AGGRESSION ACROSS EARLY CHILDHOOD IN THE CONTEXT OF
DEVELOPMENTAL COMPETENCIES

A Thesis in
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by
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Abstract

Persistent aggressive behavior during the elementary school years has been identified as a risk factor for both current and future social and academic success. This study examined developmental associations between emergent literacy, attentional control, and social competence skills across the pre-kindergarten year and relative contributions to aggression control. Three-hundred-fifty-six Head Start students were followed through first grade. Regression analyses revealed that preschool competencies contributed to aggression control in elementary school, specifically initial levels of attentional control and prosocial skills as well as acquisition of prosocial skills across the preschool year. Trajectories of aggressive behavior from preschool to elementary school were also identified along with competencies associated with trajectories. Maintenance of attentional control deficits predicted persistent aggressive behavior, while attentional control gains led to declines in aggression. Implications for preschool programs are discussed.
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CHAPTER 1: INTRODUCTION

The concept of school readiness, as defined by research and policy, implies that by age five children should be functioning at a cognitive and behavioral level that allows optimal adaptation to the challenges of formal schooling (Ladd, Herald, & Kochel, 2006). This preparedness for formal schooling, however, is not always achieved by the age of five, especially in children with temperamental, behavioral and economic vulnerabilities. Many risk factors have been identified as contributing to children not being prepared for formal schooling, the most salient of which is poverty. Children living in poverty are less likely to enter school with the basic learning skills and social emotional competencies that are required for a successful transition to formal schooling (Fantuzzo, Bulotsky-Shearer, McDermott, McWayne, Frye, & Perlman, 2007). This then leads to a gap in social emotional competencies and cognitive skills between those children with academic and social preparedness for school and children coming from more socio-economically disadvantaged backgrounds.

In this case, implementation of early childhood interventions to increase the likelihood of equal success in school is indicated. In order to achieve this goal it is necessary to study specific social emotional and cognitive deficits that may be risk factors for disadvantaged youth as well as whether these processes are developed and maintained in unique ways in high risk populations. One aspect of social emotional competence (and school readiness) that has been identified as a potential risk factor for concurrent and future behavioral and academic problems is physical aggression (Mesman, Bongers, & Koot, 2001; Keane & Calkins, 2004; Campbell, Spieker, Burchinal, Poe, & NICHD Early Child Care Research Network, 2006). It is important to note that rates of aggression are generally higher in economically disadvantaged communities,
which may be indicative of processes contributing to increased and potentially more stable levels of aggression in Head Start samples (Ingoldsby, et al., 2006).

Aggression has been defined as the act of initiating hostile behavior with the intent to dominate and/or hurt another person physically or psychologically. Common aggressive behaviors that can be identified in toddlers and preschool aged children include: yelling at others, biting, hitting, fighting with others, breaking things on purpose, and demanding or taking desirable objects from others (Coie & Dodge, 2006). Physically aggressive behavior is relatively common among toddlers due to increasing independence and sense of independence and ownership; however, aggressive behaviors typically decline during the late preschool period (Coie & Dodge, 1998). While aggressive behavior can be conceptualized as a normative behavior for children during early periods of development, children engaging in highly aggressive behaviors on a more frequent and severe basis may be at risk for social and academic difficulties (Campbell et al., 2006; Baillargeon, et al., 2007a; Lee, Baillargeon, Vermunt, Wu, & Tremblay, 2007).

Researchers and policy makers have recognized the need for early developmental studies examining the cognitive and behavioral risks affecting disadvantaged youth and the ways in which these risks can be remediated. The National School Readiness Task Force has identified social-emotional competencies as one of the central components of school readiness and proposed that it should be a specific priority of preschool education (Vernon-Feagans & Blair, 2006). Additionally, research has documented that the pre-academic competencies young children acquire during the early preschool years form the foundation upon which they will develop and build future competencies (Fantuzzo, et al., 2007).
The future of early childhood interventions will require an in-depth understanding of typical and atypical developmental pathways of aggression throughout preschool into the early elementary school years as well as knowledge of the correlates, predictors, and risk factors that facilitate reduction or maintenance of aggression levels across time. Additionally, intervention efficacy will depend on teachers, researchers and interventionists’ ability to predict which children are at highest risk for continuing on a pathway of increased aggression over time. These high-risk pathways of aggression influence risk for concurrent and future problems with interpersonal relationships, externalizing symptomology, academic underachievement, and grade retention.

Continuing on a pathway of increased aggression is a risk factor for peer rejection, academic difficulties, and later symptoms of both internalizing and externalizing disorders (Coie, Dodge, & Kupersmidt, 1990; Lahey, Loeber, Quay, Applegate, Shaffer et al., 1998; Keane & Calkins, 2004; Gilliom & Shaw, 2003). Research suggests that children engaging in aggressive behaviors are less likely to form and maintain positive peer relationships throughout the preschool and elementary school years (Ladd, 2006). Vitaro, Gagnon, and Tremblay (1990) found that peer behavioral ratings of children who engaged in “fighting” and “disturbing class” shared less, fought more, and disturbed others, all of which predicted rejection by peers. This study also found that approximately one-third of children rated as peer-rejected in Kindergarten maintained this rejected status one year later, suggesting that aggressive and disruptive behaviors are instrumental in predicting concurrent and future peer rejection. Additionally, children engaging in aggressive behavior are more likely to develop conflictual relationships with teachers (Palermo, Hanish, Martin, Fabes, & Reiser, 2007; Stipek & Miles, 2008).
In addition to poor quality of interpersonal social relationships with peers and adults, researchers have found that aggressive and disruptive behaviors may affect a child’s capacity to complete academic lessons and meet grade-level expectations (Kupersmidt & Coie, 1990). Thus, the link between behavioral and academic performance is important for the study of aggressive behavior in early childhood education (Normandeau & Guay, 1998; Hinshaw, 1992). In a longitudinal study, Normandeau and Guay (1998) found that aggressive behavior in Kindergarten was negatively related to school achievement in first grade (r = -.46). Numerous studies have documented similar significant associations between an individual’s aggressive behavior and his/her concurrent and future academic performance (see Hinshaw 1994 for review; Miles & Stipeck, 2006). It has been hypothesized that these associations are the result of a bidirectional relationship between externalizing behavior and academic performance (Dobbs, Doctoroff, Fisher & Arnold, 2006).

In addition to affecting peer relations and academic achievement, aggressive behavior is a risk factor for the emergence of externalizing and internalizing psychopathologies later in development (Vitaro, et al., 1990; Tremblay, et al., 2005; Campbell et al., 2006). Aggression is a central feature of some childhood Axis I disorders (such as Oppositional Defiant Disorder and Conduct Disorder) as well as a comorbid feature in disorders such as Attention Deficit Hyperactivity Disorder (Ostrov, Ries, Stauffacher, Godeski & Mullins, 2008). Children engaging in disruptive and/or aggressive behaviors are at increased risk for being diagnosed with a clinical disorder (Dick, Viken, Kaprio, Pulkkinen & Rose, 2005); these children are also at increased risk for long-term problems with academic progress and social relationships.
Given that aggression is both a normal feature of childhood and a potential risk factor for negative outcomes, it is important to study the development, stability, gender differences, and associated correlates of aggression, as well as the factors that influence the inhibitory control of aggression (Ostrov et al., 2008).

CHAPTER 2: AGGRESSION IN CHILDHOOD

Development of Aggression. Aggression during toddlerhood and early childhood is common and in many cultures, is viewed as a part of growing up (Reebye, 2005). It may be normative for young children to hit, yell, bite, and throw objects when engaging with peers and adults. Adults may not punish these behaviors, rather parents and teachers tend to view these behaviors as an opportunity to provide corrective feedback.

In a review of aggression, Coie and Dodge (1998; 2006) identified toddlerhood and early childhood (ages 2-4) as the developmental period characterized by the highest frequency of aggression. During these years children are becoming more independent and able to physically express their will to protest and resist with peers and adults (Hay, 2005). Additionally, Baillargeon and colleagues (2007a) reported that more children were likely to increase their use of aggression between ages one and two, rather than decrease in their frequency of aggressive behavior.

Following this period of increasing aggression there is a general tendency for a gradual decrease in physical aggression between preschool age and the early elementary school years (Coie & Dodge, 1998; Tremblay & Nagin, 2005). Some researchers have noted that this decrease in physical aggression coincides with an increase in verbal aggression (due to better language skills) between 24 and 48 months of age (Cohen, 2001). By the time children reach the early
preschool period, the overall frequency of physically aggressive behavior has decreased, and
when aggressive acts do occur they are usually isolated to situations involving specific
possessions. By the time children reach elementary school, instances of physical aggression are
very infrequent, whereas persistent use of aggression during elementary school and beyond
indicates higher risk for psychopathology (Coie & Dodge, 1998). When aggressive behaviors do
not decline by the early elementary school years, it may indicate delays or deficits in the
development of skills associated with self-control, including language, emergent literacy,
attentional control, and social competence.

*Stability of Aggressive Behavior.* Individual differences in rates of aggression appear
fairly stable across time (Coie & Dodge, 1998). Although a decline in aggression is theoretically
expected some studies show moderate to high correlations among individuals between the ages
of 2 and 5 (r = .47 to .76) (Keenan & Shaw, 1994). In a study of aggression in 2,940 toddlers,
Baillargeon and colleagues (2007a) separated toddlers into categories displaying aggression
“occasionally”, “sometimes” and “often”. This study found that children at 17 months of age
were estimated to be in the same physical aggression category (low = aggressive occasionally;
medium = aggressive sometimes; high = aggressive often) one year later, suggesting that the
predictive value of a toddler’s physical aggression status was high for outcomes measured one
year later.

In another study of children from 18 to 24 months of age, Keenan and Shaw (1994) found
overall moderate stability of aggressive behavior across this developmental period. The sample
was also stratified into a pervasive aggression group (19% of sample) and a non-pervasive
aggression group (81% of sample). Children in the pervasive aggression group manifested
aggressive behaviors in more than two situations, and engaged in more than one type of aggression, while remaining children displaying less aggression were placed in the non-pervasive aggression group. Stability correlations for the global ratings of aggression in the pervasive group (18 to 24 months) were very strong (r = .57 to .71) while stability estimates for the non-pervasive group were somewhat low (r = .05 to .32).

In a study of slightly older children, Mesman and colleagues (2001) found that early aggression, hyperactivity, and oppositional behavior measured in preschool (when children were ages 2-3) predicted significant variance in preadolescent (age 10-11) externalizing and internalizing problems. The preschool pathways were significant for boys (R² = .43 externalizing; R² = .39 internalizing) and girls (R² = .25 externalizing; R² = .13 internalizing) using parent report data. When teacher report data was analyzed, preschool pathways are somewhat less predictive yet still significant for boys (R² = .29 externalizing; R² = .14 internalizing) and girls (R² = .22 externalizing; R² = .08 internalizing). These data suggest that significant individual stability in preadolescent externalizing problems can be explained by behaviors evident in the early preschool years (ages 2-3) across informants.

It is important to note that stability estimates for younger children (between ages of 1 and 3) are higher than what is generally found when considering stability of aggression from early childhood through the early elementary years, suggesting that there may be a period in time where aggressive behavior becomes less stable (Baillargeon, et al., 2007a; Campbell & Ewing, 1990; Egeland, Pianta & Ogawa, 1996). This may be due to the developmental processes between 3 and 5 years of age when children acquire many skills and competencies that may work to foster the control of aggression (Caprara, Barbaranelli, & Pastorelli, 2001). Because preschool
aged children are rapidly developing internal neurobiological structures that assist with executive function and inhibitory control (Blair, 2002), as well as being exposed to more structured time with peers and adults, this period of life may be the most appropriate for preventive interventions designed to promote aggression control (Tremblay et al., 2005; Keenan & Shaw, 1994).

*Sex Differences in Aggressive Behavior.* In addition to the development and stability of aggression, it is important to consider sex differences in the manifestation of aggressive behavior (Juliano, Werner, & Cassidy, 2006). A meta-analysis of gender differences in aggressive behavior reports that young boys tend to exhibit higher rates of aggression than girls (weighted mean of $d = .44$) (Archer & Cote, 2005).

Some research finds that sex differences are evident in the type of aggression in which young children engage (Ostrov & Keating, 2004). Researchers have proposed that aggression intended to inflict harm through damage, threat, or control of relationships, referred to as relational aggression, indirect aggression or social aggression is typically the preferred method of aggression among females (Vaillancourt, 2005). This behavior emerges during the preschool years and continues into middle childhood, with research finding that girls prefer relational methods of aggression, while boys are more likely to use physical aggression (Crick, Ostrov & Kawabata, 2007). These gender differences may be related to the different socialization methods used with boys and girls (Keenan & Shaw, 1997) or to the importance that girls place on social interaction. Both relational aggression and physical aggression display moderate levels of stability over time and predict negative peer and teacher relationship outcomes (Ostrov et al., 2008; Card, Stuckey, Sawalani & Little, 2008).
In a study of physical aggression, Mesman, Bongers, and Koot (2001) found that boys ages 4 and 5 had significantly higher parent report scores on the Dutch translation version of the Externalizing Subscale of the Child Behavior Check List (CBCL) compared to girls of the same age; similar results were found at ages 10 and 11. This finding suggests that development and stability of aggressive behavior may be different for boys and girls in the preschool period. Boys have also been found to engage in more forcefully aggressive acts over a longer period of time, while girls may outgrow this tendency at an earlier age (Coie & Dodge, 1998; Lee, Baillargeon, Vermunt, Wu & Tremblay, 2007).

In a longitudinal study of 2,940 children from the age of 17-29 months, Baillargeon and colleagues (2007b) used a latent three-class model to classify children as either high-aggressive or medium-aggressive based upon the estimated likelihood of engaging in aggressive behaviors “sometimes” versus “often”. This study found, using mother reports, that 35% of the population of males was characterized as medium-aggressive, while 5% of boys were high-aggressive at 17 months. Comparatively, 18% of females were characterized as medium-aggressive, with only 1% characterized as high-aggressive at 17 months. Data collected one year later showed that 80% of 17-month-old children were estimated to be in the same physical aggression status that they were in one year prior. This study suggests that gender differences in aggression can be detected sometime around the first year of life and that these differences are likely to remain stable one year later.

Similarly, Archer and Cote (2005) found sex differences in aggressive behavior were not only evident, but increased between the ages of 2 and 5, using data from the National Longitudinal Study of Canadian Youth. Mother report of aggression in this study found that
females were more likely to belong to a declining trajectory of aggression than their male counterparts. Hypotheses attempting to understand this phenomenon consider that girls may develop language and prosocial skills earlier than boys or, girls may develop alternative manifestations of externalizing behavior (relational aggression) and/or internalizing behavior.

In the most recent meta-analytic review of gender differences in aggressive behaviors Card and colleagues (2008) reviewed 148 studies of relational and physical aggression. Of the studies reviewed, 107 reported significant gender differences; these differences were consistent with prior reviews finding physical aggression more common among boys than girls (Craig, Peters, Willms, 2002; Crick, 1995; Vaillancourt et al, 2003). These findings are supported by a medium effect size (r = .29). The magnitude of gender differences was affected by method of assessment, with parent reports and self-reports yielding lower levels of gender differences, while peer reports and observer reports yielded largest differences.

**Persistent Aggression and Negative Outcomes.** Although many children show a normative decline in aggression prior to school entry, there is evidence that some individuals maintain high levels of aggressive behavior past age five (Nagin & Tremblay 1999; Tremblay & Nagin, 2005). Researchers have identified persistent aggression trajectories based upon longitudinal data following school aged children through adolescence (Campbell et al 2006; Nagin & Tremblay, 2005). These persistent aggression trajectories are often influenced by gender and socio-economic risk with boys and disadvantaged individuals most likely to follow a profile of high-stable aggression.

In a study of physical aggression from school entry through adolescence, Brame, Nagin, and Tremblay (2001) found three general trajectories of aggression in a sample of 925 boys.
Teacher and parent rated measures of aggression were collected repeatedly from Kindergarten through high school. This study revealed the largest trajectory, which comprised over half of the sample (57%) was that of low and steadily declining levels of aggression at school entry which continued to remain low throughout adolescence. The second trajectory found in this study comprised 31% of the sample and can be described as moderate and declining levels of aggression in childhood leading to low levels of aggression by adolescence. The last trajectory, comprising 10% of the sample included children with a consistently high level of aggressive behavior beginning at school entry and remaining stable through adolescence. Similarly, a study of 6,000 children measured across six sites within the United States and internationally, found distinct trajectories (across samples) of children evidencing high levels of disruptive-aggressive behaviors from age 6 through 15; high aggressive trajectories generally represented 10-17% of the sample (Broidy, et al., 2003).

Another longitudinal study of aggression found evidence for five developmental trajectories of aggression in a sample of 1,195 children from ages 2 through 12 (Campbell, et al, 2006). This study measured aggression using parent report (from ages 2-4) and teacher report (from ages 5-12). The five trajectories of aggression were: very low aggression, low-stable aggression, moderate-decreasing aggression, moderate-stable aggression, and high stable aggression. Children on the high-stable aggression trajectory continued to show poorest adjustment across all groups over time. These children had poorer social skills, were more likely to meet symptom criteria for ADHD and ODD, and had lower quality of friendships. Children on the moderate-aggression trajectory demonstrated fewer problems than the high-stable group, but consistently had more problems with poor regulation than the lower aggression groups. The
moderate-decreasing trajectory included children who were high in aggressive behavior during childhood, but by age five had reached a significantly lower level of aggression; by age nine this group of children was almost indistinguishable from the low aggression group. This group of children followed the expected developmental pattern of aggression, with high levels of aggression evident prior to preschool entry and declining levels of aggression through the preschool years and very low levels of aggression once Kindergarten and elementary school age was reached.

Therefore whereas the majority of children follow the typical developmental pattern of aggression, with declining aggressive behaviors prior to elementary school, there is a distinct, yet small, group of children who may not evidence this normative decline (Brame et al 2001; Campbell et al., 2006; Broidy et al., 2003; Archer & Cote, 2005). The aforementioned studies would suggest that children showing high levels of aggression at school entry were most likely aggressive in preschool years and are at elevated risk for continuity of this behavior through adolescence (Broidy et al., 2003). It would be useful to determine which children will desist versus persist in high levels of aggression in order to better identify these children. Studying the preschool development of regulatory control, social emotional and cognitive skills related to the decline of aggression can provide invaluable information for indicated interventions (Juliano et al., 2006).
CHAPTER 3. DEVELOPMENTAL COMPETENCIES

In order to better understand the factors related to desistence and control of aggression researchers have examined its behavioral correlates. Social competencies such as emotion knowledge and prosocial behavior are often negatively related to concurrent and future expression of externalizing behavior (Card et al., 2008).

Social competencies have been described as skills which allow children to engage in successful interactions with peers and adults (Rose-Krasnor, 1997), these skills include knowledge of one’s own emotions, knowledge of the other individual’s emotions as well as the ability to voluntarily enact a behavior intended to benefit another (Garner & Waajid, 2008; Mussen & Eisenberg, 2001). These skills are often negatively related to aggression and may be potential protective factors for future functioning, thus generating interest in increasing social competencies as a method of decreasing aggressive behavior (Frey, Hirschstein, Guzzo, 2001).

Typically researchers have found that the trajectories of prosocial behavior, emotional understanding, and perspective taking increase over the preschool year while aggression expression typically declines during this time (Eisenberg & Mussen, 1989). During the preschool period, children progress from an initially self-centered interaction style toward a style that allows for increasing orientation to others. This is facilitated by social competencies which begin to emerge in the second year of life and increase throughout the preschool period, taking more complex and differentiated forms as children grow older (Zahn-Waxler, Radke-Yarrow, Wagner & Chapman, 1992).

Prosocial and emotionally competent behaviors are more likely to occur as children get older; these increases are linked to socialization, increases in perspective taking abilities as well
as increased opportunities for peer-to-peer interactions (Eisenberg et al., 1996; Knafo & Plomin, 2006). Prosocial behaviors can be operationalized as approaching peers and adults in a friendly manner, sharing resources in social activities, cooperating with peers and/or adults in group activities, including rather than excluding peers in play and learning situations, offering assistance to peers and adults when needed, and reciprocating positive communication and behaviors with peers and adults (Ladd, Herald & Kochel, 2006). Prosocial behavior also includes initiating contact, being generally sociable, and approaching new people, as well as voluntary behavior that is intended to benefit another person (Eisenberg & Fabes, 1998; Farver & Branstetter, 1994). Emotional competence refers to children’s ability to apply knowledge of emotion in an effort to regulate one’s own emotional experience as well as negotiate exchanges with others (Saarni, 1990; Ross, Powell, & Elias, 2002). Emotionally competent behavior is related to prosocial behavior, as many prosocial behaviors require a child to understand an individual’s emotional state (Eisenberg, Spinrad, & Sadovsky, 2006).

**Development of social competencies.** Social competencies are associated with a growing capacity for self-regulation, more sophisticated perspective taking cognitive abilities and an increased command of language (Eisenberg & Mussen, 1989; Hoffman, 2001; Estreem, 2005). These skills allow children to determine what another individual may want/need and effectively organize a behavioral response (Zahn-Waxler et al, 1992; Farver & Branstetter, 1994; Eisenberg & Fabes, 1998) thus leading to more opportunities for positive interpersonal interactions with peers. Children are more likely to respond in a socially competent manner when they are able to inhibit an impulsive response to interpersonal conflict, consider the consequences of an aggressive response and instead generate and implement a more prosocial solution.
Emotional development has also been linked to prosocial development; prosocial development is based on more than just cognitive reasoning and logic, as it benefits from emotional understanding and knowledge (Eisenberg & Mussen, 1989). Prosocial behavior is associated with the ability to label and regulate one’s own emotions as well label emotions of others. The emotions that are most often linked with prosocial behavior are empathy and sympathy which require a child to first understand and accurately label the emotion that is being expressed by another individual (Eisenberg & Mussen 1989; Hoffman, 2001). Once this occurs a child can empathize or sympathize with another, which increases the likelihood of prosocial response (Eisenberg, et al., 1999).

Prosocial behavior and emotion knowledge are influenced by environmental factors; family and school environments allow for expression of socially competent behavior which can be supported by parents, teachers and peers (Farver & Brandstetter, 1994). Exposure to parents, teachers, and classroom climates which provide warmth and nurturance are likely to support the development of prosocial behavior (Bohart & Stipek, 2001). In a study of first grade children’s emotional and behavior problems, Hoglund and Leadbeater (2004) examined whether the school environment (classroom, peer relationships, teacher relationships) contributed to development and expression of prosocial behavior after parenting factors were taken into account. Results showed that higher classroom levels of prosocial behavior, as reported by students, were significantly related to teacher ratings of social competence throughout the first grade year (r = .14). Additionally, children enrolled in classrooms with higher levels of prosocial behavior made more developmental gains in social competence over the first grade year; suggesting that a
prosocial environment promotes development of socially competent behaviors in early elementary school.

In addition, there has been some support for parenting techniques including increased warmth and nurturance being linked to children’s socially competent responding in preschool (Krevans & Gibbs, 1996; Eisenberg & Fabes, 1998). In a longitudinal study (beginning at age 4) Hastings and colleagues (2000) found that mothers who used more authoritarian parenting approaches had children who showed more disregard, and less concern for others 2 years later; while authoritative parenting was related to more empathy and concern for others. Additionally, parental socialization practices continued to predict reports of children’s concern for others two years later. Krevens and Gibbs (1996) also found that parental discipline strategies were significantly related to children’s prosocial behavior, and children’s empathy at ages 11-14 \( (r = .34) \). Use of inductive discipline strategies led to children who were more prosocial \( (r = .31) \); while power-assertive discipline was negatively related to children’s prosocial behavior \( (r = -.31) \). Suggesting that socialization influences from both home and school environments play a large role in development and continuity of socially competent behavior.

**Continuity of social competence.** A review of the scant literature studying stability of emotion knowledge reveals that once the ability to understand basic components of emotion expression are developed there is high to moderate continuity over time. A longitudinal study of children aged 3-6 found that children’s emotional understanding demonstrated moderate-high stability \( (r=.48) \) (Brown & Dunn, 1996). In a study of children in middle childhood (ages 7-11) researchers reported that individual differences in emotion understanding emerged early and remained stable over time. Younger children made improvements in emotion understanding,
however following the first year of the study emotion knowledge remained stable and there was no evidence of individuals regressing in emotion knowledge skills (Pons & Harris, 2005).

A number of studies have found moderate consistency of prosocial behavior over time (Eisenberg & Fabes, 1998; Graziano & Eisenberg, 1997). In a longitudinal study assessing the stability and change in prosocial behavior at ages 2, 3, 4 and 7 years, Knafo and Plomin (2006) estimated (using teacher and parent report) moderately significant stability over a 6 year span ($r = .13$ to $.21$). Estimates are somewhat suppressed due to the 6 year time estimation, and also because displays of prosocial behavior become more differentiated with age. When considering estimates over a shorter period of time, early childhood only (ages 2 to 4), estimates of prosocial continuity were higher ($r = .32$ to $.40$), suggesting that prosocial responding remains moderately similar and continuous over the early childhood years.

In addition to finding moderate stability of prosocial behavior in young children, some research finds significant stability for prosocial acts as early as age 2. Zahn-Waxler, Robinson, and Emde (1992) followed 184 children from 14-20 months of age using maternal reports of prosocial behavior. This study found maternal reports of prosocial patterns to be moderately stable over a duration of 6 months ($r = .51$).

In a longitudinal study of prosocial responding beginning at age four, Michalik, Eisenberg, Spinrad, Ladd, Thompson, and Valiente (2007), found moderate stability of prosocial responding through middle childhood (age 8). A sample of 214 children were assessed using parent report, teacher report, and self-report of prosocial behaviors beginning in preschool and at a four-year follow-up in second grade. This study found significant stability for prosocial
behavior using parent report (r = .41) and teacher report (r=.34). The self-report measures given to young children were also significantly consistent over four years (r = .30).

**Sex differences in social competence.** When considering sex differences in emotion knowledge Brown and Dunn (1996) found that at age 6 girls outperformed boys on a vignette task requiring explanation of conflicting/ambivalent emotions experienced by the main character. Additionally, this study revealed that girls’ emotional understanding was more likely to be associated with socially competent behavior in home and school settings.

In addition to emotion knowledge, significant differences in prosocial behaviors have been found between boys and girls. Research on sex differences in preschoolers is not particularly conclusive because boys and girls may vary in the frequency and type of prosocial behavior expressed. However, studies generally find that girls tend to exhibit a higher frequency of prosocial behaviors as compared to boys (Persson, 2005; Sebanc, 2003; Zahn-Waxler et al, 1992).

In a study of prosocial development among two-year-old children Zahn-Waxler and colleagues (1992) found that observer reports of prosocial behavior yielded significant sex differences, with girls expressing more empathic concern than boys and also more self-referential behaviors than boys between the ages of 18-20 months. In preschool aged children, Sebanc (2003) found that girls in the sample (n=98) were more prosocial, better liked, and less disliked ($F(1,92) = 8.90, p< .01$), when using a combination of teacher and sociometric reporting. Sociometric interview results also showed that girls were more prosocial and more likely to develop conflict-free friendships while in preschool.
While the general trend is that girls are more prosocial than boys, some researchers have found no significant differences in the expression of prosocial behaviors in boys and girls (Farver & Branstetter, 1994; Eisenberg et al., 1999). When differences are found, however, most studies report that preschool-aged girls exhibit a higher frequency of prosocial responding than their male age-mates (Persson, 2005).

*Social competence and aggression.* In a meta-analysis of 31 studies, Card and colleagues (2008) reported significant inverse associations between aggression and prosocial behavior. Twelve studies utilized teacher report ratings to determine the relationship between aggression and prosocial behavior, finding moderately significant negative relationships ($r = -.39$). Studies using parent reports of these constructs also found moderate and negative relationships ($r = -.36$); suggesting that children with higher levels of prosocial skill development are more likely to control aggression than children with fewer prosocial skills.

Hastings, Zahn-Waxler, Usher, Robinson and Bridges (2000) investigated whether prosocial behavior in preschool aged children would buffer or lessen the likelihood of developing future externalizing problems. A sample of 72 children was assessed using observation and parent report measures at the first assessment (age 4-5) and again two years later (age 6-7). Results of initial assessment demonstrated that children who displayed more concern and empathy toward mother and an experimenter simulating an injury (in a lab setting) were reported to have fewer behavior problems two years later. This study also revealed that the stability of externalizing problems (from preschool to early elementary) was moderately attenuated when children had high concern for others. These children’s actual number of externalizing problems dropped significantly from preschool (M= 58.60, sd = 8.31) to early
elementary (M = 54.06, sd = 8.34), t (72) = 4.03, p < .001. This suggests that increased prosocial responding may be associated with both lower baseline levels of externalizing problems as well as decreases in externalizing problems over time.

These findings support the existence of a negative relationship between prosocial responding, emotion understanding and aggression during the preschool and elementary years. In general, prosocial behavior in children has been found to be negatively related to not only aggression, but also to negative emotionality, anger, fear, and anxiety (Eisenberg & Fabes, 1998; Hastings et al., 2000). This is consistent with the finding that teachers, parents and peers tend to rate children that are more prosocial as less shy, and less aggressive; and those who are more aggressive are more likely to be rated as withdrawn and less prosocial preschoolers (Howes & Phillipsen, 1998; Sebanc, 2003; Card et al., 2008).

**Emergent Literacy Skills.**

In addition to development of behavioral skills which can facilitate decreases in aggression, preschoolers are developing pre-academic skills which affect current and future expression of externalizing behavior. Emergent literacy skills have been described as the premier academic skills that children acquire which predict later reading, writing, and academic achievement. Emergent literacy skill development is influenced by early environmental exposure to literacy related accoutrements as well as development of code-related skills which are developed in the early home and preschool settings. Code-related skills include print awareness, grapheme knowledge, grapheme-phoneme correspondence, and phonological awareness (Rhymer, Haebig, & West, 2009).
**Development of emergent literacy skills.** Code-related emergent literacy skills likely develop through phases which at first, rely on contextual recognition and eventually lead to complete phonological awareness. The developmental framework posited by McCormick and Mason (1986) asserts that children begin understanding letters and words in a context-dependent manner. For example, a child will be able to read the word “stop” when it is posted on a stop-sign or recognize the letter “M” when arriving at McDonald’s; however, the child cannot recognize these letters/words when embedded in a string of sentences. Following increased contextual cues children are then able to acquire an understanding of the conventions of reading and print, such as the knowledge that words and sentences are constructed and read from left to right and that book pages are turned from right to left. Children then develop knowledge of the alphabet used in their language and the ability to discriminate between letters versus non-letters, which is called print awareness. Once children have developed print awareness they then develop grapheme-phoneme correspondence which refers to the knowledge that each letter makes a specific sound. The final phase of emergent literacy as outlined by McCormick and Mason (1986) is phonological awareness, or the ability to recognize that words are a series of letters which when placed together make specific sounds (i.e., a child hearing the word “book” and knowing that it begins with the letter “b”). The developmental timing and accuracy of these code-related pre-literacy skills are influenced by home and preschool environments and have been shown to predict future academic and behavioral functioning (Rhymer, Haebig, & West, 2009).

Environmental influences on emergent literacy development include family literacy practices, parental characteristics, child characteristics and socio-emotional aspects of parent-
child relationship (McNaughton, 1995; Wasik & Hendrickson, 2004). Additionally, each of these factors is affected by the socio-economic environment in which a child is raised.

When considering family environment McNaughton (1995) states that socialization of culturally accepted language, activities reflecting family literacy practices and family mediated exploration of books influence a child’s opportunity for developing code-related emergent literacy skills. Also parent-child relationships characterized by warmth, nurturance, supportive speech and behaviors were correlated with higher language and literacy achievement in the future. Additionally these family mediated factors affect the child’s attention, interest and motivation in independent exploration of books and other literacy activities. Wasik and Hendrickson (2004) build upon this model by positing that the broader cultural and ethnic expectations and beliefs about education can influence a child’s language proficiency and opportunity for engagement with literacy material.

The preschool environment is also very important for emergent literacy skill development. High quality preschool programs including literacy add-ons have increased both pre-academic and socio-emotional readiness skills (Bierman et al., 2008). The continuity of emphasis on emergent literacy between the home and preschool environments is also a relevant factor in emergent literacy development.

*Emergent literacy deficits lead to negative outcomes.* Emergent literacy deficits are often linked to the early childhood environment, as home and preschool environmental factors are linked to pre-literacy achievement and are very crucial to later academic success. Children in poverty are more likely to enter preschool with deficits in early literacy skills, with only 19% of children below the poverty line entering school with the requisite literacy skills. Research has
found clear converging evidence that children experiencing early deficiencies in core emergent literacy skills are at risk for underachievement in future reading skills (Stevenson & Newman, 1986; Arnold & Doctoroff, 2003).

In a longitudinal study of children’s early pre-academic skills Stevenson and Newman (1986) found that early print awareness was moderately correlated (r=.52) with reading achievement in high school. Similarly math and reading skills in Kindergarten are significantly related to interest in academics in middle school and high school. Children from socioeconomically disadvantaged backgrounds are more likely to enter preschool with lower literacy skill levels, struggle with gaining these skills, become disinterested in academic success, and eventually become at risk for grade retention and school failure (Arnold & Doctoroff, 2003). Individuals at risk for this cycle of underachievement, disinterest, and failure often benefit from early intervention targeting both academic and social-emotional competencies (Greenberg, Domitrovich & Bumbarger, 2001).

Emergent Literacy and Aggression. Researchers have identified links between difficulties with emergent academic skills and concurrent and future aggressive and externalizing behavior. Hinshaw (1992) outlines the specific comorbidity among learning difficulties originating in early academic skill development and their relationship with behavioral functioning. It is likely that children entering preschool with fewer pre-academic skills and comorbid aggression are less able to organize themselves for optimal participation in literacy instruction. Additionally, literacy instruction may be more effortful and frustrating for children entering preschool with deficits in early reading and math skills. This frustration is often expressed through aggressive behavior in the classroom setting. Thus, early emergent literacy deficits and aggressive behavior are likely
reciprocally influencing and contributing to the maintenance of future problems. Children with comorbid externalizing problems and academic difficulties are at greater risk for future diagnosis of a mental disorder, school failure, and criminal activity (Frick, Kamphous, Lahey, Loeber, & Hart et al., 1991). Future research examining the comorbidity between aggression and emergent literacy will benefit from examining potential mechanisms underlying this relationship in preschool populations.

**Attentional Control Skills**

Attentional control skills have been defined as the capacity to focus and flexibly shift attention as well as ignore irrelevant stimuli in order to respond to relevant task demands (Blair & Diamond, 2008). Attentional control skills have been posited as an important aspect of rapidly developing executive function skills occurring during the preschool period. Executive function skills develop to facilitate children’s ability to plan and organize their thinking and behavior, and facilitate both academic and social success. As a prime component of developing executive function skills, attentional control has been linked to both emergent literacy development as well as development of social competence (Welsh, Nix, Blair, Bierman, & Nelson, 2010; Blair & Diamond, 2008). Attentional control promotes goal-directed behavior and effective approaches to learning tasks. Additionally, socially competent behavior relies on attention to important situational and facial cues in order to determine an individual’s emotional state and organize a competent response. Children with both behavioral and academic problems often have difficulty with the regulation of attention and attentional control (Hay, in press).

Children’s early attention skills have been posited as a possible mechanism linking disruptive behavior and emergent academic skills. In a preliminary examination of mechanisms...
that account for the relationship between externalizing behavior and academic problems, Arnold (1997) found that boys’ externalizing behavior was significantly associated with emergent literacy skills ($r = -.59$). Furthermore this study found that attention skills significantly mediated the relationship between emergent academic skills and disruptive behavior in boys (but not the relationship between behavior skills and later academic skills). This suggests that among children with attention deficits, poor academic learning may precede and escalate disruptive and aggressive behavior.

Attentional control skills are important in the development of approaches to learning, academic success and development of social competence. One method of evaluating these skills includes direct assessment of attention using tasks of executive function; these tasks require children to discriminate between relevant and erroneous stimuli for accurate completion. Research has shown that executive attention as measured through direct child tests are significantly related to academic success and behavioral regulation development (Welsh, Nix, Blair, Bierman, & Nelson, 2010; Blair & Razza, 2006; Bull & Scerif, 2001). In addition, observations of inattentive behavior are also predictive of current and future behavioral regulation and organization necessary for school and social success. Teacher, parent, and observational measures of children’s on-task behavior as well as inattentive behavior are predictive of concurrent and future difficulties with social competence and academic success (Greenfield & Fischel, 2005). This suggests that the cognitive and behavioral aspects of attentional control capacity are both important in predicting academic and behavioral problems in preschoolers.
CHAPTER 4. METHODOLOGY

The goal of the current study was to add to the existing literature on the development of aggression using a longitudinal design that examined initial levels and acquisition of social competence skills, emergent literacy skills, and attentional control skills and their relation to aggression decline as children transition from preschool to elementary school. Particularly of interest was whether development of competencies across the preschool are uniquely predictive of elementary school levels of aggressive behaviors, with initial aggression controlled. Empirical literature demonstrates that the majority of children follow the typical developmental pattern of aggression, with declining aggressive behaviors prior to elementary school however, there is a distinct, yet small, group of children who may not evidence this normative decline (Brame et al 2001; Campbell et al., 2006; Broidy et al., 2003; Archer & Cote, 2005). This study hypothesized that the initial levels as well as the acquisition of social competencies, emergent literacy, and attentional control skills would foster reduction in children’s expression of aggressive behavior. Additionally, it was hypothesized that distinct trajectories of aggressive behavior would be identified with some children evidencing low stable aggression, some high stable, and some declining. It was hypothesized that distinct trajectories from preschool to elementary school would be predicted by initial level and acquisition of developmental competencies. To test these hypotheses, this study used a longitudinal data set that includes measures of skill competencies at the beginning and end of the pre-kindergarten year, as well as aggressive behavior measured from preschool through first grade.

Participants
Participants included two cohorts of 4 year old children followed from preschool through first grade. Children were recruited from 44 Head Start classrooms as a part of a larger project (Head Start REDI). Participants resided in three Pennsylvania counties (Blair, Huntington, and York) which included rural areas, small towns, and small urban centers. Brochures were distributed to all parents of children in participating classrooms; those parents interested in participating returned brochures with contact information. Once families were contacted, informed consent was obtained for 356 children (19% Hispanic; 26% African American; 55% European American; 54% girls) which represented 86% of the eligible population. Although the initial sample included 356 children, 29 children were no longer a part of the sample at first grade follow-up assessment, due primarily to family moves out of the area. Attrition analyses were conducted to determine whether those children who dropped out of the study were significantly different from children who remained in the study through follow-up. The sample was split into two groups based upon whether individuals remained in the study through first grade follow-up or dropped from the study prior to this time. When comparing groups, children who left the study were not significantly different from those who remained in the study on initial measures of aggression, race, gender, location, or cohort.

**Measures**

Teacher ratings of child behaviors as well as direct child tests were used to assess the domains of interest. Teachers completed several measures describing children’s level of aggressive behavior, level of inattentive and hyperactive behavior, and level of prosocial skill. Preliminary analyses indicated high correlations between lead and assistant teachers in Head Start; thus their scores for each child were averaged to obtain a robust measure of each domain.
Teacher measures from the Kindergarten and first grade years reflect only the scores of the single teacher.

*Aggressive behavior.* Aggressive behavior was assessed using the Child Behavior Scale – Teacher at each time point. This measure includes seven items representing the construct of aggressive-oppositional behavior taken from the *Teacher Observation of Child Adaptation-Revised (TOCA-R)* (Werthamer-Larsson, Kellam, & Wheeler, 1991). Some wording modifications were used to ensure that items were developmentally appropriate for children (Appendix A). Teachers used a 6-point Likert scale to answer each item. Items included: “stubborn” “yells at others” “fights with other children” “breaks things on purpose”. Response options included: Almost never (score of 1), Rarely (score of 2), Sometimes (score of 3), Often (score of 4), Very often (score of 5), Almost always (score of 6). Ratings from preschool lead and assistant teachers were averaged due to high correlations among classroom teachers (*r* = .79 to .88). Additionally, teacher ratings from the spring of Kindergarten and the spring of first grade were moderately correlated (*r* =.41). Ratings from kindergarten teachers and first-grade teachers were averaged in order to provide a robust indicator of the child’s level of aggression after the transition to elementary school. Analyses conducted on all participants (N=356) revealed that inter-item reliability of this scale across three years was generally high (alphas .74 to .93).

*Social Competence.* Prosocial behavior was assessed using 6 items from the *Social Competence Scale* at preschool (Conduct Problems Prevention Research Group, 1995) (Appendix A). Teachers rated how often children exhibited specific prosocial behaviors using a 6-point Likert scale [1 (“Almost never”) to 6 (“Almost always”)]. Wording adaptations were made to ensure that the scale was developmentally appropriate for preschool children. Items
included “invites others to play”, “shares with other children”, and “helps other children”.

Analyses conducted on the data from preschool revealed high correlations between lead and assistant teachers ($r = .70$ to $.75$), thus were averaged providing a more robust prosocial skill measure. Analyses conducted on data from both cohorts of participants ($N = 356$) revealed high internal consistency ($\text{alphas} = .87$ to $.90$).

Direct child tests of emotion knowledge were also used; children completed the Emotion Recognition Questionnaire (ERQ) which required receptive recognition and verbal identification of basic emotion faces. In this task, children are presented with vignettes describing emotionally evocative situations and asked to point to the appropriate feeling (Ribordy, Camaras, Stafani & Spacarelli, 1998). Analyses conducted on data from both cohorts of participants ($N = 356$) reveals that inter-item reliability of this scale is generally moderate to high for preschool emotion knowledge ($\text{alphas} = .56$ to $.62$). Children also completed the Assessment of Children’s Emotion Skills (ACES) which required children to indicate basic emotion faces in photographs of human faces (Shultz, Izard, & Bear, 2004). Correlations between emotion knowledge in preschool were in the moderate range for both fall and spring measures ($r = .41$, fall; $r = .52$, spring). In order to achieve a robust measure of emotion knowledge scores on the ACES and ERQ were standardized and combined to create a composite score for fall and spring.

**Emergent Literacy Skills.** Print awareness, blending and elision skills were measured using subtests of the Test of Preschool Early Literacy (TOPEL) (Lonigan, Wagner, Torgesen, & Rashotte, 2007). Print awareness was tested using a 36 item assessment in which children completed multiple choice questions requiring children to match the picture of an item with the correct word representing the item (i.e. “these are pictures of books, which one shows the name
of the book?”). This task also includes 12 items assessing a child’s knowledge of letter names. Phonological processing was assessed with the Blending and Elision subtests; in blending the child is asked to combine different parts of a word (e.g. "hot" and "dog"), and then either point to the correct picture (multiple choice items) or say the correct word (free response items). The Elision subtest asked children to deconstruct compound words (e.g. if the word is toothbrush, and we take away brush, what word does that make?). To respond, the child must either point to the correct picture (multiple choice items), or say the correct word (free response items). In order to get a robust measure of emergent literacy the print awareness, blending, and elision subtests were composited. Analyses conducted on the emergent literacy composite data from both cohorts of participants ($N=356$) reveals that inter-item reliability of this scale is generally high for preschool emergent literacy (alphas = .94 to .96).

Attentional Control Skills. Two tasks were administered directly to children to assess their attentional control skills. The Peg Tapping task (Diamond & Taylor, 1996) required children to tap a wooden dowel twice when the experimenter tapped once and once when the experimenter tapped twice. After practice trials, children were administered a series of 16 mixed one-tap and two-tap trials. Children have to inhibit the tendency to copy the experimenter and produce the opposite response. The score was the number correct. The Dimensional Change Card Sort (DCCS; Frye, Zelazo, & Palfai, 1995) used cards depicting blue and red rabbits and boats. At first, children were taught to sort the cards based on color or shape, in a counterbalanced design. Then, after 12 trials, the children were asked to sort the cards based on the other dimension for the remaining 6 trials. The score was the number correct after the sorting rules were changed, designed to measure the child’s ability to inhibit the pre-potent response and
switch attention to the current sorting direction. Scores on each of these tasks were standardized and then composited to achieve a robust direct test of attentional control.

Teacher ratings of attention and activity level were also used. The DuPaul ADHD rating scale total composite teacher rating was assessed at the fall and spring of preschool (DuPaul, 1991). This 14-item scale, based on the Diagnostic and Statistical Manual symptoms of attention-deficit/hyperactivity disorder, reflects difficulties with impulse control, distractibility, and sustained attention. It consists of two subscales: 1) Inattention-Hyperactivity, and 2) Impulsivity-Hyperactivity, as determined by DuPaul (1991). Examples of items include: "Is easily distracted," "Has trouble following directions," and "Goes from one uncompleted activity to another." Teachers used a 4-point Likert scale to rate how much each item described each individual student. Response options included “Not at all” (score of 0), “Just a little” (score of 1), “Pretty much” (score of 2), and “Very much” (score of 3). Lead and assistant teacher ratings were averaged, as were all 14 items on the scale, resulting in a single summary score for this measure. Analyses conducted on data from both cohorts of participants (N =356) reveals that inter-item reliability of this scale is generally high for preschool hyperactive and inattentive behavior (alphas = .94 to .95).

Procedure

Assessments were conducted at four time points: 1) beginning of pre-kindergarten year in Head Start, 2) end of pre-kindergarten year in Head Start, 3) end of Kindergarten year 4) and end of first grade year. At each time point, research assistants delivered and explained the rating scales to teachers. Teachers completed written versions of all measures and were given monetary compensation for participation. For the pre-kindergarten direct assessments children were pulled
out of classrooms for two 45-minute sessions in order to complete direct tests (see Bierman et al, 2007 for in-depth review of procedures).

CHAPTER 5. RESULTS

Preliminary analyses.

Descriptive statistics including means, standard deviations, and range are shown in Table 1 for all variables. Sex differences were examined by conducting t-tests comparing the means for girls and boys on all variables. No significant sex differences emerged on the direct child assessments of emergent literacy skills, attentional control, or emotion knowledge skills. There were however significant differences between boys and girls on teacher ratings. Girls received higher ratings on prosocial behavior, whereas boys received higher ratings on aggressive and hyperactive-inattentive behavior (see Table 2).

Correlations among academic (emergent literacy skills), attentional control skills, and social competence skills (prosocial behavior, emotion knowledge) were computed. All of these predictor variables showed moderately high stability over the course of the pre-kindergarten year, with stability estimates ranging from $r = .81$ (hyperactive-inattentive behaviors) to $r = .43$ (emotion knowledge) for boys, and from $r = .79$ (aggression) to $r = .65$ (attentional control) for girls. Cross-sectionally, elevated aggression was significantly correlated with lower literacy skills (for boys only), less attentional control, less prosocial behavior, and elevated hyperactive-inattentive behaviors. Significant interrelationships emerged between the ability to organize oneself academically and the ability to regulate attention and engage in prosocial interaction. Specifically, for both boys and girls, emergent literacy skills, attentional control, prosocial behavior and (inversely) hyperactive-inattentive behaviors were significantly intercorrelated.
Emotion knowledge was also significantly correlated with attentional control, emergent literacy skills, and prosocial behavior (for girls and boys), but not consistently with hyperactive-inattentive behaviors (only for boys in the Spring) (see Table 3).

Predicting Aggression in Kindergarten and First Grade: Linear Analyses

First, predictive correlations were computed to determine the degree to which pre-kindergarten skills and behaviors predicted aggressive-oppositional behavior after the transition into elementary school. As shown in Table 4, preschool aggression was a significant and important predictor of aggression after the transition into elementary school. Attentional control and prosocial behavior assessed in the fall and the spring of the pre-kindergarten year also predicted low levels of aggression in elementary school, whereas elevated hyperactive-inattentive behaviors predicted elevated aggression for both boys and girls. By the end of the pre-kindergarten year, delays in emergent literacy skill acquisition predicted elevated elementary school aggression for both boys and girls and, for boys only, low levels of emotion knowledge predicted elementary aggression.

Next, a regression was computed to examine the degree to which emergent literacy, attentional control, and social competence skills in the pre-kindergarten year predicted aggression after the transition into elementary school, beyond the variance accounted for by pre-Kindergarten aggression. Child sex, county, intervention condition, and a verbal proxy for IQ (EOWPVT) as well as initial levels of aggression were entered in the first step of the regression as control variables. Next, the emergent literacy composite, attentional control composite, and emotion knowledge composite along with teacher ratings of prosocial and ADHD behavior from the fall of preschool were entered, representing initial levels of preschool competencies. In the
third step, skill composites and teacher ratings from the end of preschool were entered in order to represent acquisition of skills over the preschool year. In the fourth step, interactions between preschool competencies and sex were entered.

Results predicting to elementary school aggression are shown in table 5. Significant increments in variance were accounted for by steps 1, 2, and 3. Beyond the variance accounted for by preschool aggression levels, sex, location, and verbal skills (entered in step 1), initial competencies accounted for an additional 3% of the variance in predicting elementary school aggression (step 2). Initial levels of attentional control skills (attentional control, standardized β = -.14, p < .05; ADHD behavior, standardized β = .15, p < .10) and prosocial skills (standardized β = .16, p < .05) made unique contributions to the prediction of elementary school aggression, beyond that accounted for by preschool aggression. At the third step, the acquisition of prosocial skills during the preschool year as measured by teacher ratings made a unique contribution to the prediction of elementary aggression (standardized β = -.32, p < .01). No significant prediction to the model was made by the inclusion of sex by preschool competence interactions at Step 4, so this step was removed from the final model. This analysis suggests that preschool levels of social competencies, emergent literacy, and attentional control skills, along with the acquisition of prosocial behavior during the preschool year all facilitate the regulatory control of aggressive behavior, predicting future functioning beyond what is accounted for by demographic variables, verbal IQ, and initial aggression.

**Predicting Aggression in Kindergarten and First Grade: Group Comparisons**

Next, pre-kindergarten characteristics of children showing four different developmental trajectories of aggression were compared. Aggression trajectories were created using teacher
ratings of aggressive/oppositional behavior at the fall of the preschool year (time 1) and after entry into elementary school, represented by a composite of Kindergarten and first grade teacher ratings (time 2). A student who received a rating which was greater than or equal to ½ of a standard deviation above the mean at a given time point was considered “high” in aggression at that time. Students who received a rating that was less than or equal to ½ of a standard deviation above the mean were considered “low” in aggression. Using this method, four developmental trajectories of aggression were identified, discriminating students who received low stable ratings of aggression over time (n=218), those who received high stable ratings of aggression (n=41), those who received low ratings in preschool and high ratings in elementary school (increasing, n= 54), and those who received high ratings in preschool followed by low ratings in elementary school (decreasing, n=43). The percentage of children in each group did differ by sex ($\chi^2 (3,356) = 23.25, p<.001$), with more boys on high stable and increasing trajectories and more girls on low stable and decreasing trajectories.

In order to compare preschool characteristics of children following different aggression trajectories an ANCOVA was computed. Preschool county, a proxy for IQ (EOWPVT) and child sex were entered as covariates. Significant main effects for group were found for emergent literacy and emotion knowledge at the spring of the preschool year while group differences in attentional control, inattention and hyperactivity, and prosocial behavior were evident at the fall and spring of the preschool year. To explore these main effects Tukey post-hoc tests were conducted (see F-values, group means, and standard deviations in Table 5).

Individuals following a low stable trajectory of aggressive-oppositional behavior were selected as the comparison group as they follow a typical developmental pathway of low
aggressive-oppositional behavior from preschool to elementary school. Results for other groups are compared to this group and are discussed below.

**High Stable Trajectory.** Children following a high stable trajectory of aggressive behavior entered preschool with similar emergent literacy skills as compared to peers with low stable rates of aggression. At the conclusion of the preschool year, however, individuals high in aggression evidenced significantly lower emergent literacy skills as compared to low stable peers, reflecting differences in literacy gains over the preschool year. This suggests that individuals on a high stable trajectory of aggression are less likely to make the necessary literacy gains across the year, despite entering preschool without significant literacy deficits.

When considering social competencies, children with stable aggressive behaviors entered preschool with fewer prosocial behavior skills; additionally, these children left preschool with significantly fewer prosocial behavior skills than their non-aggressive peers. This suggests that children on a high stable aggression trajectory may have problems with acquisition of prosocial behavior skills in preschool. In addition to prosocial behavior deficits these children evidenced significant differences in emotion knowledge compared with the low aggression group at the spring of the pre-kindergarten year. This suggests that although entering preschool with comparable emotion knowledge skills, children on a high stable trajectory acquired significantly fewer emotion knowledge skills as compared to low aggressive peers.

Analysis of attentional skills at the beginning of preschool revealed that children in the high-stable aggression group had significant attentional control deficits as well as significantly higher levels of inattentive and hyperactive behavior at the entrance of preschool. Additionally, at the conclusion of the preschool year children on a high-stable trajectory of aggression
continued to display significant attentional control deficits and significantly more inattention and hyperactivity than their non-aggressive peers. This suggests that individuals high and stable in aggression are more likely to enter preschool with significant attentional control deficits which are not remediated over the preschool year. These children are likely not making necessary gains in attentional control and regulation of attention and activity level, thus facilitating maintenance of aggressive behavior over time.

*Increasing Aggression Trajectory.* Children following an increasing trajectory of aggressive behavior were rated as having low aggression levels in preschool and were later rated as highly aggressive by their elementary school teachers. Individuals on this trajectory entered preschool with emergent literacy skills similar to their peers, however at the conclusion of preschool these children had significantly lower levels of emergent literacy skills compared to low aggression peers. This suggests that although not aggressive in preschool, children following an increasing aggression trajectory did not acquire emergent literacy skills during preschool at the same rate as their peers with stable low aggression.

When considering social competence skills, children who became aggressive after the entrance into elementary school did not differ significantly from low aggressive peers on ratings of prosocial behavior or emotion knowledge at the fall of preschool. At the conclusion of preschool aggression increasers evidenced significantly lower levels of prosocial behavior; which suggests that these children are gaining fewer prosocial skill competencies as compared to low aggressive peers. Similarly, at the conclusion of preschool, these children evidenced significantly lower levels of emotion knowledge. This suggests that the failure to develop broad
social competence skills during the course of the prekindergarten year at a rate comparable to non-problem peers served as a precursor of increasing aggression after kindergarten transition.

Aggression increasers also evidenced significant deficits in attentional control skills at the entrance to preschool. Children following an increasing aggression trajectory entered preschool with elevated levels of inattentive and hyperactive behavior. Additionally, at the conclusion of preschool, aggression increasers continued to display elevated levels of inattentive and hyperactive behavior as well as attentional control deficits. Children following a trajectory of increasing aggression were apparently not making the necessary gains in regulatory control of attention and activity level during preschool, thus facilitating increases in aggression over time at the transition into elementary school.

*Decreasing Aggression Trajectory.* Children following a decreasing trajectory of aggression were rated as elevated in aggression levels at the start of the prekindergarten year, but within normal levels of aggression after the transition into elementary school. Children on this trajectory entered preschool with similar emergent literacy skill levels as their non-aggressive peers. At the conclusion of preschool however, children on a decreasing aggression trajectory evidenced significantly lower emergent literacy skills. Possibly, their aggressive behavior impeded their development of emergent literacy skills during preschool.

Children following a decreasing trajectory of aggression had similar levels of emotion knowledge as their non-aggressive peers. When considering preschool levels of prosocial behavior, however, these children had significantly lower levels as compared to non-aggressive children. This is likely because children following this trajectory are more aggressive in preschool, thus likely to have fewer prosocial interactions with peers.
When considering attentional control skills children following a decreasing trajectory of aggression evidence higher levels of inattentive and hyperactive behaviors across the preschool year. This is likely related to concurrent high aggression levels which occurred during the preschool period for this group. Children following decreasing trajectory also began preschool with significant deficits in attentional control skills. At the conclusion of the preschool year, however, aggression decreasers had similar levels of attentional control skills as their non-aggressive peers. This suggests that their attentional control deficits were remediated across the preschool year, possibly facilitating aggression control after the transition into elementary school. Additionally, at the conclusion of preschool, aggression decreasers evidenced significantly higher levels of attentional control skills as compared to high stable aggressive peers. This provides evidence that while individuals on high stable as well as decreasing trajectories are highly aggressive in preschool, the acquisition of attentional control skills is instrumental in facilitating their subsequent reduction in aggressive behavior.
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<td>-.06</td>
<td>-.57**</td>
<td>-.68**</td>
<td></td>
<td>.76**</td>
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Note: Correlations for boys are on top, correlations for girls are on bottom. Att Ctrl = Attentional Control. EmotKnow = Emotion Knowledge.
* p < .05. ** p < .01.
Table 4. Preschool Predictors of Elementary School Aggression

<table>
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<td>.46**</td>
<td>.47**</td>
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<td>.43**</td>
<td>.46**</td>
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<td>.06</td>
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<tr>
<td>Literacy - S</td>
<td>-.14**</td>
<td>-.12</td>
<td>.14†</td>
</tr>
<tr>
<td>Attentional - F</td>
<td>-.18**</td>
<td>-.15*</td>
<td>-.19*</td>
</tr>
<tr>
<td>Attentional - S</td>
<td>-.17**</td>
<td>-.17*</td>
<td>-.16*</td>
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<tr>
<td>Control - F</td>
<td></td>
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</tr>
<tr>
<td>Control - S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion - F</td>
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<td>.03</td>
<td>-.21**</td>
</tr>
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<td>Emotion - S</td>
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<td>-.08</td>
<td>-.17*</td>
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<tr>
<td>Knowledge - F</td>
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<td></td>
<td></td>
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<tr>
<td>Knowledge - S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prosocial - F</td>
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<td>-.24**</td>
<td>-.14†</td>
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<td>ADHD - S</td>
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<td>.40**</td>
<td>.26**</td>
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</table>

* p < .05. ** p < .01.
Note: F = fall and S = spring of the prekindergarten year.
Table 5. Profile group differences predicted by emergent literacy, social competence and attentional control competencies (whole sample with county and sex as covariates)

<table>
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<th>Predictor</th>
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<td>-.03 (.10)</td>
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<td>-.23 (.11)**</td>
<td>-.11 (.09)*</td>
<td>-.18 (.10)*</td>
</tr>
<tr>
<td>Emotion Knowledge</td>
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<td>-.09 (.12)</td>
<td>-.00 (.10)</td>
<td>.04 (.13)</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>.08 (.05)</td>
<td>-.18 (.12)*</td>
<td>-.16 (.10)*</td>
<td>-.01 (.11)</td>
</tr>
<tr>
<td>Attentional Control</td>
<td>Fall</td>
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<td>-.24 (.12)**</td>
<td>-.21 (.10)**</td>
<td>-.23 (.12)**</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>.09 (.05)</td>
<td>-.30 (.12)**a</td>
<td>-.05 (.10)</td>
<td>-.02 (.11)a</td>
</tr>
<tr>
<td>Prosocial Behavior</td>
<td>Fall</td>
<td>4.26 (.05)</td>
<td>3.15 (.11)**</td>
<td>4.23 (.09)</td>
<td>3.05 (.11)**</td>
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<tr>
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<td>4.15 (.10)*</td>
<td>3.31 (.12)**</td>
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<td>1.52 (.08)**</td>
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<td>1.50 (.07)**</td>
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<td>.46 (.04)</td>
<td>1.39 (.09)**</td>
<td>.71 (.07)**</td>
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Note: all significance values indicate difference from comparison group. *indicates significance at the p <.05 level; **indicates significance at the p<.01 level; † indicates significance at the p<.10 level; “a” indicates differences between high stable and decreasing groups
CHAPTER 6. DISCUSSION

The results confirm expectations that initial levels and acquisition of early developmental competencies in the domains of literacy, attentional control skills, and social skills facilitate aggression control over time. While predictors in each domain were interrelated, unique predictive variance was provided by prosocial and attentional control skills. Specifically, higher levels of teacher rated prosocial behavior as well as direct-tests of attentional control skills at the beginning of the preschool year predicted aggression control in elementary school. In addition, children’s acquisition of prosocial skills over the pre-kindergarten year was uniquely associated with lower aggression in elementary school, a pattern found previously in preschool-aged children (Hastings et al., 2000; Howes & Phillipsen, 1998; Sebanc, 2003; Card et al., 2008). These findings replicate previous empirical and conceptual work emphasizing the importance of prosocial and attentional control development during the preschool year.

Results of this study also found four distinct trajectories of aggressive behavior following children from preschool through elementary school. While other studies of aggressive behavior have found similar trajectories (Broidy et al., Brame, et al., Campbell et al., 2006) this study included examination of specific preschool predictors related to trajectory membership. As expected, children belonging to the high stable trajectory evidenced poorest academic and social adjustment in preschool and elementary school. These children entered preschool with deficits in attentional control skills, lower levels of prosocial behavior, and higher levels of hyperactive-inattentive behaviors; and over the course of the preschool year developed deficits in both emergent literacy and emotion knowledge. These factors are likely contributing to the maintenance of aggression over time and placing children at an increased likelihood for future
diagnosis of externalizing psychopathology and/or other antisocial behaviors. Children following this trajectory are also at increased risk for peer rejection as they are not developing the necessary emotional awareness and prosocial skills needed for reciprocal peer friendships (Ladd, 2006; Vitaro, Gagnon & Tremblay, 1990). These risk factors in addition to socioeconomic disadvantage indicate that intervention is necessary for increased academic and social development. These results would suggest that most effective interventions for high stable aggressors will need to include a focus on aggression reduction, increases in social competence as well as development of attentional control skills.

While the high stable aggression trajectory was expected and replicates prior research, one of the more surprising findings of this study was the discovery of an increasing aggression trajectory, which had not been previously identified in conceptual or empirical research with preschool children. Prior research has identified slightly rising trajectories of aggressive behavior in middle childhood (Campbell, Spieker, Vandergrift, Belsky & Berchinal, 2010) and adolescent populations (Brame et al., 2001), however increasing trajectories of aggression have not previously been identified in preschool populations. This trajectory, however surprising, was distinct, reliable and comprised 15% of the total sample. Children following this trajectory evidenced significant deficits in attentional control skills as well as higher levels of inattention and hyperactivity at the beginning of preschool. While emergent literacy, emotion knowledge, and prosocial skill deficits emerged throughout the preschool year and were evident at the conclusion of pre-kindergarten. This group of children likely enters preschool with developmental competencies which are at an adequate level for completion of many preschool tasks, thus preschool teachers rate these individuals as lower in aggressive behavior. However, as
these children face the demands of elementary school education which include increasingly complex social interactions and more instructional time spent with academic curricula, aggression increasers are unable to meet these increasing demands and begin to display more externalizing behavior.

Early intervention is also indicated in the case of aggression increasers. Because these individuals did not display aggressive behavior early in preschool, however were at increased risk for development of future aggression, identification of these individuals may be difficult. Results of this study would suggest that aggression increasers can be identified as individuals entering preschool with attentional control deficits which can be examined through direct-child test. Additionally, teacher ratings of inattention and hyperactivity may be useful in addition to direct-tests of attentional control skills. Once identified, intervention targeting emergent literacy, emotion knowledge and prosocial behavior is indicated in the prevention of future aggressive behavior in these individuals.

In contrast, a trajectory that was expected and of most interest was the declining aggression trajectory. Children following this trajectory displayed increased aggressive behavior and inattention-hyperactivity as well as prosocial skill deficits at both time points in preschool. Although displaying behavioral difficulties across the preschool year, these children displayed similar emotion knowledge skills as peers in the low stable aggression group at both beginning and end of preschool. Attentional control skills are of most importance in understanding the decline in aggression occurring between preschool and elementary school in this group of children. Children declining in aggression begin preschool with attentional control deficits; however these deficits are remediated over the preschool year, resulting in similar skill levels as
compared to low aggressive peers. Additionally, at the conclusion of the preschool year attentional control skills can be used to differentiate among children who will subsequently decrease in aggressive behavior and those who will not. Children remaining stable in high aggression expression maintained attentional control deficits across the preschool year, while children evidencing a subsequent decrease in aggressive behavior were able to remediate their attentional control deficits by the end of the preschool year. Although this study did not examine first grade social and academic outcomes, prior research finds that children following decreasing trajectories of aggression are more likely to have better adjustment in these domains as compared to peers remaining highly aggressive (Campbell et al., 2006; Campbell et al., 2010; Cote et al., 2006). These results would suggest that interventions targeted at aggression reduction should include a primary focus on increasing/remediating deficits in attentional control skills as these skills are instrumental in determining which individuals will decline in aggression versus those who remain aggressive over time.

Attentional control skills have previously been examined primarily in the domains of academic adjustment, with studies finding that executive attention and inhibitory control lead to better reading and math outcomes (Welsh et al., 2010; Fuchs et al., 2005; Passolunghi, Vercelloni, & Schadee, 2006; Swanson & Sachse-Lee, 2001). Results of the current study indicate that these rapidly developing executive function skills, primarily attentional control, are important in gaining regulatory control over aggressive behavior. Further examination of the dual behavioral and academic advantages of increased attentional control skills is warranted. It will be important to determine the nature of the relationship between attentional control and aggressive behavior; specifically, whether increased attentional control skills facilitate
aggression decline in a direct or indirect manner. It is plausible that attentional control skills increase attention to emotion cues in others, thus mediating its relationship with aggressive behavior. While this study finds a clear link between longitudinal aggression decline and increases in attentional control skills during the preschool year, further investigation is needed to examine potential mediators and moderators of this relationship. This further investigation will have specific implications for intervention science and provide more specific evidence for how attentional control skills affect aggressive behavior as well as how these skills can be targeted in the preschool setting.

Additional implications of these results indicate the importance of including direct-child tests of developmental competencies in addition to teacher ratings. While teacher reports of child behavior are useful, the addition of direct-child tests is incrementally beneficial in the study of aggression control. As this study suggests, executive function skills (specifically attentional control) which are rapidly developing during preschool are central to understanding aggression decline and/or maintenance. These skills however, may be difficult for teachers to accurately observe and report on. Additionally, direct-child tests of attention, inhibitory control, working memory and planning are relatively cost-effective. For the added information they provide, these tasks are short in duration and relatively enjoyable for most children. Direct-child tests of attentional control, and other executive function skills, may be useful in understanding gains in regulatory control of aggression. Future studies will need to include consideration of these skills as they will provide valuable information for intervention and prevention science.
Limitations

One important limitation of the current study is the relatively small sample size. Significant gender differences were found among trajectory membership with more boys belonging to high stable trajectories and more girls belonging to declining trajectories of aggression. Although this is a pattern found in previous research (Archer & Cote, 2005), future investigation may need to recruit larger samples which will allow for creation of whole sample trajectories as well as trajectories separated by gender. This will be valuable information for developing preventive interventions which may benefit from knowledge of whether acquisition of developmental competencies differs between boys and girls.

Although this study found a declining trajectory of aggressive behavior other behavioral and academic outcomes from elementary school were not examined. Future research will benefit from analysis of academic, social, and behavioral correlates for individuals following declining trajectories of aggressive behavior. It is of interest to determine the relationship between developmental competencies (i.e. attentional control skills) which predict trajectory membership and concurrent academic, social, and behavioral outcomes in elementary school. It is likely that developmental competencies which are facilitating the decline of aggressive behavior are also related to more successful peer relationships and academic success in reading and math.
References


### Table 1. Descriptive Statistics for all Variables

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<td>ERQ</td>
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Note: Composites are standard scores; DCCS= Dimensional Change Card Sort, ACES = Assessment of Children’s Emotion Scale, ERQ= Emotion Recognition Questionnaire
Table 2. Sex Differences

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* p <.05 level. ** p <.01.
Table 6. Predicting Aggression to Formal School Settings (Kindergarten & 1st grade composite) from Emergent Literacy, Social-Emotional, and Neuro-Developmental Competencies in Preschool

<table>
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<td>Emergent literacy (fall)</td>
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<td>-.07</td>
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<td>.05*</td>
</tr>
<tr>
<td>Emotion Knowledge (spring)</td>
<td>-.05</td>
<td>.06</td>
<td>.06</td>
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<tr>
<td>Emergent literacy (spring)</td>
<td>-.06</td>
<td>.07</td>
<td>-.07</td>
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<tr>
<td>Prosocial behavior rating (spring)</td>
<td>-.26</td>
<td>.07</td>
<td>-.32**</td>
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<tr>
<td>ADHD behavior rating (spring)</td>
<td>.03</td>
<td>.10</td>
<td>.03</td>
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</tbody>
</table>

*indicates significance at the p < .05 level, **indicates significance at the p < .01 level, †indicates trend levels of significance p < .10
### Appendix B: Child Behavior Questionnaire-Teacher (Aggression Scale)

<table>
<thead>
<tr>
<th></th>
<th>Almost Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Breaks things on purpose</td>
<td></td>
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<tr>
<td>2) Stubborn</td>
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<td>3) Yells at others</td>
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<td>4) Knowingly breaks rules</td>
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<td>5) Fights with other children</td>
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<tr>
<td>6) Ignores or refuses to obey adults</td>
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<tr>
<td>7) Hits, pushes, or shoves</td>
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</tbody>
</table>