CHILD INHIBITORY CONTROL AND PARENT FACTORS AS CONTRIBUTORS TO SCHOOL READINESS

By

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DISSERTATION ABSTRACT

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School readiness, the levels of basic academic and social skills that children have upon school entry, is strongly predictive of later academic and life outcomes. School readiness is often considered to have two separate but related components: socioemotional and academic. Both components are significantly associated with a child's levels of inhibitory control (IC), the ability to inhibit responses to irrelevant stimuli when working on an identified goal. IC, in turn, is fostered or hindered by the parenting that child receives. In addition, parenting stress is associated with parenting behaviors and child socioemotional competence. Therefore, this dissertation sought to disentangle the associations between parenting behaviors, parenting stress, child IC, and socioemotional and academic school readiness in a sample of 87 mother-preschooler dyads. Results of this dissertation indicated that, in our sample, child IC and parenting behaviors were not associated with socioemotional school readiness. In addition, parenting stress was not found to be associated with child IC. However, child IC was found to be a significantly associated with academic school readiness.

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¡Si se pudo!

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CHAPTER I

INTRODUCTION

Child Inhibitory Control and Parent Factors as Contributors to School Readiness

School readiness describes the levels of basic academic and social skills that children have upon school entry (Raver, 2003). It is a significant predictor of later academic outcomes (e.g., college attendance; Duncan et al., 2007), which in turn predict better life outcomes and mental health (Chen & Kaplan, 2003; Kubzansky, Berkman, Glass, & Seeman, 1998). While much of the conversation around school readiness refers to it as a single construct, it can actually be thought of as having two main facets: socioemotional readiness (or readiness for school and the school environment) and academic readiness (or readiness for learning academic material; Duncan et al., 2007; Lewit & Baker, 1995). Not all children begin school with the optimal level of readiness; this is problematic, as both of these forms of school readiness predict later academic outcomes (Duncan et al., 2007).

Many factors influence a child's level of school readiness and later academic performance. One key factor is inhibitory control (IC), which is defined as the ability to inhibit responses to irrelevant stimuli (e.g., distracting peers) when working on an identified goal (e.g., following the rules; Carlson & Moses, 2001; Carlson & Wang, 2007; Harnishfeger, 1995). Indeed, levels of IC in preschool have been found to be associated with an array of skills that are necessary for socioemotional and academic school readiness. First, IC is involved in emotion regulation and social skills (Kopp, 1982),

which are key components of socioemotional school readiness (Rhoades, Greenberg, & Domitrovich, 2009). Socioemotional school readiness, in and of itself, is a predictor of academic outcomes (McClelland, 2007). Second, IC is thought to contribute to individual differences in intelligence, attention, memory, and reading comprehension (Dempster, 1992; Diamond, 1990), which are key components of academic school readiness. Lastly, the literature directly investigating the associations between IC, academic school readiness, and later academic outcomes is mixed, with some work suggesting that they are separate predictors but others finding null effects (Kurdek & Sinclair, 200, McClelland et al., 2007; Willoughby, Kupersmidt, & Voegler-Lee, 2012). To my knowledge, no direct analyses of the associations between IC, socioemotional school readiness, and academic school readiness have been investigated in the same sample.

In addition to internal factors like IC, external factors–namely a child's environment–also have important implications for school readiness. For children entering school, the environment is primarily shaped by their parents. While parents are often their children's first teachers, much of the focus of this influence is on the academic concepts parents expose their children to, such as letters and numbers. However, less obvious parent factors, such as parenting stress, have been found to influence the socioemotional component of school readiness (Anthony et al., 2005; Chazan-Cohen et al., 2008). Specifically, children of more stressed parents exhibit lower levels of socioemotional readiness at school entry compared to their peers (Anthony et al., 2005). Furthermore, although parenting stress has been found to be a predictor of parenting behaviors (Crnic,

Gaze, & Hoffman, 2005), and parenting behaviors are known to be associated with their child's IC (Olson, Bates, & Bayles, 1990), little is known about the separate influence of parenting stress and parenting behaviors on child IC.

Therefore, the aims for this study were to 1) confirm the correlation between child IC and socioemotional school readiness in a local sample of 3 through 5-year-olds, 2) test the association between child IC and academic school readiness, and 3) explore the associations between parenting stress, parenting behaviors, child IC, and the socioemotional and academic facets of school readiness.

CHAPTER II

LITERATURE REVIEW

School Readiness

The concept of school readiness refers to a number of constructs that encompass a child's preparedness for school at the beginning of kindergarten. Exact definitions vary, but school readiness usually includes one or more of the following: academic skills, socioemotional skills, and attentional skills (Dotterer, Iruka, & Pungello, 2012; Duncan et al., 2007; Lewit & Baker, 1995). Others have extended the definition to also include constructs such as physical well-being, motor development, temperament, values, approach to learning, language development, and literacy skills (High, 2019). While these are all important constructs, an efficient way of considering school readiness is to divide it into socioemotional (including temperament, values, self-regulation) and academic (language, literacy, knowledge of basic pre-academic concepts) components.

It is important to better understand school readiness, as it can have long term implications for children. Academic readiness and attentional skills have both been found to be strong predictors of later academic achievement (Duncan et al., 2007; Romano, Babchishin, Pagani, & Kohen, 2010; Pagani, Fitzpatrick, Archambault, & Janosz, 2010). Academic achievement and success are associated with better life outcomes, such as postsecondary education, mental health, and health behaviors (Chen & Kaplan, 2003; Kubzansky, Berkman, Glass, & Seeman, 1998). Therefore, a critical first step in the goal of improving outcomes for all children is clear identification of both the internal and

external factors associated with both facets of school readiness, in order to intervene early and better prepare children for school.

Inhibitory Control and School Readiness

IC is the ability to actively avoid attending to stimuli that are irrelevant to the task at hand (Harnishfeger, 1995), or the ability to suppress a primary response when it's inconsistent with a goal or rule (Carlson & Wang, 2007). For example, school-aged children use IC to avoid shouting when it is inappropriate to do so or avoid hitting a peer even when wanting to do so. IC is a central component of executive function (EF), a group of skills that guide goal-directed behavior by planning, organizing, and controlling impulses unrelated to a goal (Carlson & Wang, 2007). Studies suggest that both school readiness and academic achievement are influenced by EF (Best, Miller, & Naglieri, 2012; Visu-Petraa, Cheiea, Bengaa, & Miclea, 2011), yet others suggest that this is driven more by IC than EF generally (Allan et al., 2014; McClelland et al., 2007). Additional confusion arises in the literature with regard to the terms used to refer to the control of impulses. It is referred to as IC (as it is here), part of self-regulation, part of effortful control, or included with other EF skills (Eisenberg, Valiente, & Eggum, 2010; Kopp, 1982; Liew, McTigue, Barrois, & Hughes, 2008). In order to reach a consensus about what IC is and its influence on school readiness and academic outcomes, there is a need to create a more cohesive definition of IC and clearly distinguish it from related constructs.

There is a robust literature demonstrating that IC is associated with overall levels of school readiness (e.g., Allan et al., 2014; McClelland et al., 2007). These findings are mostly specific to the socioemotional component (Carlson & Wang, 2007; Rhoades, Greenberg, & Domitrovich, 2009; Spinrad et al., 2007), but the association between IC and school readiness is complex. A large literature documents the strong link between IC and socioemotional functioning (e.g., Rhoades et al., 2009), and a separate literature links socioemotional functioning to academics (e.g., McClelland 2007). More recent work has examined the direct influence of IC on academic school readiness (Blair & Razza, 2007), although this work is not as established as that linking IC to socioemotional functioning. The following two sections detail the known links between IC and the socioemotional and academic facets of school readiness.

IC and socioemotional school readiness.

IC is a key component of emotion regulation and social skills (Carlson & Wang, 2007; Kopp, 1982), which form the basis for socioemotional school readiness (Raver, 2003). Assessments of IC in preschoolers significantly predict socioemotional competence above and beyond other variables associated with socioemotional competence (Rhoades et al., 2009), suggesting that it may be IC that drives these associations. Both emotion regulation and more general measures of socioemotional school readiness are associated with academic outcomes (Fuhs, Nesbitt, Farran, & Dong, 2014; Mann, Hund, Hesson-McInnis, & Roman, 2017; Mcclelland, Connor, Cameron, & Morrison, 2007; Sabol & Pianta, 2012: Willoughby, Kupersmidt, & Voegler-Lee, 2012).

If these are indeed driven by IC, it may be because IC leads to fewer distractions for children in the classroom and allows them to remain more emotionally positive in the face of academic challenges, which then sets the stage for better learning (Harrington et al., in press). Indeed, children who experience fewer emotional difficulties are more likely to experience school success when compared to peers who experience higher levels of emotional difficulties (Raver, 2003).

IC and academic school readiness.

Although there is a well-established association between IC and socioemotional school readiness, literature on the association between IC and academic school readiness is much more complex. This is partially a result of the inconsistency in constructs investigated in these studies. Some work has found that IC is predictive of academic school readiness (Allan, Hume, Allan, Farrington, & Lonigan, 2014; Blair & Razza, 2007; Mann, Hund, Hesson-McInnis & Roman, 2017) and later achievement (Liew, McTigue, Barrois, & Hughes, 2008). Other studies suggest an association between the functions of IC (e.g., behavioral regulation, emotional regulation) and academic school readiness (McClelland et al., 2007). And yet other studies show that EF, which includes IC, is predictive of math and language skills (Fuhs et al., 2014; Willoughby, Kupersmidt, & Vogler-Lee, 2012). Another reason for the complexity is that socioemotional and academic school readiness are strongly correlated (Bierman, Torres, Dominiteovich, Welsch, & Gest, 2008). One possibility is that the effect of IC on academic school readiness is mediated by socioemotional school readiness. Lastly, and most importantly,

some cognitive processes related to behavior and emotional control (e.g., IC, executive function, working memory) are related to academic areas such as early literacy and math. For instance, emotionality and self-regulated learning may involve the same cognitive processes (Blair, 2002). Therefore, the degree to which IC is associated with academic school readiness independent of socioemotional school readiness remains unclear. Nevertheless, it remains to be established whether there is an association between IC and academic school readiness, independent of social emotional school readiness or whether socioemotional school readiness mediates that association.

Parent Factors and Child IC

In addition to the internal factors associated with school readiness, Bronfenbrenner's ecological model (Bronfenbrenner, 1994) suggests internal and external factors interact to influence the development of children – including the development of school readiness. According to Bronfenbrenner (1994), a microsystem is made up of activities, social roles, and interactions experienced by the young child in a given setting. As part of children's microsystems, parents play a central role in their overall development via direct influence as well as through daily interactions with their children.

When this works well, children are likely to arrive at kindergarten with appropriate levels of socioemotional and academic readiness. However, not all parents are ready for this responsibility. While many parental factors can result in problematic outcomes for children, two common ones are high levels of parenting stress and

engagement in harsh parenting behaviors. Although it is unclear whether parenting behaviors mediate the link between parenting stress and child outcomes, parenting stress has been found to be independently associated with decreased positive parenting behaviors (Crnic, Gaze, & Hoffman, 2005) and socioemotional school readiness (Anthony et al., 2005). Therefore, two important parent factors to consider when trying to understand the external influences on school readiness are parenting stress and parenting behaviors, as both are separately associated with child IC or its functions (Anthony et al., 2005; Chazan-Cohen et al., 2008; Olson, Bates, & Bayles, 1990).

Parenting stress and child IC.

Parenting stress is defined as the difficulty experienced as a result of demands associated with being a parent (Anthony et al., 2005). It is associated with a host of outcomes for the children of these parents, including behavior problems, low social competence, and internalizing and externalizing symptomatology (Anthony et al., 2005; Chazan-Cohen et al., 2009). Importantly, these outcomes are all also associated with IC (Carlson & Wang, 2007; Kopp, 1982; Rhoades et al., 2009). However, it is unknown whether parenting stress is directly associated with child IC. This may be a bidirectional association, as parenting a child with low levels of IC may in and of itself increase parenting stress.

Parenting behaviors and child IC.

In contrast to the literature on parenting stress and IC, the literature on parenting behaviors and their influence on the development of child IC is much clearer. Parenting

behaviors are predictive of child EF (of which IC is a key component; Lengua, Honorado, & Bush, 2007), and have been found to predict children's performance on measures of cognitive nonimpulsivity and ability to delay gratification (Olson, Bates, & Bayles, 1990). In addition, parenting behaviors have been found to predict child socioemotional competence (Anthony et al., 2005). Specifically, negative parenting behaviors like harsh discipline are associated with lower levels of social competence, and positive parent behaviors like nurturing are associated with higher social competence (Anthony et al., 2005).

Importantly, parenting stress and parenting behaviors are also meaningfully correlated. Stress is a predictor of parenting behaviors (Anthony et al., 2005; Crnic, Gaze, & Hoffman, 2005) as parents experiencing higher levels of stress engage in more negative parenting behaviors (harsh discipline) and fewer positive parenting behaviors (nurturing parenting; Anthony et al., 2005). It is still unknown whether, after controlling for parenting behaviors, parenting stress is directly associated with child IC. Therefore, a direct comparison of the influences of parenting stress and parenting behaviors on child IC within our same sample was necessary.

Present Study

Although links have been established between child IC and socioemotional and academic school readiness, the field of school psychology could benefit from a clearer understanding of the influence of parent factors on child IC and school readiness. The goal of this dissertation is to contribute to the literature about the impact of parenting

stress and parenting behaviors on child IC, and the associations between child IC and both components of school readiness.

There is a well-established association between child IC and their socioemotional school readiness. Recent work suggests that, controlling for socioemotional school readiness, there may also be an association between IC and academic school readiness. In addition, there is an established association between parenting behaviors and child IC. Furthermore, it is known that parenting stress influences parenting behaviors. However, little research exists investigating the direct influence of parenting stress on child IC, controlling for parenting behaviors. Nevertheless, it is known that parenting stress is related to poorer outcomes. Specifically, the research questions were as follows:

1. What is the association between child IC and socioemotional school readiness?
2. Is the association between child IC and academic school readiness mediated by socioemotional school readiness?
3. What are the direct associations between parent factors (parenting stress and parenting behaviors) and child IC?

CHAPTER III

METHODS

Participants.

Participants in this study included eighty-seven mother-child dyads (M child age = 4.06, SD = 0.76) who were part of a larger study conducted at the University of Oregon in the Eugene/Springfield area. About half (52%) of the child participants were male and the sample was predominantly white (85%). Thirty two percent of the children were reported by their mothers to have attended some type of preschool (e.g., Preschool, Head Start, center-based, etc.) while 68% were reported to have no previous schooling experience.

Protocol.

Mother-child dyads were recruited from the community via Facebook and other forms of online advertising. Women interested in the study underwent a screening process which included a number of questions to ensure they had a biological child between the ages of 3 and 5 who resided with them at least half-to-full time during the week. The screening process ensured that the child had not yet enrolled in kindergarten (as one of the main dependent variables was readiness for school), and that the child had not been diagnosed with a developmental delay, sensory impairment, or the mother had other reasons to believe the child would not be able to successfully the complete the session. The screening included questions about behavioral and learning problems in the child, and involvement with child welfare. Finally, mothers were asked if their primary

language was English, whether they were left-handed, whether they were pregnant or could be pregnant at the time of the study, or whether they had a history of concussion, neurological disorders, or any other contraindications that would preclude MRI scanning.

Before the session, mothers were invited to complete questionnaires via a secure Qualtrics link. These questionnaires included The Parenting Stress Index-Short Form to measure parent stress, and the Deveraux Early Childhood Assessment for Toddlers to measure child socioemotional school readiness. Mother-child dyads then came into the lab at the Prevention Science Institute at the University of Oregon and participated in a three-hour session during which parent-child interactions were video recorded to provide a means of observationally coding parenting behaviors, and children were administered assessments related to school readiness and inhibitory control. Children were administered the Bracken School Readiness Assessment-Third Edition to measure academic school readiness. Measures of child IC included the Head-Toes-Knees-Shoulders task, the Day/Night Stroop task, the Balance Beam task, the Zoo Go/No-Go (GNG) task, the Fish/Shark GNG task, and the Tower task. Mothers were paid for their participation and children were able to pick a small prize out of a prize box at the end of the session.

Measures.

PSI-SF. The Parenting Stress Index-Short Form (Abidin, 1990) is a tool that measures the level of stress in the parent–child relationship and is typically used with parents of children between the ages of 1 month and 12 years of age. It was derived from the Parenting Stress Index and consists of 36 items which parents rate on a scale of 1 to 5 (1 = "strongly disagree", 5 = "strongly agree"). The 36 items are divided into three subscales: Parental Distress (PD), Parent-Child Dysfunctional Interaction (P-CDI), and Difficult Child (DC), which combine to form a Total Stress scale. Items include statement like "my child turned out to be more of a problem than I expected" and "my child smiles at me much less than I expected". The PD subscale was used as a measure of parenting stress. Higher scores on this subscale are indicative of higher levels of parenting stress. Internal consistency in this sample was high ($\alpha > .84$).

DECA-T. The Devereux Early Childhood Assessment for Toddlers (Powell, Mackrain, LeBuffe, & Lewisville, 2007) is a behavior rating scale that mothers completed and assessed children's social and emotional health, as well as resilience. Items in this measure asked mothers to specify how often their children engaged in behaviors such as "act happy with familiar adults", and "play with other children". Mothers' answers could range between "never" and "very frequently". T-scores and percentile ranks are derived from this measure and subscales include Initiative, Self-Regulation, Attachment/Relationships, Total Protective Factors, and Behavioral Concerns. The Total Protective Factors subscale is used as a measure of socioemotional

school readiness. Higher scores indicate better social emotional health and lower scores indicate poorer social emotional health. Internal consistency for Total Protective Factors in this sample was moderate ($\alpha = .66$).

BSRA-3. Bracken School Readiness Assessment-Third Edition (Bracken, 2007) is a brief school readiness assessment that measures a child's academic school readiness. Administration takes an average of fifteen minutes, and results yield composite scores, percentile ranks, and descriptive classifications. The BSRA-3 is a nationally normed assessment and measures a child's knowledge of colors, letters, numbers and counting, size and comparison, and shapes. Percentile ranks—which take into account child age—were used as a measure of academic school readiness.

Child Inhibitory Control Composite. In the literature, several tasks have been used as measures of inhibitory control. These tasks include the Head–Toes–Knees–Shoulders (HTKS) task (McClelland et al., 2007), the Day/Night Stroop task (Carlson & Moses, 2001; Lengua, Honorado, & Bush, 2007), the Balance Beam task (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009), the Zoo GNG task (He et al., 2010), the Fish/Shark GNG task (Kim, Shimomaeda, Giuliano, & Skowron, 2017), and the Tower Building task (Carlson & Moses, 2001). A child IC composite was created by combining these previously used tasks. Prior to creating the composite z-score, a correlation analysis was conducted to ensure the tasks were all associated with each other. Correlations among the variables included as part of the IC composite ranged from .262 to .565 with p-values ranging from < .001 to < .05. As such, scores on all tasks were z-scored and

averaged to create the composite. Higher scores on this composite indicate a higher level of child IC.

In the HTKS task, children were presented with a number of prompts such as "touch your head" and "touch your toes," but they were asked to do the opposite of what they were asked. For example, they were asked to touch their heads when the assessor said, "touch your toes," and vice versa. Children completed six practice trials with assessor feedback before completing the 10 test trials. Children who responded correctly to at least half of the test trials received two additional prompts. These prompts were "touch your shoulders" and "touch your knees". Once administered the new prompts, children were to do the opposite. For example, when the assessor said, "Touch your knees," the child was to touch their shoulders and so on. Children completed four practice trials with the new prompt and feedback was provided. Following the practice trials, children completed 10 test trials that included all four possible prompts. For each trial, children were scored 0 for an incorrect response, 1 for a self-corrected response, and 2 for a correct response. Higher scores on this task indicate a higher level of IC.

In the Day/Night Stroop task, children were presented with pictures of the moon and the sun on a computer screen. Children were instructed to say the opposite of what each picture represented. For example, children would respond "day" to a picture of the moon and stars and "night" to a picture of the sun. Two practice trials were administered to ensure children understood the task. Children were administered 16 test trials without

feedback, in a fixed random order. Correct verbal responses were scored a 1 and incorrect responses received a 0. Responses were scored by one of the assessors during administration and they were later summed. Higher scores on this task indicate a higher level of IC.

In the Balance Beam task, children participated in three trials of walking across a 6 feet long "balance beam" made up of tape on the floor. During the first trial, children were instructed to walk across the balance beam as fast as possible. For the second and third trials, children were asked to walk as slow as possible. The amount of time the child took to walk across the "balance beam" was recorded in seconds for each trial. During trials two and three, children were to walk slow; those times were averaged and the difference between the fast trial and slow trials was calculated. A smaller difference indicates a lower level of IC, while a bigger difference is indicative of a higher level of IC.

During the Zoo GNG task, children were presented with pictures of zoo animals on a computer screen and were told to help the zookeeper catch all the animals who escaped from their cages. They were instructed to press the space bar for all the animals (Go), except for the chimpanzee – Fred who helps the zookeeper catch the animals (NoGo). Children were given 12 practice trials and a total of 120 test trials, presented in two blocks of 60 trials each. Response accuracy was calculated across both Go and NoGo trials. Higher accuracy on this task indicates a higher level of IC.

During the Fish/Shark GNG task, children were presented with an iPad game in which they were asked to respond by tapping the screen when a fish swam by (Go), in order to catch the fish but to avoid touching the screen when a shark swam by (NoGo). After a practice block of 10 Go trials, a block of 30 Go trials and 10 No-Go trials was presented. Percentages were calculated for the proportion of Go and NoGo accuracy. Higher accuracy indicates higher levels of IC.

In the Tower task, children were to take turns with the assessor in building a tower using 20 wooden blocks. Children were first given a brief demonstration of turn-taking where the assessor paused before placing each block until children gave the assessor a turn. Ideally, children were to provide the assessor a turn every other block for half of the blocks. Children were scored a 0 if they did not wait to give the assessor a turn and a 1 if they gave the assessor a turn. If the child knocked the tower down, then they were scored a -1. Higher scores indicate greater child IC.

Parenting behaviors. Parent-child interactions were video recorded during free play, clean up, and a denied request. These interactions provide a means of observationally coding parenting behaviors. Due to technical difficulties experienced during some of the sessions, we have video recordings of only 83 of the dyads. Interactions were coded for harsher discipline and nurturing behaviors, as both have been found to be associated with child socioemotional competence (Anthony et al., 2005). The Parent–Child Interaction System (PARCHISY; Deater-Deckard, 2000) coding scheme

was used to code for harsh parenting. The PARCHISY coding scheme assesses individual mother and child characteristics in addition to the quality of mother-child interactions. The PARCHISY scheme contains 7 mother codes, 8 child codes, and 3 dyadic codes. Each code represents a global rating on a 7-point scale, which provides an estimate of the frequency of the behaviors of interest. Two mother codes were used: negative affect and negative content (control). On these codes, a score of one represents no negative control or affect displayed and a score of 7 represents exclusive use of negative control and constant use of negative affect. These codes were averaged to create a harsh parenting composite. Because 85.5% of mothers exhibited the lowest level of harsh parenting, we made the decision to dichotomize this variable to represent the absence (0) or presence (1) of harsh parenting. For the 12 mothers who exhibited any presence of harsh parenting behaviors, scores on the 1-7 scale ranged between 1.5 and 3.22 with a mean of 2.12.

Nurturing parenting behaviors were coded using the Parenting Interactions with Children: Checklist of Observations Linked to Outcomes (PICCOLO; Roggman, Cook, Innocenti, Jump Norman, & Christiansen, 2013). The PICCOLO contains 4 domains, for maternal affection, responsiveness, encouragement, and teaching. Each domain contains 7-8 codes, which are rated on a 0 (“absent”), 1 (“barely”), or 2 (“clearly”) and averaged. All domains were averaged to represent nurturing parenting. A higher score on the PICCOLO represents a higher level of nurturing parenting.

Data Analysis

Prior to running any analyses, data were checked for distribution and outliers. Outliers were winsorized at 3 SD from the mean. Visual inspection revealed that, with the exception of the harsh parenting and nurturing parenting variables, distributions of the variables of interest were roughly symmetrical with no severe skew. The age of child participants ranged from 3 through 5 years (M = 4.06, SD = 0.76). Age was normally distributed, with skewness of .48 (SE = 0.25) and kurtosis of -0.87 (SE = 0.50). Bracken scores ranged from 1 to 100 (M = 59.21, SD = 28.23) and were normally distributed, with skewness of -.211 (SE = 0.25) and kurtosis of -1.13 (SE = 0.51). The PSI-PD scores ranged between 12 and 52.17 (M = 26.15, SD = 8.57), and were moderately skewed with a skewness of .768 (SE = .255) and a kurtosis of .582 (SE = 0.50). DECA-TPF scores ranged between 81.93 and 128.00. Scores were moderately skewed with a skewness of -0.60 (SE = .258) and a kurtosis of .509 (SE = .511). The child IC composite scores ranged from -1.78 to 1.67. IC scores were normally distributed with a skewness of .137 (SE = .255) and kurtosis of -.597 (SE = .506). The PICCOLO scores ranged from 4.69 to 14 and the distribution could be considered severely skewed with a skewness of -1.27 (SE = .264) and kurtosis of 1.523 (SE = .523). In order to improve the distribution, transforming the PICCOLO variable was attempted. However, transformations of the variable did not meaningfully improve the distribution. As such, the decision was made to use the original data and results from analyses using this variable should be interpreted with caution.

After checking continuous variables for outliers and distribution, we ran zero-order correlations to examine the association between all continuous variables. Child sex and the harsh parenting dichotomized variable were not included in this array (Table 2). To address the main research questions, we ran a series of multiple regression analyses, all of which controlled for child age and sex, as both are likely to influence child variables. As seen in Table 2, child age was strongly correlated with child IC ($r(88) = .663$, $p < .001$).

The first multiple regression, addressing the hypothesized link between child IC and socioemotional school readiness, included DECA-TPF as the dependent variable and the child IC composite as the predictor. The second research question, whether the association between child IC and academic school readiness is mediated by socioemotional school readiness, was investigated using a series of multiple regressions testing the assumptions of mediation. The steps in establishing mediation discussed by Baron and Kenny (1986) were employed. The analyses required establishing significant associations between the IV (child IC) and DV (Bracken) as well as the IV (child IC) and the mediator (DECA-TPF). First, a direct association between child IC (the IV) and academic school readiness (Bracken; the DV) had to be established. Next, an association had to be established between child IC and socioemotional school readiness (DECA-TPF; the mediator). If those two assumptions were met by the data, then the effects of mediation could be investigated. The last research question, on the direct associations between parent factors (parenting stress, nurturing and harsh parenting behaviors) and

child IC, was also addressed using a series of multiple regressions. The first included the child IC composite as the dependent variable and the measure of parenting stress as a predictor, while controlling for both observed parenting behaviors. The second included child IC as a dependent variable, nurturing parenting as a predictor, while controlling for parenting stress. The third included child IC as the dependent variable, harsh parenting as a predictor, while controlling for parenting stress.

CHAPTER IV

RESULTS

Preliminary Analyses

Participant demographics, means, and standard deviations for all variables are shown in Table 1. Table 2 shows a correlation matrix including all continuous variables. Correlation results indicated there was a significant association between academic school readiness on the Bracken and child IC ($r(87) = .252$, $p = .019$). However, there was no significant association between socioemotional school readiness (DECA-TPF) and child IC ($r(87) = -.035$, $p = .751$). As would be expected, Child IC and child age were significantly correlated ($r(88) = .663$, $p < .001$). Additionally, a moderate significant correlation was found between parenting stress and child socioemotional school readiness ($r(86) = -.397$, $p < .001$).

Main Analyses

A multiple linear regression was calculated to address research question 1, the influence of child IC on socioemotional school readiness. Results indicated that, when controlling for child age and sex, child IC was not significantly associated with parent-reported socioemotional school readiness, $\beta = .138$, $t(83) = .944$, $p = .348$. Results of this first regression can be found on Table 3.

Table 1

Descriptive Statistics for All Continuous Variables

Variable	n	Range	M(n)	SD(%)
Child age	87	3.0 – 5.7	4.06	0.76
Child sex (female)	87		42	48.3
Parent stress (PSI-PD)	86	12.00 - 52.17	25.92	8.61
Socioemotional school readiness (DECA-TPF)	86	81.93 - 128.00	109.85	8.46
Child IC composite	87	-1.42 – 1.67	-.02	.73
Nurturing parenting (PICCOLO composite)	82	4.69 - 14.00	11.06	1.97
Harsh parenting (PARCHISY; Present)	82		12	14.6
Bracken percentile score	87	1 - 100	59.21	28.23

Note. With the exception of the nurturing and harsh parenting variables, the distributions of the variables listed are roughly symmetrical with no severe outliers or skew.

Table 2

Correlation Matrix

Variable	1	2	3	4	5	6	7
1. Child age							
2. Child Sex	-.009						
3. Parent stress (PSI-PD)	.044	.011					
4. Socioemotional school readiness (DECA-TPF)	-.160	.085	-.397**				
5. Child IC composite	.663**	.015	.037	-.035			
6. Nurturing parenting (PICCOLO composite)	.089	.065	-.002	.074	.138		
7. Harsh parenting (PARCHISY)	-.036	-.054	.031	-.090	-.130	-.405**	
8. Bracken percentile score	-.09	-.050	-.059	.132	.252*	.096	-.102

Note. * p <.05, **p <.001

Table 3

Hierarchical Regression Analysis Predicting Socioemotional School Readiness with Child IC While Controlling for Age and sex (N = 87)

Predictor	B	SE B	β	R^2	T	p-value
Step 1				.033	23.364	.000
Age	-1.776	1.191	-.160		-1.492	.139
Sex	1.436	1.808	.085		.795	.429
Step 2				.043	17.928	.000
Age	-2.823	1.628	-.254		-1.734	.087
Sex	1.429	1.809	.085		.790	.432
Child IC	1.610	1.706	.138		.994	.348

To test research question 2, that socioemotional school readiness mediates the association between child IC and academic school readiness, we first needed to establish that the IV (child IC) affects both the DV (academic school readiness; Bracken percentile scores) and the mediator (socioemotional school readiness; DECA TPF). A multiple linear regression was calculated to measure the influence of child IC on academic school readiness. As shown in Table 4, the full model was significant, $F(3,83) = 8.304$, $p < .001$, $R^2 = .186$. When controlling for child age and sex, child IC was significantly associated with Bracken scores, $\beta = .559$, $t(83) = 4.221$, $p < .001$. In other words, participants' Bracken scores were 4.221 percentile ranks higher for each unit scored on the IC composite. While the IV and DV were significantly associated, results from the analyses

addressing our first research question indicated there was no association between child IC (the IV) and socioemotional school readiness (the mediator). Therefore, this assumption of mediation was not met. As such, the data did not support our hypothesis that socioemotional school readiness would mediate the association between child IC and academic school readiness.

Table 4

Hierarchical Regression Analysis Predicting Academic School Readiness With Child IC While Controlling for Age and Sex (N = 87)

Predictor	B	SE B	β	R^2	T	p-value
Step 1				.011	4.374	.000
Age	-3.378	4.036	-.091		-.837	.405
Sex	-2.928	6.097	-.052		-.480	.632
Step 2				.186	6.385	.000
Age	-17.169	4.924	-.462		-3.487	.001
Sex	-2.709	5.568	-.066		-.666	.507
Child IC	21.559	5.208	.559**		4.221	.000

Note. **p < .001

Research question 3 was addressed using a series of regression analyses. The first multiple regression examined the influence of self-reported parenting stress on child IC, while controlling for both forms of measured parenting behaviors, child sex, and child age. Results of this analysis indicated that parenting stress (PD subscale) was not

significantly associated with child IC, $\beta = -.085$, $t(76) = -1.060$, $p = .292$. A second multiple regression included child IC as a dependent variable, and nurturing parenting as a predictor, while controlling for child age, sex, and parenting stress. Results indicated that nurturing parenting is not significantly associated with child IC, $\beta = .078$, $t(77) = .958$, $p = .341$. Results of a third multiple regression in which child IC was included as the dependent variable, and harsh parenting as a predictor, indicated harsh parenting was not significantly associated with IC after controlling for parenting stress, child age and sex, $\beta = -.111$, $t(77) = -1.378$, $p = .172$. Results of these three multiple regression models can be found in Tables 5a-5c.

Exploratory Analyses

Some exploratory analyses were conducted post hoc to determine whether other subscales on the PSI-SF were significantly associated with child IC when controlling for parenting behaviors and child age and sex. Results of these regressions indicated that, in our sample, there is no association between any of the subscales of the PSI-SF and child IC (p-values > .25). Relatedly, a multiple linear regression was calculated to explore the influence of parenting stress on socioemotional school readiness. The overall model was significant, $F(3,85) = 6.364$, $p = .001$, $R^2 = .189$. When controlling for child age and sex, PSI-PD was significantly associated with DECA-TPF, $\beta = -.395$, $t(82) = -3.965$, $p < .001$. Children's socioemotional school readiness scores decreased by .392 as their mother's PSI-PD score increased. Results of this regression are exhibited in Table 6 below. Interestingly, when controlling for both types of observed parenting behavior (nurturing

and harsh parenting), parenting stress remained significantly associated with children's socioemotional school readiness.

Table 5a

Hierarchical Regression Analysis Predicting Child IC With Parenting Stress While Controlling for Child Age, Sex, and Observed Parenting Behaviors (N = 80)

Predictor	B	SE B	β	R^2	T	p-value
Step 1				.515	-6.169	.000
Age	.688	.079	.700		8.728	.000
Sex	-.027	.118	-.018		-.230	.818
Harsh Parenting	-.199	.182	-.095		-1.093	.278
Nurturing Parenting	.015	.033	.040		.453	.652
Step 2				.522	-5.492	.000
Age	.687	.079	.700		-8.726	.000
Sex	-.029	.118	-.020		-.248	.805
Harsh Parenting	-.175	.183	-.084		-.958	.341
Nurturing Parenting	.017	.033	.045		.512	.610
Parenting Stress (PSI-PD)	-.007	.007	-.085		-1.060	.292

Table 5b

Hierarchical Regression Analysis Predicting Child IC With Nurturing Parenting While Controlling for Child Age, Sex, and Parenting Stress (N = 80)

Predictor	B	SE B	β	R^2	T	p-value
Step 1				.502	-7.706	.000
Age	.697	.079	.710		8.802	.000
Sex	-.013	.119	-.009		-.111	.912
Parenting Stress (PSI-PD)	-.002	.007	-.020		-.245	.807
Step 2				.508	-6.540	.000
Age	.690	.080	.702		8.660	.000
Sex	-.022	.119	-.015		-.182	.856
Parenting Stress (PSI-PD)	-.002	.007	-.019		-.230	.819
Nurturing Parenting	.029	.030	.078		.958	.341

Table 5c

Hierarchical Regression Analysis Predicting Child IC With Harsh Parenting While Controlling for Child Age, Sex, and Parenting Stress (N = 80)

Predictor	B	SE B	β	R^2	T	p-value
Step 1				.502	-7.706	.000
Age	.697	.079	.710		8.802	.000
Sex	-.013	.119	-.009		-.111	.912
Parenting Stress (PSI-PD)	-.002	.007	-.020		-.245	.807
Step 2				.514	-7.577	.000
Age	.692	.079	.705		8.783	.000
Sex	-.024	.118	-.016		-.201	.841
Parenting Stress (PSI-PD)	-.001	.007	-.015		-.191	.849
Harsh Parenting	-.230	.167	-.111		-1.378	.172

Table 6.

Hierarchical Regression Analysis Predicting Socioemotional School Readiness with Total Parenting Stress While Controlling for Age and sex (N = 86)

Predictor	B	SE B	β	R^2	T	p-value
Step 1				.010	23.214	.000
Age	-1.778	1.197	-.160		-1.485	.141
Sex	1.483	1.828	.088		.811	.420
Step 2				.159**	24.175	.000
Age	-1.642	1.104	-.148		-1.487	.141
Sex	1.654	1.685	.098		.981	.329
Parenting Stress (PSI-PD)	-.392	.099	-.395		-3.965	.000

Note. **p <.001

CHAPTER V

DISCUSSION

The goal of this study was to determine the influence of child IC and parent factors on preschooler's school readiness using the following questions: What is the association between child IC and socioemotional school readiness?, Is the association between child IC and academic school readiness mediated by socioemotional school readiness?, What are the direct associations between parent factors (parenting stress and parenting behaviors) and child IC? When interpreting findings of this study, it is important to note that all data are cross sectional and as such no causal conclusions can be made.

With regard to question 1, child IC was not associated with socioemotional school readiness in our sample. Interestingly, a post hoc exploratory analysis revealed that parenting stress was significantly negatively associated with children's socioemotional school readiness. Although both measures are parent report, these results suggest that parents who feel more stressed tend to report their children as less socioemotionally competent, or that parents of less socioemotionally competent children experience greater stress than parents of more competent children. Because the directionality of this association is unknown, future research would benefit from including an observable measure of socioemotional school readiness.

Overall, it appears that, at least in the context of these analyses, neither parenting behaviors or parenting stress are predictive of child IC. While the results of the regression

investigating the role of harsh parenting on child IC was not significant, the trend-level p-value and low variance in observed harsh parenting suggest that future work employing samples with more variance in these forms of parenting behaviors may have enough power to test these theories more fully. In addition, the zero-order correlation analyses indicated there is an inverse association between harsh parenting and nurturing parenting within our sample, suggesting that parents who engage in more nurturing parenting behaviors may be less likely to engage in harsh parenting behaviors. Further research investigating the association between nurturing and harsh parenting behavior is necessary to better understand how these parent factors interact.

The mediation assumption test requiring a multiple regression examining the influence of child IC on academic school readiness suggests that indeed, laboratory assessments of child IC predict academic school readiness. Given the cross-sectional nature of the data used for the present study, we are not able to make causal inferences about the direction of these effects. However, one implication of this finding is that it supports other work emphasizing the need for early intervention. If having a higher level of IC can significantly influence a child's academic school readiness, determining ways to help children more fully develop their IC abilities before they enter formal schooling may be beneficial. This may be especially true when considering children who may be likely to struggle with IC (e.g., children who have experienced trauma, and children with ADHD). Future research is needed in order to better understand these associations and

the importance of IC on the development of both socioemotional and academic school readiness.

Generally, school readiness refers to children's social emotional and academic skills prior to entering kindergarten. Definitions used in studies investigating school readiness vary but generally include academic skills, socioemotional skills, and attentional skills (Dotterer, Iruka, & Pungello, 2012; Duncan et al., 2007; Lewit & Baker, 1995). In this study, we operationalized school readiness as having two main components: socioemotional and academic. To this end, we obtained a parent report of children's social and emotional health and resilience, and directly assessed these children's knowledge of preacademic skills via the Bracken School Readiness Assessment. Interestingly, although it was expected that there would be an association between both aspects of school readiness, this was not the case within our sample. However, this may be a result of the measure used to measure child socioemotional school readiness in our sample. While in other studies, teacher reports and observations may have been used, here we used a parent report. Our measure of academic school readiness could be considered to be more objective than our measure of socioemotional school readiness. While the Bracken is a standardized test that measures knowledge of preacademic concepts by assessing the child themselves, it is more challenging to assess socioemotional school readiness. A significant limitation of the present study is our use of parent report as a measure of children's socioemotional school readiness, as parents may be biased in their reporting and they may underreport or overreport socioemotional

health and/or resilience. It is important to consider that parents' perception of their children may be influenced by their experience of parenting and vice versa. However, parents also have access to a wide repertoire of socioemotional behaviors exhibited by their child that may not be evident to outside observers. Future work in this area would benefit from additional measures of socioemotional school readiness to complement parent report.

In addition to the sole use of parent report to assess socioemotional school readiness, other limitations of this study include sample size and composition. We did not perform an a priori power calculation to determine sample size, and instead based our stopping rule on availability of funds. Therefore, while the sample was large compared to other studies in the field, we may have been underpowered to detect significant associations between the variables of interest. In addition, the sample was not ethnically diverse. Most participants were Caucasian (85%). Lastly, this was a low-risk community sample in which we observed a very low frequency of harsh parenting behaviors. While this was not unexpected due to the recruitment procedures (not over-enrolling participants from backgrounds where harsh parenting behaviors are more commonly observed), the lack of variability did limit our ability to study the associations between harsh parenting and child outcomes.

Further investigation of the association between child IC and academic school readiness is necessary. Because other research suggests child IC is strongly associated with socioemotional school readiness, further investigation about how and under what

circumstances child IC can be used to predict socioemotional school readiness is necessary. Because of our study used cross-sectional data and had some limitations with regard to sample size and diversity, the findings are unlikely to generalize to a more diverse population. If indeed child IC does significantly and reliably serve as a predictor of socioemotional school readiness, various fields (e.g., early education, early intervention, school psychology, and developmental psychology) would benefit from better understanding these associations in the service of better preparing children for school entry.

Finally, more research on the influence of parent factors on child IC and both socioemotional school readiness and academic school readiness would be helpful. While we did not find a significant influence of parent factors on child IC or either form of school readiness within our sample, these findings must be interpreted in the context of our limitations. Future research with larger, more diverse samples as well as more precise measures of socioemotional school readiness and more variability in the measurement of harsh parenting may find otherwise.

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