

The Association between Maternal Social Information Processing and Children's Inhibitory Control and School Readiness

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Abstract

Difficulties present in self-regulatory capacities in children can adversely affect a child's school readiness. It has been hypothesized that maternal social information processing (SIP) capacities influence children's self-regulatory capacities. This study examined whether maternal social cognitive and neurocognitive capacities are associated with children's self-regulatory capacities and school readiness. 42 mother-dyads were recruited from low-income areas. The children's ages ranged from 4 to 5 years old. The social information processing theory (SIP) of parenting risk was used to measure maternal social-cognitive and neurocognitive capacities across three domains. These domains included maternal attributions, unrealistic expectations and executive functioning. Children's behavioral inhibition was assessed. Mother's and teacher's ratings of externalized behavior and teachers ratings of school readiness were also collected. Two of the three domains of SIP, unrealistic expectations and executive functioning, showed significant associations with both children's behavioral inhibition and mother's ratings of externalized behaviors. Although direct links between SIP and teacher ratings of school readiness were not found, higher levels of externalized behaviors were found to be associated with poorer school readiness. Thus, there was some support for SIP to be linked to school readiness. Implications for preventive interventions are discussed and further exploration of parental SIP and school readiness are warranted.

Introduction

Factors present during early childhood can be predictive of many adult outcomes. Whether it is emotional, social or physical development all of these factors have a direct effect on the development of children (Encyclopedia of early childhood development, 2011). Young children typically are part of a small microsystem which is primarily composed of their parents and school. This study will examine whether maternal social cognitive and neurocognitive capacities are correlated to children's self-regulatory capacities and school readiness.

Self-Regulation in Children

Self-regulation is a complex culmination of capacities that allow children to respond appropriately to their environment (Bronson, 2000). These specific capacities allow children to regulate their behavior and act in accord to social standards (Kochanska, Coy & Murray, 2001). These capacities include being able to begin and stop activities based on the situational demands, control verbal and motor acts in social and educational settings, and delay gratification (Kopp, 1982).

Children begin to build the foundation of their self-regulation capacities in the first five years of their life (Blair, 2002). Late infancy through preschool age is considered the critical time period for the emergence of self-regulatory capacities (Kochanska, Coy & Murray, 2001). Within the first two years of life children are capable of control, which entails initiating, maintaining and stopping behaviors and following caregivers' requests (Kopp, 1982). By the age of 2 children have acquired the skill of self-control which allows them to regulate and delay behavior on request, but also when there is an absence of external monitors (Kopp, 1982). By age 3, children should be able to self-regulate, or in other words, have the flexibility in their control processes where they can meet the demands of varying situations. Although the development of a certain level of self-regulation occurs naturally, it is still governed by involvement with the environment.

Maternal discipline style is a factor that is commonly linked to the presence of self-regulation difficulties in children (Kochanska, Coy & Murray, 2001). Difficulties in self-regulatory capacities are typically expressed as externalized behavior problems. Externalized behavior is defined as problem behaviors directed toward the external environment that can be identified through rule-breaking, disruptive behaviors and negative interpersonal interactions (January et al., 2017). Evidence of the early expression of externalized behaviors is important because it is indicative of future antisocial behaviors such as substance use and conduct problems, which have major life consequences (January et al, 2017). The presence of rule breaking at home and school, poor emotional regulation, and ineffective discipline by parents have been labeled as early indicators of criminality (Wrightsmann, Greene, Nietzel & Fortune, 2001). These early indicators show the impact that the presence of externalized behaviors and the role parents play have on children's future outcomes. In children the presence of these behaviors does not only impact future outcomes such as criminality, but has been linked to current and future academic problems (January et al, 2017). Research has suggested that the early display of externalized behaviors has been linked to poorer academic performance.

Self –Regulation and School Readiness

Deficits in the ability to self-regulate have been associated with poor school readiness. Self-regulatory skills are not only associated with the academic component of school readiness, but also the behavioral component (Razza & Raymond, 2013). One specific self-regulation capacity that will be the primary focus of this study is behavioral inhibition. Externalized behavior will also be a primary component of this study, but is being used to conceptualize the lack of self-regulatory capacities or behavioral inhibition.

Another self-regulatory capacity of interest in this study is delay of gratification. Delay of gratification entails a child's ability and willingness to either control their impulses to act immediately or to do as instructed, which is to wait for the desirable award (Mischel, Shoda, & Rodriguez, 1989). In other words, this measure examines a child's ability to express inhibitory control when directed to do so. For example, a well-known delay-of-gratification task is the

Marshmallow Test (Bembenuddy & Karabenick, 2004). This task asks kids to not eat the singular marshmallow while the researcher steps out the room. The children are told if they are able to wait, when the researcher returns they will give them two marshmallows. The time it takes for the child to either wait or eat the marshmallow is measured as delay of gratification. In 2013, Razza and Raymond (2013) found that delay of gratification was positively associated with academic skills and negatively associated with externalizing behaviors. In other words, children who displayed more externalizing behaviors had lower scores for delay of gratification, meaning they were less able to delay gratification. Research has shown that the ability to delay gratification served as a protective factor against behavioral problems and it also promoted academic performance (Razza & Raymond, 2013). Presently, past research has shown that there is an association between school readiness and delay of gratification. This study will build upon previous research that has examined associations between child self-regulatory capacities and school readiness. In addition, given the well-established role of parenting in influencing the development of children's self-regulatory capacities, this study will also assess the impact of maternal social-cognitive and neurocognitive capacities.

Maternal Social Information Processing

The Social Information Processing (SIP) model of parenting risk uses cognitive mechanisms to understand how parents respond emotionally and behaviorally to their environment (Azar, Stevenson, & Johnson, 2012). The SIP model is utilized as the foundation to the present study (Azar, Stevenson, & Johnson, 2012). These are the three elements of the model: schemas, executive functioning and biased appraisals (see figure 1 below).

A schema is a person's knowledge structure that can be thought of as a filter for one's intake of information from the surrounding world (Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017). The SIP model attempts to capture a parent's schema by focusing on, their expectations of their child. Whether these expectations are realistic or developmentally inappropriate is reflective of the quality of the parent's schema (Azar et al, 2017). Parents who tend to have developmentally inappropriate or rigid expectations may be at risk for various problematic parenting behaviors such as neglect and physical abuse.

Executive functioning consists of higher-level cognitive processes. These processes include problem-solving, planning, and working memory. In 2015, Bridgett and colleagues concluded after reviewing numerous studies on executive functioning that self-regulation is intergenerationally transmitted from parent to child (Bridgett et al., 2015). This link was found between ineffective parenting such as harsh discipline, but also was correlated with executive functioning. Mothers with lower overall executive functioning responded more harshly to a child's conduct problems (Bridgett al, 2015). While reviewing one particular component of executive functioning, it was concluded that mothers with lower working memory had a tendency to react negatively when faced with challenging behaviors from their child (Bridgett et al, 2015). Also, mothers who have poor spatial working memory tended to be less sensitive in terms of responsiveness to their infants.

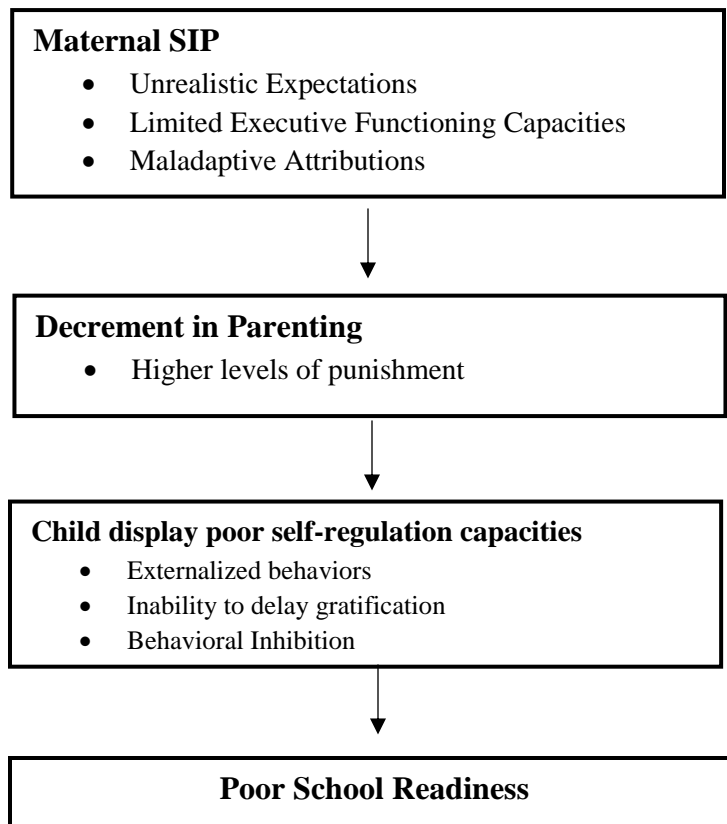


Figure 1. A theorized pathway attempting to illustrate the correlation between maternal SIP and children's ability to self-regulate and their school readiness.

The last component of the SIP model is attributions. Attributions can be thought of as a person's interpretation of others' behavior (Azar et al, 2017). Hostile attribution bias is a bias for interpreting ambiguous situations as hostile or threatening. Parents who exhibit this bias tend to have more aggressive responses to child behaviors, including increased use of harsh discipline (Slep & O'leary, 1998). Harsher parenting styles tend to be correlated with children who have poor self-regulation. Hostile attributions prevent the measured parenting required to help children develop self-regulation. Poor self-regulation is an element of the presence of many externalizing behaviors such as aggression, rule breaking, and defiance. The presence of these behaviors does not only increase the risk of developing antisocial behaviors in children, but also is correlated to poorer school outcomes.

Current Study

The present study is premised on the idea that maternal cognitive processes will affect children's self-regulatory capacities. Using this SIP approach to understanding these cognitive process postulates that children will be effected in terms of ability to display behavioral inhibition and their level of externalized behaviors. This study examined the following hypotheses:

Hypothesis 1: Maternal SIP difficulties will be associated with children's externalizing behaviors

Hypothesis 2: Maternal SIP difficulties will be associated with difficulties in children's behavioral inhibition

Hypothesis 3: Maternal SIP difficulties will be associated with poor school readiness

Hypothesis 4: Difficulties in Children's behavioral inhibition will be associated with externalized behaviors

Hypothesis 5: Children's behavior inhibition difficulties will be associated with poor school readiness

Methods

Participants

Participants in the study were low-socioeconomic (SES) mothers that were recruited in Philadelphia, PA, as part of a larger federally funded study that examined SIP and child neglect (NICHD #5R01HD53713). These mothers had children ranging from 4 to 5 years old. Participants were recruited from child protective services, parenting services contract agencies, and community settings such as Head Starts and daycares.

Demographics

Forty-two mother-child dyads participated in this study. Of the 42 children who participated in the study, the average age was 4.96 years old ($SD=.58$) with 47.6% being male and 52.4% being female. Of the 42 mothers in the study the average age was 30.00 years old ($SD= 5.40$). The sample was primarily African-American mothers (69.0%) and children (69.0%). Of the mothers in the study 59.5% reported not being employed and 40.5% reported being employed. Of the mothers reported being employed, 47% reported working a part-time job, and 52.9% reported working a full-time job. On average the 42 mothers participating in this study had an education level of 11.26 years ($SD=1.51$). Of the mothers participating, 28.6% had substantiated child protection services (CPS) records for maternal perpetration of child neglect. Of the mothers with a CPS record, 17.1% were reported as only being a perpetrator of neglect and 11.4 % of mothers were reported for being a perpetrator of neglect and other forms of maltreatment.

Procedure

Data collection was completed over the course of 3 home visits that were scheduled a week apart. During these visits consent forms were solicited and assessments began. Mothers gave consent for their children and themselves and also for their children's teachers to participate in the study. Mothers also gave consent for a record search of Department of Social Service records for evidence of maltreatment. Assessments and measures were given in a fixed order, standardizing the delivery process of the measures. The mothers were paid \$150 for participating in the study. Forms were sent to the children's teachers/daycare providers to complete.

Measures

Parent Opinion Questionnaire (POQ). The POQ was used to measure unrealistic expectations mothers may have for their children's capacities (Azar et al, 1984). The scale was designed to capture these expectations at varying developmental stages (Twentyman, Plotkin, & Dodge, 1981). These stages ranged from infancy to 16 years old. The measure consists of 80 agree-disagree statements. These statement range from, "In most cases, a 6 years old can get up, was, dress, and go to school unassisted" to "A 15 year old should be expected to help 'patch up' his or her parents' martial problems" (Twentyman, Plotkin, & Dodge, 1981). This scale has adequate test-retest reliability over a two week period ($r=.85$) and good internal consistency [$r= .83$ with 100 CPS cases (Azar, 1988); $r = .87$ with 296 normal mothers (Hamilton & Orme, 1986)]

Wisconsin Card Sorting Test (WCST) The WCST is a neuropsychological test of executive functioning (Heaton, 1981). The number of preservative errors will be used to indicate executive functioning problems. Preservative errors are calculated by indicating the number of times the participant continued to use a rule that was no longer correct or applicable to their new task. This is indicative of greater executive functioning problems. To reduce positive skew in these data, scores were log-transformed prior to analyses.

Child Vignettes (CV) To measure mothers' attributions for their children's behavior, the CV was used. This scale measures the degree to which parents attribute negative intentions to their child's misbehavior. It also measures the degree to which they would punish the child for these behaviors. Mothers were read 18 vignettes which described aversive child behavior (Plotkin, 1983). They were then asked to imagine if this child was their own. They then rated on a scale from 1 to 9 how much that child engaged in that behavior to annoy them (Negative attributions ratings). They were then asked, using the same scale, to which degree they would punish the child (Punishment ratings). Lastly, they were asked to rate using the same scale, to what degree did they feel the child's behavior was due to something the parent did (Blame ratings). The purpose of the last rating was to capture possible self-blame which is typically found in neglectful parents rather than negative intent attributions which is most commonly found in abusive parents. This scales has been used in prior research and has an adequate internal consistency ($\alpha= .94$).

Gift Wrapping Task The gift wrapping task is a child's measure used to assess the child's ability to delay gratification or express inhibitory control (Kochanska, Murray, Jacques, Koenig, & Vandegest, 1996). The children were sat facing away from the researcher and were told that they were getting a gift and were instructed not to peek. The researcher then wraps the present for 60 seconds purposefully doing so in a loud manner. The children's peeking behaviors are then assessed and coded. Peeking behavior is coded on a 1 to 5 scale (5= child turns around and does not turn back, 4= child turns around and turns back, 3= child looks over shoulder enough to see, 2= child turns head to side, but not over 90°, 1= child does not try to peek). Latency to peek over shoulder and latency to turn around and peek were also recorded for analysis. The peeking behavior rating scale had an adequate interrater reliability ($\alpha=.958$). The latency scales both had good interrater reliability with latency to turn around being, $\alpha= .81$ and latency to peek over shoulder being, $\alpha=.807$.

Walk-a-Line Slowly (Balance Beam) The Walk-a-Line slowly task is primarily used to assess a child's behavioral inhibitory control (Kochanska et al, 1996). The children were asked to walk along a 6-foot straight line as if it were a balance beam. The researcher measured the amount of time it took for the child to walk the line. This was considered the child's baseline. The child was then asked to repeat the task two more times but was instructed to walk as slowly as they can. The researcher recorded the time for each subsequent attempt. To quantify the inhibitory control the difference of the child's fastest time and slowest time will be used. Previous research has been able to link scores on this task to measure of executive functioning such as the Dimensional Change Card Sort, but also other inhibitory control measures such as the peg-tapping task (Bierman, Nix, Greenberg, Blair & Domitrovich, 2008).

Child Behavior Checklist (CBCL) The CBCL was used to assess emotional and behavioral problems as a measure of externalizing behaviors. The 100-item questionnaires were given to parents and teachers gauging questions around emotionally reactivity, anxious and depressive symptoms, somatic complaints, sleep problems, attention problems, aggressive behaviors, and if the child was withdrawn (Achenbach, 2000). Only the attention and aggression subscales were used by this study. Each question on this scale uses a 3 point Likert scale as the responses. With 0 meaning not true, 1= sometimes true/somewhat true, and 2= very true/often true. Higher scores on this scale mean greater problems. Scaled internal consistency within the CBCL is $\alpha=0.94$ (total problem scale), $\alpha=0.87$ (internalizing scale), and $\alpha=0.89$ (externalizing scale) (Kristensen, Henriksen, & Bilenberg, 2010). CBCL items are rated by mothers and teachers (Teacher Child Behavior Checklist, TCBCL).

Child Behavior Questionnaire (CBQ)

The Child Behavior Questionnaire is a 32-item questionnaire were rated by teachers as a measure of a child's school readiness. CBQ is comprised of five subscales rating children's aggressive/oppositional behavior, prosocial behavior, emotional regulation, social competence, and internalizing/withdrawn behaviors. The response options were given on a 6-point Likert scale ranging from 1 being almost never to 6 being almost always. The aggressive/oppositional behavior scale was composed from items from the Teacher Observation of Classroom Adaption-Revised (Werthamer-Larsson, Kellam, & Wheeler, 1991). The prosocial behavior, emotion regulation and social competence scales were adapted from the Social Competence Scale (Conduct Problems Prevention Research Group, 1990).

Results

Descriptive Statistics on Study Variables and Comparisons to Prior Work

As noted in Table 1, most measures in the study were completed. The exceptions were one mother that refused to complete the Wisconsin Card Sort and three children that did not attend daycare or kindergarten and no teacher data was available. Two other children's teachers did not submit forms when this report was completed.

When compared to prior research, the mean and standard deviation of the data collected on maternal unrealistic expectations show close resemblance to non-neglectful moms in the Azar et al. (2017) study. In regards to negative attributions, the mean is similar to neglectful mothers (Azar et al, 2017). Scores on the gift delay task resemble scores from previous studies utilizing this paradigm with similar populations (e.g., Merz et al., 2016). Data collected on similarly aged

children that completed the balance beam task were not replicated in the data set. For the balance-beam task, the mean obtained in this sample was higher than the data collected by Bierman and colleagues (2008). In a study that looked at children who were in a borderline or clinical range for externalizing behavior, our children’s means fell considerably lower than Roskam and colleagues (2016) when they conducted their descriptive analysis of their participants CBCL data, meaning the children in the present data set displayed less externalized behavior than the children in the Roskam and colleagues (2016) study.

Table 1. Descriptive Statistics

Variables	Number of Participants	Mean	Standard Deviation
SIP Factors			
Unrealistic Expectations (POQ Total)	42	7.73	4.15
Executive Functioning (WCST errors)	41	13.66	11.24
Negative Attributions (CV Annoy)	42	52.14	20.8
Behavioral ratings			
Maternal Rating Attention Problems (CBCL)	42	4.71	2.18
Maternal Rating Aggressive Behavior (CBCL)	42	16.19	6.92
Teacher Rating Aggressive Behavior (TCBCL)	37	9.46	11.17
Teacher Rating Attention Problems (TCBCL)	37	4.54	4.69
Behavioral Inhibition			
Balance Beam (Seconds)	42	6.88	1.15
Gift Delay Peeking Rating	42	2.67	1.52
Latency to Peek Over Shoulder	42	35.86	25.79
School Readiness (CBQ)			
Emotional Regulation	37	4.21	3.09
Prosocial Behavior	37	4.59	3.19
Social Competence	37	4.43	2.41
Aggressive/Oppositional Behavior	37	2.24	1.18

Associations between Maternal Social and Neurocognitive Capacities and Children’s Externalizing Behavior

The first hypothesis, that SIP problems will be associated with externalizing behaviors, was tested using Pearson correlations as seen in Table 2. For the first domain of SIP, unrealistic expectations, there was a significant negative correlation between maternal unrealistic expectations and teachers’ perception of aggressive behaviors which was contrary to the hypothesis. Children whose mothers tended to have more unrealistic expectations had teachers who rated the children as having significantly lower levels of aggressive behaviors. There were no significant associations between maternal ratings of externalized behaviors and maternal unrealistic expectations.

As predicted, the second domain of SIP, maternal executive functioning, was significantly positively correlated with mothers’ perceptions of attention problems and aggressive behavior. Specially, mothers with more preservative errors on the Wisconsin Card Sort (WCST) (poorer executive functioning) perceived higher levels of both aggressive behaviors and attention problems in their children. This is consistent with the theorized model that maternal SIP difficulties is associated with the presence of children’s externalizing behavior. There were no significant finds for the association between teacher ratings and maternal executive functioning.

The last domain of SIP, negative attributions, did not yield any significant associations with either mothers’ or teacher ratings’ of externalized behaviors.

Table 2. Correlations between Maternal SIP capacities and Children’s Externalizing Behavior

Variables	Maternal Rating Attention Problems¹ (CBCL)	Maternal Rating Aggressive Behavior¹ (CBCL)	Teacher Rating Attention Problems ¹ (TCBCL)	Teacher Rating Aggressive Behavior ¹ (TCBCL)
Unrealistic Expectations (POQ Total)	.029	-.181	-.185	-.291*
Executive Functioning¹ (WCST errors)	.391**	.391**	.103	.003
Negative Attributions (CV Annoy)	.039	.098	-.245	-.219

¹Different participant size, refer to Table 1

+p<.10 level *p<.05 level **p < .01

Associations between Maternal Social and Neurocognitive Capacities and Children’s Behavioral inhibition

The second hypothesis, that maternal SIP will be associated with difficulties in children’s behavioral inhibition, was also tested using Pearson correlations. There was a significant negative correlation between maternal unrealistic expectations and child’s latency to peek. As predicted, children whose mothers exhibited more unrealistic expectations displayed less behavioral inhibition and peeked over their shoulder sooner.

For the second domain of SIP, maternal executive functioning, there was a significant negative correlation with child’s latency to peek over shoulder and turn around (Table 2). That

is, mothers who were less cognitively flexible (more executive functioning difficulties) had children who had shorter latency to peek/turn around on the delay task, thus exhibiting poorer behavioral inhibition. The last domain of SIP, negative attribution, did not yield significant associations with any of the behavioral inhibition measures.

The balance beam measure did not yield significant associations with any of the SIP domains. That is, SIP was not linked to behavioral inhibition as measured by the balance beam measure, which measures a child's ability to behaviorally inhibit gross motor movements.

Table 3. Correlations between Maternal SIP capacities and Children's Behavioral Inhibition Measures

Variables	Balance Beam (Seconds)	Gift Delay Peeking Rating	Latency to Peek Over Shoulder	Latency to Turn Around and Peek
Unrealistic Expectations (POQ Total)	-.082	.121	-.270*	.132
Executive Functioning¹ (WCST errors)	-.055	.232	-.274*	-.394**
Negative Attributions (CV Annoy)	-.193	.008	-.142	.236

¹Different participant size, refer to Table 1
+*p*<.10 level **p*<.05 level ***p* < .01

Associations between Maternal Social and Neurocognitive Capacities and School Readiness

The third hypothesis was that maternal SIP difficulties would be associated with poor school readiness was tested using Pearson correlation. Contrary to the hypothesis maternal SIP difficulties did not yield significant results with teacher ratings of children's school readiness except for a trend on children's emotional regulation in the opposite direction to the prediction. In other words, there was a marginally significant trend that mothers who tended to have more negative attributions had children who were rated by teachers as more emotionally regulated.

Table 4. Correlations between Maternal SIP capacities and Teacher Rating of Children's School Readiness

Variables	Emotional Regulation¹	Prosocial Behavior¹	Social Competence¹	Aggressive/Oppositional Behavior¹
Unrealistic Expectations (POQ Total)	.211	.171	.204	-.161
Executive Functioning¹ (WCST errors)	.059	-.047	.008	.173
Negative Attributions (CV Annoy)	.223+	.136	.192	-.188

¹Different participant size, refer to Table 1
+*p*<.10 level **p*<.05 level ***p* < .01

Associations between Children’s Behavioral Inhibition and Externalized Behavior

The fourth hypothesis, that children’s behavioral inhibition difficulties will be associated with externalized behaviors, was tested using Pearson correlations. There was a positive correlation between the gift-delay rating and the ratings of attention problems from teachers. Children who displayed more behavioral inhibition difficulties on the gift delay task had teachers who reported more attention problems as the hypothesis predicted. There was also a significant negative correlation between latency time to turn around/peek and teacher ratings of attention problems. Children who displayed less behavioral inhibition and peeked earlier had teachers who rated them having more attention problems, as the hypothesis predicted. Mother ratings of externalized behaviors did not yield significant results, nor did teacher ratings of aggression.

Table 5. Correlations between Children’s Behavioral Inhibition and Externalized Behavior

Variables	Maternal Rating Attention Problems ¹ (CBCL)	Maternal Rating Aggressive Behavior ¹ (CBCL)	Teacher Rating Aggressive Behavior ¹ (TCBCL)	Teacher Rating Attention Problems ¹ (TCBCL)
Balance Beam (Seconds)	-.043	-.145	-.180	-.112
Gift Delay Peeking Rating	.205	.050	.131	.358*
Latency to Peek Over Shoulder	-.140	-.017	.006	-.142
Latency to Turn Around and Peek	-.222	-.237	-.044	-.333*

¹Different participant size, refer to Table 1
+p<.10 level *p<.05 level **p < .01

Associations between Children’s Behavioral Inhibition and School Readiness

The fifth hypothesis that is children’s behavioral inhibition difficulties will be associated with poor school readiness were tested using Pearson correlations. No significant correlations were found.

Table 6. Correlations between Children’s Behavioral Inhibition and Teacher Rating of Children’s School Readiness

Variables	Emotional Regulation ¹	Prosocial Behavior ¹	Social Competence ¹	Aggressive/Oppositional Behavior ¹
Balance Beam (Seconds)	.001	.136	.072	-.008
Gift Delay Peeking Rating	-.059	-.119	-.094	.145
Latency to Peek Over Shoulder	-.113	.005	-.059	.017
Latency to Turn Around and Peek	.015	-.020	-.004	-.086

¹Different participant size, refer to Table 1
+p<.10 level *p<.05 level **p < .01

Associations between Children’s Externalized Behavior and School Readiness (Clarifying Analysis)

To understand the lack of findings for the analyses involving the school readiness measure, the assumed link between ratings of behavior problems and school readiness was tested using Pearson correlations.

There was a statistically significant positive correlation between maternal ratings of attention problems and aggressive/oppositional behaviors. As the hypothesis predicted, mothers who reported having children with more attention problems had children whose teachers rated them as having more aggressive and oppositional behavior. There was a marginally significant trend between maternal ratings of children’s aggressive behavior and teachers’ ratings of children’s aggressive/oppositional behavior, indicative of poor school readiness.

There was a statistically significant negative correlation between teachers’ ratings of children’s aggressive behavior and teachers’ rating of emotional regulation, prosocial behavior, and social competence. Meaning, children whose teachers rated them as exhibiting higher aggressive behavior were also rated lower on the all three of the school-readiness subscales. There was a positive correlation between teacher ratings of aggressive behavior in the children and the aggressive/oppositional behavior subscale of the school-readiness measure.

There was a statistically significant negative correlation between teachers’ rating of the children’s attention problems and teachers’ rating of emotional regulation, prosocial behavior and social competence. Meaning, children whose teachers rated them as exhibiting higher attention problems were also rated lower on all three of the school readiness subscales, indicative of poor school readiness. There was a positive correlation between teacher ratings of attention problems in the children and the aggressive/oppositional behavior subscale of the school readiness measure (poor school readiness).

Table 7. Correlations Between Children’s Externalized Behavior and Children’s School Readiness

Variables	Emotional Regulation¹	Prosocial Behavior¹	Social Competence¹	Aggressive/Oppositional Behavior¹
Maternal Rating Attention Problems¹ (CBCL)	-.175	-.109	-.151	.348*
Maternal Rating Aggressive Behavior¹ (CBCL)	-.075	-.170	-.129	.226+
Teacher Rating Aggressive Behavior¹ (TCBCL)	-.552**	-.668**	-.648**	.691**
Teacher Rating Attention Problems¹ (TCBCL)	-.738**	-.722**	-.777**	.908**

¹Different participant size, refer to Table 1

+*p*<.10 level **p*<.05 level ***p* < .01

Discussion

The majority of research examining the SIP model of parenting risk has focused on the role of maternal cognition in parenting. The present study sought to extend this research by

examining associations between maternal social and neurocognitive abilities and children's behavioral inhibition and school readiness as measured by maternal and teacher ratings of behaviors problems and teachers' ratings of school readiness. Specifically, the model hypothesized that deficits in maternal SIP would lead to poor child behavioral inhibition, poor school readiness, and the presence of externalized behaviors in children.

The first hypothesis tested was whether SIP difficulties were associated with higher levels of externalized behaviors in children. Only mother's executive functioning was found to link to the level of children's externalizing behaviors, as predicted, but only when the child's behavior was rated by the mother, not teachers. Inconsistency between the mother rating and teacher ratings of externalized behavior may be due to the fact that mothers and teachers do not observe children in the same environment. Children may not act the same way at home that they do at school or the structure at home and school may be different, which may give children more or less opportunity to express these behaviors. Teachers' class size and other classroom contextual factors (e.g., frequency of child misbehavior) may also affect their rating of the children that participated in the study (Berg-Nielsen, Solheim, Belsky, & Wichstrom, 2012). In larger classrooms, child misbehavior may go unnoticed, or if this child has peers who tend to have more externalized behaviors, their expression of externalized behaviors may seem minimal to the teacher and not properly reported. Contrary to the hypothesis maternal unrealistic expectations was negatively correlated with teacher ratings of children's aggressive behavior. It is not clear why this relationship did not support the hypothesized model, but one can speculate that parents' higher expectations for their child may lead the child to exhibited behavior more similar to adults. This behavior can transfer to the school setting where the teacher may perceive the child as having less of these aggressive behaviors because of socialization and the responsibilities the child has taken on at home. It is important to note that the means of mothers' unrealistic expectations in this study more closely resembled mothers who lacked SIP difficulties, which may be another explanation for this relationship. These mothers may not have social and neuro-cognitive impairments as hypothesized, such that these unrealistic expectations may be used more cautiously and deliberately and be beneficial to the child. The lack of findings in this domain of SIP suggests that there may be a specific threshold for the effects of unrealistic expectations. A number of unrealistic expectations below this threshold may be beneficial to the child, while above this threshold it may produce adverse outcomes for the child. In regard to negative attributions, findings did not replicate previous work. Although maternal attributions have been linked to parenting risk (Azar et al., 2017), maternal negative attributions were not found to link to children's self-regulatory capacities.

The second hypothesis tested was whether maternal SIP difficulties were associated with difficulties in behavioral inhibition in children. As predicted, children with mothers who tended to have more unrealistic expectations and poorer executive functioning exhibited poorer behavioral inhibition. Mothers who tend to have better executive functioning are believed to have better cognitive flexibility, which may involve some modeling of maternal behavioral inhibition, but also teaching and modeling different ways to display behavioral inhibition.

There was inconsistency in SIP findings between the child behavioral inhibition measures. As predicted, the gift delay measure showed significant links to SIP and only trends were found for the balance beam measurement of behavioral inhibition. The lack of consistency across the two measures may be attributed to variation in the type of behavioral inhibition each measure assessed. The gift delay measure assesses children's ability to delay gratification but also children's compliance, while the balance beam primarily focuses on children's ability to

behaviorally inhibit gross motor movements. As this study's focus is on preschoolers there may be developmental aspect involved in the lack of maturation to be able to inhibit these gross motor movements while compliance is typically more heavily influenced by socialization rather than biology.

The third hypothesis tested was whether maternal SIP difficulties were positively associated with poor school readiness as measured by social competencies. No support was found for this hypothesis directly with the CBQ data. Surprisingly, the reverse was found for one SIP domain. There was a positive trend between maternal negative attribution's and teachers' ratings of children's emotional regulation, meaning the more negative attributions a mother had, the higher the children were rated on emotion regulation capacities by their teachers. The SIP model was developed around parents who maltreated their children, including those who neglected and abused their children. Child neglect and abuse has been associated with poor school performance. With the children on highly structured schedules in daycare and schools it may be more difficult for teachers to identify this emotional dysregulation. Children tend to perform their best when they are on a set and predictable schedule.

The fourth hypothesis tested was whether children's behavioral inhibition difficulties were associated with the presence of externalized behaviors. As hypothesized, poor behavioral inhibition was correlated with the level of externalized behavior based on teachers' ratings of attention problems.

The fifth hypothesis was that children's behavioral inhibition difficulties will be associated with poor school readiness. Results from this study failed to support this hypothesis when teachers' ratings of school readiness were examined. To understand the lack of findings for the analyses involving the school readiness measure, the assumed link between ratings of behavior problems and school readiness was tested. Teacher ratings of attention problems and aggressive behaviors in the children were significantly associated with all the school readiness subscales (emotional regulation, prosocial behavior, social competence, and aggressive/oppositional behavior). Maternal ratings of the children's aggressive behavior and attention problems were associated with the school readiness domain of aggressive oppositional behavior. These promising results may indicate that the presence of externalized behaviors is a better indicator of school readiness than children's behavioral inhibition and maternal SIP. In previous research, the CBQ has been used a measure of school readiness, but also as a measure of temperament. Typically, a CBQ is not the only measure used to predict a child's school readiness but it is usually coupled with other academic measures (i.e. Test of Preschool Early Literacy). The lack of academic measures in this project may be the reason for the lack of findings.

This study supported the idea that difficulties in specific domains of maternal SIP are associated with children's externalized behaviors and poor behavioral inhibition. It also supported the idea that children's poor behavioral inhibition is associated with externalized behaviors. This study did not find the posited association between difficulties in maternal SIP and poor school readiness and children's poor behavioral inhibition and poor school readiness. There was an association between children's externalizing behaviors and poor school readiness. There was a lack of findings regarding maternal negative attributions and all the children's outcomes. Previous research has shown the impact negative maternal attribution has on parenting (Azar et al., 2016 & Azar et al., 2017). Wang, Deater-Deckard, & Bell (2013) found that household chaos moderates the relationship between maternal attributions and parenting behavior. Doing further analysis on the chaos of the homes of the mothers that participated in the

study may provide more insight on the lack of findings between maternal attributions and the child outcomes researched in this project. This can be explored in the larger project, of which this sample was a part, as home chaos was measured.

Although the study was not able to support all of the predicted hypotheses, findings nevertheless have implications for schools. This study looks at both mother and child, allowing prevention and intervention workers to create a programs that involve just the child, mother, or the mother-child dyad. Specifically, this project can give insight to evidence-based practices focused on changing behavior problems that use a systemic or ecological model. That is, practices that work with parents and not just children in schools. A systemic model argues for environmental factors that may contribute to a child's adverse outcomes and this project provides insight on the effects maternal social cognitive and neurocognitive capacities have on their child's behavioral inhibition and school readiness. Intervention programs such as ParentCorps (that is, including the parent, child and teacher) build upon many of the hypotheses that were supported in this study. This program has elements of Parent Child Interaction Therapy (Niec, Eyberg, & Chase, 2012), or instruction involving using positive reinforcement to encourage compliance and social-behavioral compliance. This type of intervention program has had research support that suggest it reduces children's externalized behaviors and an increase in their academic performance by children (Brotman et al., 2013).

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