rate of change in anxiety across K, G1 and G2.

Step 2: unconditional parallel process growth models. Estimates and fit statistics for the model with parent reported social competence and anxiety and the model with teacher reported social competence and parent reported anxiety (the teacher/parent model) are presented in Table 4. Fit indices suggested good fit for both models. Estimates for the anxiety and social competence portions of parent and teacher/parent report models did not change substantially when included in the parallel process model. As with the unconditional models, means for the latent anxiety slope factor were positive and significant and means for the latent social competence slope factor were positive but not significant, suggesting that children's anxiety increases over time but that, on average, social competence does not significantly change over time. The same was true for the model with teacher/parent report model. Model estimated variances for the latent growth (intercept and slope) factors were significant for both anxiety and social competence in parent and teacher/parent report models, which suggests that there are significant individual differences in the model implied kindergarten anxiety and social competence levels as well as the rate of change across K, G1, and G2. In both parent repot and teacher/parent report models, intercept slope correlations for the anxiety factor were not significant, suggesting that relative model-estimated anxiety in kindergarten was not related with the rate of change in anxiety over time. The correlation between intercept

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and slope factors for social competence was not significant for the parent report model, but was negative and significant for the teacher/parent report model. As with the univariate unconditional model, this indicates that lower average model estimated social competence relative to peers in kindergarten is associated with relatively steeper increases in social competence across time.

In support of aim 1, the correlation between the anxiety slope and social competence slope was negative and significant for the parent report model. This suggests that steeper increases in anxiety over time are associated with relatively steeper decreases social competence. In other words, as anxiety increases over time, social competence decreases at a steeper rate relative to peers, and as social competence decreases, anxiety increases at a steeper rate relative to peers. These patterns are in line with the expected relations between changes in anxiety and changes in social competence outlined in aim 1.This effect was not found for the teacher/parent report model. Also in support of aim 1, the correlation between latent anxiety intercept and latent social competence intercept was negative and significant for the parent report model, which suggests that on average, higher kindergarten social competence is associated with lower kindergarten anxiety relative to other peers in the sample, and higher kindergarten anxiety is associated with lower kindergarten social competence relative to other peers in the sample. This effect was not found for the teacher/parent model.

Contrary to expectations for aim 1b that higher kindergarten anxiety levels would be associated with decreases in social competence across time, the correlation between the anxiety intercept and social competence slope was <u>negative</u> and significant for teacher/parent but not parent report models. This suggests that higher parent reported

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anxiety in kindergarten, relative to peers, is associated with relative decreases in social competence trajectories, as reported by teachers, across time. Contrary to expectations for aim 1c, the correlation between the social competence intercept and anxiety slope was not significant for parent or teacher/parent report models, suggesting that average model-implied kindergarten social competence levels do not have a bearing on the rate of changes in anxiety across time. Estimates of residual variances for the anxiety and social competence variables were significant, which suggests that there is variability in anxiety and social competence cannot be accounted for with the growth and co-growth in these factors. This likely suggests that there are other variables that contribute to anxiety and social competence levels at any given time.

Step 3: parallel process growth models with externalizing problems as a time-varying covariate. Model estimated means variances, correlations, and path estimates between externalizing and anxiety/social competence variables at each time point are presented in Table 5 and an illustration of the model is presented in Figure 2. Teacher reported binary externalizing variable at K, G1 and G2 were included in the teacher/parent report model and parent reported binary externalizing variable at K, G2, and G2 was included in the parent repot model. Model fit was good for parent and teacher/parent report models. After accounting for externalizing at each time point, average model estimated anxiety slopes were no longer significant in both parent and teacher/parent report models. Other model estimated means for latent factors did not appear to change substantially. Variance estimates were still significant for intercept and slope factors and did not appear to change substantially when externalizing was included in the model. Correlations among growth factors did not appear to change substantially

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when externalizing was included in the model. Comparison with unconditional parallel process estimates revealed that significant paths remained significant and did not change in valence (see Tables 4 and 5 for comparisons)[1]. Because most of the substantively meaningful portions of the models did not appear to change when externalizing was included as a TVC, models for aims 2 and 3 do not include externalizing.

Note that the mean estimate for the anxiety slope factor did change when externalizing was entered into the model. It could be that those who experience externalizing problems also tend to experience worsening anxiety symptoms over time, which accounts for the observed increases in anxiety over time, such that when externalizing is accounted for there are no longer substantial changes in anxiety on average. This could have to do with overlapping symptom factors, like attention control. Those with externalizing problems may have difficulty shifting and focusing attention, which could exacerbate anxious emotions. It also is possible that those with increasing anxiety over time also experience simultaneous increases in externalizing problems, perhaps as a way of handling or coping with their anxious emotions.

Aim 2 Overview and Analytic Plan

In order to assess the influence of temperament variables (negative emotionality and attention control) on growth in anxiety and social competence, parent and teacher reported temperament variables were included as predictors of latent intercepts and slopes for anxiety and social competence in the parent and parent/teacher report models,

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[1] Note that in a model in which the continuous externalizing variable (centered within person to reflect within-person deviations from individual averages at each time point) was entered into the model as a time varying covariate, substantive estimates (covariances between growth factors) also did not appear to change substantially.

respectively (see Figure 3). Temperament variables were grand mean centered to ease interpretability. Because interpretations of model estimates will change with the inclusion of covariates, interpretations of the unconditional models and conditional models (with predictors) are included for consistency. Temperament factors are included as time-invariant covariates (i.e. only included at the kindergarten measurement point), because individual differences in temperament are thought to be more stable over time than social competence or anxiety. Prior literature supports this assumption (E.g., Pedlow et al., 1993; Spinrad et al., 2006), and including time-invariant covariates will allow for a more parsimonious model. Furthermore, the way that temperament is conceptualized as influencing the growth in anxiety and social competence factors, coupled with the fact that temperament is a trait variable that likely does not have significant within person changes across time, the time-invariant covariate model is most appropriate for this aim.

Aim 2 Results

Chi square estimates of model fit for models in which temperament variables (attention focusing and negative emotionality) were included was not significant for the parent report model, but was significant for the teacher report model (χ^2 (15) = 17.69, $p =$ .28 for parent report; χ^2 (15) = 27.95, $p = .02$ for teacher/parent report). CFI estimates suggested good fit for both parent and teacher/parent models (.995 for parent report model; .979 for teacher/parent report model).

Substantive estimates examining relationships between anxiety and social competence did not change when temperament was included as covariate for the parent report model. This suggests that the observed patterns and links among growth in anxiety and social competence occur even after accounting for kindergarten temperament ratings.

For the teacher/parent report model, however, the correlation between the social competence intercept and slope factors was no longer significant when temperament variables were entered into the model ($r = .07$, $p = .842$). Note that in models without temperament covariates there was a significant negative correlation between social competence intercept and slope factors, such that lower initial social competence was associated with steeper increases in social competence across time.

Relations between temperament and anxiety. As expected, parent reported negative emotionality significantly predicted the parent reported anxiety intercept factor ($\beta = .15$, $z = 6.36$, $p < .001$), but contrary to expectations, negative emotionality did not predict the anxiety slope factor ($\beta = -.001$, $z = 6.36$, $p = .92$), suggesting that greater negative emotionality is associated with higher model-estimated anxiety levels in kindergarten but is not associated with changes in anxiety over time. Teacher reported negative emotionality did not significantly predict the parent reported anxiety intercept ($\beta = .02$, $z = 1.48$, $p = .14$) or slope factor ($\beta = .003$, $z = 0.22$, $p = .83$) in the teacher/parent report model. Contrary to expectations, parent reported attention focusing did not significantly predict the latent parent reported anxiety intercept ($\beta = .02$, $z = 1.16$, $p = .24$) or slope factor ($\beta = -.007$, $z = 0.083$, $p = .40$). Teacher reported attention focusing did not significantly predict the parent reported anxiety intercept ($\beta = .02$, $z = 1.47$, $p = .14$) or slope factors ($\beta = .003$ $z = 0.34$, $p = .73$) in the teacher/parent report model.

Relations between temperament and social competence. As expected, parent reported negative emotionality significantly predicted the parent reported latent social competence intercept ($\beta = -.18$, $z = 5.22$ $p < .001$) and slope factors ($\beta = .05$, $z = 2.23$, $p < .05$), such that higher negative emotionality was associated with lower relative model

estimated social competence in kindergarten, but **increasing** social competence over time. Teacher reported negative emotionality significantly predicted the teacher reported latent social competence intercept (β = -.18, z = 2.93, $p < .01$), such that higher negative emotionality was associated with relatively lower model-estimated social competence in K, but was unrelated to the social competence slope factor (β = .02, z = 0.62, p = .53). As expected, parent reported attention focusing significantly predicted the social competence intercept (β = .15, z = 4.82, $p < .01$) but not social competence slope factor (β = .001, z = 0.02, p = .98). As expected, teacher reported attention focusing significantly predicted the teacher reported social competence intercept (β = .31, z = 10.95, $p < .01$) and slope factors (β = -.09, z = 5.53, $p < .01$), such that lower attention focusing was associated with lower relative model-estimated social competence in K, but with relatively steeper **increases** in social competence over time, compared to others in the sample.

Aim 3 Overview and Analytic Plan

In order to examine how relations among anxiety and social competence growth differ as a function of gender, a multiple group parallel process growth model was employed. Group structure was imposed on the parallel process growth model from aim 1 (without covariates). An iterative series of increasingly less constrained models were compared. Models in which the means (the vector of model implied means, α; model a), means and parts of the covariance matrix (α and Ψ; model b) were constrained to be equal across girls and boys were compared to models where these parameters were freely estimated for boys and girls. Note that for model b, only covariances (correlations) of interest (outlined in aim 3 above) were freely estimated across group (i.e. anxiety intercept-social competence slope covariances (correlations) and social competence

intercept-anxiety slope covariance). All other variance and covariance (correlation) estimates were constrained equal across boys and girls. Differences in model fit between constrained and unconstrained models were assessed using χ^2 difference tests, with Satorra-Bentler adjusted values to account for the use of MLR estimation. Comparisons for model b allowed me to answer the substantive hypotheses outlined in aim 3 with regard to gender differences in relations between kindergarten anxiety/social competence and growth in anxiety/social competence (i.e. intercept/slope correlations).

Aim 3 Results

Model estimates and parameters for models in which the means (model a), and means and specific covariances (model b) are freely estimated across girls and boys are presented in Table 6. Chi-square difference tests suggest that the model in which means are estimated separately for boys and girls fits significantly better than the model in which means are constrained to be equal across boys and girls for both parent and teacher/parent report models. In models for both boys and girls, average model-estimated social competence slopes were not significant for both parent and teacher/parent report models (See Table 6). Average model estimated anxiety slopes were positive and significant for girls, but not for boys, which suggests that on average, girls tend to experience increases in anxiety over time but boys experience relatively flatter trajectories. This is in line with previous literature that suggests girls tend to endorse more anxiety symptoms than boys, and that girls express onset of anxiety symptoms at an earlier age than boys (Roza et al., 2003).

Model fit comparisons suggest that the model in which means and covariances (correlations) of interest (presented in bold in Table 6) are estimated separately for boys

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and girls (model b) fits significantly better than the model in which covariances (correlations) are constrained and only means are freely estimated (model a) for the parent report model. This difference was marginally significant for the teacher/parent report model. Contrary to the hypothesis that the correlation between anxiety intercept and social competence slope would be significant for boys, results suggested that the correlation between the anxiety intercept and social competence slope was *negative* and significant for girls but not boys in the teacher/parent report model. This suggests that girls, but not boys, with higher relative parent reported anxiety in kindergarten tend to have decreasing social competence over time, and girls with lower anxiety in kindergarten tend to have relatively steeper increasing social competence over time. Furthermore, the correlation between anxiety intercept and social competence slope was *positive* and significant for girls but not significant for boys in the parent report model. This suggests that girls with relatively higher parent reported anxiety in kindergarten have steeper *increases* in parent reported social competence across time, compared to other girls in the sample. In sum, girls with higher parent reported anxiety in kindergarten have steeper increases in social competence over time according to parents, but have steeper decreases in social competence over time according to teachers. These relations were not significant for boys' parent or teacher reported social competence.

Contrary to expectations that lower social competence in kindergarten would be associated with steeper increases in anxiety over time for girls, the social competence intercept anxiety slope correlations was not significant for boys or girls. This was true for parent and teacher/parent report models.

CHAPTER 4

DISCUSSION

This dissertation lends support to a growing body of literature on relations among anxiety and social competence development, and addresses the need for a developmentally-focused understanding of within-person changes in anxiety and social competence across early elementary school at important developmental junctures, such as the transition to kindergarten. Findings from this dissertation are in accordance with tenets of developmental psychopathology theory suggesting that environmental shifts and pressures, and the timing of these shifts, can have a bearing on developmental change (Cicchetti, 1984; Cicchetti & Toth, 2009). This notion is a common theoretical thread that is expressed in many overarching theories of development, including dynamic systems approaches (Thalen, 2005) as well as Sameroff's (2010) unified theory of development. In this dissertation, I examined how both inter- and intra-individual changes in anxiety and social competence trajectories may be related with each other, as well as specific relations between individual differences during the transition to kindergarten and changes in anxiety and social competence over time. Namely, my findings suggest that increasing anxiety trajectories are associated with steeper decreases in social competence across elementary school, and that temperamental features such as attention focusing and negative emotionality at the point of transition to kindergarten may be associated with social competence, but not anxiety trajectories.

These findings should be considered with caution because results were not always consistent across parent and teacher reports of child behavior, and because power to detect growth effects was low given the sample size and number of measurement point

(Hertzog et al., 2006). It is therefore difficult to ascertain whether this is due to key contextual differences between behaviors on which parents and teachers report, or whether they are due to limited power to detect effects that are present. The discussion for this dissertation is organized as follows: Section I provides broad explanations for the findings in the context of theory and the extant literature, section II explains key strengths and limitations of the current study design and provides suggestions for future research, and section III outlines possible implications of the current findings, if replicated and extended, for policy and practice.

I. Findings within the Context of Theory and the Extant Literature

Broadly, some studies to date have supported unidirectional findings suggesting children with anxiety symptoms may be at-risk for maladaptive social adjustment (e.g., Ginsburg, La Greca, & Silverman, 1998; Motoca et al., 2012; Settipani & Kendall, 2013), and poor social adjustment also may be a risk factor for developing anxiety symptoms (Burt et al., 2008; Wichstrom, Belsky, & Berg-Nielsen, 2013). The current study advances the literature in several ways. First, findings suggest that within-person trajectories for anxiety and social competence may build on each other over time in a cyclical fashion. Second, findings help to support how individual differences in kindergarten are associated with changes in social competence over time. Third, individual difference variables examined herein were not associated with changes in anxiety, which helps to highlight the importance of examining the timing of specific risk factors. Finally, this study provides preliminary insight into gender differences among these variables, and could help to shed light on how relations among anxiety and social

competence may function differently for boys and girls. Each of these findings are addressed, in order, below.

Relations among changes in anxiety and changes in social competence across elementary school. Findings suggest that anxiety and social competence change in tandem over time, such that increases in anxiety were associated with decreases in social competence. More specifically, anxiety and social competence trajectories were related, such that children with steeper increases in anxiety, relative to the trajectories of other peers in the sample, also tended to have steeper decreases in social competence, and steeper increases in social competence were associated with steeper decreases in anxiety across kindergarten, 1st, and 2nd grade. These findings suggest broadly that children who experience worsening anxiety symptoms tend to also experience worsening social competence problems, and vice versa. This finding was significant only for parent reports of child behavior, but not for teacher reports of child behavior. Results also showed that kindergarten anxiety and social competence levels were concurrently related, such that those who had higher anxiety in kindergarten, relative to peers in the sample, also had lower social competence in kindergarten, relative to peers in the sample. Together, these findings are in line with previous research findings on relations among internalizing problems and social functioning trajectories (Burt et al., 2008; Motoca et al., 2012; Reynolds, 2013).

Findings showing that changes in anxiety were associated with changes in social competence can be explained and expanded upon through dynamic systems approaches to development. Briefly, dynamic systems theory views development as a continuous, fluid, and ever-changing process through which moment-to-moment interactions with the

environment cascade over time, creating histories which have a bearing on future adjustment and change (Thalen, 2005). For instance, children may experience general negative arousal on a daily basis, perhaps upon separation from parents at the start of the school day or general negative affect across different contexts, and these fine grained experiences could lead to momentary avoidant coping, which in turn could lead to lost opportunities to interact with (and learn adaptive social skills from) peers, as well as peer rejection or isolation. Indeed, global avoidant coping behaviors are associated with greater anxiety (Barlow, 2000; Kendall, 1992). These daily occurrences could, then, compound over longer periods of time, further eroding self-efficacy and exacerbating anxious arousal. This, in turn, leads to patterns in which anxious arousal is impeding on social information processing and cognitive interpretations of social interactions, which further erodes social awareness and ability to execute adaptive social behaviors (Daleiden & Vasey, 1997; Suarez & Bell-Dolan, 2001; Suarez-Moralez & Bell, 2006). These avoidant patterns could occur across multiple different contexts where children are able to choose whether or not they interact with peers, including social interactions on the playground, with playgroups, or among friends outside of school. Parents could be more likely to observe children in these free play contexts, which could help to explain why these findings were significant for parent and not teacher reports of social skills.

In short, it appears that anxiety and social competence are cyclical and mutually reinforcing systems that build on each other over time and across smaller moment-to-moment instances, leading to the longer term relations among anxiety and social competence trajectories observed herein. Research examining day-to-day relations among anxiety and social competence in early childhood is needed, but evidence on global

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relations among avoidance, anxious arousal, and cognitive interpretation biases support the possibility that these factors might be related on micro as well as macro time scales (Daleiden & Vasey, 1997; Suarez & Bell-Dolan, 2001; Suarez-Moralez & Bell, 2006). Future research would need to employ designs that examine these behaviors across different time scales, including within person day-to-day changes in anxiety and social competencies, as well as longer term trajectories of change across elementary school and middle childhood, in order to truly speak to the extent to which these cyclical processes are occurring.

It is important to note that this was found for parent, but not teacher reported social competence. On one hand, this could be attributable to issues with power to detect effects, as evidence suggests that power to detect relations among latent slopes is low in samples with fewer than 500 participants and 5 measurement occasions (Hertzog et al., 2006). It could be that this study simply was not able to pick up on relations among variables that were small, but present, especially within the teacher report model where differences in reporter variance could make the magnitude of relationships less robust. Alternatively, parents may be reporting on child social competencies across more diverse and varied contexts, whereas teachers observe only classroom social behavior. Therefore, parents may be more attuned to slight and nuanced changes that are occurring in social competencies year to year, which could be more specifically related to *changes* in anxiety, given the theoretical day-to-day relations between anxiety and social competence that are outlined herein.

In addition to understanding how trajectories for anxiety and social competence may be related, examining change over time following a specific developmental

transition can elucidate how risk or promotive factors function during critical developmental junctures. Contextual changes and the shift to formal schooling coincides with advances in cognition and regulation (Sameroff & Haith, 1996), which allow for more nuanced and complex social relationships to emerge. As Sameroff (2010) suggests, and in keeping with broader developmental psychopathology theoretical approaches, individual differences during these punctuated environmental changes can be important for understanding future continuity or discontinuity in developmental change.

Relations between individual differences at the transition to kindergarten and changes in social competence. Findings suggest that higher anxiety in kindergarten, lower negative emotionality, and higher attention focusing traits were associated with relatively steeper decreases in social competence over time, as compared with peers in the sample. With regard to the relation between initial anxiety and decreases in social competence, those who enter kindergarten with higher relative anxiety levels may be more likely to avoid salient social experiences that are needed to build their social competencies during that first year of formal schooling. For instance, avoiding difficult or anxiety provoking situations on the playground or during classroom group activities could result in fewer opportunities to learn conflict resolution skills or adaptive play behaviors that set the stage for building positive peer relationships as well as future social competencies (Cillessen & Bellmore, 2004; Fabes, Gaertner, & Popp, 2006). Failing to engage with peers to learn these skills could result in relative decreases in social competence across time. The transition to kindergarten is a sensitive period for the development of social competencies, and anxious arousal may interfere with these experiences. Previous literature supports the idea that emotional control during the

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transition to kindergarten provides affordances that can enhance or mitigate future social

adjustment (Eisenberg, Valiente, & Eggum, 2014; Olson & Lifgren, 1988).

Contrary to expectations, according to parent reports of temperament and social

behavior, higher negative emotionality in kindergarten was associated with concurrently

lower social competence in kindergarten but with steeper increases in social competence

over time, and according to teacher report of temperament and social behavior, lower

attention focusing in kindergarten was associated with lower relative social competence

in kindergarten, but with steeper increases in social competence over time. These

purportedly "risky" temperament profiles could be associated with concurrently lower

social competence during the transition to kindergarten when children are navigating

novel environments and their emotion regulation capabilities are more taxed. For

instance, as with anxiety, children with poor attention control and negative emotionality

may have greater difficulty adjusting to novel classroom schedules, unfamiliar peers, and

longer school days associated with the transition to kindergarten, leading to lower

concurrent social competence ratings. These initial deficits could be associated with

normative subsequent increases in social competence as they become more comfortable

in the formal school setting. This is supported by findings from the literature that suggest

even children with internalizing problems tend to increase in social competence from

kindergarten to 1st grade, but taper off and increase less rapidly later in elementary

school, relative to those without internalizing problems (Barry & O'Connor, 2010). Barry

and O'Connor (2010) postulated that this increase among children with internalizing

problems reflected generally normative increases in social competence during early

school settings when children are rapidly learning the cognitive skills necessary to

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navigate social environments in the classroom and where this is a focus of classroom instruction.

It is important to note that findings for attention control and anxiety predicting changes in social competence were significant only for teacher reports of child temperament and social competence, and findings for negative emotionality were significant only for parent report. This likely has to do with the different contexts in which parents and teachers interact with children. Teachers could be more aware of children's attention control than their displays of negative emotionality, given that their instruction likely focuses on task completion and direction, and negative emotions may be expressed less frequently in the classroom setting than in other contexts, such as on the playground when teachers are not as present. Teachers may, therefore, provide more explicit scaffolding and support for the social development of children in the classroom who they perceive as having poor attention control, leading to increases in social competence across subsequent years for those children. Parents, on the other hand, may be more aware and attuned to instances of negative emotionality, as their interactions with their children may be less centered on task completion than that of teachers, and more frequent one-on-one interaction between parents and children may make instances of negative emotions more apparent to parents than teachers. For parents, instances of negative emotionality may elicit greater scaffolding and encouragement of adaptive social interactions. Despite the proximal increases observed herein for those with higher negative emotionality and lower attention focusing, these children could experience subsequent decreases in social competence in middle childhood, as social demands and the social structure become more complex and the focus in the classroom is no longer on

building these skills explicitly (i.e. later elementary school classrooms no longer focus on building social skills). Future research will need to examine the effects of temperament on non-linear trends in social competence across early and middle childhood in order to capture these effects. The findings between anxiety in kindergarten and changes in social competence also differed by reporter, and were found only for teacher reports of social competence. Some research suggest that teachers tend to report more drastic decreases in social competence over time because the context in which they interact with children expects more compliance, and therefore more opportunities for children to display poor social competencies, as they get older and the classes become more structured (Chan et al., 2000). Therefore, teachers may have been even more attuned to these global or broad decreases in social competencies among children with higher general or global anxiety levels than parents.

Transactional relationships and interactions with peers and the larger peer context can also help to explain relations among temperament and anxiety in kindergarten and changes in social competence over time. Rimm-Kauffman and Pianta (2000) highlight the importance of dynamic relationships with peers as an important component to consider when examining the transition to kindergarten. As mentioned, _lower_ negative emotionality and _higher_ attention control also associated with worsening (decreasing) social competence over time. It could be that those with low negative emotionality and high attention control have overly controlled or inflexible profiles that make them appear socially maladapted to their peers. Some research does support the notion that *high* levels of inhibitory control are associated with more internalizing type symptoms, like withdrawal or depression (Eisenberg et al., 2004; Murray & Kochanska, 2002), as this

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leads to inflexible and rigid behaviors. Low impulsivity may indeed be a risk factor for the development of overly rigid or inflexible social behaviors, which could make children appear awkward or not socially dynamic (Eisenberg, Sadovsky et al, 2005). These findings could extend to children with overly controlled attention behaviors, ultimately leading to decreases in social competence over time. Other research further supports the notion that a reluctance to express emotions (or perhaps lower negative emotional expression) could be associated with poor social adjustment, possibly because peers find this kind of behavior off-putting (Eisenberg et al., 2007: Jacob et al., 2014). With respect to findings among anxiety in kindergarten and changes in social competence and the larger peer context, youth with elevated anxiety in kindergarten may also elicit rejection from peers. The extant literature supports this possibility. For example, children who are perceived by peers as being anxious are more likely to be rated as less likeable and less physically attractive by peers than those who are perceived as being less anxious (Barrow, Baker, & Hudson, 2011). There also is evidence that overt displays of anxious behaviors lead to peer rejection, which may mitigate opportunities to interact with peers, thus decreasing opportunities for children to learn crucial social skills that can enhance self-efficacy for handling social and other difficult situations (Hodges & Perry, 1999; Hymel, Rubin, Rowden & LaMare, 1990; Verduin & Kendall, 2008). In kindergarten, these skills could include adaptive conflict resolution and communicative play behaviors (Cillessen & Bellmore, 2004; Fabes, Gaertner, & Popp, 2006). Another body of research findings suggest that anxious behaviors are associated with increased risk of being friends with other socially unskilled peers (Rubin et al., 2006), which could create environments conducive to increasingly poorly executed social interactions and anxiety maintenance.

Peer rejection and inadequate friendship environments, coupled with decreased tendencies for assertiveness, cooperation, and appropriate communication among anxious youth could exacerbate anxious tendencies by fostering avoidance and decreasing self-efficacy and also lead to inadequate social learning environments and subsequent decreases in adaptive social behaviors and peer acceptance. In this sense, dynamic peer reactions to temperament and anxious behavior are important to consider and more research is needed to fully uncover these relations.

Relations between individual differences at the transition to kindergarten and changes in anxiety. Contrary to expectations, kindergarten social competence levels were not related with changes in anxiety over time, nor were negative emotionality and attention focusing in kindergarten. These findings may have to do with developmental timing. For example, it could be that social competence does not emerge as a risk factor for the development of anxiety until later in elementary school. That is, decreases in social competence over time appear to be more important for the development of anxiety than general levels at the start of kindergarten. In support of this idea, studies examining heterogeneity in social competence trajectories suggest that differences between children's social competence levels in kindergarten are small and that differences in trajectory do not begin to emerge until 1st grade, with some increasing and others decreasing after this time point (Lamont, & Van Horn, 2013). This could suggest that social competence in kindergarten is not a reliable indicator of risk, and that rate of change following 1st grade is a more meaningful. Furthermore, cascade models that support social competence as a risk factor for the development of anxiety focused on later periods of development, beginning at 8 years (Burt et al., 2008). Although social

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competence during the transition to kindergarten is a well-established risk factor for subsequent academic and social adjustment (See Denham, 2008 for a review), it could be that the rate of change (decline) in social competence following this transition is more meaningful for anxiety development than mean level differences during the transition. Those who fail to show normative increases in social interaction skills may be more at risk for anxiety problems than those who show initially low levels of social skills. Furthermore, changes in anxiety over time may reflect patterns of heterotypic continuity, with overall levels of anxiety remaining relatively stable or increasing generally, but the manifestation or type of anxiety changing across development (Weems, 2008).

Findings also revealed that initial anxiety levels in kindergarten were associated with concurrent negative emotionality, but that negative emotionality was not associated with changes in anxiety. Research evidence supports the idea that the tendency to experience negative emotions is associated with anxiety levels (Leguna, 2003; Suveg & Zeman, 2004). It could be that worsening anxiety over time is more strongly associated with *interactions* among negative emotionality and emotion regulation, such that those with high negative emotionality but better emotion regulation do not experiences worsening anxiety, but those with high negative emotionality coupled with lower emotion regulation abilities are most at risk for worsening anxiety over time. Indeed, evidence suggests that children with greater negative affectivity and lower effortful control are at greater risk for anxiety symptoms and attention to threat stimuli (Lonigan & Vasey, 2009), and children with anxiety symptoms tend to report lower self-efficacy for handling anxious emotions (Suveg & Zeman, 2002). It could be that the combination of poor

regulation and negative emotions is more important for the development of anxiety over time than the feelings of negative emotions alone.

Contrary to expectations, attention control was not related with concurrent anxiety in kindergarten or changes in anxiety over time. Findings from the literature generally suggest that lower attention control is associated with higher anxiety symptoms (Muris, de Jong & Engelen, 2004; Trosper & May, 2011). Theoretically, deficient attention control could inhibit the ability to shift attention from anxiety arousing situations, thus enhancing focus on anxious emotion and intensifying feelings of under-control. Attention control also has been associated with externalizing problems, as it is thought to play a role in reducing impulses and aggression (e.g., Eisenberg, Fabes, Guthrie, & Reiser, 2000; Kochanska & Knaack, 2003). It could be that the current measure of attention control is tapping into the ability to focus attention on tasks (example items include, "is easily distracted when listening to a story," and "will move from one task to another without completing any of them"), rather than the ability to attend away from threats. This type of distractibility is likely more associated with attention deficit problems and externalizing/impulsivity deficits than with anxiety. Specific computer-based measures of attention to threat and executive functioning, like the NIMH flanker inhibitory and attention control task, may help to better capture these attention biases related with anxiety. Future research should employ these measures in addition to traditional parent and child measures of temperament in order to fully capture these relationships.

Gender differences in relations among anxiety and social competence. The findings for relations among initial anxiety and social competence trajectories varied as a function of gender, however given the exploratory nature of this aim, these findings

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should be interpreted as preliminary and tentative. More specifically, girls with higher parent reported anxiety in kindergarten had steeper increases in social competence across kindergarten, 1st, and 2nd grade according to parents, but steeper decreases in social competence according to teachers. Findings for relations between kindergarten anxiety and changes in social competence for boys were not significant. Given the differences in magnitude and direction for parent and teacher reported effects, gender differences need to be understood within context. Parents and teachers are likely reporting on different instances of social behavior, and evidence supports the notion that trajectories of social behaviors differ in shape and magnitude of change when parents and teachers report on child behaviors (Barry & O'Connor, 2010; Chan et al., 2000). Chan et al. (2000) postulate that parents may be more likely to report higher social competencies in their children because of social desirability, whereas teachers may not be bound by the same biases. With respect to the current findings, it could be that parents of relatively more anxious girls are especially likely to over-report their child's social competencies because it would be more gender non-normative, and thus more stigmatizing, to rate their girls as having poor social competencies (Rose & Rudolph, 2006). Parents may be less likely to have this bias when reporting on boys, for whom lower social competence ratings may be normative (Reynolds et al., 2013).

Teacher ratings of social competence, on the other hand, tend to be influenced by teacher-student relationship quality, such that greater relationship quality is associated with higher teacher ratings of social competence (Barry & O'Connor, 2010). It could be that anxiety is interfering with teachers' ability to maintain and build adequate student teacher relationships with girls, and is leading to generally lower ratings of social

competencies over time for those with greater anxiety levels as a result. More specifically, girls may be more likely than boys to express their anxious emotions globally (Carter, Silverman, & Jaccard, 2011; Muris, Meesters, & Knoops, 2005) as well as to teachers, which could disrupt student-teacher relationship quality and in turn lead to lower ratings of social competencies over time. Anxiety may interfere less with student-teacher relationship quality for boys, who may be less verbal or expressive about their anxiety around teachers. For example, socialization practices for boys may discourage them from expressing internalizing type emotions, like anxiety and sadness, which could lead to less overt expression of these feelings around teachers (Perry-Perrish & Zeman, 2011). If boys are not expressing their anxiety, this may not interfere as readily with teacher ratings of social competence. Research does suggest that there are global gender differences in student-teacher relationship quality (Hamre & Pianta, 2001) but also that the adjustment outcomes associed with student teacher relationships differ by for boys and girls, which suggests that student teacher relationships may influence social competence development differently for boys and girls (McCormick & O'Connor, 2014). Future research will need to address the possibility that ratings of children's social competencies may be influenced by perceived student teacher relationships, and the role that this might play in observed gender differences for teacher reported social competence and anxiety.

With regard to non-significant relations between anxiety and social competence changes for boys, it is possible that teacher and parent ratings did not pick up on boys' expression of anxious behaviors. For example, externalizing behaviors may be a more socially acceptable way for boys to express their anxious emotions, which could mean

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that externalizing problems play a more prominent role in the association between anxiety and social competence for boys than for girls, and evidence supports the idea that boys tend to have higher ratings of externalizing behavior problems than girls (Laird et al., 2001). For example, boys may be more likely to act out or aggress in the face of anxious arousal, which could in turn, lead to peer rejection or isolation, and subsequent anxiety or worsening externalizing problems. Socialization practices for boys may dictate different ways of expressing, experiencing, and handling anxiety, and our measures may be more sensitive to detecting anxiety among girls than among boys. Indeed, the literature supports the notion that boys are more likely to choose aggressive options in neutral social situations (see Card, Stucky, Sawalani, & Little, 2008 for a meta-analysis). Future research should consider the role that externalizing plays in the development of social competence for boys and girls separately to address this consideration.

II. Strengths, Limitations and Additional Directions for Future Research

Strengths. The longitudinal nature of this study allowed for the examination of both intra- and inter-individual change across the transition to kindergarten and the beginning of elementary school. This period of development is punctuated by rapid advances in cognitive and social development (Sameroff & Haith, 1996), and this study contributes to a growing body of literature supporting the development of anxiety and social competence together over time during this time. Although not originally intended, the models that examine relations among parent reported anxiety and teacher reported social competence provide some insight into behaviors across context and reporter.

Findings for relations among anxiety and social competence were independent of externalizing behavior problems at each time point. The literature suggests that there is a

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strong link among social competence deficits and externalizing problems, as issues with self-regulation and aggression will naturally interfere with adaptive social interaction (Crick & Dodge, 1996; Dodge, Laird, Locheman, & Zelli, 2002; Richard & Dodge, 1982). Children who experience difficulty with anxiety could also experience co-occurring externalizing difficulties (e.g., Franco et al., 2007), which could suggest that externalizing difficulty plays a role in the relations among anxiety and social competence. However, findings from this dissertation suggest that the observed relations among changes in anxiety and changes in social competence, and among anxiety in kindergarten and changes in social competence were significant even after controlling for parent and teacher reports of children's externalizing difficulty. This lends credence to the idea that these problems are independent of other types of common behavior problems children experience.

Limitations and Directions for Future Research. Despite strengths, there are several limitations to the current study design that need to be noted. The original intention for this research project was to estimate models using teacher reported anxiety and social competence separately from models using parent reported anxiety and social competence. Extreme variability in trajectory magnitude, direction, and degree of linearity precluded the use of teacher reported anxiety models of change. Individual plots of observed raw anxiety values across time suggested that some children increased drastically between kindergarten and 1st grade and then subsequently decreased, whereas others decreased and then increased subsequently. There are two possible explanations for these problems with model estimation, taking into consideration the low or non-significant correlations between teacher ratings across time.

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First, there may be distinct sub-populations of individual anxiety trajectories that cannot be modeled with variable oriented approaches. If this is the case, then person centered approaches that can capture different classes of change (such as Growth Mixture Modeling) are needed. Indeed, research does suggest that there may be subpopulations of anxiety trajectories that are associated with different rates and shapes of change for different children (Duchesne et al. 2008). Furthermore, there could be real changes between kindergarten and 1st grade that are accounting for these dramatic differences between and within person. From a developmental perspective, anxiety tends to manifest differently across development, demonstrating strong heterotypic continuity as well as shifts and changes (discontinuity) at major developmental transitions (Weems, 2008). More specifically, anxiety tends to focus on separation worries and fears during early childhood, and on specific phobias and generalized anxiety disorder during middle childhood, which reflect general developmental differences across time (Weems, 2008). The drastic changes between kindergarten and 1st grade (with some increasing and others decreasing at this point observed herein) could be capturing this developmental inflection point. This could mean that overall measures of anxiety are increasing as specific phobias are emerging for some children that had previously not experienced problems with separation anxiety, but are decreasing between kindergarten and 1st grade for those who experienced separation anxiety during the transition to kindergarten that is subsiding as they get older. Despite these fluctuations across development, anxiety is stable over longer periods of time, and experiences of clinical anxiety do not tend to spontaneously remit (Bittner et al., 2007; Essau et al., 2000; Keller et al., 1992; Pine et al., 1998).

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Additionally, drastic changes such as these would likely be reflected in the parent report models.

Alternatively, differences between teachers at each grade could be masking within-person change. That is, teachers may not consistently report on children's anxiety symptoms across time. Reports of anxiety between teachers may differ based on individual teacher characteristics, like general knowledge about how to accurately identify anxiety symptoms, and would therefore fluctuate year to year. This reporter specific variance would be confounded with within person change in traditional growth model approaches. Research supports the possibility that anxiety may be especially subject to problems with between reporter differences. For example, multi-trait multi-method studies examining reporter variances in anxiety, depression, and aggression traits suggest that there is the poorest amount of agreement between reporters (teacher, parent, and peer) for anxiety than for any other trait, as well as evidence suggesting that there is significant general reporter-specific variance across anxiety, depression, and aggression (Epkins & Meyers, 1994). Teachers may have greater difficulty reporting on problems of an internalizing nature than they do for other more easily observed phenomena, which could lead to greater amounts of reporter specific error in reporting anxiety problems. Indeed, studies suggest that teachers report significantly fewer anxiety symptoms for clinically anxious youth than are self-reported, and are also generally poor at identifying which children in their classrooms are within clinical thresholds for anxiety problems (Dadds et al., 1997; Epkins, 1993). Although parents may also be subject to individual differences that could change their ability to accurately report and assess anxiety symptoms (such as their own depression symptoms; See Blandon et al., 2010), parent

reports are not subject to differences in reporter variance between waves because the same parent is reporting at all three waves. In the absence of consistent teacher reports across wave, a parent-report anxiety model may be more appropriate to capture within person change. Although the current study was unable to have a pure teacher report model that could speak to children's behavior within the school context, including a model with multiple different raters of child's behavior across context (parent reported anxiety with teacher reported social competence) could be a methodological strength.

Another limitation of the current project is that the power to detect effects among growth variables was low, and could have accounted for non-significant relations with growth factors observed herein. Findings suggest that even in samples with greater than 500 participants and 5 or more measurement occasions, power to detect slope-slope covariances between constructs was low (Hertzog et al., 2006). The power to detect variance may also be low in samples with small sample sizes and fewer than 4 measurement occasions (Hertzog et al., 2008). Given that significant relations among some growth factors were revealed, even in the face of low power, is a strength of the current study and suggests that they could be associated with large effect sizes. Future research should include larger sample sizes with more frequent measurement occasions, to capture changes occurring within years, and over longer periods of time, in order to capture longer-term developmental changes across early and middle childhood.

Another limitation is that the observed relations could be a function of measurement effects, especially for the observed relations among temperament, anxiety, and changes in social competence. Those who are highly socially skilled may not be changing in social competence over time (i.e., there is a "ceiling effect" for their growth)

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because the measure does not capture nuanced differences among highly socially skilled youth, so change may occur only for those who have the most room for growth. This is supported by findings that suggest that social competence is relatively stable over time and that growth is generally flat for a majority of youth (Bornstein, Hahn, & Hays, 2010; Lamont & Van Horn, 2013). Similar floor and ceiling effects have been found in other studies that employ growth modeling approaches (Reynolds, Sander, & Irvin, 2010). Future research should employ more nuanced measures capable of capturing specific individual differences and changes in social competence. For example, measures should include specific items that tap expected developmentally relevant change in cognitive perspective-taking ability and social interaction complexity that are thought to change naturally across elementary school, so that specific within and between person differences can be explored (Crick & Dodge, 1994).

An additional limitation is that the extent to which changes in anxiety represent clinically meaningful change is questionable, as change in social competence and anxiety appeared to be relatively small over time. The current project used a community sample of children, in which the instances of clinical anxiety levels are likely to be relatively low. Previous research suggests that approximately 11-18% of children in community samples meet sub-clinical thresholds (Barrett & Turner, 2001). This means that a majority of children in the sample were not clinically or even sub-clinically anxious. Furthermore, children's anxiety was rated using a 3-point scale, ranging from 1 (never) to 3 (often). Average scores ranged from 1 (suggesting mostly ratings of "never" on anxiety) to 2.63 (suggesting some ratings of "sometimes" or some ratings of "often" on anxiety items). Although there are no established clinical cut scores for this measure of

anxiety, these ranges suggest that on average, most children did not have consistently high ratings of "always"(3) on all items. Although change was significant at each time point, average change across all three time points was less than half a rating point. Although there is no evidence that this is clinically meaningful change, this does suggest that children's parents are noting some increase in anxious behavior across time. Furthermore, these are average rates of change, around which children varied considerably, with some increasing more dramatically and others decreasing across time. Although these may not be clinically anxious children, there is evidence that even sub-clinical levels of anxiety are meaningful and are associated with similar levels of impairment to those within the clinical range (Angold, Costello, Farmer, Burns, & Erkanli, 1999; Pina, Zerr, Villalta, & Gonzales, 2012). Therefore, within person changes in anxiety may be substantively meaningful and relate with social adjustment, even if this change is not within the clinical threshold. Future research will need more dynamic measures that could capture more nuanced changes in anxiety levels across time, as a 3-point rating system may not be sufficient to capture real change. It also is possible that the relations among anxiety and social competence operate differently for those with more pronounced clinical anxiety than they do for the typically developing population. Future research should, therefore, examine differences in these relationships as a function of whether children are clinically anxious.

Another limitation is that only linear growth was modeled in this study. Linear models, in which change was equal between kindergarten and 1st grade and 1st and 2nd grade, may be limited in their ability to explain these trajectories. Previous research indicates that change in anxiety and social competence are non-linear (Duchesne et al.

2008; Barry & O'Connor, 2010; Chan et al., 2000). Examining non-linear change would allow researchers to uncover inflection points that could provide more nuanced understanding of relations among within person increases in anxiety and social competence, which could be more pronounced at some developmental points than at others. For instance, there appears to be a normative increase in social competence from kindergarten to 1st grade, and understanding for whom this increase is attenuated or less steep may provide meaningful information about these trajectories, as well as relationships with potentially co-occurring inflection points or non-linear rates of change in anxiety (Duchesne et al. 2008; Barry & O'Connor, 2010; Chan et al., 2000). Larger sample sizes and more frequent measurement occasions across longer periods of time (through elementary and middle school) would be needed to fully capture these trajectories. In addition, the current study examined trajectories for the sample as a homogenous group, but it is possible that there is significant heterogeneity in trajectory, with specific sub-populations of change that represent distinct patterns of change. Future research should use growth mixture modeling techniques to assess the extent to which specific types of change in social competence are associated with specific patterns of change for anxiety, and for whom these relations exist. It is likely the case that the observed relations among growth in anxiety and social competence are stronger for some children than for others.

An additional methodological limitation is that specific change across the transition to kindergarten was not explicitly assessed. The current discussion frames change as a function of individual differences during the transition to kindergarten as a central feature, but change at the transition to kindergarten was not explicitly assessed

because kindergarten was the first measurement occasion. In order to capture true changes across this transition, measurement occasions before and after this transition are needed. Furthermore, Rimm-Kauffman and Pianta (2000) outline important dynamic ecological perspectives for understanding the transition to kindergarten, and highlight the need for a holistic examination of contextual differences, transactional relationships with teachers, parents and peers, as well as the broader cultural context in which the transition is occurring. Future research needs to examine differences as a function of each of these dynamic relationships as the transition occurs in order to better understand how anxiety and social competence may serve as risk or promotive factors during this time. The aforementioned multiple-time-scale-designs could address this by including more frequent clusters of measurement "bursts" before and during this transition to capture any possible inflection points or disturbances in developmental trends, relative to previous levels, as children transition into formal schooling. This study would also need to include specific assessments of socioeconomic status, broader family dynamics and relationships, as well as teacher-student relationships to better capture the changes occurring during this transition. The current study was based on a fairly homogeneous and high SES group. Future research is needed to apply and extend findings among different sociocultural contexts.

Models examining changes in anxiety in school contexts was not included, due to potential issues with differences between teacher-specific variance in reports of anxiety. Future research that employs a multi-trait multi-method approach is needed to isolate specific sources of differences between parent and teacher reports of anxiety and social competence. Specific parent characteristics (such as parent depression symptoms or

parent-child attachment security), and specific teacher characteristics (such as knowledge of anxiety symptoms, teacher depression symptoms, and student-teacher relationship quality) would be important to explore as predictors of reporter-specific variance in parent and teacher reports to uncover how and why these sources differ. Additionally, methods that employ independent observational methods across different contexts (at school, home, and in extracurricular environments), as well as peer and self-reports, would be useful to help provide a more complete picture of children's social behavior.

In addition to problems with study design, there are conceptual limitations that are important to address. For example, there is definitional construct overlap with anxiety, social competence, and social withdrawal (also commonly referred to anxious solitude, social withdrawal, shyness, Gazelle, Olson & Allan, 2010; Ladd, 2006; Stewart & Rubin, 1995), and it could be the case that the observed relations among anxiety and social competence are actually tapping into trajectories of social withdrawal. Social withdrawal is generally defined as being ineffective when joining social interactions, tending to play alone, and weariness in social situations, despite a desire to socially engage (Gazelle & Ladd, 2003; Gazelle, Olson, & Allan, 2010; Ladd, 2006; Rubin, Coplin, & Bowker, 2009). Evidence suggests that there is heterogeneity in social withdrawal trajectories (Eggum et al., 2009). Social withdrawal is conceptually similar to anxiety symptoms (weariness/nervousness, apprehension, and avoidance), and has similar etiologies and risk factors (e.g., behavioral inhibition; Broberg, Lamb, & Hwang, 1990; Rosenbaum et al., 1988). In fact, the utility of behavioral inhibition as a temperamental trait is widely debated, and the extent to which behavioral inhibition is actually distinct from anxiety is questionable. Children can be categorized as either inhibited or not, or along an inhibited-

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uninhibited continuum. Behavioral inhibition in infancy and toddlerhood has been linked with anxiety disorders and poor social adjustment later in development, although not all children with inhibited temperament manifest anxiety disorders (Kagan et al., 1999; Kerns, Siener, & Brumariu, 2011). Behavioral inhibition is stable across development, but *there is debate regarding whether behavioral inhibition should be considered temperament, or whether it is a marker for pathology development and risk* (Kagan et al., 1988). This is especially important to note in light of findings that suggest as many as 40% of children are not classified as inhibited or non-inhibited (Kagan, 1988). Although BI has been shown to predict anxiety disorder development (e.g. Kagan et al., 1999; Thorell, Bohlin, & Rydel, 2004), continuity in BI across development is most clear for children at the extremes of the BI continuum (Kagan et al., 1988), and anxiety disorders are most likely to develop in those who have extreme manifestations of these temperaments (Kagan et al., 1999).

Given that the predictive value of behavioral inhibition is present only at the extremes, coupled with findings that suggest that as little as 15% of the population can be categorized as inhibited, BI may be less useful as a temperamental trait than as a risk factor or early indicator for anxiety disorders (Kagan et al., 1988). It seems that behavioral inhibition (and social withdrawal and related constructs) may be better understood and studied as separate anxiety and social competence constructs, than as a single behavioral trait. Future research focusing on the factor structure of these constructs is needed to fully understand the extent to which these are distinguishable behavioral traits, as well as a developmentally focused examination of construct invariance across development. It could be that behavioral inhibition as a single trait is more useful in

younger children, but that this construct begins to differentiate as children get older and their social competencies become more complex. Future research should use factor analytic techniques within multi-trait-multi-method frameworks to explore the extent of overlap in anxiety, social competence, and social withdrawal/inhibition constructs.

III. Implications for Policy and Practice

This study provides important insights into the importance of looking at anxiety in kindergarten, rather than broadband internalizing symptoms. Findings from the extant literature that focus on internalizing problems, but not anxiety explicitly, demonstrate that social competence deficits among children with internalizing problems may emerge later in early childhood than was observed here. For example, evidence suggests that children with internalizing problems experience relatively steeper increases in social competence across kindergarten and 1st grade, but plateau and demonstrate attenuated social competence growth later in elementary school, relative to those without internalizing problems (Barry & O'Connor, 2010). It could be that anxiety is more salient than broadband internalizing problems for younger children, given that anxiety tends to emerge earlier than other internalizing problems, like depression (Brady & Kendall, 1992). Therefore, anxiety may interfere with social development at earlier time points than have been observed when looking at broader internalizing difficulty. If replicated, indicated and selective prevention programs aiming to prevent social competence decline or difficulty, such as the *Primary Project* aimed at prevention social maladaptation in early childhood (Chandler et al., 1984; Nafpakttis & Perlmutter, 1998; Weissberg et al,. 1983), should consider examining anxiety in kindergarten as a risk factor for identifying children who may benefit from these programs, especially among girls. This and other

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similar programs also should consider using multiple reporters of anxiety and social competence, including parents, teachers, peers, and independent observers, as risk could vary depending on the context of social deficits. More research is needed to uncover in what contexts and under what circumstances anxiety may be a salient risk factor for developing social difficulties.

Additionally, anxiety prevention programs may benefit from including social skills training components, as well as a specific developmental focus. Social competence enhancement is often implicitly included in anxiety prevention efforts. For example, group structure in prevention settings provides a means for children to learn and foster social skills in a safe and therapeutic setting. Given relations among growth in these variables, including more explicit social skills training may benefit children in early elementary school as these skills begin to emerge and change. This is especially relevant to anxiety development, given that many children experience anxiety in times of transition or stress. Understanding how to alleviate anxiety in these settings can have implications for public health, as well as efficient psychological resource allocation. Findings also suggest that social competence may not be a useful indicator of risk for emerging anxiety in kindergarten. Although social competence and anxiety may be cyclically related over time, levels of social competence at the kindergarten time point may not be a useful indicator of risk for anxiety. Alternatively, tracking social competence over time could be a more useful way of assessing risk. More specifically, tracking and identifying children who do not show normative increases in social competence *following the transition to kindergarten* could be more useful.

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APPENDIX A

TABLES AND FIGURES

Table 1

Descriptive Statistics, Skew, and Kurtosis

	N	M(SD)	Range	Skew	Kurtosis
Kindergarten (K)					
SES	289	-0.05(0.92)	-4.37 to 0.81	-1.12	1.30
TR Social Competence	291	3.30(0.69)	1.13 to 4.00	-0.82	-0.18
PR Social Competence	248	3.48(0.45)	1.75 to 4.00	-0.84	0.53
TR Anxiety	289	1.25(0.25)	1.00 to 2.25	1.23	1.32
PR Anxiety	248	1.28(0.24)	1.00 to 2.42	1.35	2.72
TR Externalizing (continuous)	290	1.17(0.24)	1.00 to 2.69	2.75	9.82
TR Externalizing problems	*34*	---	---	---	---
PR Externalizing (continuous)	248	1.23(0.21)	1.00 to 2.18	1.27	1.887
PR Externalizing problems	*34*	---	---	---	---
TR Negative Emotionality	278	3.29 (0.93)	1.10 to 5.41	-0.07	-0.53
PR Negative Emotionality	248	4.08(0.71)	2.15 to 5.92	0.02	-0.12
TR Attention Focusing	291	4.83(1.17)	1.50 to 7.00	-0.30	-0.69
PR Attention Focusing	248	4.80(0.83)	2.08 to 6.46	-0.69	0.40
1st Grade (G1)					
TR Social Competence	284	3.29(0.69)	1.00 to 4.00	-0.98	0.49
PR Social Competence	228	3.52(0.45)	2.29 to 4.00	-0.86	-0.07
TR Anxiety	284	1.25(0.33)	1.00 to 2.63	1.10	0.86
PR Anxiety	228	1.30(0.25)	1.00 to 2.42	1.28	2.19
TR Externalizing (continuous)	280	1.17(0.28)	1.00 to 2.64	2.32	5.90
TR Externalizing problems	*38*	---	---	---	---
PR Externalizing (continuous)	228	1.20(0.19)	1.00 to 1.98	1.40	2.29
PR Externalizing problems	*32*	---	---	---	---
TR Negative Emotionality	278	3.50(0.95)	1.33 to 6.52	0.26	-0.19
PR Negative Emotionality	229	3.98(0.80)	1.73 to 6.00	-0.03	0.04
TR Attention Focusing	283	4.75(1.22)	1.67 to 6.92	-0.48	-0.59
PR Attention Focusing	229	4.84(0.84)	2.38 to 6.69	-0.59	-0.05
2nd Grade (G2)					
TR Social Competence	277	3.34(0.64)	1.17 to 4.00	-0.93	0.40
PR Social Competence	213	3.51(0.47)	1.75 to 4.00	-1.09	0.86
TR Anxiety	277	1.32(0.32)	1.00 to 2.63	1.26	1.88
PR Anxiety	213	1.30(0.26)	1.00 to 2.25	1.28	2.19
TR Externalizing (continuous)	277	1.13(0.21)	1.00 to 2.33	2.44	7.28
TR Externalizing problems	*35*	---	---	---	---
PR Externalizing (continuous)	213	1.19(0.21)	1.00 to 2.45	2.25	7.40
PR Externalizing problems	*24*	---	---	---	---
TR Negative Emotionality	276	3.35(1.10)	1.08 to 6.22	0.02	-0.44
PR Negative Emotionality	213	3.91(0.75)	1.69 to 6.12	-0.12	-0.19
TR Attention Focusing	277	4.90 (1.22)	1.50 to 7.00	-0.37	0.29
PR Attention Focusing	213	4.85(0.79)	2.46 to 6.62	-0.41	-0.29

Note. SES = mean of z-scores of mother education and parent reported household income at T1. TR = teacher report, PR = parent report. Anxiety and social competence variables are calculated from means of measure items, so ranges may appear limited. TR and PR externalizing problems is the dummy coded externalizing problems variable (scores ≥ 1 sd from the mean coded as 1, all other scores coded as 0). *N* for the externalizing problems variable refers to the frequency of participants with scores of 1 ($\leq$ 1sd from the mean).

Table 2a

Correlations Among Focal Variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. TR SC K	---											
2. TR SC G1	.64**	---										
3. TR SC G2	.49**	.55**	---									
4. PR SC K	.45**	.51**	.36**	---								
5. PR SC G1	.36**	.52**	.33**	.58**	---							
6. PR SC G2	.31**	.42**	.44**	.52**	38**	---						
7. TR Anx K	-.19**	-.06	-.07	-.12	.03	-.05	---					
8. TR Anx G1	-.07	-.29**	-.06	.01	-.08	-.10	.08	---				
9. TR Anx G2	-.03	-.06	-.22**	-.02	-.04	-.13	.06	.23**	---			
10. PR Anx K	.02	-.04	-.09	-.22**	-.21**	-.18*	.11	.11	.27**	---		
11. PR Anx G1	.08	-.02	-.02	-.15*	-.22**	-.18*	.02	.26**	.31**	.71*	---	
12. PR Anx G2	.07	-.004	-.02	-.16*	-.28**	-.29**	.13	.13	.30**	.59**	.66**	---

Note. TR = teacher report, PR = parent report. K = kindergarten, G1 = 1st grade, G2 = 2nd grade. SC = social competence, ANX = anxiety. $^*p < .05$; $^{**}p < .01$.

Table 2b

Correlations Between Covariates (Rows) and Focal Variables (Columns)

Covariates	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
14. TR Ext K	-.60**	-.37**	-.37**	-.24**	-.11	-.06	.08	.04	-.005	-.03	-.10	-.10
15. TR Ext G1	-.44*	-.64**	-.34**	-.21**	-.28**	-.19**	-.006	.33**	.05	-.03	-.02	-.02
16. TR Ext G2	-.44**	-.48**	-.62**	-.27**	-.29**	-.28**	.06	.12	.17**	.03	-.01	.004
17. PR Ext K	-.34**	-.28**	-.24**	-.38**	-.36**	-.35**	-.07	.03	.08	.31**	.24**	.22**
18. PR Ext G1	-.31**	-.38**	-.25**	-.35**	-.44**	-.51**	-.15*	.17*	.17*	.27**	.37**	.32**
19. PR Ext G2	-.32**	-.33**	-.28**	-.31**	-.50**	-.50**	-.08	.05	.06	.17*	.23**	.30**
20. TR NE K	-.53**	-.40**	-.36**	-.26**	-.14*	-.19**	.34**	.08	.21**	.04	.03	.01
21. TR NE G1	-.39**	-.55**	-.28**	-.24**	.15*	-.08	.05	.51**	.16**	-.07	.05	-.06
22. TR NE G2	-.33**	-.31**	-.45**	-.11	-.12	-.13	.07	.26**	.52**	.10	.17**	.20**
23. PR NE K	-.10	-.16*	-.16*	-.36**	-.25**	-.18**	.16*	.06	.17**	.43**	.36**	.40**
24. PR NE G1	-.06	-.14*	-.17*	-.30**	-.33**	-.33**	-.01	.08	.17*	.33**	.43**	.39**
25. PR NE G2	.05	-.05	-.10	-.25**	-.33**	-.29**	.000	.04	.12	.34**	.41**	.48**
26. TR AF K	.67**	.46**	.38**	.32**	.19**	.23**	-.11	-.05	-.09	.03	.12	.03
27. TR AF G1	.54**	.60**	.40**	.30**	.28**	.23**	.02	-.15**	-.08	.003	.03	-.002
28. TR AF G2	.40**	.41**	.61**	.21**	.14*	.20**	.01	-.11	-.23**	-.06	-.05	.01
29. PR AF K	.35**	.31**	.32**	.38**	.26**	.28**	-.10	-.04	-.05	-.06	-.01	-.09
30. PR AF G1	.30**	.29**	.28**	.27**	.29**	.24**	-.01	-.02	-.11	-.09	-.09	-.09
31. PR AF G2	.19**	.25**	.24**	.25**	.27**	.33**	-.04	.03	-.04	-.11	-.09	-.13

Note. TR = teacher report, PR = parent report. K = kindergarten, G1 = 1ˢᵗ grade, G2 = 2ⁿᵈ grade. Ext = externalizing, NE = negative emotionality, AF = attention focusing. $^*p < .05$; $^{**}p < .01$. Numbers in row headings correspond to focal variables 1-12 presented in Table 2a.

Table 2c

Correlations Among Covariates

Covariates	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.
14. TR Ext K	---																	
15. TR Ext G1	.44**	---																
16. TR Ext G2	.52**	.46**	---															
17. PR Ext K	.36**	.30**	.29**	---														
18. PR Ext G1	.26**	.44**	.33**	.74**	---													
19. PR Ext G2	.24**	.32**	.41**	.69**	.77**	---												
20. TR NE K	.37**	.30**	.31**	.21**	.26**	.23**	---											
21. TR NE G1	.36**	.58**	.39**	.24**	.30**	.18**	.40**	---										
22. TR NE G2	.24**	.26**	.46**	.17**	.23**	.15*	.39**	.40**	---									
23. PR NE K	.12	.12	.10	.40**	.34**	.29**	.16*	.13	.12	---								
24. PR NE G1	.08	.13	.09	.33**	.44**	.25**	.14*	.06	.12	.69**	---							
25. PR NE G2	-.07	.01	.003	.25**	.34**	.34**	-.01	-.01	.11	.66**	.75**	---						
26. TR AF K	-.49**	-.35**	-.34**	-.32**	-.27**	-.27**	-.51**	-.35**	-.37**	-.09	.001	.01	---					
27. TR AF G1	-.37**	-.47**	-.36**	-.29**	-.33**	-.25**	-.35**	-.45**	-.34**	-.13*	-.10	-.07	.56**	---				
28. TR AF G2	-.28**	-.25**	-.46**	-.21**	-.20**	-.20**	-.31**	-.31**	-.60**	-.11	-.09	-.10	.46**	.51**	---			
29. PR AF K	-.15*	-.13*	-.25**	-.28**	-.25**	-.28**	-.17**	-.17**	-.19**	-.26**	-.18**	-.22**	.37**	.28**	.25**	---		
30. PR AF G1	-.12	-.12	-.22**	-.20**	-.28**	-.24**	-.12	-.13*	-.21**	-.19**	-.26**	-.24**	.31*	.35**	.32**	.74**	---	
31. PR AF G2	-.02	-.10	-.12	-.23**	-.23**	-.29**	-.13	-.07	-.12	-.26**	-.23**	-.29**	.30**	.29**	.31**	.68**	.73**	---

Note. TR = teacher report, PR = parent report. K = kindergarten, G1 = 1st grade, G2 = 2nd grade. Ext = externalizing, NE = negative emotionality, AF = attention focusing. $^{*} p < .05$; $^{**} p < .01$.

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Table 3

Univariate Unconditional Growth Models

		PR		TR
		Anxiety	Social Competence	Social Competence
Means				
	α(Latent Intercept)	1.28**	3.48**	3.29**
	β(Latent Slope)	0.02*	0.02	0.02
Variances/Correlations				
	α	0.04**	.13**	0.34**
	β	0.004*	.02*	0.03*
	α ,β	-.11	-.14	-.50**
Residuals at K, G1, & G2		.02**	.07**	.17**
Fit Statistics				
	χ^2/df (linear)	4.92/3, p = .18	4.13/3, p = .25	3.64/3, p = .30
	CFI	.992	.992	.995
χ^2/df (Intercept Only, Null)		14.87/6	12.87/6	9.72/6, p = .13
Satorra-Bentler Scaled $\Delta\chi^2$/Δdf		9.44/3, p = .02	8.01/3, p = .05	5.40/3, p = .14

Note. Means = estimated means for latent intercept and slope factors PR = Parent Reported Variables, TR = Teacher Reported Variables. Results for the teacher reported anxiety model are not presented here, as this model was met with convergence issues. $\Delta\chi^2$ tests fit of the linear models in comparison to an intercept-only (null) model. $^*p < .05$; $^{**}p < .01$.

Table 4

Parallel Process Growth Models

	PR Social Competence & PR Anxiety	TR Social Competence & PR Anxiety
Means		
$\alpha_{anxiety}$ (Latent Intercept)	1.28**	1.28**
$\beta_{anxiety}$ (Latent Slope)	0.02*	0.02*
$\alpha_{Socialcomp}$ (Latent Intercept)	3.48**	3.29**
$\beta_{socialcomp}$ (Latent Slope)	0.02	0.02
Variances/Correlations		
$\alpha_{anxiety}$	.04*	.04*
$\beta_{anxiety}$	.004*	.004*
$\alpha_{Socialcomp}$	.13**	.34**
$\beta_{socialcomp}$	.02**	.03*
$\alpha_{anxiety}, \beta_{anxiety}$	-.11	-.11
$\alpha_{Socialcomp}, \beta_{socialcomp}$	-.15	-.50**
$\beta_{anxiety}, \beta_{socialcomp}$	**-.68***	**.11**
$\alpha_{anxiety}, \alpha_{Socialcomp}$	**-.32***	**.02**
$\alpha_{anxiety}, \beta_{socialcomp}$	**.08**	**-.20***
$\alpha_{Socialcomp}, \beta_{anxiety}$	**.11**	**.07**
Residuals Anxiety K, G1, & G2	.02**	.02**
Residuals Social Comp K, G1, & G2	.07**	.17**
Fit Statistics		
χ^2/df	12.73/11, $p = .31$	12.93/11, $p = .30$
CFI	.996	.996

Note. Means = estimated means for latent intercept and slope factors. Residuals for measured anxiety and social competence are constrained to be equal across each measurement point. $^*p < .05$; $^{**}p < .01$.

Table 5

Parallel Process Growth Model Estimates with Externalizing as a Time Varying Covariate

PR Social Competence & PR Anxiety

Means

$\alpha_{anxiety}$ (Latent Intercept)	1.27**
$\beta_{anxiety}$ (Latent Slope)	0.01
$\alpha_{Socialcomp}$ (Latent Intercept)	3.50**
$\beta_{socialcomp}$ (Latent Slope)	0.02

Variances/Correlations

	1.	2.	3.	4.	5.	6.	7.
1. $\alpha_{anxiety}$	.04**						
2. $\beta_{anxiety}$	-.11	.003*					
3. $\alpha_{Socialcomp}$	-.28**	.17	.12**				
4. $\beta_{socialcomp}$	.06	-.60*	-.24	.02*			
5. Ext$_k$	.01	-.001	-.03	-.01	.12**		
6. Ext$_{G1}$	.01	.004	-.03	-.01	.07**	.12**	
7. Ext$_{G2}$	.001	.001	-.04**	.004	.06**	.05**	.10**

Path Estimates

Ext$_K$ → S-C$_K$	-0.15
Ext$_{G1}$ → S-C$_{G1}$	-0.16
Ext$_{G2}$ → S-C$_{G2}$	-0.28
Ext$_K$ → Anx$_K$	0.05
Ext$_{G1}$ → Anx$_{G1}$	0.06
Ext$_2$ → Anx$_2$	0.09

Fit Statistics

χ^2/df	13.18/11, p = .28
CFI	.995

TR Social Competence & PR Anxiety

Means

$\alpha_{anxiety}$ (Latent Intercept)	1.28**
$\beta_{anxiety}$ (Latent Slope)	0.02
$\alpha_{Socialcomp}$ (Latent Intercept)	3.36**
$\beta_{socialcomp}$ (Latent Slope)	0.005

Variances/Correlations

	1.	2.	3.	4.	5.	6.	7.
1. $\alpha_{anxiety}$	.04**						
2. $\beta_{anxiety}$	-.12	.004*					
3. $\alpha_{Socialcomp}$	.03	.05	.27**				
4. $\beta_{socialcomp}$	-.19*	.15	-.48*	.03**			
5. Ext$_k$	.003	-.003	-.05*	.002	.10**		
6. Ext$_{G1}$	.001	.001	-.06**	.004	.03**	.12**	
7. Ext$_{G2}$	.004	.001	-.06**	-.006	.04**	.02*	.11**

Path Estimates

Ext$_K$ → S-C$_K$	-0.50**
Ext$_{G1}$ → S-C$_{G1}$	-0.55**
Ext$_{G2}$ → S-C$_{G2}$	-0.23
Ext$_K$ → Anx$_K$	-0.01
Ext$_{G1}$ → Anx$_{G1}$	-0.002
Ext$_2$ → Anx$_2$	-0.005

Fit Statistics

χ^2/df	10.18/11, p = .51
CFI	1.00

Note. PR = parent report; TR = teacher report; Ext = binary externalizing problems variable (1 = scores $\geq$ 1 sd from the mean 0 = all those below 1 SD from mean). Ext was parent report in the PR model and was teacher report in the TR social competence & PR anxiety model; K = kindergarten, G1 = 1st grade, G2 = 2nd grade. * $p < .05$; ** $p < .01$.

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Table 6

Parallel Process Growth Models by Gender

	PR Social Competence & PR Anxiety		TR Social Competence & PR Anxiety	
Model a (Means by Gender)	Boys	Girls	Boys	Girls
$\alpha_{anxiety}$(Latent Intercept)	1.30**	1.25**	1.30**	1.25**
$\beta_{anxiety}$(Latent Slope)	0.01	0.03**	0.01	0.03**
$\alpha_{Socialcomp}$(Latent Intercept)	3.41**	3.56**	3.12**	3.45**
$\beta_{socialcomp}$(Latent Slope)	0.03	0.01	0.01	0.03
Fit Comparisons				
χ^2/df (means constrained)	46.09/38, $p = .17$		81.965/38, $p < .01$	
χ^2/df (model a)	36.95/34, $p = .33$		47.79/34, $p = .06$	
Satorra-Bentler Scaled $\Delta\chi^2/\Delta df$ (model a vs. constrained)	9.60/4, $p < .05$		41.12/4, $p < .01$	
Model b (Correlations by Gender)	Boys	Girls	Boys	Girls
$\alpha_{anxiety}$	.04**		.04**	
$\beta_{anxiety}$	.004		.004	
$\alpha_{Socialcomp}$	.13**		.31**	
$\beta_{socialcomp}$	.01*		.03*	
$\alpha_{anxiety}, \beta_{anxiety}$	-.10		-.09	
$\alpha_{Socialcomp}, \beta_{socialcomp}$	-.11		-.61**	
$\beta_{anxiety}, \beta_{socialcomp}$	-.74**		.08	
$\alpha_{anxiety}, \alpha_{Socialcomp}$	-.30**		.11	
$\alpha_{anxiety}, \beta_{socialcomp}$	**-.17**	**.70****	**-.14**	**-.40****
$\alpha_{Socialcomp}, \beta_{anxiety}$	**.25**	**-.21**	**.17**	**-.24**
Residuals Anxiety K, G1, & G2	.02**		.02**	
Residuals Social Comp K, G1, & G2	.07**		.17**	
Fit Comparisons				
χ^2/df (model b)	25.41/32, $p = .79$		42.96/32, $p = .09$	
Satorra-Bentler Scaled $\Delta\chi^2/\Delta df$ (model b vs. model a)	16.11/2, $p < .01$		5.32/2, $p = .07$	

Note. PR = parent report; TR = teacher report; Model a = the vector of model implied means α are freely estimated for boys and girls; model b = vector of means α and parts of the covariance matrix Ψ are freely estimated for boys and girls. In model b, only bolded covariances are freely estimated, all others are constrained equal for girls and boys. These models were estimated without covariates. $^*p < .05$; $^{**}p < .01$.
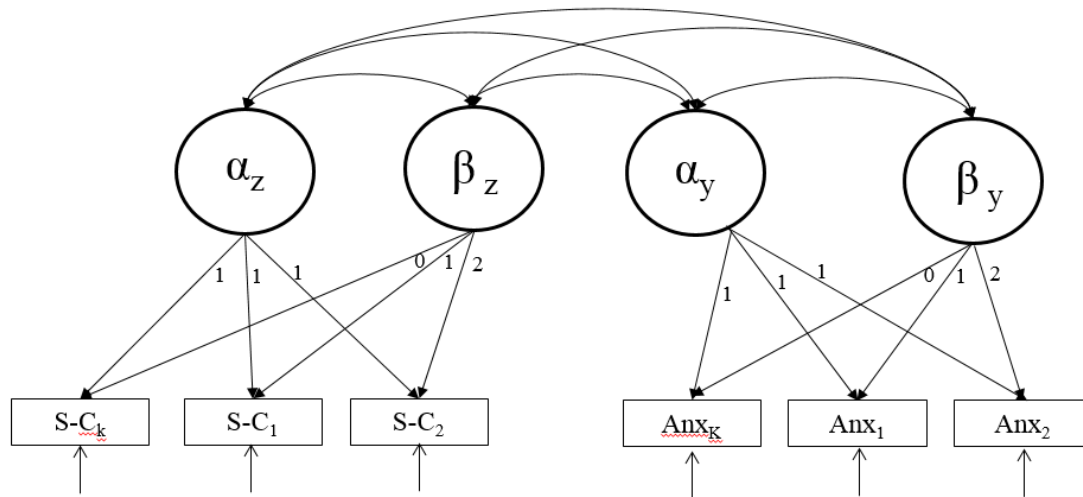
Figure 1. Statistical Model for Aim 1. S-C=social competence. Anx=anxiety levels. The subscripts k, 1, and 2 = kindergarten, 1st, and 2nd grade, respectively. Residual variances and means for latent factors were estimated but not shown here for simplicity.
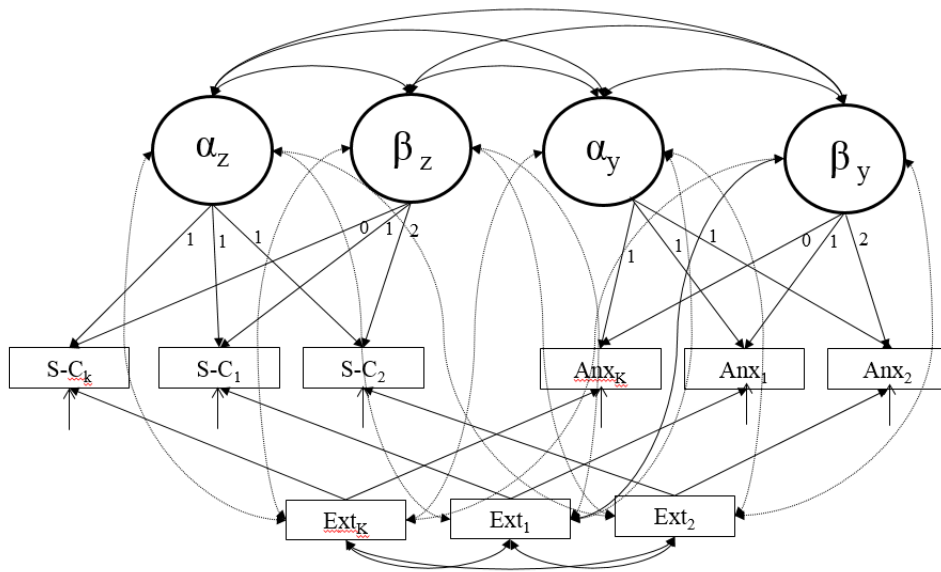
Figure 2. Statistical Model with Externalizing as a Time-Varying Covariate. S-C=social competence. Anx=anxiety levels, Ext = externalizing. The subscripts k, 1, and 2 = kindergarten, 1st, and 2nd grade, respectively. Residual variances and means for latent factors were estimated but not shown here for simplicity.
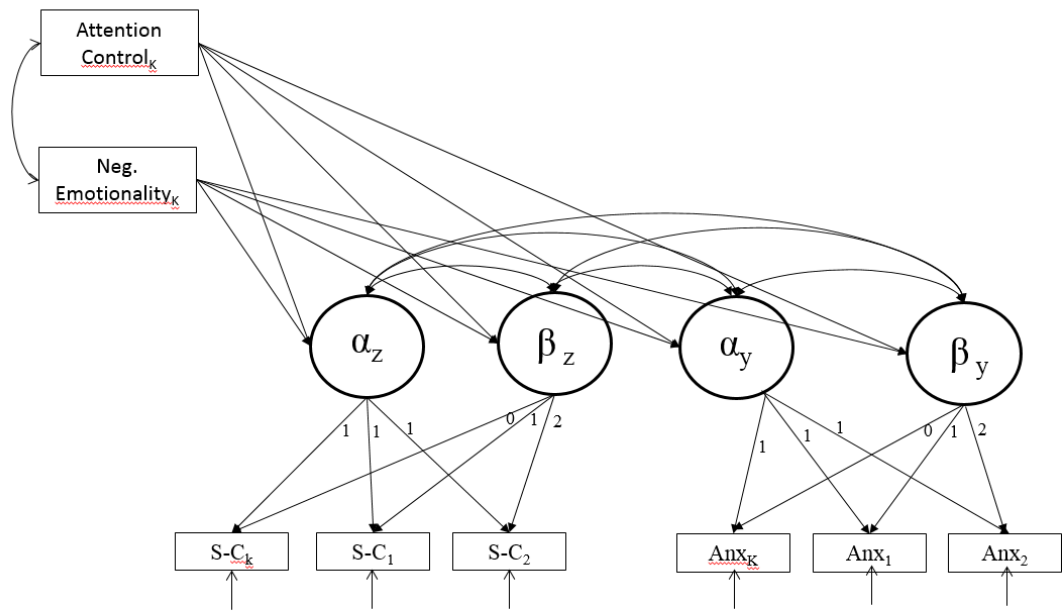
Figure 3. Statistical model for Aim 2 with temperament variables as time-invariant covariates. S-C=social competence. Anx=anxiety levels. The subscripts k, 1, and 2 = kindergarten, 1st, and 2nd grade, respectively. Residual variances and means for latent factors were estimated but not shown here for simplicity.
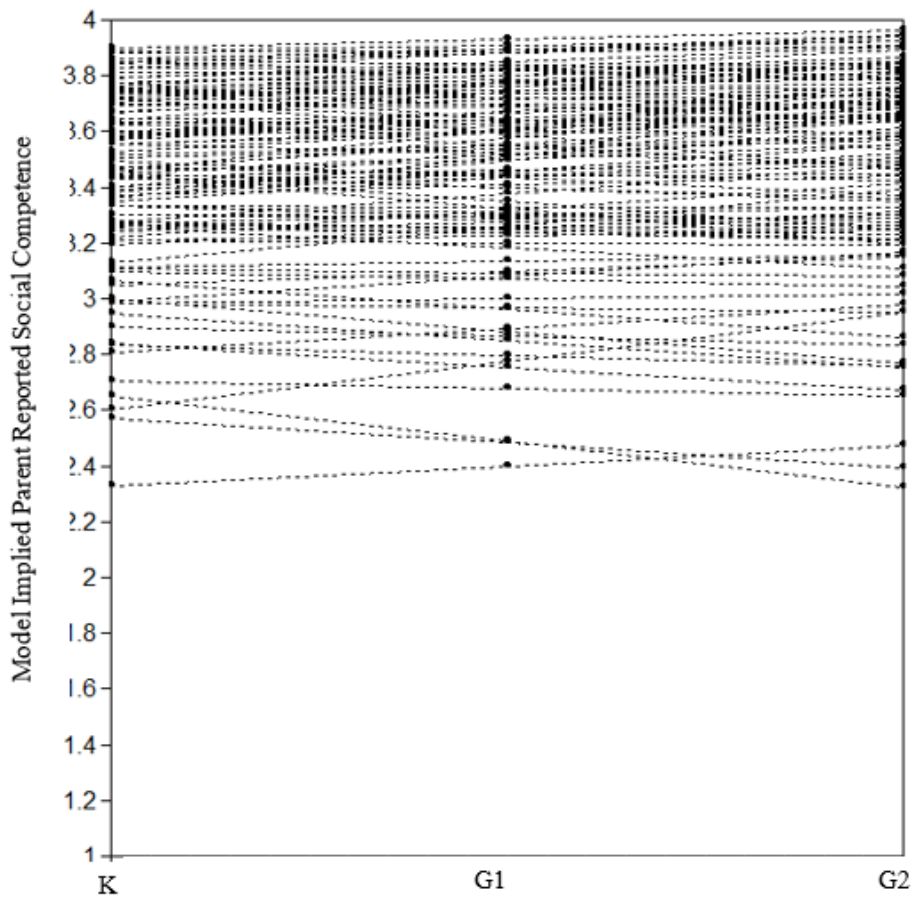
APPENDIX B

200 TEACHER REPORTED SOCIAL COMPETENCE TRAJECTORIES
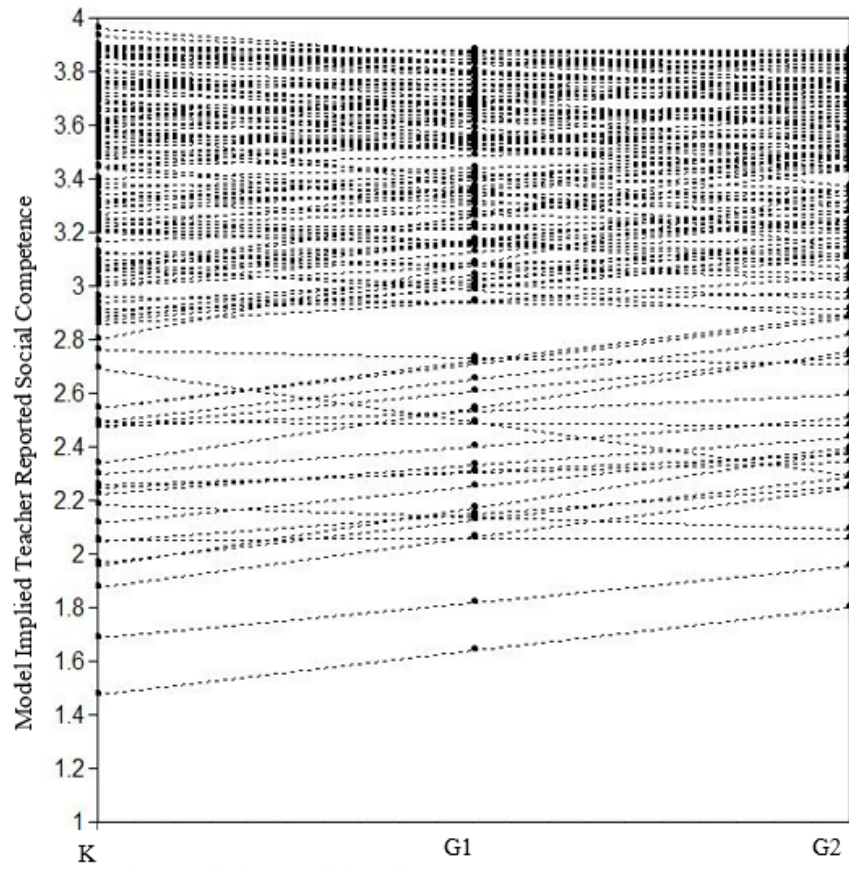
APPENDIX C

200 PARENT REPORTED SOCIAL COMPETENCE TRAJECTORIES

APPENDIX D

200 PARENT REPORTED ANXIETY TRAJECTORIES

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