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Peer Interactions and School Readiness in Head Start Children: Physical Aggression, Relational Aggression, and Prosocial Behavior

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PEER INTERACTIONS AND SCHOOL READINESS IN HEAD START CHILDREN:
PHYSICAL AGGRESSION, RELATIONAL AGGRESSION, AND PROSOCIAL
BEHAVIOR

By

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The current study investigated the relationship between peer interactions and school

readiness children enrolled in Head Start. The constructs of displayed and received

physical aggression, relational aggression, and prosocial behavior within children's peer

interactions were examined through direct observation. School readiness was measured

through direct assessment. It was hypothesized that aggression within peer interactions

would predict lower school readiness, while prosocial behaviors within peer interactions

would predict better school readiness. Sex was also hypothesized to moderate the

relationship between relational aggression, relational victimization, physical aggression,

physical victimization and school readiness. It was hypothesized that relational

aggression and victimization would more severely impact the school readiness of girls

and physical aggression and victimization would more severely impact the school

readiness of boys. Structural equation modeling (SEM) analyses revealed that physical

aggression and victimization as well as displayed and received prosocial behavior did not

significantly predict school readiness. Relational aggression predicted better school

readiness. Also, sex moderated the relationship between relational victimization and

school readiness such that relational victimization predicted better school readiness for

girls, but did not predict school readiness for young boys. Knowledge gained from this

study can inform preschool classroom practices on the role that peer aggression and prosocial behavior play in individual differences in children's school readiness.

This thesis is dedicated to my parents, Bill and Pat Faria, with love.

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Chapter 1 - Introduction

The purpose of the current study was to investigate the relationship between peer interactions and individual differences in children's school readiness in a Head Start sample. Specifically, physical aggression, physical victimization, relational aggression, relational victimization, displayed prosocial behavior and received prosocial behavior were examined in relation to children's school readiness in a low socio-economic status (SES) sample.

Living in Poverty

Studying the relationship between peer interactions and school readiness within Head Start samples is particularly important because children enrolled in the program are often living in poverty, which places them at risk for poor social and academic development. As of 2009, the federal poverty level was set at $22,050 for a family of four, $18,310 for a family of three, and $14,570 for a family of two (Department of Health and Human Services (HHS), 2009). In 2007, 20.9% of children in the United States under the age of 5 are living below the federal poverty threshold (US Census Bureau, 2008). Past studies documented that as many as 33% of American children live below the poverty line for one year or more, and 18% live in extreme poverty (Rank & Hirschl, 1999). Because the effects of poverty are most profound during a child's earliest years, it is even more problematic that younger children are more likely to experience poverty (Bradley, Corwyn, Burchinal, McAdoo, & Garcia Coll, 2001; Bronfenbrenner, 1996).

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Preschool children living in poverty are at risk for many negative outcomes, including deficits in language and cognition (Arnold & Doctoroff, 2003; Bradley, et al., 1999; Duncan, Brooks-Gunn & Klebanov, 1994; Hester & Kaiser, 1998; Kaiser & Delaney, 1996; McLoyd, 1998). Children living in poverty are also at-risk for broad negative social-emotional difficulties such as problem behavior (Duncan & Brooks-Gunn, 1997; Qi & Kaiser, 2003). Specifically within social domains, children living in poverty have deficits in impulse control as well as social problem-solving skills (Lochman, Lampron, & Rabiner, 1989; Shaw, Keenan, & Vondra, Delliquadri, & Giovannelli, 1997). These social deficits may also lead to peer rejection, which further places children at-risk for negative social development (Dodge, Pettit, & Bates, & Valente, 1995).

Poverty also has negative relationships with children's cognitive and academic development. Unfortunately, living in communities with fewer resources to support the learning and development of young children can lead to poorer school readiness. Low-income children are disadvantaged in school readiness, with deficits in cognitive skills when compared to higher SES children (Baker, 1998; Stipek & Ryan, 1997). The combined effects of living in poverty are detrimental for children's social development and school readiness, making research in this population important.

What is Aggression and Why Should We Study It?

Aggression is a behavior of interest to psychologists, teachers, and parents that has a wide ranging impact on our society. Aggression is generally defined as an act that intentionally causes harm to others (Crick & Grotpeter, 1995). Aggression in its broadest form has impacts on society as a whole through examples of extreme violence in schools

such as the Columbine shootings, and more recently the Virginia Tech attacks. At the child level, aggressive behavior is linked with poor outcomes such as depression, loneliness, peer rejection, negative self perception, and academic difficulties (Crick & Grotpeter, 1995; Grotpeter & Crick, 1996; Crick, Casas, & Ku, 1999; Hinshaw, 1992). Childhood aggression is also a strong predictor of future social adjustment problems (Coie, Dodge, & Kupersmidt, 1990).

The historical approach to studying aggression focused primarily on violence and physical aggression (Bandura, Ross, & Ross, 1961). More recently, studies of aggression have broadened the definition to include more varied forms of aggression, such as relational aggression, expanding the research to include the aggressive patterns more typical of young girls (Crick & Grotpeter, 1995; Crick, Casas, & Mosher, 1997; Crick & Bigbee, 1998). Physical aggression, however, remains the most studied and well understood aspect of childhood aggression.

Physical aggression. Physical aggression is the most salient form of aggression and is defined as bodily harm or threat to harm (Bonica, Arnold, Fisher, Zeljo, & Yershova, 2003). In preschool it includes pinching, punching, kicking, and threat of these actions. It is the most commonly studied form of aggression both historically and presently in the field. There are also very alarming associations between physical aggression in childhood and negative outcomes later in life such as alcohol and drug abuse, violent crimes, depression, suicide attempts, spousal abuse, and eventually neglectful and abusive parenting of their own children (Fergusson, Horwood, Ridder, 2005; Farrington, 1994; Kokko & Pulkkinen, 2000; Nagin & Tremblay, 1999; Serbin, et al., 1998; Stattin & Magnusson, 1989).

Relational aggression. In contrast to the historical approach to studying aggression, which arguably left girls out of the discussion, more recent studies have identified different aggressive strategies in which girls more commonly engage, such as relational aggression. Relational aggression is defined as harming others through damage to close relationships, including peer, sibling, parental, and romantic relationships and includes behaviors that are used to undermine a child's feelings of acceptance (Bjorkqvist, Lagerspetz, & Kaukiainen, 1992; Crick & Grotpeter, 1995). Relational aggression manifests differently at different ages, with more sophisticated behaviors developing through middle childhood and into adolescence. However, relational aggression is a common behavior found in early childhood (Crick, Casas, & Mosher, 1997). In preschool, relational aggression encompasses simple, direct behaviors that involve a current situation or provocation, such as "I won't be your friend unless you give me that crayon" (Crick & Grotpeter, 1995). Relational aggression is also considered to be a unique construct separate from physical aggression in childhood (Crick, Casas, & Ku, 1999).

However, the impact of relational aggression is still being explored. A handful of studies have investigated the effects of perpetrating relational aggression with negative outcomes documented, including concurrent peer rejection and future social maladjustment (Crick & Grotpeter, 1995; Crick, 1996). Engaging in relational aggression has also been linked with clinical pathology such as internalizing symptoms (Crick & Grotpeter, 1995). Interestingly, relational aggression also appears to have a more severe impact on girls as compared to boys (Crick & Grotpeter, 1995; Crick, 1996). Considering the negative impact that relational aggression has on young children, understanding its

etiology and use in young children is importance to prevent future social and psychological problems. However, relational aggression has been explored mostly in Caucasian, middle-class samples (Crick & Grotpeter, 1995; Crick, Casas, & Mosher, 1997; Crick & Bigbee, 1998), with little attention to the possible different manifestations of relational aggression that might be observed in diverse samples. This study extended current the literature by examining both physical aggression and relational aggression in a low-income preschool sample.

Peer Victimization

With an extensive literature on bullying within schools, peer victimization is now acknowledged as a common, yet detrimental aspect of children's peer interactions (Bjorkqvist, Ekman, & Lagerspectz, 1982; Olweus, 1993). Peer victimization is characterized as persistent harassment from peers (Olweus, 1993). The school is one setting where peer victimization is common, and this harassment often leads to maladjustment (Kochenderfer, Ladd, & Ladd, 2001). The two types of victimization included in this study are physical victimization and relational victimization. These two subtypes of victimization are distinct constructs, with only 13 % of children experiencing both physical and relational forms of peer victimization (Crick, Casas, & Ku, 1999). Regardless of form, peer victimization can have severe academic and social effects leaving socially victimized children at a disadvantage within school settings (see Olweus, 1993 for a review). Victimization is concurrently related to peer rejection, and longitudinally related to internalizing problems into adulthood (Olweus, 1993; Perry, Kusel, & Perry, 1988).

Physical victimization. Physical victimization in preschool is characterized by being the recipient of physical attacks such as hitting, kicking, pinching as well as threat of these actions (Ostrov & Keating, 2004). Physical victimization is related to social-psychological adjustment problems, such as anxiety, depression, feelings of loneliness, low self-esteem, and internalizing problems into adulthood (Boivin & Hymel, 1997; Boivin, Hymel, & Bukowski, 1995; Crick & Bigbee, 1998; Egan and Perry, 1988; Olweus, 1993). Victimized children also experience additional problems with peers in the form of general peer rejection (Perry et al., 1988) as well as having fewer friends and smaller social networks (Bukowski, Sipploa, & Boivin, 1995; Hodges, Malone, & Perry, 1995).

A child's school success can also be influenced by peer rejection. Children who experience peer victimization often develop school avoidant behaviors and are less engaged in their classrooms (Kochenderfer & Ladd, 1996). In a sample of middle-school students, victims were less interested in school, less independent, more impulsive in their learning behaviors, and engaged in more disruptive behavior in class (Wentzel & Asher, 1995). Academic outcomes can also be influenced by peer victimization resulting in lower academic achievement in multiple domains (Olweus, 1978).

Relational victimization. Relational victimization occurs when a child is harmed by manipulating their relationships, threatening damage of those relationships, or both (Crick et al., 2001). In preschool relational victimization involves direct interactions, and is characterized by social exclusion such as being told, "I'm not your friend," or, "you can't play with me" (Ostrov & Keating, 2004). The effects of relational victimization are less understood, with few longitudinal studies examining the future effects of peer

relational victimization. However, what is known about relational victimization is similar to the effects of physical peer victimization, such that recipients of relational victimization experience poor social-psychological adjustment with an emphasis on internalizing problems such as depression (Crick & Bigbee, 1998). Relational victimization may also be linked with regulatory systems within social interaction. In one study, girls who were categorized as extreme victims of relational aggression reported significantly more problems inhibiting anger and controlling impulsive behavior (Crick & Bigbee, 1998). Most research on the effects of relational victimization is limited to outcomes in the social-emotional areas of child development, and the effects of relational victimization on school readiness have not yet been explored.

Prosocial Behavior – A Dimension of Social Competence

In contrast to the negative aspects of peer interactions, this study also examined positive social behaviors. Social competence is a newer construct in the field of child development, reflecting the shift from the historical deficit models that dominated the field of psychology to a more positive view of the whole child. Rather than studying the negative factors that shift children's trajectories in a detrimental way, prominent theorists such as Ed Zigler began studying constructs that impacted children's lives in a more positive way (Raver & Zigler, 1997; Zigler & Phillips, 1961). Social competence is one of those positive constructs.

Teachers, researchers, and parents agree that social competence encompasses a child's ability to function effectively in social interactions. In preschool, children who display self-control and compliance are considered socially competent (Hogan, Scott, Bauer, 1992). As children grow and mature, behaviors such as rule-following at home

and at school are included as developmentally appropriate behaviors that demonstrate social competence (Masten & Coatsworth, 1998). When asked to describe a hypothetically socially-competent child, psychologists included these same behaviors, such as sharing, generosity, and initiating social activities (Waters, Noyes, Vaughn, & Ricks, 1985).

Prosocial behavior is an integral aspect of the greater construct of social competence and is defined as cooperativeness, helpfulness, sharing, and being empathic (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000). Several studies have explored prosocial behavior in young children (for a review see Eisenberg & Fabes, 1998). As early as age two and a half children commonly exhibit helping behaviors in response to another child in distress, however these behaviors are not present in children at one and half years of age, suggesting that prosocial behavior develops in early toddlerhood (Baillargeon et al, 2007).

Prosocial behavior is also related to global positive outcomes for children. In social-emotional domains, prosocial behavior is related to more advanced social problem-solving skills, closer friendships, and higher self-esteem (see Eisenberg & Fabes, 1998). Children who display more prosocial behaviors also display less disruptive behavior, and prosocial behavior is documented as one protective factor against developing aggressive tendencies (Bandura, 1999; Bandura, Barbaranelli, Caprara, & Pastoirelli, 1996; Mendez, Fantuzzo, & Cicchetti, 2002). Within peer groups and friendships, prosocial behavior is also used to maintain positive interconnectedness (Sober & Wilson, 1998).

In academic domains, prosocial behavior is linked with positive cognitive outcomes, such as better math, science and literacy achievement in elementary school

(Haynes, Ben-Avie, & Ensign, 2003; Miles & Stipek, 2006). Prosocial behavior is also related to increased academic achievement into early adolescence (Caprara, et al., 2000). With the positive impact that prosocial behavior has on both social-emotional development as well as academic success, it is important to better understand prosocial behavior within young children.

Development of Peer Interactions

Peer interactions do not develop in isolation. From an ecological perspective, the many microsystems within a child's life interact in meaningful ways to support or stress development. Extending this dynamic theory of child development to peer interactions would posit that children's aggression, victimization, and prosocial behaviors may all interact in meaningful ways to shape a child's social and academic development.

The historic approach to aggression and victimization within children's peer interactions has depicted bullies as socially inept youth who aggress their peers because they lack the social skills to react with more appropriate strategies (Sutton, Smith, & Swettenham, 1999). The social information processing model of peer interactions (Crick & Dodge, 1994) view aggression as a result of deficits in five important processes that allow a child to assess and respond to social situations: social perception, interpretation of social cues, goal selection, creating a response strategy, and deciding on an appropriate response. This social skills deficit model of peer aggression purports that aggressive children do not have these necessary social information processing skills (Randall, 1997), are socially blind (Hazler, 1996), or lack the empathy to regulate their aggressive actions (Olweus, 1993) and therefore bully their peers.

In contrast to the social skills deficit models of aggression and victimization, new theories supporting the co-occurrence of aggression, victimization, *and* prosocial behavior have appeared in the literature (Sutton, Smith, & Swettenham, 1999). Rather than assuming that children who engage in aggressive strategies lack social skills, this models proposes that children who engage in physical aggression and relational aggression engage in prosocial peer interactions at equal levels. This approach includes a more comprehensive model of peer interactions and posits that young children can engage in varying levels of aggression and prosocial behavior, and also receive varying levels of victimization and prosocial behavior. Therefore, this study included observations of both negative and positive peer interactions and explored how these different peer interactions were dynamically related to school readiness.

Sex and Aggression

Early studies in aggression primarily included male participants, with an assumption that females did not have the capacity for aggression as did males. Even in Bandura's social modeling studies, aggression was hypothesized to be a masculine trait such that young boys would be more predisposed to aggression than young girls (Bandura, Ross, & Ross, 1961). However, more recent research suggests that girls' aggression can be just as frequent and severe as boys' aggression, but manifests in different forms. For example, young boys often engage in more physical and verbal aggression than do girls (Block, 1983; Bjorkqvistt, Lagerspetz, & Kaukiainen, 1992; Crick & Grotpeter, 1995) while young girls engage in more relational aggression rather than physical aggression (Crick & Grotpeter, 1995).

These differences may be due to differing social goals of young boys and girls (Block, 1983). Young boys typically gain peer acceptance through physical dominance, and therefore use physically aggressive behaviors to achieve social goals (Block, 1983). Girls, however, seek close, intimate connections with others and use relationally aggressive behaviors that harm others' relationships (Block, 1983). Relationally aggressive episodes cause more distress for girls than boys because relational aggression targets the close dyadic friendships that are so highly valued by young girls (Crick, 1995; Crick, & Bigbee, 1998; Galen & Underwood, 1997). While previous studies purported that aggression was purely masculine, more recent studies have revealed that the sex difference is not in the quantity of aggressive actions, but in the type of aggression that is displayed (Crick & Grotpeter, 1995).

Similar to differences in displayed aggression, sex differences in peer victimization also exist. Most research to date concerning peer victimization has focused on physical or verbal victimization, such as being pushed, kicked, teased, or called names. Other forms of victimization, such as relational victimization are not as well understood or studied. Physical patterns of victimization occur more often within young boy's peer interactions, and are not as common among girls (Bjorkqvistt, et al., 1992; Crick et al., 2001). Therefore, peer victimization with young girls has historically been left out of the research literature. Recent studies have suggested that relational victimization is more common among girls, as one study conducted by Crick and colleagues in 2005 revealed that according to both teacher and peer reports, girls were more often the victims of relational victimization rather than physical victimization (Cullerton-Sen & Crick, 2005). The current study included direct observations of young

boys' and girls' physical and relational victimization to better understand patterns of peer victimization, and how victimization in the Head Start classroom was related to school readiness.

School Readiness

Over the last two decades researchers, policy makers, administrators, and educators have debated what it means to be "ready for school." In the early 1990s the National Education Goals Panel (NEGP) listed many areas of focus necessary to improve schooling in America, with children's readiness to learn listed as number one (Kagan, Moore, & Bredekamp, 1995). School readiness has now developed into a multi-domain concept capturing a child's ability to succeed in kindergarten. Within the child, there is a set of specific skills necessary for school success that encompass multiple domains of development including 1) cognitive development (such as early math and science skills), 2) language and literacy skills, 3) physical development (such as fine and gross motor development, as well as health), 4) social-emotional development, and 5) approaches to learning (Kagan, Moore, & Bredekamp, 1995). Building on the child-level skills needed for success, a broader definition of readiness has evolved that includes the ability of families and communities to support learning and development for young children, as well as the ability of schools to teach children once they arrive at their doors (Kagan, 1990). These multiple relationships and networks, including within the child, the home, schools, peers, and communities can either hinder or help a child's transition into elementary school both directly and indirectly (Rimm-Kaufman & Pianta, 2000). This study conceptualizes school readiness in terms of a child's cognitive skills that include

constructs such as early literacy and numeracy as well as other basic concepts such as knowledge of numbers, shapes, colors, and sizes..

School readiness in preschool is a construct of interest because it predicts later academic success (Kagan, Moore, & Bredekamp, 1995). Specifically, pre-literacy skills such as letter recognition are documented antecedents of reading ability in elementary school (Hart & Risley, 1999; Jordan, Snow, & Porche, 2000; Whitehurst & Lonigan, 1998). Also, preschool mathematical skills predict more complex skills later in development including problem solving (Sophian & Vong, 1995). Therefore, school readiness is an important antecedent of academic success for young children. It is also important to study the construct of school readiness in low-SES samples such as Head Start because children living in poverty are at-risk for lower school readiness and therefore later academic difficulties once they transition into the public school system.

Ecological Systems Theory

The study of social and academic development is often dependent upon environmental stimuli that can either hinder or enhance a child's development. Uri Bronfenbrenner's Ecological Systems Theory purports that children's development occurs within relevant environments, and identifies five systems within the environment that impact a child's development (1979). The microsystem is the environment most proximal to the child, including structures such as the family, school, peer group, or community. The mesosystem connects the more immediate environments, such as the relationship between home and school for children. The exosystem includes environments that have an indirect impact on child development, such as a parent's work environment. The macrosystem is the larger culture in which the three other systems are

embedded. Finally, a system involving change over time was introduced, referred to as the choronosystem. Bronfenbrenner purports that relationships exist both within and between systems and that they are bi-directional in influence (Bronfenbrenner, 1979).

This study attempted to apply Bronfenbrenner's ecological perspective to how a child's peer and academic structures interact within the microsystem of the preschool classroom. Theoretically then, peer interactions within the social structure of the preschool classroom will interact with children's academic learning and eventually their school readiness outcomes in ways that can provide either positive or negative preschool experiences for each child.

Peer Interactions and School Readiness

Peer interactions are viewed as a developmental context for learning. Through interactions with their peers, young children practice the important skills necessary for competent social and academic adjustment to school (McWayne, Fantuzzo, & McDermott, 2004). In the preschool classroom children use their peer play interactions to work through more complicated academic material presented during instructional periods. Also, peer play in preschool is one context where children learn and practice the new demands and expectations of the school (Farran, 2000; Farran & Son-Yarbroug 2001). Thus peer interactions can be a positive force in a child's life that help them develop the necessary skills to adapt to more advanced social and academic challenges in preschool classrooms.

We also know that peer interactions are related to children's adjustment to school (Ladd, 1990). Children view friendships as a major concern when transitioning into new schools (Levine, 1966). Peer interactions in elementary school have far-reaching effects,

with negative peer interactions predicting school avoidance, disruption, and school failure into high school (Parker & Asher, 1987). In younger children, those with more positive peer interactions experienced better adjustment across the kindergarten school year, and liked school better (Ladd, 1990). Conversely, children who experienced peer rejection early in their school experience had more negative outcomes such as poor school adjustment, and an overall dislike of school (Ladd, 1990).

Peer interactions in preschool can also have academic ramifications. Positive and effective peer interactions are related to academic competence through higher academic achievement in elementary school and high school (Ladd, Kochenderfer, & Coleman, 1996). Similarly, if a child fails to engage in effective peer interactions in preschool it can lead to poor academic achievement and increased truancy (Hartup & Moore, 1990; Kupersmidt, Coie, & Dodge, 1990).

Children who experience peer victimization are also at risk for negative school-related outcomes. With an extensive literature on bullying and victimization, it is well documented that children who are victimized engage in maladaptive school behaviors, such as school avoidance, dislike of school, lower academic motivation, less cooperative classroom behaviors, as well as lower achievement in areas such as math, spelling, and reading (Buhs, Ladd, & Hearld, 2006; Kochenderfer & Ladd, 1996; Wentzel & Asher, 1995). Overall, peer interactions can either support or stress children's social and academic lives. Examining the specific relationships between preschoolers' physical aggression and victimization, relational aggression and victimization, displayed and received prosocial behaviors, and school readiness will shed new light on the links between social-emotional development and children's early school success.

Research in Educational Settings: Nested Nature of the Data

When conducting research that examines children's academic achievement, one of the most important methodological challenges to address is the multilevel structure of the data (children nested within classrooms, which are nested within schools). Specifically in low-income preschools, a large amount of the variance in children's academic development is due to differences between classrooms. In studies of the cognitive development of young children living in poverty and attending federally funded preschools, nearly 20% of the variance in children's cognitive outcomes at the end of the preschool year was due to between-classroom effects (Lee, Loeb, & Lubeck; 1998). Other studies have demonstrated similar rates of between-classroom variation in children's academic outcomes (Reynolds & Packer 1992; Hill and Rowe, 1996).

Recently, there has been a growing awareness of these nestings as a methodological challenge that must be adequately addressed in educational research. Over the past two decades, advances in statistical analysis have been made that allow researchers to better account for these nestings and examine intricate relationships in educational settings in a more appropriate manner (Reynolds & Packer 1992). The earliest solutions to nested data involved aggregating child-level data to the classroom level or disaggregating classroom-level data to the child level, both of which have been recently discredited as inappropriate strategies (Raudenbush & Bryk, 2002). Currently, techniques such as random-coefficient regression models, covariance components models, multilevel modeling (MLM/HLM), and complex sample modeling in structural equation modeling (SEM) are available to account for the multilevel structure of educational data. Because the data included in this study were collected in Head Start

classrooms, and children were nested within classrooms, all analyses addressed the nested nature of the data to adequately examine the relationship between peer interactions and school readiness.

Current Study

The current study examined how physical aggression, physical victimization, relational aggression, relational victimization, displayed prosocial behavior and received prosocial behavior within children's peer interactions during preschool were related to individual differences in school readiness.

Hypotheses

Hypothesis 1: Relational aggression will exist in children enrolled in Head Start as young as four years of age. Understanding whether or not children living in poverty, who are at-risk for many negative social and cognitive outcomes engage in relationally aggressive strategies in their peer interactions will shed new light on the social-emotional development of children enrolled in Head Start.

Hypothesis 2: Sex differences will exist in peer interactions such that girls will engage in more relationally aggressive and prosocial behaviors than boys, while boys will engage in more physically aggressive behaviors. Although these sex differences have been found with children a young as age four, they have not been explored in an at-risk sample.

Hypothesis 3: Physical and relational aggression in peer interactions will predict lower school readiness scores. With the literature supporting the need for effective and high quality peer interactions during the preschool years, it was hypothesized that

aggression within peer interactions would hinder school readiness. Therefore physical and relational aggression were hypothesized to predict lower levels of school readiness.

Hypothesis 4: Prosocial behavior in peer interactions will predict better school readiness scores. Because prosocial behaviors are adaptive for multiple domains, prosocial behavior was expected to predict better school readiness skills.

Hypothesis 5: Physical and relational peer victimization in peer interactions will predict lower school readiness scores. Based on the previous peer victimization literature, it was hypothesized that physical and relational victimization would have independent effects on school readiness, but that both would be negative and predict lower school readiness.

Hypothesis 6: Received prosocial behavior in peer interactions will predict better school readiness scores. Based on research that demonstrates the importance of positive peer interactions in social-emotional and academic development, it was hypothesized that receiving prosocial behaviors from peers would predict better school readiness skills.

Hypothesis 7: Sex will moderate the relationship between peer interactions and school readiness such that relational aggression and victimization will have a more severe and negative relationship with girls' school readiness and physical aggression and victimization will have a more severe and negative relationship with boys' school readiness. Because of the documented sex differences in aggression as well as young children's sex-specific social goals, this study examined how aggression differentially impacted boys and girls' school readiness.

Chapter 2 - Method

Participants and Sampling

Participant recruitment took place early in the fall semester of the 2007-2008 school year. During this period, demographic data for classrooms and centers were collected to aid in sample selection. One-hundred-sixty-four children were initially consented in the fall of the school year. However, 4 children moved to classrooms not participating in the study within the same school, 14 children moved to schools not participating in the study, and 18 children were excluded because their teachers declined to continue participating in the study after October 2007. Therefore, due to attrition, 128 children had complete peer observations, 9 of which were missing language or school readiness assessments. The final sample of children with complete data included 119 children from 18 classrooms in six Head Start centers.

Centers were included in this study if they a) were located within 20 miles of the Coral Gables campus of University of Miami, b) had more than two Head Start classrooms with at least five enrolled children who were 4 years of age on or before September 1, 2007. Classrooms were included in this study if they a) were located in a selected center, b) had at least five enrolled children who were 4 years of age on or before September 1, 2007, and c) instruction in the classroom was conducted primarily in English. Children were included in this study if they a) were enrolled in a selected Head Start center and classroom and b) were 4 years of age on or before September 1, 2007. Centers, classrooms, and children were excluded from this study if they did not meet these inclusion criteria.

The final sample ($N = 119$) primarily included children of primarily minority ethnicities (52% Hispanic, 43% African-American, 4% Asian, 1% mixed race/ethnicity). Fifty-five percent of the sample was female, ranging in age from 4.01 to 5.33 years ($M = 4.53$, $SD = .29$). All children were from low-SES backgrounds. As of 2007, the Head Start income cutoff to receive services was set at 130% of the federal poverty level. Therefore, all children included in this study were living at or below 130% of the federal poverty level, which translated to less than $26,000 in yearly income for a family of four.

Measures

Observations of children's peer interactions were collected in the preschool classroom, as well as direct assessments of children's language and school readiness. Observations were collected from September to April, language assessments were conducted in April, and school readiness assessments were conducted in May..

Observations of peer interactions. The most naturalistic attempt at measuring peer interactions is through direct observation of children at play. The Early Childhood Play Project Observation System (ECPPOS; Ostrov & Keating, 2004) was used to assess both displayed and received peer interactions including the constructs of physical aggression, physical victimization, relational aggression, relational victimization, displayed prosocial behavior, and received prosocial behavior. The ECPPOS is a continuous event recording focal child observational approach (Fagot & Hagan, 1985). Participants were observed for ten minute intervals on at least eight sessions throughout the school year. In total, children were observed at least 80 minutes from September 2007 to April 2008. Live paper-and-pencil recording of behavior was used rather than videotaping because it was less intrusive for preschool children. A random observation order was followed, with all

participating children observed at a similar rate. Randomized orders were created through online random number generating software.

The ECPPOS coded displayed and received behaviors in the following domains; physical aggression, physical victimization, relational aggression, relational victimization, displayed prosocial behavior, and received prosocial behavior. It also allowed for information about play partners, such as frequency of same-sex versus other-sex play partners, and how many teacher interactions occurred during each 10-minute observation. Frequency counts for each child were calculated for discrete behaviors in the aforementioned behavior categories (both displayed and received), summing over all observations to yield one aggregate score for each construct measured. Frequency scores were then divided by number of observations to yield average scores for each domain for each child.

Validity of the ECPPOS was assessed in previous studies by correlating rates/incidences of aggression between accepted measures such as the Preschool Social Behavior Scale (PSBS; Crick,, Casas, & Mosher, 1997). In Ostrov and Keating (2004), partial correlations were analyzed between relational aggression observations and teacher-reported behavior on the PSBS teacher form. For both boys and girls the partial correlations revealed consistency between the two forms of assessment for relational aggression (r_{boys}(17) =.48, $p<.05$; r_{girls}(19) =.54, $p<.01$).

Intra-class correlations (ICCs) are one method to assess inter-rater reliability between independent raters that is accepted in the literature (Bartko, 1976; McGraw & Wong, 1996). In previous studies, past raters had high agreement with median ICCs ranging from .82 to .96; specifically: physical aggression, .96 (ICC = .75); verbal

aggression, .83 (ICC = .85); and relational aggression, .88 (ICC = .82). Similar analyses using single measure ICCs were conducted with the current data (see Table 1).

Expressive and receptive language. Educationally relevant language assessments were collected in the spring. To better serve the unique needs of bilingual children, standardized assessments of receptive and expressive language skills in both Spanish and English were collected using the Expressive (EOWPVT; Brownell, 2001a) and Receptive (ROWPVT; Brownell, 2001b) One-Word Picture Vocabulary Tests for both English-only speakers as well as the Spanish bilingual version (EOWPVT-SBE, ROWPVT-SBE; Brownell, 2001c, 2001d). These assessments are individually administered, norm-referenced tests that provide an assessment of individuals' receptive and expressive vocabulary. The assessments are appropriate with use for children ages 2 to 18 years of age, and were administered in 10-15 minutes per child, per assessment. Because the sample included a large number of bilingual children, this assessment was specifically chosen because of its Spanish bilingual version. The Spanish bilingual versions allow children to be tested in their dominant language, and answers may be given in either English or Spanish. Trained assessors individually administer the assessment in a quiet area of the school, outside of the classroom.

Both classical test theory and item response theory analyses were conducted during the construction of the assessment. The English versions of the EOWPVT and ROWPVT were normed on a national sample of 2,327 children living in the United States whose primary language at home was English. The expressive and receptive subscales demonstrated good internal consistency with Cronbach's alpha coefficients and

split-half reliability coefficients above .92 for the expressive scale and above .95 for the receptive scale for 4 and 5 year old children (Brownell, 2001a; 2001b).

The bilingual receptive and expressive assessments were normed on a sample of 1,050 bilingual individuals living in the United States, including children from Mexican, Puerto Rican, Cuban, Central-American, South-American, and other Hispanic backgrounds. Cronbach's alpha coefficients and split-half reliability coefficients were above .92 for the expressive scale and above .96 for the receptive scale for 4 and 5 year old children, suggesting good internal consistency (Brownell, 2001c; 2001d).

School readiness. To assess children's individual levels of school readiness, the Bracken Basic-Concept Scale-Revised (BBCS-R; Bracken, 1998) was used. The BBCS-R was designed to assess basic concept development. The first five subsets (colors, letters, numbers/counting, sizes, comparisons, and shapes) combine to form the School Readiness Composite score (SRC). The BBCS-R gives scaled and standardized scores for different age groups based on normative levels of performance.

Reliability and validity studies found that internal consistency ranged from .93 to .97 for the subsets representing the SRC for children between the ages of 3 and 5 years. Furthermore, adequate test-retest reliability was found for the SRC ($r = .88$). The BBCS-R has also been found to be a good predictor of academic growth over a school year. Construct validity was assessed by comparing the BBCS-R with other instruments used to measure basic concepts (Boehm Test of Basic Concepts, revised and preschool versions). The SRC and total BBCS-R were strongly correlated to the aforementioned measures, suggesting that they measure similar constructs.

Procedure

    Recruitment. Eligible centers and classrooms in Miami-Dade County were identified based on the inclusion and exclusion criteria stated above, using information provided by the Miami-Dade Community Action Agency. Once centers were randomly selected, graduate research assistants contacted center directors via phone informing them of the study and inviting them to participate. Meetings between researchers from the University of Miami and interested center directors were scheduled to describe the project in detail and allow an opportunity for directors to ask questions, as well as obtain written consent from each director who agreed to participate. Seven centers were originally contacted to participate in the study, with 6 agreeing to the research project, for a total of 21 Head Start classrooms involved.

    Center directors were asked to give the selected classrooms' teachers a letter from the researchers and the Miami-Dade Community Action Agency describing the study and informing them that they would be contacted by the research team. Once the center director granted permission, researchers contacted teachers in person and explained the project to them. If they agreed to participate, teachers were asked to sign an informed consent form. At the completion of the study, teachers were given a gift of $50 for classroom materials in the form of a gift card.

    Confidentiality. Confidentiality was maintained at all times in this study. During the data collection process, one master sheet linking names with study identification number was kept in a locked file cabinet on the University of Miami campus. Complete questionnaires did not include the participants' names and IDs; the only information on hard copies of questionnaires was the participant's identification number.

All hard copies of data, such as questionnaire forms, observational coding sheets, or demographic information were kept in secure and locked file cabinets located in a locked office on the UM campus. Data was entered and stored on a secure computer located on the UM Coral Gables campus within a locked office. The computer itself was password protected, as well as the database used for entering and storing data. Passwords were required to first enter the computer, and another password was required to enter the database. Only research staff listed on the protocol had access to the data entry process.

Assessment. Data collection occurred throughout the 2007-2008 school year. Observations of children's peer interactions began in September and ended in April, with a focus on relational aggression and victimization, physical aggression and victimization, and displayed and received prosocial behavior. Trained personnel observed each child at least eight times for ten minutes each. Coders remained as unobtrusive as possible, with very limited interactions with teachers and children during the coding process. Observations did not impact instructional time within the classroom, and did not interfere with regular classroom routines. During observations, if a child became aware that they were being observed or displayed signs of discomfort, observations were ended.

Direct assessments of language and school readiness were collected in the spring of the school year. All assessments were conducted in a quiet area of the school, outside of the classroom. Prior to assessments, children were given the choice to participate or not participate in the Bracken assessment. If any child exhibited hesitancy, discomfort, or the desire not to participate (or to cease participation) that child's participation was terminated and the child was returned to his or her classroom. A second attempt to assess the child's language or school readiness was made on a separate day. If the child refused

after a second attempt, that child was excluded from the assessment. When picking children up from the classroom, researchers asked each child if they would like to play some games with the researcher. The school readiness assessment lasted between 15 and 20 minutes per administration of the BBCS-R (Bracken, 1998). Upon direct assessment completion, children received stickers and verbal praise.

Language assessments were collected during the month of April. Because expressive and receptive language assessments were conducted in both English and Spanish all assessors were fluent in both English and Spanish. Assessments lasted between 10 and 15 minutes for each subscale of the EOWPVT and ROWPVT. Expressive scales were conducted first, following the standardized protocol, and receptive scales were conducted second. Because the assessments were bilingual, students who were identified as bilingual based on information from their teacher and the assessment screener were assessed in both English and Spanish. Upon completion children received stickers and verbal praise.

Data Analyses

Multivariate analyses of variance (MANOVA) and structural equation modeling (SEM) were used to analyze the seven separate hypotheses in the current study.

Nested nature of the data. Because the data in this study included children clustered within classrooms, all analyses accounted for the nested nature of the data and were analyzed within a structural equation modeling (SEM) framework. Conducting the analyses within an SEM framework rather than HLM allowed for a) indices of model fit to assess how well the sample data fit the population estimates, and b) the creation of latent factors to remove measurement error from the construct of School Readiness.

Therefore, in all of the following structural equation models, the clustering of the data was accounted for in the analyses.

Specifically within the M*plus* software (Muthén & Muthén, 2006), one approach to analyzing nested data is to compute standard errors and an adjusted chi-square test of model fit that take into account the non-independence of observations due to students being nested within classrooms. In M*plus*, complex samples can be accommodated by indicating how the data are nested through a cluster variable. By assigning each child a classroom variable and designating that variable as the cluster variable, standard errors and parameter estimates are adjusted to account for the non-independence of observations within clusters. In this sample, there were 18 clusters, or classrooms. The average number of students participating in this study per classroom was 6, however classes ranged from 2 to 10 participating students.

In nested data, intra-class correlations (ICC) are used to calculate the amount of variance between clusters, or in this case, between classrooms.

$$ICC = \frac{\sigma^2 between}{\sigma^2 between + \sigma^2 within}$$

If ICC values are below .05 there is no advantage in modeling the data within the multi-level framework. However, in most school settings there is considerable between classroom variance in student academic achievement, with ICCs ranging from .10 to .25 depending on the construct of interest (Hill & Rowe, 1996; Reynolds & Packer 1992). Therefore it is beneficial to account for the between classroom differences in research on academic achievement in school settings.

Another challenge when modeling complex data is that standard chi-square estimates are not applicable because the distribution is dissimilar to the standard chi-

square distribution. Thus, comparing nested models is inappropriate using the maximum likelihood estimation (ML) chi-square. However, M*plus* produces a scaling correction factor for maximum likelihood with robust standard errors (MLR) analyses which can be used to compute the Satorra-Bentler scaled mean-adjusted chi-square test value (TRd). By multiplying the ML chi-square value by the MLR scaling correction factor, one can hand-calculate the correct values to test goodness of fit. The TRd chi-square is the appropriate value to use with complex samples to test nested model fit. Therefore, the TRd will be used in all model fit analyses in this study.

Chapter 3 - Results

Nested Nature of the Data

Intra-class correlations were analyzed to determine the extent to which between-classroom variance existed in the outcome variable of school readiness. In this sample, ICCs in the observed school readiness indicators ranged from .03 to .23. Subscales revealed differing levels of variance between classrooms, with 3.5% of the variance in colors, 21% of the variance in letters, 14% of the variance in numbers, 10% of the variance in sizes/comparisons, and 22% of the variance in shapes due to between-classroom differences. Because of the existence of between-classroom variance, the data were modeled in M*plus* accounting for the nestings using maximum likelihood with robust standard errors (MLR) estimation techniques for complex samples.

Reliability of the Early Childhood Play Project Observation System (ECPPOS)

Inter-rater reliability of the ECPPOS was assessed using absolute, single-measure intra-class correlations (ICCs). Reliability sessions were conducted on 31% of the sample, including 272 observational sessions (see Table 1). All independent raters met the .70 ICC value for acceptable levels of reliability on the observational categories. Physical aggression ICCs ranged from .84 to .93, physical victimization ICCs ranged from .71 to .92, relational aggression ICCs ranged from .74 to .89, relational victimization ICCs ranged from .86 to .98, displayed prosocial behavior ICCs ranged from .77 to .88, and received prosocial behavior ICCs ranged from .70 to .90. However, because verbal aggression and verbal victimization were low incidence behaviors in this sample, not all coders were able to obtain adequate levels of reliability for this category

of peer interactions (see Table 1). Therefore verbal aggression and verbal victimization were dropped from further analyses.

Descriptive Statistics

Before analyses were conducted, all predictor and outcome variables were examined for normality. The direct assessments of language and school readiness were all normally distributed. However, because the direct observations of peer interactions captured low incidence behaviors, the frequency counts were converted to average scores to create a more normal distribution of the data. The sample means and standard deviations are reported in Table 2 for observations of peer interactions, as well as direct assessments of receptive language, expressive language, and school readiness.

The most common peer interactions were prosocial behavior and physical aggression, and the least common peer interactions were relational aggression and relational victimization (see Table 2). Children's language ability scores were within typical range, however the sample average school readiness score remained one standard deviation below the standard mean ($M = 100$, $SD = 15$).

Correlations

To examine the relationship between measures of peer interactions, language ability, and school readiness, bi-variate correlations between all predictors and outcome variables were computed. See Table 3 for details.

Observations of peer interactions. Many of the subscales of the observational coding system were significantly correlated with each other (see Table 3). Observations were also significantly correlated with school readiness. Physical victimization was significantly and negatively correlated with the shapes subscale, $r = -.20$, $p < .05$.

Relational victimization was significantly and positively correlated with the sizes/comparisons subscale, $r = .22$, $p < .05$. Relational aggression was also significantly and positively correlated with multiple subscales of school readiness assessment (see Table 3). However, physical aggression, prosocial behavior displayed and prosocial behavior received were not significantly correlated with any of the subscales of school readiness (see Table 3).

Expressive and receptive language. Expressive and receptive language were highly correlated, $r = .65$, $p < .01$. Expressive and receptive language scores were also significantly and positively correlated with all subscales of school readiness. Expressive language was significantly positively correlated with observations of received prosocial behavior, while receptive language was significantly and negatively correlated with observations of both physical aggression and physical victimization (see Table 3).

School readiness. Along with the aforementioned cross-construct correlations, the different subscales of school readiness were also significantly and positively correlated, with values ranging from .32 to .73 (see Table 3).

Did Relational Aggression Exist in this At-Risk Sample?

Hypothesis 1: Relational aggression will exist in children enrolled in Head Start as young as four years of age. The null hypothesis that relational aggression scores were equal to zero was tested with one-sample t-tests. Using the average scores of both relational aggression and relational victimization (frequency divided by number of observations), relational aggression and relational victimization were both significantly different from zero when adjusting for multiple comparisons, $t (124) = 9.47$, $p < .01$, $t (124) = 11.07$, $p < .01$.

Were There Sex Differences in Aggression, Victimization, and Prosocial Behavior?

Hypothesis 2: Sex differences will exist in peer interactions such that girls will engage in more relationally aggressive and prosocial behaviors than boys, while boys will engage in more physically aggressive behaviors. This hypothesis was tested using MANOVA with Type III sum of squares procedures to test the different rates of peer interactions by sex of the child. The fixed factor was sex and the dependent variables included the ECPPOS observed scores of physical aggression, physical victimization, relational aggression, relational victimization, displayed prosocial behavior, and received prosocial behavior (see Table 4). MANOVAs revealed that girls were more relationally aggressive than boys, $F(1, 121) = 20.06$, $p < .01$. Boys were also more physically victimized than girls $F(1, 121) = 5.04$, $p < .05$. However, there were no significant differences between girls and boys on physical aggression, relational victimization, prosocial behavior displayed, or prosocial behavior received.

Did Peer Interactions Predict Individual Differences in School Readiness?

Hypothesis 3: Physical and relational aggression in peer interactions will predict lower school readiness scores. Hypothesis 4: Prosocial behavior in peer interactions will predict better school readiness scores. Hypothesis 3 and 4 were analyzed simultaneously in one structural equation model. The measurement component of the model was first established, followed by the structural model. Nestings within the data were addressed by using the Analysis TYPE=COMPLEX command in M*plus* with classrooms set as the

cluster variable. Standard errors and parameter estimates were adjusted based on the non-independence of observations within classrooms.

Measurement model. The measurement model included one latent variable of school readiness composed of the 5 Bracken Basic Concepts Scale-Revised subscales of colors, letters, numbers, sizes/comparisons, and shapes (see Figure 1). Each BBCS-R subscale had the same metric, which meant that each indicator of the latent variable also had the same metric. Therefore, it was less important which subscale set the metric for the latent variable in the current situation than for latent variables that combine measures with different metrics. The colors subscale was chosen as the indicator to set the metric for the latent variable of School Readiness. Errors of the numbers and letters subscales were correlated, as well as errors of the shapes and sizes/comparisons subscales. Numbers and letters were correlated because they both assess symbol or label relationships that are directly instructed in the Head Start classroom, while sizes/comparisons and shapes were correlated because they both assess spatial skills. The measurement model yielded good model fit, TRd χ^2 (3) = .766, *p* = .86, CFI = 1.00, RMSEA = 0.000, SRMR = 0.008, indicating that the sample data and the parameter estimates were not significantly different from each other. Factor loadings were all above the .40 cutoff suggesting adequate factor structure. The loading for colors was .69, letters .69, numbers .68, sizes/comparisons .46, and shapes .56.

Structural model. The structural model was then assessed, and yielded good model fit, TRd χ^2 (27) = 25.650, *p* = .54, CFI = 0.989, RMSEA = 0.029, SRMR = 0.042, and explained 31% of the variance in school readiness. To test the paths between physical aggression, relational aggression, and displayed prosocial behavior, the separate scores

from the ECPPOS were added as indicators (see Figure 2). Control variables of sex, receptive language, and expressive language were also included in the model. The errors of receptive and expressive language were correlated due to shared measurement variance, because they were separate subscales of the same direct language assessment. The only significant predictor of the latent variable of school readiness was relational aggression, which significantly positively predicted school readiness, $\beta = .20$, $p < .05$ (see Figure 2). For every one standard deviation increase in relational aggression, there was a 0.2 standard deviation increase in school readiness. Therefore, for every one more relationally aggressive act per observational session, children's school readiness scores increased by 3 points on a standardized test with a mean of 100 and standard deviation of 15. All other indicators did not significantly predict school readiness (see Figure 2).

     Hypothesis 5: Physical and relational peer victimization in peer interactions will predict lower school readiness scores. Hypothesis 6: Received prosocial behavior in peer interactions will predict better school readiness scores. Hypothesis 5 and 6 were analyzed simultaneously in one inclusive structural equation model. A separate model was imposed for received behaviors because displaying aggressive behavior and being the recipient of peer victimization are separate constructs, and may impact school readiness in different ways. The measurement component of the model was first established, followed by the structural model. Nestings within the data were addressed by using the Analysis TYPE=COMPLEX command in M*plus* with classrooms set as the cluster variable. Standard errors and parameter estimates were adjusted based on the non-independence of observations within classrooms.

The measurement model was identical to that used to test Hypothesis 3 and 4, and yielded good model fit, TRd χ^2 (3) = .766, p > .05, CFI = 1.00, RMSEA = 0.000, SRMR = 0.008, with factor loadings ranging from .46 to .69 (see Figure 1). The structural model was then assessed for model fit. To test the paths between physical victimization, relational victimization, and received prosocial behavior, the separate scores from the ECPPOS were added as indicators (see Figure 3). Control variables of sex, receptive language, and expressive language were also included in the model. The errors of receptive and expressive language were correlated due to shared measurement variance, because they were separate subscales of the same direct language assessment. The model yielded good model fit, TRd χ^2 (27) = 26.79, p = .48, CFI = 0.984, RMSEA = 0.034, SRMR = 0.044, and explained 34% of the variance in school readiness. Again, the only significant predictor of the latent variable of school readiness was relational victimization which significantly and positively predicted school readiness, β = .20, p < .05 (see Figure 3). For every one standard deviation increase in displayed relational aggression, there was a 0.2 standard deviation increase in school readiness. Therefore, for every one more relational victimization per observational session, children's school readiness scores increased by 3 points on a standardized test with a mean of 100 and standard deviation of 15. All other indicators did not significantly predict school readiness (see Figure 3).

Did Sex Moderate the Relationship Between Peer Interactions and School Readiness?

Hypothesis 7: Sex will moderate the relationship between peer interactions and school readiness such that relational aggression will have a more severe and negative relationship with girls' school readiness and physical aggression will have a more relationship with boys' school readiness. To examine moderation, a multiple group

model was conducted with two groups (girls and boys) simultaneously. This was estimated first for displayed aggression and then for victimization. In both models, all parameters were first completely constrained to be equal, requiring that all latent variable means, intercepts of indicators, variances, covariances, factor loadings, and structural coefficients were assumed equal between girls and boys. Each separate parameter was then released to be free to vary between girls and boys, and model fit was estimated to determine if allowing that parameter to be different between girls and boys significantly improved fit. An adjusted TRd chi-square was estimated for the contribution of each parameter. If the TRd chi-square was significant ($p < .05$), the parameter remained free to vary between girls and boys. If the TRd chi-square associated with the parameter was not significant ($p > .05$), the parameter remained constrained equal between girls and boys. Measurement models were first assessed to determine if there was measurement invariance between girls and boys. Secondly, structural models were examined to determine if the relationships between peer interactions and school readiness differed between girls and boys.

Measurement model. To determine if measurement models differed between boys and girls, parameters estimating the latent factor of School Readiness were first assessed. The baseline model where all factor loadings and means of indicators were constrained to be equal between girls and boys had the following fit indices, TRd χ^2 (19) = 43.87, $p <$ .001, CFI = 0.861, RMSEA = 0.164, SRMR = .0137, suggesting poor model fit. Each parameter was then released to be free to vary beginning with the factor loadings, followed by the indicator means. The only parameter that improved model fit by allowing it to be different between girls and boys was the intercept of the BBCS-R

sizes/comparisons subscale (see Table 4). Therefore, the intercept of sizes/comparisons

was allowed to vary between girls and boys. For girls, the estimate was 9.25, while for

boys, it was 7.56. The final measurement model also included the correlated errors of

indicators between sizes and shapes, as well as the error between numbers and letters.

This measurement model adequately fit the data, TRd χ^2 (16) = 15.33 , p = .500, CFI =

0.99, RMSEA = 0.04, SRMR = 0.09.

Structural model. The final measurement model was used as the baseline

comparison model for models testing structural parameters. Multiple Group-Model 1

tested the structural equality between girls and boys for displayed peer interactions.

Multiple Group-Model 2 tested the structural equality between girls and boys for received

peer interactions. For models of displayed peer interactions, 2 out of 15 tested parameters

were free to vary between girls and boys (see Table 6). All others were constrained to be

equal between the two groups. The parameters that were different between girls and boys

included the variance and mean of relational aggression. This model adequately fit the

data, TRd χ^2 (69) = 69.43, p = .462, CFI = 0.944, RMSEA = 0.059, SRMR = 0.138 and

explained 26% of the variance in school readiness for girls and 27% of the variance in

school readiness for boys. However, because the factor loadings between physical

aggression, relational aggression, and displayed prosocial behavior did not improve

model fit by being free to vary between girls and boys, sex did not moderate the

relationship between displayed peer interactions and school readiness.

For models of victimization and received peer interactions, 3 of the 15 tested

parameters were different between girls and boys (see Table 7). This model adequately fit

the data, TRd χ^2 (64) = 69.13, p = .308, CFI = 0.941, RMSEA = 0.063, SRMR = 0.139

and explained 39% of the variance in school readiness for girls and 33% of the variance in school readiness for boys. The victimization model revealed that the variances of physical victimization and relational victimization yielded better fit when they were estimated freely between girls and boys, suggesting that there were different level of variability in these indicators based on sex. For girls, the variance of physical victimization was .215, while for boys, it was .336. Also, the variance of relational victimization was higher for girls .138 and lower for boys .055. Finally, to test the moderation hypothesis, the structural coefficients between the indicators of physical victimization, relational victimization, received prosocial behavior, and the latent variable of school readiness were tested, and relational victimization was different between girls and boys (see Table 7). Specifically, relational victimization significantly predicted higher school readiness for girls, $\beta = 0.46$, $p < .01$, while relational victimization did not significantly predict school readiness for boys, $\beta = -0.12$, $p = $ ns. Therefore, sex significantly moderated the relationship between relational victimization and school readiness in this Head Start sample.

Post-Hoc Analyses

Two sets of post-hoc analyses were conducted to examine specific questions that arose from the results of the current study. First, t-tests were conducted to determine if the current sample displayed similar or different rates of physical aggression and relational aggression when compared to historical samples. Second, ANOVAs were conducted to determine if young girls who were relationally victimized interacted more with their teachers during the course of the school year, to potentially explain the positive relationship between relational victimization and school readiness in girls.

Historical comparisons of rates of aggression Post-hoc analyses were conducted that examined whether the mean physical and relational aggression scores in the current study were statistically different from the validation study of the Early Childhood Play Project Observation System (Ostrov & Keating, 2004). Independent samples t-tests revealed that the boys in the middle-class, primarily Caucasian validation sample displayed more physical aggression than the boys in the current Head Start sample, t (74) = 2.29, p < .05. Girls in the middle-class, primarily Caucasian validation sample also engaged in more relational aggression than the girls in the current Head Start sample, $t(90)$ = 4.12, p < .01.

Relational victimization and teacher interactions. To better understand the positive relationship between relational victimization and school readiness, ANOVAs were conducted with frequency of relational victimization as the fixed factor and number of teacher interactions as the dependent variable. Teacher interactions were aggregated counts of how many times the child interacted with the teacher during the course of the observation sessions throughout school year. These interactions could be teacher-initiated or child-initiated. Analyses revealed that children who were relationally victimized 5 times during the school year interacted significantly more with their teacher than children who were only relational victimized between 1 and 4 times, F (5,83) = 4.12, p < .01. M_1 = 17.9 (9.40), M_2 = 18.76 (8.30), M_3 = 16.12 (7.95), M_4 = 16.67 (5.92), M_5 = 33.17 (8.01).

Chapter 4 - Discussion

The findings of this study extended the previous literature on peer interactions by simultaneously examining the constructs of physical aggression and victimization, relational aggression and victimization, as well as prosocial behavior in at at-risk sample. Previous literature primarily focused on physical aggression to the exclusion of relational aggression. Also, studies rarely examined negative as well as positive peer interactions simultaneously. This study also extended the literature by examining these constructs within an at-risk sample of children enrolled in Head Start. Finally, the methodology of this study is unique in that it included both direct observations of peer interactions as well as direct assessments of school readiness. Results indicated that peer interactions in preschool were related to school readiness, although not necessarily in the directions or with the strength hypothesized. While relational aggression and relational victimization predicted better school readiness scores, physical aggression, physical victimization, displayed prosocial behavior and received prosocial behavior were not significant predictors of individual differences in school readiness. Also, different paths between relational victimization and school readiness were observed for boys and girls, further extending our knowledge of how this form of aggression may have different implications for the different sexes.

Relational Aggression in Head Start

The first hypothesis, that relational aggression existed in Head Start populations as young as four years of age, was supported in this study. This study replicated the findings that relational aggression and victimization existed in preschool and also extended it to include low income, primarily minority samples. These findings illuminate

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the importance of including relational aggression in the discussion of young, at-risk children's social and emotional development. Rather than focusing primarily on the development of physical aggression, special attention should also be paid to different subtypes of aggression and victimization within these samples because peer interactions that include relationally aggressive strategies are a daily reality for these children.

It should also be noted that relationally aggressive peer interactions occurred at different rates in this sample when compared to historical samples. For example, in the middle-class samples, girls engaged in an average of seven relationally aggressive acts while boys engaged in about three relationally aggressive acts over the course of five observational sessions (Ostrov & Keating, 2004). However, in the current sample, frequency rates were lower for both boys and girls. In this Head Start sample, girls engaged in an average of four relationally aggressive acts and boys engaged in an average of two relationally aggressive acts over the course of five observational sessions. Independent samples t-test analyses revealed that boys in the middle-class, primarily Caucasian validation sample displayed more physical aggression than the boys enrolled in Head Start, while the girls in the middle-class, primarily Caucasian validation sample also engaged in more relational aggression than the girls enrolled in Head Start. These differences could be explained by many variables, however attending an early intervention program may be one significant difference between these two samples. Although previous literature has documented that children living in poverty are at-risk for more problem behavior (Kaiser, Hancock, Cai, Foster, & Hester, 2000) the contrary was found in this study. The levels of physical aggression displayed by boys and relational aggression displayed by girls in the low-income sample were muted. Perhaps this is due

to the effects of Head Start's early intervention curriculum that focuses on fostering positive social development (Zigler & Valentine, 1979). These findings are encouraging and support the positive influence that early intervention can have on young children's social-emotional development (Ramey & Ramey, 1998).

Sex Differences in Peer Interactions in Head Start

The second hypothesis of this study examined whether boys and girls engaged in different levels of physical aggression, relational aggression, physical victimization, relational victimization, displayed prosocial behavior, and received prosocial behavior in this at-risk sample. Some of the reported sex differences between boys and girls peer interactions were consistent with the previous literature, but some were different, questioning the generalizability of findings of studies conducted with typically developing middle-class preschoolers to the social-emotional experiences of low-SES at-risk children.

Physical aggression. Contrary to previous findings that suggested preschool boys were more physically aggressive than their girl peers (Bjorkqvistt, Lagerspetz, & Kaukiainen, 1992; Block, 1983; Crick & Grotpeter, 1995), this study revealed no sex difference in physical aggression. Girls were just as physically aggressive as their boy peers. It should be noted here that displayed physical aggression was a very common behavior, second only to displayed prosocial behavior in this sample. Perhaps engaging in physical aggression is a protective factor for young girls in this at-risk sample. Expectations about children's behavior also differ between low-income families and more affluent families (Pettit, Bates, & Dodge, 1993). Perhaps these differing expectations resulted in young girls living in poverty engaging in equal levels of physical

aggression as their boy peers, while in the previous middle-class samples there were more distinct differences between boys and girls on physical aggression.

Relational aggression. In this low-SES sample, the sex differences in relational aggression were replicated. Young girls engaged in significantly more relational aggression in their peer interactions than boys. While boys did engage in relational aggression, it was a more common experience for young girls. Preschool girls tend to engage in more verbal play with fewer play partners, boys tend to engage in more physical play with larger groups of boy peers (Maccoby, 1998). Because of these differences in preschool peer interactions there may be more of an opportunity for relational aggression to occur in the peer interactions of young girls rather than young boys, accounting for the greater levels of relational aggression displayed by girls in this sample and previous studies. Therefore young girls living in poverty are at-risk for dual aggression, both physical and relational. Interventions that target the reduction of aggression in preschool classrooms may benefit from specifically targeting both physical and relational aggression.

Physical victimization. Consistent with previous literature, young boys were more physically victimized than girls. This may be explained by examining the social goals of young boys. Because young boys gain peer acceptance through physical dominance (Block, 1983) physical victimization may be a common occurrence in the power structure of the preschool peer environment for young boys. Perhaps young boys are more physically victimized as a result of how young boys vie for power in their social relationships at this age. Also, because young boys are more likely to play with young boys than young girls (Maccoby, 1998), combined with the physical strategies that boys

employ within their peer interactions (Block, 1983), there may be more of an opportunity for young boys to be the recipients of physical victimization.

Anecdotally, another possible explanation is related to the context in which this study was conducted. In many of the classrooms where these observations were conducted, the teachers supported strict gender-typed behaviors. For example, during one observational session where a young girl was cleaning up and threw her play-do into the bucket rather than placing it, the teacher responded with "girls are flowers, girls are soft" and directed the child to replace the play-do in a gentle way. During another observational session one boy and one girl were engaged in a physical fight. When the teacher intervened she reprimanded the young boy and said "boys don't hit girls", however, the young girl was not reprimanded. Perhaps gender-typed social instruction from the teachers in this sample resulted in less physical victimization for young girls when compared to boys.

Relational victimization. Contrary to previously reported sex differences, boys and girls were both relationally victimized at equal frequencies in this sample. This finding contradicts the assumption that relational victimization is a problem only in young girls' peer interactions, indicating that more attention should be paid to how boys might also be relationally victimized. Although girls may be more verbal about their victimization, boys are also victims and should not be excluded from the discussion of relational victimization at this age.

Displayed and received prosocial behavior. In previous literature girls were consistently reported as more prosocial than boys (Eisenberg & Fabes, 1998). However, in this study which used observational measures of prosocial behaviors, boys and girls

were both equally prosocial. Also, girls and boys were equal recipients of prosocial behavior, suggesting that this positive behavior was equally displayed and received by both sexes in this at-risk preschool sample.

Prosocial behavior displayed was the most common behavior observed in the Head Start preschool classroom. These are encouraging findings, both because prosocial behavior was the most frequently displayed peer interaction by children enrolled in Head Start and also that boys did not display deficits in this behavior. Previous literature has documented that compared to typically developing samples, children enrolled in Head Start display deficits in social skills (Kaiser, et al., 2000), therefore it is encouraging that prosocial behavior was the most commonly displayed peer interaction in this sample. This behavior occurred without targeted intervention and should be positively reinforced to ensure that prosocial behavior continues as a part of children's repertoire of social skills that they can rely on as they transition into the public school system.

Physical Aggression and School Readiness

The second hypothesis that negative subtypes of aggression would be related to children's individual differences in school readiness was not supported in the direction that was hypothesized. Physical aggression was not a significant predictor of children's school readiness, suggesting neither a positive nor negative relationship between physical aggression and academic achievement for young children. One explanation is that physical aggression is a relatively normative behavior in the preschool classroom. In the final sample of 119 children, only six children never engaged in a physically aggressive act. Of those six children, three were girls and three were boys. Of all the behaviors observed in this study, physical aggression was the second most common behavior that

children displayed, with an average of about one physically aggressive act observed per ten minute observational session. The negative hypothesized relationship between aggression and academic achievement was based on studies that examined this link in older children (elementary and middle school). However, the lack of a predictive relationship may capture this normality of aggression in four and five year old students. The maladaptive influence of hitting a peer on the playground may be less severe for preschool students than for a 4th grade student who continually engages in fist fights during elementary school. Perhaps the negative relationship between physical aggression and academic achievement develops later in life, when most children have learned more appropriate strategies to cope with negative peer interactions. Children that persist with physical aggression into elementary school may have more difficulties in their school adjustment and academic achievement, but at ages 4 and 5, this relationship may not be present.

Analyses also revealed that sex did not moderate the relationship between physical aggression and school readiness, suggesting physical aggression did not predict school readiness for neither boys nor girls. This finding extends our knowledge of how physical aggression may be different or similar between the sexes. Because both boys and girls engaged in similar rates of physical aggression in this sample, and because the relationship between physical aggression and school readiness was similar between girls and boys, there may be more similarity between the sexes in terms of physical aggression in preschool than was previously expected.

Relational Aggression and School Readiness

Contrary to the lack of findings with physical aggression, relational aggression was related to better school readiness in Head Start preschoolers. Although it was hypothesized that relational aggression would have a negative relationship with school readiness, engaging in relational aggression actually predicted better school readiness scores. One explanation for the unexpected direction of this relationship could be that the children who use relational aggression are more socially advanced and may better understand social relationships. Contrary to the social skills deficit approach to aggressive peer interactions (Crick & Dodge, 1994), researchers now acknowledge that some aggressive children may also be socially competent and may manipulate the social relationships around them to their advantage (Sutton, Smith, & Swettenham, 1999). This advanced knowledge of social relationships and enhanced social skills may be an academically adaptive skill in the preschool classroom. Therefore the child who uses relational aggression with their peers may also be a child who easily interacts with adults and teachers and therefore is able to gain more from classroom instruction, facilitating their learning in cognitive domains in school readiness.

There may also be a third variable that better explains the relationship between relational aggression and school readiness. To engage in relational aggression a young child must understand that their actions will influence the feelings and behaviors of others, tapping into Theory of Mind (ToM). Theory of Mind (ToM) refers to a child's ability to understand the mental state of others and also how others' mental states may influence their beliefs and behaviors (Wellman, 1990). Understanding others' mental states is intricately related to relational aggression and relational victimization. Theory of

Mind (ToM) skills are also related to better social skills (Capage & Watson, 2001; Jenkins & Astington, 2000; Lalonde & Chandler, 1995) and advanced cognitive skills (Carlson & Moses, 2001; Frye, Zelazo, & Palfai, 1995). Therefore, Theory of Mind may be a variable that explains the positive relationship observed between relational aggression and school readiness.

Further supporting the link between Theory of Mind and relational aggression, researchers have recently linked social relationship knowledge with peer exclusion. Focusing on socially-related Theory of Mind skills, Abrams and colleagues (2009) have coined a new term labeled Theory of Social Mind (ToSM) that taps into children's ability to understand the social relationships of others separate from their own social perspectives. A subset of social perspective taking, Theory of Social Mind (ToSM) requires the ability to use information about prior social experiences and relationships to evaluate how a peer will feel toward another child, separate from the focal child's own feelings toward that peer (Abrams, Rutland, Pelletier, & Ferrell, 2009). In a study of children between the ages of 6 and 11 who were primarily "White British", Theory of Social Mind (ToSM) was linked to differential peer exclusion in children's social groups (Abrams, Rutland, Pelletier, & Ferrell, 2009). This link supports the interpretation that perhaps Theory of Mind ability drives the relationship between relational aggression (which involves social exclusion) and better school readiness. Therefore, models including theory of mind as a predictor of both relational aggression and school readiness would add to our understanding of how relationally aggressive preschool peer interactions are related to academic domains of development.

Analyses also revealed that sex did not moderate the relationship between relational aggression and school readiness, suggesting that engaging in relationally aggressive acts had a significant and positive relationship with school readiness for both boys and girls. Therefore, the third variable (ToM/ToSM) hypothesis may hold true for all children. Perhaps preschool children enrolled in Head Start who are socially advanced enough to engage in relational aggression are also those that are more academically competent.

Prosocial Behavior and School Readiness

The fourth and sixth hypotheses that displayed and received prosocial behaviors would predict better school readiness were not supported in this study. In the coding of prosocial behavior, many varied behaviors were included under the label of prosocial behavior, including sharing, cooperating, complimenting a peer, comforting a peer after a negative experience, and social inclusivity. By aggregating these behaviors together into one construct, the unique relationships between each type of positive peer interaction and school readiness may have been masked. Although complimenting a friend on their work may not be related to increases in cognitive domains, perhaps sharing, cooperating, or being socially inclusive does predict better school readiness. Future directions include disaggregating this data into its unique sub-types of prosocial behavior to examine more closely which prosocial behaviors, if any, are related to early cognitive development. Again sex did not moderate the relationship between prosocial behavior and school readiness, therefore neither displayed nor received prosocial behaviors (as aggregated in this sample) predicted school readiness for boys or girls.

Physical Victimization and School Readiness

The fourth hypothesis that physical victimization predicted lower school readiness scores was not supported. Contrary to the hypothesized negative relationship between physical victimization and individual differences in school readiness, peer interactions that included physical victimization did not significantly predict school readiness. Similar to the lack of relationship between physical aggression and school readiness, this may be explained by the relative normality of receiving physical aggression within the preschool classroom. The average rate of physical victimization was one physical victimization per every two observational sessions. Again, in the sample of 119 children, only six children had never been physically victimized throughout the course of the school year. Of those six children who were never physically victimized, five were young girls. Therefore in the entire sample, only one boy did *not* experience physical victimization during the their preschool year. This suggests that unfortunately, physical victimization was a common occurrence in the Head Start preschool classroom for 4 and 5 year old children. Therefore, physical victimization may not have such a severe negative relationship with academic outcomes as has been demonstrated in older, middle to upper class samples because it is more normative at this age group in this sample. Again, sex did not moderate this relationship suggesting that neither for boys nor girls did physical victimization predict lower school readiness.

Relational Victimization and School Readiness

Relational victimization, similar to relational aggression, was positive related to school readiness. However, moderation analyses revealed that this significant and

positive relationship was only present for young girls, and that relational victimization was not related to young boys' school readiness.

For young girls, perhaps being relationally victimized pulled girls into more socially advanced behaviors in their peer interactions and allowed for the practice of social skills that may be applied to other areas of the preschool classroom such as interactions with teachers and adults. Young girls may therefore have had a developmental context for learning in their relationally aggressive peer interactions which may have been unexpectedly adaptive for their academic development.

Another explanation may be that young girls who were relationally victimized turned to the adults in the preschool classroom for social support, or that teachers in the preschool classrooms offered more support to young girls who were relationally victimized. To examine this theory, post-hoc analyses were conducted and determined that young girls who were more relationally victimized also interacted more with their preschool teachers. This finding has been found in other low income preschools where young girls' interactions with teachers increased over the course of the school year while young boys' decreased (Farran, 2001). Through increased attention to young girls and decreased attention to young boys, teachers may be inadvertently establishing patterns of behavior in the classroom that could aid in the academic development of young girls, but hinder the development of young boys living in poverty (Farran & Shonkoff, 1994). Therefore, one possible explanation for why relational victimization predicted higher school readiness scores for girls and not boys may be because teachers interacted more with relationally victimized girls during the preschool year. It should be noted that because of the limited teacher interaction data in this study the direction of this

relationship cannot be determined. Future studies that examine child and teacher responses to relational victimization would add to our understanding of the positive relationship between relational victimization and school readiness for young girls.

Contrary to the relationship present for young girls, relational victimization was not related to young boys' school readiness. This lack of a relationship may be explained by boys' play style in preschool. Young boys tend to engage in less of the dyadic relationships that are damaged through relationally aggressive peer interactions (Maccoby, 1998). Looking at the play patterns of boys, relational victimization may be less detrimental to their school readiness because boys may not internalize the effects of relational aggression. Also, boys tend to avoid or disengage from relationally aggressive peer interactions (Singh, Faria, Yale-Kaiser, 2009) and therefore may not have the opportunity to practice the adaptive social skills that are commonly displayed in instances of relationally aggressive peer interactions.

Limitations

One limitation of this study is the small sample size. With final models including only 119 children, estimates need to be interpreted cautiously. With larger samples the estimates may be more robust and therefore the reader may have better confidence in the results. For many of the non-significant findings in this study, *p* values ranged from .06 to .08. Perhaps with larger samples sizes, these relationships could be better examined and would aid in the understanding of the social-emotional development of young children living in poverty.

Also, enrollment data was unavailable for the children included in this sample. The exclusion of this variable could be a limitation because there could be relations

between children's peer interactions and school readiness that are connected with how long a child has been enrolled in Head Start. A proxy for enrollment, child age, was entered into both displayed and received models and was neither a significant predictor of school readiness, nor explained a significant amount of the variance in school readiness. However, future studies should include years of enrollment as an important control variable when modeling school readiness.

Missing data was also a challenge in this sample. If children moved, or un-enrolled from the Head Start program we did not have complete data on any of the measures in this study, including peer observations, language assessments, and assessments of school readiness. Therefore although 164 students were initially consented, only 119 had data on all three constructs of interest in these analyses. Maximum likelihood with robust standard errors estimation techniques were employed to allow the maximum number of participants to be included in the final sample. However, because of the methodological restrictions in the data collection (children only had one of the three measures if they were enrolled in the study from September to April) many children were excluded from the final sample. Because of this, findings cannot be generalized to all Head Start preschoolers, but rather only to those who completed the entire preschool year. We cannot use the findings in this study to understand the links between peer interactions and school readiness for children who did not complete the entire preschool year, and findings should be interpreted with caution.

Another limitation is that all coders of peer interactions were female and from middle- to upper-class backgrounds. Therefore, the observers may have had their own biases about aggression, victimization, prosocial behavior, and sex. However, male

coders were not as accurate as female coders in identifying relational aggression and prosocial behavior, suggesting that the use of an all-female coding team may actually allow for more accurate observations of these behaviors (Ostrov, Crick, & Keating, 2005). Using more varied coders including both male and female coders as well as coders from varied SES backgrounds may help future studies avoid coder bias in the data.

Future Directions

Future projects should include a more detailed analysis of prosocial behavior. The unexpected lack of a relationship between prosocial behavior and school readiness prompted questions about the aggregation of the different forms of prosocial behavior into one category. In future analyses the differences specifically with social inclusivity should be examined to determine if subtypes of prosocial behavior are more related with the cognitive domains of school readiness than others.

Also, a longitudinal design that follows children into elementary school would shed more light on how the relationship between peer interactions and school readiness continue or diminish with time. Victimization literature suggests that as children transition into new schools and educational settings victimization increases (Pellegrini & Long, 2002). Therefore it would be interesting to explore how the children included in this sample fair socially and academically when entering the public school system during the kindergarten school year.

Another advantage of a longitudinal design would be to examine if the positive relationship between relational aggression and school readiness continues or is extinguished. Although relational victimization had a positive relationship with school readiness during the preschool year, perhaps persistent, long-term relational victimization

would have a negative effect. Victims could continue to display the positive relationships between relational victimization and academic development, or conversely, over time relational victimization may have a negative relationship with academic development. Following children into elementary school would allow researchers to answer many of these questions and future studies should include a longitudinal follow up of more than just one year, which is the standard in the peer interaction literature.

Other future directions include investigating the dyadic relationship between displayed aggression and victimization. During peer interactions, it could be possible that a child who engages in aggression elicits a reaction from peers that leads to victimization. Investigating the relationship between aggression and victimization and also the reciprocal relationships between victimization and aggression may give a more holistic understanding of children's peer interactions in preschool. Future models involving auto-regressive effects or cross-lag models as well as dyadic analyses could answer this research question.

A detailed examination of sex differences in peer interactions is also needed. This study examined sex of the focal child, but did not conduct analyses on sex of the peer. A more nuanced approach would be to examine if boy-boy peer interactions have different levels of aggression/victimization/prosocial behavior when compared to girl-girl peer interactions or mixed sex interactions. Future studies examining these pairing will be explored.

Finally, perhaps the peer interactions that place children most at-risk are those that are contradictory to the sex-stereotypes surrounding that child. Young boys who engage in high amounts of relational aggression may be more at risk for peer

victimization and rejection than young boys who engage in high amounts of physical aggression. Splitting the sample into high and low sex-stereotyped behaviors may be an interesting way to better examine the relationship between physical aggression/victimization, relational aggression/victimization, and negative outcomes for children.

Conclusion

This study provided support that specific peer interactions were related to children's individual differences in school readiness. Relational aggression and relational victimization predicted better school readiness scores, especially for young girls. However, physical aggression, physical victimization, as well as displayed and received prosocial behaviors were not significant predictors of school readiness in this low-income sample. It is also interesting that the findings of this study were different from previous relations documented in middle-class, primarily Caucasian samples. These differences between low-income and middle-class samples should be acknowledged when discussing children's social and academic development, especially within at-risk samples.

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Table 1. Reliability of the Early Childhood Play Project Observation System (ECPPOS) using ICCs calculated between each independent coder and an expert coder

Peer Interaction	Independent Coders					
	Coder1	Coder2	Coder3	Coder4	Coder5	Coder6
Physical Aggression	0.86	0.84	0.93	0.92	0.90	0.93
Relational Aggression	0.74	0.85	0.84	0.74	0.83	0.89
Prosocial Behavior	0.77	0.85	0.93	0.88	0.79	0.86
Physical Victimization	0.79	0.92	0.71	0.90	0.82	0.816
Relational Victimization	0.87	0.98	0.87	0.80	0.87	0.86
Prosocial Behavior Received	0.70	0.88	0.83	0.90	0.88	0.75
n°	52	57	48	71	94	64

Note: Acceptable levels of inter-rater agreement are ICCs > 0.70.

$^{\circ}$ indicates number of observation sessions coded for reliability between the each coder and the expert coder.

Table 2. Descriptive statistics

Assessment	Girls M (SD)	Boys M(SD)	Total M(SD)
Physical Victimization[a]	0.56 (0.45)	0.58 (1.42)	0.57 (1.00)
Relational Victimization[a]	0.30 (0.37)	0.09 (1.26)	0.21 (0.89)
Prosocial Behavior Received[a]	0.66 (0.4)	0.44 (1.34)	0.56 (0.95)
Physical Aggression[a]	0.76 (0.63)	0.75 (1.52)	0.76 (1.11)
Relational Aggression[a]	0.51 (0.43)	0.08 (1.27)	0.32 (0.93)
Prosocial Behavior[a]	1.02 (0.56)	0.71 (1.45)	0.88 (1.06)
Colors[b]	8.15 (4.38)	8.46 (2.84	8.29 (3.75)
Letters[b]	9.08 (6.11)	9.00 (4.90)	9.05 (5.58)
Numbers[b]	8.87 (7.08)	8.84 (5.63)	8.86 (6.45)
Sizes/Comparisons[b]	8.75 (5.44)	7.16 (3.86)	8.04 (4.85)
Shapes[b]	9.86(5.20)	9.39 (3.70)	9.65 (4.58)
Receptive Language[c]	96.39 (19.23)	89.40 (27.17)	93.26 (23.29)
Expressive Language[c]	91.46 (17.38)	83.26 (28.80)	87.79 (23.46)
School Readiness Composite[c]	85.29 (21.27)	78.05 (21.83)	82.05 (21.74)
Age[d]	4.6(0.60)	4.57 (0.93)	4.6 (0.78)

Note: [a] indicates frequency per # observations, [b] indicates raw scores ranging from 0-10, [c] indicates standardized scores with a mean of 100 and SD of 15, [d] indicates age in years.

Table 3. Correlations between peer interactions, receptive language, expressive language, and school readiness.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Expressive Lang.	1												
2. Receptive Lang.	.65**	1											
3. Physical Victimization	-0.12	-.22**	1										
4. Physical Aggression	-0.15	-0.20*	.62**	1									
5. Relational Victimization	0.04	-.03	.32**	.26**	1								
6. Relational Aggression	0.1	.05	-.13	.13	.07	1							
7. Prosocial Received	.23**	.16	.23*	.12	.13	.15	1						
8. Prosocial Displayed	0.16	.12	.20*	.33**	.23**	.27**	.49**	1					
9. Colors	.22*	.18*	-.16	.06	-.04	.19*	-.07	-.04	1				
10. Letters	.24**	.20*	-.13	-.09	.03	.12	-.07	.01	.45**	1			
11. Numbers	.26**	.19*	-.12	-.08	.04	.23*	-.05	.01	.46**	.73**	1		
12. Size/ Comparisons	.33**	.31*	-.15	.01	.22*	.23**	-.14	.17	.33**	.32**	.32**	1	
13. Shapes	.34**	.21*	-.20*	-.05	.09	.17	-.10	-.04	.42**	.43**	.45**	.51**	1

Note. *p<.05; **p<.01 (2-tailed)

Table 4. Sex Differences in Peer Interactions

Assessment	Girls M (SD)	Boys M(SD)	F (df)
Physical Victimization[a]	0.56 (0.45)	0.58 (1.42)	5.04* (1, 121)
Relational Victimization[a]	0.30 (0.37)	0.09 (1.26)	1.70 (1, 121)
Prosocial Behavior Received[a]	0.66 (0.4)	0.44 (1.34)	0.81 (1, 121)
Physical Aggression[a]	0.76 (0.63)	0.75 (1.52)	20.06** (1, 121)
Relational Aggression[a]	0.51 (0.43)	0.08 (1.27)	0.22 (1, 121)
Prosocial Behavior[a]	1.02 (0.56)	0.71 (1.45)	1.41 (1, 121)

Note. *p<.05; **p<.01 (2-tailed)

Table 5. Two-group (girl, boy) analysis of measurement invariance.

		Fit Indices				
Model	ML χ2	Scaling Factor	df_0	Adjusted χ2	Δχ2	Δ df
Baseline Model (all constrained)	50.09	0.88	19	43.88		
Color Factor Loading	49.63	0.86	18	42.49	1.39	1
Letter Factor Loading	48.94	0.860	18	43.80	0.08	1
Number Factor Loading	47.54	0.88	18	41.84	2.04	1
Size Factor Loading	49.78	0.88	18	43.86	0.02	1
Shape Factor Loading	48.90	0.89	18	43.37	0.51	1
Color Intercept	49.83	0.88	18	43.80	0.08	1
Letter Intercept	51.76	0.85	18	43.840	0.04	1
Number Intercept	49.48	0.88	18	43.34	0.53	1
Size Intercept	39.98	0.86	18	34.31	9.57**	1
Shape Intercept	37.65	0.83	17	31.13	3.17	1
School Readiness Latent Variable Mean	39.29	0.84	17	32.85	1.46	1

Note. *p<.05; **p<.01 (2-tailed)

Table 6. Two-group model (girls, boys) of the relationship between physical aggression,

relational aggression, prosocial behavior and school readiness.

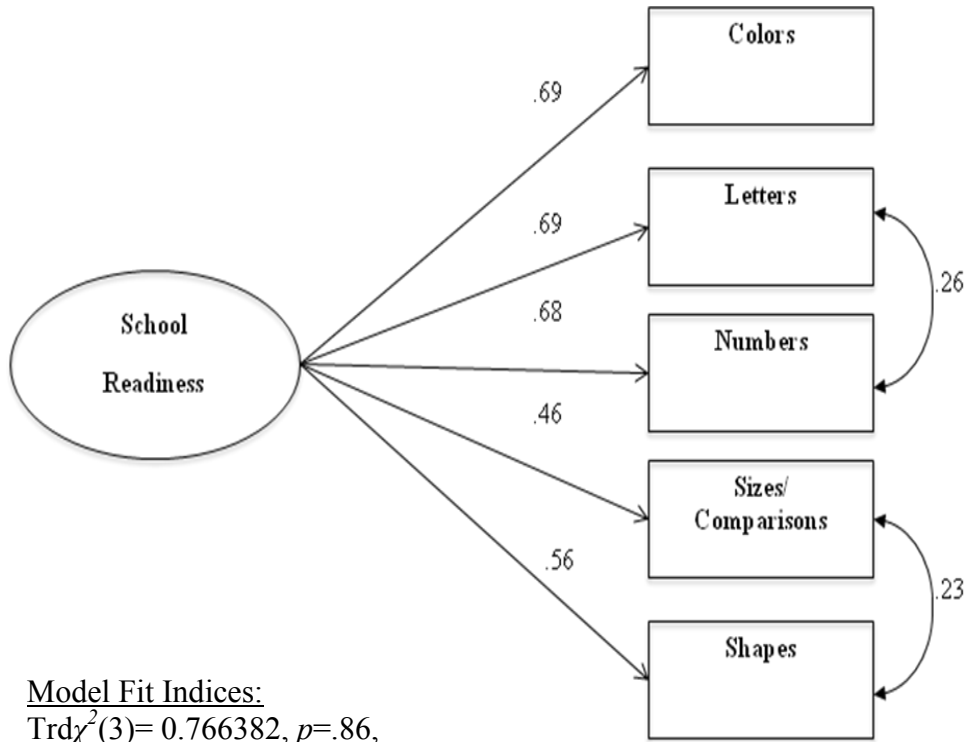| Model	Fit Indices					
	ML χ2	Scaling Factor	df0	Adjusted χ2	Δχ2	Δ df
Baseline (all constrained)	105.78	0.86	71	90.86		
Variances						
Physical Aggression	104.39	0.86	70	89.46	1.40	1
Relational Aggression	98.47	0.84	70	82.72	8.15**	1
Prosocial Received	99.76	0.83	69	82.50	0.22	1
Receptive Language	94.85	0.85	69	80.15	2.57	1
Expressive Language	98.17	0.84	69	82.56	0.15	1
Means						
Physical Aggression	94.52	0.84	69	79.21	3.51	1
Relational Aggression	83.16	0.84	69	69.43	13.28**	1
Prosocial Received	81.04	0.83	68	67.10	2.34	1
Receptive Language	82.81	0.83	68	69.06	0.38	1
Expressive Language	83.87	0.83	68	69.44	-0.01	1
Structural Coefficients						
Physical Aggression	82.36	0.84	68	68.94	0.50	1
Relational Aggression	83.33	0.83	68	69.33	0.10	1
Prosocial Received	82.40	0.83	68	68.40	1.04	1
Receptive Language	83.51	0.83	68	68.90	0.54	1
Expressive Language	79.37	0.87	65	69.13	1.20	1

Note. [*]$p<.05$; [**]$p<.01$ (2-tailed). Structural coefficients represent the coefficients associated with

the paths between the construct and the latent variable of School Readiness.

Table 7. Two-group model (girls, boys) of the relationship between physical victimization, relational victimization, received prosocial behavior and school readiness.

Model	Fit Indices					
	ML χ^2	Scaling Factor	df 0	Adjusted χ^2	$\Delta\chi^2$	Δ df
Baseline (all constrained)	106.20	0.89	71	94.84		
Variances						
Physical Victimization	104.95	0.86	70	90.68	4.16**	1
Relational Victimization	90.12	0.87	69	78.49	12.19**	1
Prosocial Received	91.63	0.86	68	78.43	0.06	1
Receptive Language	86.08	0.88	68	75.58	2.91	1
Expressive Language	89.86	0.87	68	78.27	0.22	1
Means						
Physical Victimization	83.52	0.87	67	72.67	5.83	2
Relational Victimization	85.18	0.88	67	74.79	3.70	2
Prosocial Received	85.23	0.87	67	73.90	4.59	2
Receptive Language	85.29	0.87	67	74.46	4.03	2
Expressive Language	85.80	0.87	67	74.82	3.67	2
Structural Coefficients						
Physical Victimization	85.42	0.87	66	74.15	4.34	3
Relational Victimization	80.47	0.87	66	70.33	8.16**	3
Prosocial Received	78.89	0.88	65	69.34	0.99	1
Receptive Language	79.86	0.87	65	69.48	0.85	1
Expressive Language	79.37	0.87	65	69.13	1.20	1

*Note.* [*]p<.05; [**]p<.01 (2-tailed). Structural coefficients represent the paths between the construct and the latent variable of School Readiness

Figure1. Measurement model of School Readiness.

Model Fit Indices:
Trdχ^2(3)= 0.766382, p=.86,
CFI=1.00, RMSEA=0.000
SRMR=0.008

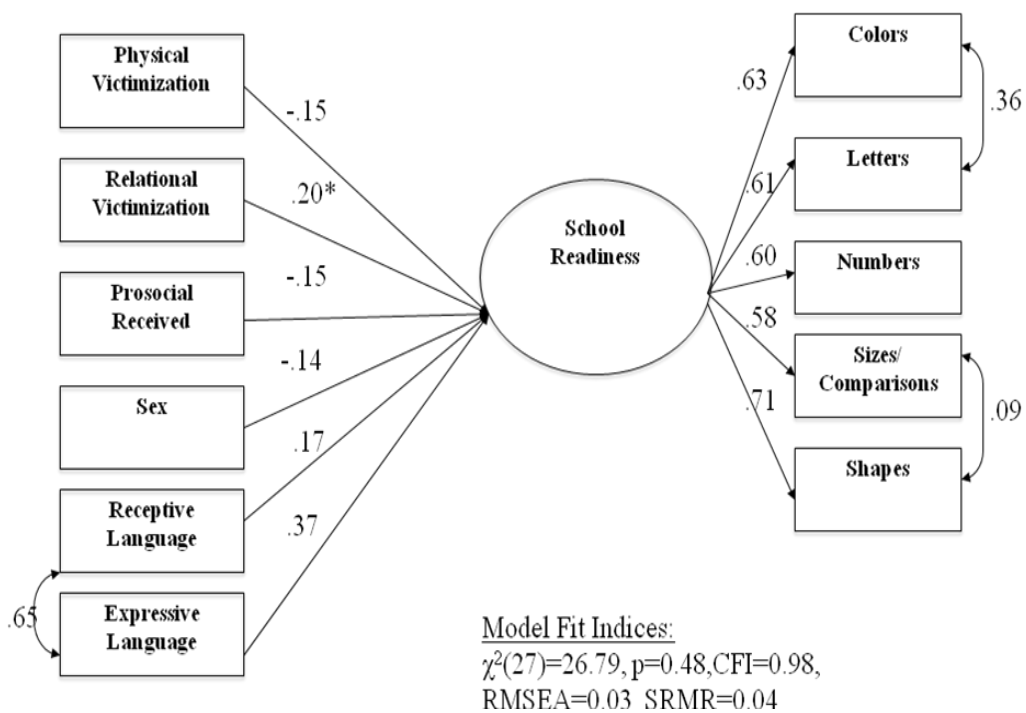Figure 2. Structural Model of Peer Aggression, Prosocial Behavior, and School Readiness

Model Fit Indices:
Trdχ^2(27)=26.79, p=0.48, CFI=0.99,
RMSEA=0.03 SRMR=0.04
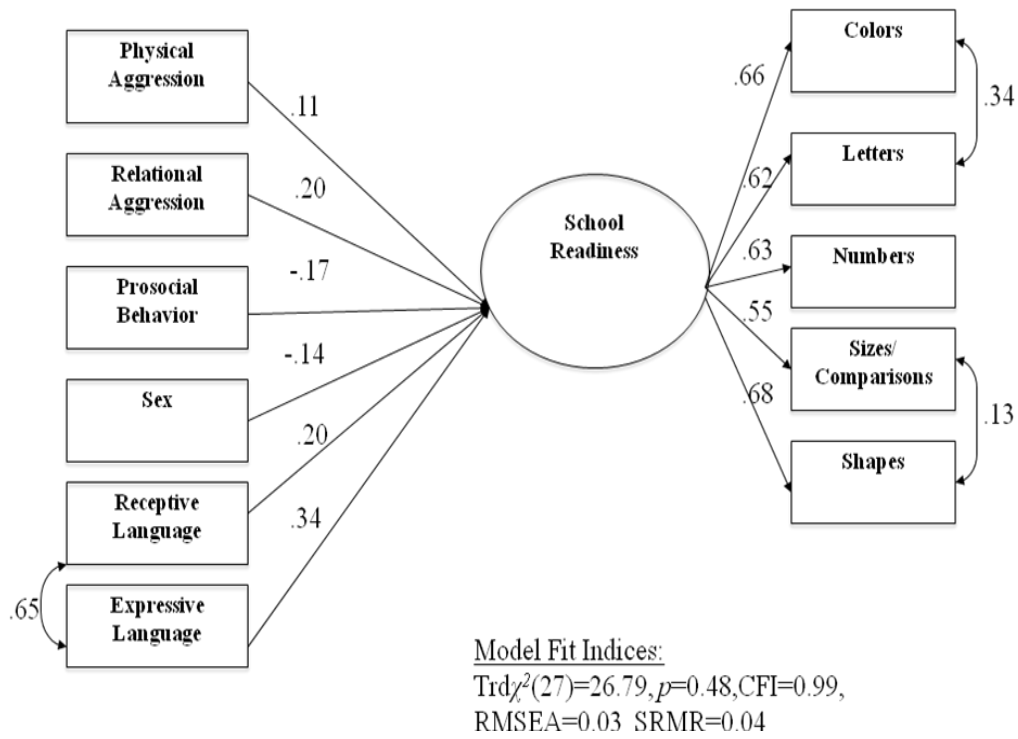
Note. *p<.05; **p<.01 (2-tailed).

Figure 3. Structural Model of Peer Victimization, Received Prosocial Behavior, and School Readiness.

Note. *p<.05; **p<.01 (2-tailed).