Published in final edited form as:

Fam Relat. 2018 July ; 67(3): 339–353. doi:10.1111/fare.12318.

The Interface of Maternal Cognitions and Executive Function in Parenting and Child Conduct Problems

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Abstract

Objective—To explore the direct and indirect associations of maternal emotion control, executive functioning, and social cognitions maternal with harsh verbal parenting and child behavior and to do so guided by social information processing theory.

Background—Studies have demonstrated a relationship between maternal harsh parenting and increased child conduct problems. However, less is known about how maternal emotion and cognitive control capacities and social cognitions intersect with harsh parenting and child behavior.

Method—Structural equation modeling was used with a convenience sample of 152 mothers from Appalachia who had a child between 3 and 7 years of age.

Results—Maternal emotion control and executive functioning were both inversely associated with child conduct problems. That is, stronger maternal emotion control was associated with less harsh verbal parenting and lower hostile attribution bias, and higher maternal executive functioning was related to less controlling parenting attitudes.

Conclusion—The results suggest maternal emotion and cognitive control capacities affect how mothers interact with their children and ultimately child conduct problems.

Implications—To more effectively reduce harsh verbal parenting and child conduct problems, interventions should help mothers to improve their emotion and cognitive control capacities.

Keywords

child misbehavior; emotion control; executive functioning; parenting; structural equation modeling

Maternal harsh parenting has been linked with child problem behaviors (Lansford, Wager, Bates, Dodge, & Pettit, 2012) and can lead to delinquency and depression in adolescence (Roche, Ghazarian, Little, & Leventhal 2011). Although warm, positive parenting strategies lead to the best child outcomes (Amato & Fowler, 2002; Voort et al., 2013), the components underlying effective parenting practices are less understood. Available literature suggests that high maternal executive functions (e.g., working memory, inhibitory control, and set-shifting) and emotion control positively predict warm, nurturing parenting practices and are inversely associated with harsh, reactive parenting practices (Crandall, Deater-Deckard, & Riley, 2015; Deater-Deckard et al., 2010). However, research in this area is limited: The complex ways in which maternal emotion control, executive functioning, and social cognitions (e.g., parenting attitudes and attributions about child behavior) affect parenting and child behaviors have not been clearly explicated. A previous study demonstrated a relationship between maternal harsh parenting and child conduct problems among mothers with low executive functioning (Deater-Deckard, Wang, Chen, & Bell, 2012). Using the same data for the present study, we assessed the intersection of parents' capacities for emotional and cognitive control—including emotion control and executive functioning—and parents' social cognitions on verbal parenting behavior. Specifically, we explored the relationships of maternal emotion and cognitive control with the outcomes of harsh verbal parenting responses and child problem behavior and the possible mediating role of maternal social cognitions based on the social information processing (SIP) theory (Azar, Reitz, & Goslin, 2008). For the purposes of this study, we defined *social cognitions* as the way individuals process, store, and retrieve information in the brain about other people, and we defined *harsh verbal parenting* as parental yelling at, threatening, or shaming their child.

Social Information Processing Theory

According to SIP theory, multiple aspects of parent cognitions are important to parenting. SIP theory posits a recursive framework in which child behaviors, maternal cognitive schemas, emotion and cognitive control capacities, social cognitions, and parenting responses dynamically influence each other. These interactions shape behavior and typically strengthen the likelihood of activating the same schema and responses in the future (Azar et al., 2008). Social cognitions and parenting behaviors are mechanisms through which maternal emotion and cognitive control capacities influence child behavior. Figure 1 provides a visual representation of this framework. When the SIP framework is applied to harsh parenting and child conduct problems, it suggests that a child's misbehavior places demands on a mother's cognitive and emotional control capacities. This activation would prompt the mother's parenting response through her social cognitions (i.e., hostile attribution bias and controlling parenting attitudes). Specifically, increased hostile attribution bias and more controlling parenting attitudes would be associated with increased harsh verbal parenting behaviors (see Dix & Meunier, 2009). The mother's response would then influence the child's behavior, triggering a repeat activation of the sequence. Additionally, child characteristics, social support, and context (e.g., neighborhood characteristics and family socioeconomic status) interact with a mother's cognitive processes to produce parenting responses and child behavior (Azar et al., 2008). Given the utility of this framework, research studies are needed to test the validity of its claims, specifically the

relationships of maternal emotion and cognitive control capacities with maternal social cognitions, maternal harsh verbal parenting, and child conduct problems.

We also acknowledge that other mechanisms not explicitly defined in SIP theory may play a role. For example, mothers with lower cognitive control capacity may implement fewer household routines due to deficits in planning. The lack of structure or other unmeasured variables may negatively affect child behavior. Further, raising a child with conduct problems may be challenging to any parent and could create stress that dysregulates parent emotion and cognitive control performance.

Emotion and Cognitive Control Capacities

Emotion and cognitive control capacities are vital for successful parenting, allowing parents to be perceptive, responsive, and flexible. Parents call on these capacities as they plan and change behavior, respond appropriately to cues, regulate emotion in the face of stress and challenging child behaviors, problem solve, and make decisions (Barrett & Fleming, 2011). Emotion and cognitive control capacities include the ability to regulate emotion and executive functions, which refer to the ability to plan, make decisions, hold pertinent information in short-term memory, pay attention, problem solve, set priorities, and control impulses (Diamond, 2013). There is some debate as to whether emotion control capacities are aspects of executive function or are separate cognitive processes that are facilitated by executive functions (Ochsner, Silvers, & Buhle, 2012). Recent studies have shown modest or nonstatistical associations between emotion control and dimensions of executive function (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Gyurak et al., 2009), suggesting that emotion control may operate separately from executive functioning. For the present study, we adopted the view that emotion control is influenced by executive functions but may be separate from specific dimensions of executive functioning. Modeling emotion control and executive functioning as separate but related constructs under the umbrella term *emotion and cognitive control capacities* allows an examination of whether they have different effects on maternal parenting strategies.

There is limited research on the role of maternal emotion and cognitive control capacity and parenting. Existing literature suggests that mothers with low emotion control, high impulsivity, low attention control, and poor decision-making tend to demonstrate less effective parenting strategies, such as overreactive discipline (Lorber, 2012), parent negativity (Deater-Deckard et al., 2010), and parent-child conflict and negative interactions (Babinski et al., 2016; Harvey, Danforth, McKee, Ulaszek, & Friedman, 2003). Moreover, maternal emotion and cognitive control functioning has been positively linked to parent involvement (Chen & Johnston, 2007), parental monitoring (Babinski et al., 2016), and maternal sensitivity (Chico, Gonzalez, Ali, Steiner, & Fleming, 2014); yet emotion and cognitive control has been inversely associated with negative reactions to child emotions (Hughes & Gullone, 2010) and child conduct problems (Deater-Deckard et al., 2012).

Role of Parenting Attitudes and Attributions

Prior studies have demonstrated associations between social cognitions and child outcomes (Thompson, Hollis, & Richards, 2003). It may be that parent social cognitions play a mediating role between maternal emotion and cognitive control capacities with the outcomes of parenting and child behaviors. Nix and colleagues (1999) found that mothers who interpret ambiguous child behavior as hostile are more likely to engage in harsh verbal and physical discipline (also see Dix & Meunier, 2009). However, when mothers reappraise hostile attributions to more neutral attributions, harsh parenting decreases (Nix et al., 1999). One explanation for this outcome is that mothers who are more emotionally reactive may be less able to reappraise their hostile attributions about child ambiguous behavior to neutral attributions, leading to harsh verbal parenting to correct the behavior. Similarly, a mother who is less attentive to shifting demands may be less reflective about how her parenting philosophies and tactics affect her child's behavior. These mothers may maintain more authoritarian beliefs versus child-centered, "progressive" parenting beliefs. Although scant research has tested the relationship between parent emotion and cognitive control capacities with social cognitions, studies have assessed how maternal social cognitions influence parent and child behavior. Two studies found a relationship between maternal hostile attributions, reactive verbal parenting (e.g., yelling or threatening the child), and conduct problems among children in early and middle childhood (Johnston, Hommersen, & Seipp, 2009; Snyder, Cramer, Afsar, & Patterson, 2005). A longitudinal study found a similar outcome: High-control–low-warmth parenting attitudes were associated with more child conduct problems (Thompson, Hollis, & Richards, 2003). These associations make sense, given that controlling parenting attitudes are associated with parental acceptance of more stern verbal parenting responses, whereas external attributions about child behavior and less authoritarian attitudes are associated with calm verbal parenting responses (Dix, Ruble, & Zambarano, 1989). Understanding how social cognitions relate to maternal cognitive control capacities, considering the important role they play in parenting, is critical to developing strategies aimed at improving parenting and behaviors.

Study Aims

The primary aim of this article was to explore the direct and indirect associations of maternal emotion control, executive functioning, and social cognitions with maternal harsh verbal parenting and child behavior using SIP theory as our framework (see Figure 1 for the analytic framework). We built on prior studies by using analytic methods that addressed measurement error and that allowed us to evaluate whether SIP theory was supported by the model. To account for direct associations due to unmeasured intervening variables that may also be salient although not accounted for in SIP theory, we analyzed direct relationships between maternal emotion control and executive functioning with parenting and child behaviors, and direct relationships between maternal social cognitions and child behaviors. We hypothesized that (a) mothers with higher scores on executive functioning tasks and, more particularly, higher self-reported emotion control would report less harsh verbal parenting and fewer child conduct problems, and (b) maternal social cognitions would mediate the relationships between maternal emotion control/executive functions with verbal parenting responses and reports of child misbehavior. Specifically, mothers with lower

emotion control would be more likely to attribute oppositional motivation to their children's ambiguous behaviors and would be more likely to engage in harsh verbal parenting to correct child behavior. Moreover, mothers who had lower executive functioning would report more controlling, authoritarian parenting attitudes, possibly because they may be less reflective about how their parenting philosophies and accompanying actions influence child behavior.

Method

Sample Procedures and Characteristics

The sample included mothers who had at least one child between 3 and 7 years of age, living in Blacksburg or Roanoke, Virginia. The majority of participants ($n = 112$) were recruited in Roanoke through (a) government and nonprofit community agencies and organizations serving families, (b) flyers distributed to parents through schools or posted in common areas throughout the community, and (c) information posted on a university website. An additional 49 mothers were recruited through an ongoing longitudinal study in Blacksburg, Virginia. The participants were representative of the racial/ethnic and socioeconomic characteristics of each recruitment site. Of the 161 individuals who agreed to participate and who had a child between 3 and 7 years of age, nine did not complete the lab visit, resulting in 152 mothers and their children who completed participation in this study. During analysis, six respondents were excluded due to missing data on control variables, which resulted in a total sample of 146. After confirming eligibility and gaining consent, a questionnaire containing basic demographic information about the mothers and children as well as social cognitive measures was completed by mothers. Maternal executive functioning tasks were completed in a laboratory at a later time.

In this sample, mothers ranged from 21 to 49 years of age ($M = 32.8$ years), and their children ranged from 3 to 7 years of age ($M = 4.8$ years). Respondents had a mean of 2.2 children and 62% of mothers were married. Nearly one third (31%) of mothers and 35% of fathers had not earned more than a high school diploma, and 18% of fathers were unemployed. The majority (76%) identified themselves as White or Caucasian; others identified themselves as African American (13%), Hispanic (5%), Asian (1%), or different race or ethnicity (5%). Participants from the ongoing Blacksburg study group had fewer socioeconomic risks (lower unemployment rate for fathers and higher high school graduation rate, and fewer mothers reported that they were single parents) compared with the more urban Roanoke sample. To address the differences that might be associated with recruitment source, study site was included as a covariate in the analysis.

Measures

Emotion control—Maternal emotion control was measured using the 10-item Emotion Control subscale of the Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A; Roth, Isquith, & Gioia, 2005). Sample items include “I have angry outbursts” and “I overreact to small problems.” Each item was measured on a 3-point scale with response options *never*, *sometimes*, and *often*. The BRIEF-A has high positive convergent validity between informant and participant report, and the emotion control scale has good

internal consistency ($\alpha = .91$; Ciszewski, Francis, Mendella, Bissada, & Tasca, 2014). Each of the items was reverse coded so that higher scores indicated higher emotion control. Our sample had similar internal consistency to previous studies ($\alpha = .90$, $M = 2.22$, $SD = 0.47$).

Executive function—The cognitive control components of attention control, inhibitory control, and working memory comprised a single executive function construct (Friedman et al., 2006). We used the following four tasks to measure the various aspects of executive functioning. Each of the scores was *z*-score standardized. Performance distributions on each task were typical for young to middle-age adults (Bopp & Verhaeghen, 2005; Heaton, 2003).

Stroop Color-Word Task: The Stroop Color-Word Task, a measure of inhibitory or attention control, was administered by computer (Stroop, 1935). From a set of 20 color words, mothers were instructed to name the color of the ink. The color of the letters and the actual written word were either congruent (e.g., *blue* written in blue ink) or incongruent (e.g., *blue* written in red ink). Scores were calculated as the number of correct responses out of 20 ($M = 18.03$; $SD = 3.63$).

Wisconsin Card Sorting Test: The Wisconsin Card Sorting Test (Heaton, 2003) was administered by computer and measured attention and inhibitory control. Mothers were shown four stimulus cards with different colors, quantities, and shapes. They were instructed to match a stack of 128 (at the urban lab) or 64 (at the rural university lab) cards to the original stimulus cards. They were not told the rule they were to sort by (either by color, quantity, or shape) but were instructed that the computer would tell them if they were right or wrong. Throughout the test, the matching rule changed several times, forcing the participant to deduce the new rule. Scores were calculated on the basis of perseveration errors per 64 trials, which were the mistakes made by using the same incorrect matching rule even after receiving feedback from the computer that the rule was no longer correct ($M = 6.67$ errors, $SD = 5.01$ errors). The scores were reverse coded so that higher scores on each of the tasks represented better performance.

Tower of Hanoi: The computerized version of the Tower of Hanoi (Davis & Keller, 1998) measured mothers' problem-solving abilities, planning, and working memory. Mothers were instructed to move three disks of different sizes from Peg 1 to Peg 3 (on a three-peg device) to make a stack identical to the stack at the start. They had to comply with two rules: only one disk could be moved each turn and larger disks could not be placed on smaller disks. Scores were calculated based on time to completion ($M = 38.48$, $SD = 16.57$ seconds). They were given up to 60 seconds; those who did not finish were given a score of 60 seconds. The scores were reverse coded so that higher scores on each of the tasks represented better performance.

Backward digit span task: The backward digit span task measured working memory. The experimenter read a series of single-digit numbers (0–9) and the mother was instructed to repeat the numbers in reverse. Following a practice trial, the task began with a four-digit sequence. An additional digit was added in each successive trial. Mothers were given two chances to correctly recite the numbers in reverse. If she failed to do so after two chances

then the task ended, and she was given the score of the last correct trial ($M = 5.09$, $SD = 2.17$ digits).

Parenting social cognitions

Parenting attitudes: Parenting attitudes were measured using the 22-item Traditional and Authoritarian subscale from the Parental Modernity Scale (Schaefer & Edgerton, 1985), which assessed the extent that mothers maintained more authoritarian, traditional beliefs versus more child-centered, “modern” beliefs. Sample items included “Children should always obey their parents” and “Children will be bad unless they are taught what is right.” Response options range from *strongly disagree* (1) to *strongly agree* (4), with higher scores indicating more controlling attitudes ($M = 2.33$, $SD = 0.44$, range = 1.36–3.64). This scale had high internal reliability in other samples ($\alpha = .88$; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002), and in our sample as well ($\alpha = .89$).

Hostile attribution bias: Hostile attribution bias was measured with the Parenting Possibilities Questionnaire (Nix et al., 1999), which uses a vignette approach to measure maternal internal and external attribution bias on a series of nine scenarios. The following is an example of one of the scenarios:

You ask your child to help set the table and hand him a plate to take to the table.
You hear a crash and you look. The plate is in pieces at your child’s feet. This probably happened because: He didn’t like having to do the chore.

Parents rated the likelihood of why a child behaved as described in each scenario on a four-point scale, from the low likelihood of “probably not why this happened; not a good reason” to the high of “probably why this happened; a very good reason.” Higher scores indicated higher hostile attribution bias ($M = 2.29$, $SD = 0.58$). The internal reliability in our sample was adequate ($\alpha = .73$).

Harsh verbal parenting: The harsh verbal parenting construct included Shame and Verbal Discipline subscales that were adapted from the Discipline Questionnaire (Lansford et al., 2010). These combined scales have been used previously in a measure of maternal harsh negativity (Deater-Deckard et al., 2012). Sample items include “How frequently do you raise your voice, yell, or scold your child?” and “How frequently do you tell your child s/he should be ashamed of her/himself?” Response options range from *never* (1) to *almost every day* (5), with higher scores indicating more self-reported engagement in harsh verbal parenting ($M = 2.80$, $SD = 0.90$). This measure had adequate reliability in our sample ($\alpha = .77$).

Child conduct problems—Child conduct problems were measured using maternal report of the five-item Child Conduct Problems subscale from the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001) and the 6-item Child Anger subscale from the Child Behavior Questionnaire, Short Form (CBQ; $\alpha = .76$; Putnam & Rothbart, 2006). These two scales have previously been included as a measure of child conduct problems (Deater-Deckard et al., 2012) and have had adequate reliability in previous studies (child conduct problems subscale: $\alpha = 0.63$, Goodman, 2001; frustration/anger subscale: $\alpha = 0.81$, Putnam

& Rothbart, 2006). Sample items in the SDQ include “Often fights with other children or bullies them” and “Often loses temper.” Mothers reported their child’s behavior using three response options: *not true* (0), *somewhat true* (1), and *certainly true* (2). In the present study, the mean SDQ score was 0.31 ($SD = 0.33$), and internal reliability for our sample was $\alpha = .64$. Sample items for the CBQ include “Gets angry when told s/he has to go to bed” and “Has temper tantrums when s/he doesn’t get what s/he wants.” Mothers reported their child’s anger using seven response options ranging from *extremely untrue* (1) to *extremely true* (7). In the present study, mean CBQ scores for individual participants ranged from 1.67 to 7.00 ($M = 4.39$, $SD = 1.19$) and internal reliability for our sample was $\alpha = .80$.

Model covariates—Study site, maternal score on the Peabody Picture Vocabulary Test—4 (PPVT-4; Dunn & Dunn, 2007), and mother report of maternal and child age, child gender, child developmental problems (“Has this child ever had any long-term health or developmental problems?”), and socioeconomic (SES) risk were included as model covariates. The PPVT-4 is an untimed test that measures verbal ability; higher scores indicated higher verbal ability. A composite score was created to measure SES risk. The following characteristics were given a score of 1 if present: mother was single and not living with the child’s father, the father had no more than a high school education, the mother had no more than a high school education, the father was unemployed, and the family did not live in a separate single-family home. Higher scores indicated more risks.

Statistical Analyses

Preliminary analysis—Preliminary data analyses were conducted in Stata 12 (StataCorporation, 2013). Independent sample t tests were conducted to compare means on demographic and key study variables between study sites. Pairwise correlations were examined among all covariates and the mean scale scores of the key study variables. Tests for collinearity using side-by-side plots and the variance inflation factors (VIFs) were conducted.

Confirmatory factor analysis—Confirmatory factor analyses (CFAs) were conducted separately on each independent and dependent variable to set up the measurement model. All CFAs were performed in Mplus Version 7 (Muthén & Muthén, 1998–2012). Items with factor loadings less than .40 were dropped. Error terms on similar items were correlated to improve model fit. Model fit was assessed for each latent variable. Latent variables with a comparative fit index (CFI) value greater than or equal to .95 indicated good fit, and any value less than .90 indicated poor fit. Likewise, for root mean square error of approximation (RMSEA), values less than or equal to .06 represented good model fit and up to .10 indicated acceptable fit (Hu & Bentler, 1999; Little, 2013). On the basis of these criteria, we created latent variables for (a) executive functioning, (b) emotion control, (c) high-control parenting attitudes, (d) hostile attribution bias, (e) harsh verbal parenting, and (f) child conduct problems.

Model building and hypothesis testing—Monte Carlo simulation methods were employed to assess analytic power for conducting the full analysis with our sample. In Monte Carlo simulations, effect sizes are predicted for each parameter based on a priori

hypotheses and the full model is simulated (Wolf, Harrington, Clark, & Miller, 2013). On the basis of this simulation, the statistical power was above 80% for all model parameters and above 90% for the majority.

We tested for shared method bias because all items except executive functioning were based on maternal report. We used the unmeasured latent factor method (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) to estimate the common variance. First, we added an unmeasured common latent factor that included all maternal-reported indicators from the latent variables to the measurement model. We examined the difference between factor loadings in the measurement model with no common latent factor to the factor loadings in the measurement model with the common latent factor. Large deltas ($\sim >.20$) suggest that there may be shared method bias. Items from the maternal emotion control, hostile attribution bias, harsh verbal parenting, and child conduct problems latent variables suggested common variance among observed indicators. Given the potential for shared method bias to affect results, the common latent factor was included in all subsequent structural models.

Model fit was assessed using the CFI and RMSEA values, which are less sensitive to sample size when evaluating model fit than the χ^2 test. The same model fit cutoffs that were used in CFA were also used when assessing final model fit. The final model was estimated using mean and variance-adjusted weighted least squares in Mplus Version 7. Missing data for study variables were minimal, with 82% of the sample having no missing data, 16% having less than 10% missing items, and 2% of the sample having greater than 10% missing items but no more than 15%. Missing data for both the measurement and structural models were addressed with full information maximum likelihood (FIML), which provides unbiased parameter estimates and standard errors by using all available data to estimate a likelihood function for each subject (Little, 2013).

Indirect effects were examined by assessing statistical significance for the paths leading to and from the intervening variable of interest. Statistical significance of intervening effects were tested using the Delta Method, which, similar to the Sobel Test, computes a z-score based on the product-of-coefficients of the indirect effects (Iacobucci, Saldanha, & Deng, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

Results

Preliminary Analyses

Correlation analyses were carried out between control variables and the major study constructs (see Table 1). Child gender and age were not statistically associated ($p > .05$) with any of the major study constructs and were therefore not included as controls in the main analyses.

Model Results

The CFA with all latent variables included yielded adequate model fit. Factor loadings for the six latent variables ranged from .44 to .88. Maternal emotion control and executive functioning were regressed on control variables (maternal age, child developmental problems, maternal PPVT, family SES risks, and study site) for all analyses. Figure 2

includes standardized results for the final model, and the Appendix includes the full structural model results. Model fit was good based on the RMSEA (.028) and CFI (.958). Maternal emotion control but not maternal executive function was inversely associated with maternal harsh verbal parenting and hostile attribution bias. Maternal executive functioning was inversely associated with high-control parenting attitudes. Neither of the maternal social cognition constructs (i.e., high-control parenting attitudes, hostile attribution bias) was statistically associated with maternal report of harsh verbal parenting. Maternal emotion control, executive functions, and hostile attribution bias were all statistically associated with maternal report of child conduct problems. Although there was a statistical relationship between maternal emotion control and hostile attribution bias and between hostile attribution bias and child conduct problems, hostile attribution bias did not statistically mediate the relationship ($z = -0.81$, $p = .421$).

Given the potential for nonrecursive processes (Kiff, Lengua, & Zalewski, 2011), maternal harsh parenting was regressed on child conduct problems as an alternative model, and in a second alternative model, maternal social cognitions and harsh parenting were regressed on child conduct problems. Model fit for both alternative models was equivalent to model fit in the main model. Comparing the alternative models to the main model, levels of statistical significance in relationships between constructs were generally maintained between the main model and the alternative models, so we elected to retain the original model.

Discussion

The results highlight that maternal emotion and cognitive control capacities and their social cognitions contribute in important but complex ways to parenting and children's behaviors. Maternal emotion control appears to be especially salient to verbal parenting strategies for young children and parental perceptions of child behavior, whereas maternal executive functioning may be more relevant to parenting attitudes. Previous studies (Deater-Deckard et al., 2010; Harvey et al., 2003; Lorber, 2012) have generally shown an inverse association between either maternal emotion control or maternal executive functioning with harsh parenting, but past studies have not included both maternal emotion control and executive function in the same model. Our results imply that a mother's ability to control her emotions is more salient to maternal harsh verbal parenting strategies than a mother's ability to plan, pay attention, problem solve, and hold pertinent information in working memory. Both maternal emotion control and executive functioning appear to be important contributors to mothers' report of children's problem behaviors. In our results, mothers who reported better emotion control and mothers who performed better on executive functioning tasks were less likely to report child conduct problems.

Utility of Social Information Processing Theory to Parenting and Child Behaviors

According to SIP theory, mothers call on their cognitions in complex, everyday parenting situations. In our sample, maternal emotion control, executive functioning, and hostile attribution biases were all associated with child conduct problems and, in the case of maternal emotion control, with harsh verbal parenting. However, the mechanism through

which these cognitive processes are associated with harsh verbal parenting and child conduct problems is complex and may not be completely explained by SIP theory.

Consistent with SIP theory, emotion and cognitive control processes (i.e., emotion control, executive functions) were related to social cognitions (i.e., parent attributions, parenting beliefs) in the expected direction. Specifically, higher maternal emotion control was associated with less parent hostile attributions about child behavior and maternal executive functioning was associated with less controlling parenting attitudes. However, social cognitions did not explain the relationships between emotion control and executive functioning and the parenting and child behaviors measured in this study. In terms of verbal parenting strategies, based on the results, mothers appear to call on their higher order cognitive processes, particularly their ability to control emotions, more so than their social cognitions. It is not surprising that maternal emotion control was directly related to yelling or shaming a child without first even considering their attributions or attitudes about the child's behavior, as a lack of emotion control indicates difficulty controlling in-the-moment emotional reactions and considering the consequences in advance.

With regard to child conduct problems, maternal emotion control and executive functioning were protective against child conduct problems and maternal hostile attribution bias was associated with higher levels of child conduct problems. Tests for hostile attribution bias as a mediator of the relationship between maternal emotion control and child conduct problems were not statistically significant, suggesting that lower maternal emotion control and hostile attribution bias independently contributed to more child conduct problems. Although in bivariate analyses maternal harsh verbal parenting was associated with more child conduct problems, this relationship was not statistically significant in the final model when controlling for shared method bias. Regardless, this result does not indicate that maternal verbal parenting behaviors are unimportant to child behaviors. Rather, an alternative explanation is that maternal higher order cognitions may trump maternal report of harsh parenting for understanding child conduct problems. This outcome could occur because maternal emotion control, executive functioning, and hostile attribution bias are related to parenting and household functioning in multiple ways that are positively or negatively correlated with child behaviors. However, additional research is needed to determine the validity of this claim.

Contrary to the results of other studies (Fish, Amerikaner, & Lucas, 2007; Thomas et al., 2003), high-control parenting attitudes was not associated with either parenting or child behaviors. One potential explanation for the lack of statistical significance in our study was that we used methods to address measurement error and controlled for shared method bias, which are two methods not typically used in other studies. In fact, before controlling for shared method bias, mothers' high-control parenting attitudes as well as their report of harsh verbal parenting practices were both positively associated with child conduct problems. However, these associations disappeared once we accounted for the shared method of maternal report. On this basis, we suggest that future research account for common methods variance where observed measures of parent and child behavior are not possible.

The direct association between higher emotion control and less reported harsh verbal parenting was expected. Lorber (2012) found that parents with better emotion control used less overreactive verbal discipline strategies. This relationship is logical: Mothers who are good at controlling their emotions generally are also less likely to verbally overreact to misbehavior in young children. However, maternal executive functioning was not statistically associated with maternal report of harsh verbal parenting. Chen and Johnston (2007) found that deficits in executive functioning were related to inconsistent discipline but not to parental overreactivity which, similar to the present study, included items measuring parents' propensity to yell at their child. However, given the number of studies showing a relationship between lower maternal executive functioning and their engagement in harsh parenting, the nonstatistical relationship was surprising. One explanation is that maternal executive functioning is especially important as a moderator of mothers' response to stressors, rather than directly affecting how mothers parent. Another possible explanation is that mothers who had strong executive control abilities, such as working memory, attention-shifting, and planning, were more attuned to their own parenting behaviors than were mothers with poorer executive functioning and this may have affected their survey responses. This rationale could also partially explain the nonstatistical relationships between executive functioning with emotion control and hostile attribution bias. Finally, it may be that low maternal executive functioning has a more definite link to measures of parental use of physical punishment (vs. harsh verbal parenting) as demonstrated in the child maltreatment literature (Fontaine & Nolin, 2012).

The protective relationship between not only maternal-reported emotion control and child conduct problems but also maternal executive functioning and child conduct problems suggests that maternal emotion and cognitive control capacities are related to child behavior in important ways; yet these control capacities may not work through the pathways of parenting attitudes or harsh verbal parenting practices. Other possible mechanisms through which emotion and cognitive control capacities are related to child behaviors include genetics, the establishment of household routines, engaging children in activities to enrich child development, other forms of parental discipline, and warm, nurturing parenting (Crandall et al., 2015; Hughes & Gullone, 2010). Executive functions are highly heritable (Beaver, Wright, & Delisi, 2007); mothers who have lower executive functioning are more likely to have children who struggle with self-regulation, which may manifest as conduct problems (Friedman et al., 2006).

Limitations and Strengths

An important limitation of this study was that we used cross-sectional data; thus, causality cannot be determined, and the temporal requirements for mediation were not met. Notwithstanding this limitation, given the scarcity of research on this topic, this analysis is an important first step. To partially address the limitation of concurrent data, we analyzed alternative models. Given the results of the main model and the alternative models, the primary unanswered question is whether maternal hostile attributions cause child conduct problems or the reverse, or whether they are recursive. Longitudinal studies where temporal relationships can be assessed are essential to fully understand the relationship of maternal cognitions with parenting and child behavior. Additionally, aside from the executive

functioning measure, all other major study constructs were based on maternal report. We minimized shared method bias by controlling for it using a shared latent factor, but having multiple reporters and observation of parent–child interactions is the gold standard.

The study also has a number of strengths. In addition to task-based measures of maternal executive function, we included measures of maternal emotion control and parenting social cognitions. This strategy allowed us to use SIP theory as the framework for our analyses and to assess the relationship of each construct on parenting and child behaviors in a moderate risk sample. Although SIP theory was not fully substantiated in this study, the findings are important as researchers continue to refine SIP theory or other theories used to explain maternal harsh parenting and child behaviors. Unlike most previous studies of maternal executive function and parenting, the executive function measure in this study comprised multiple tasks, which produces a more reliable measure of executive functioning. Further, our analytic strategy allowed us to address the concerns of measurement error, control for shared method bias, and provided results from a more rigorous analytic method than previously used in this type of research.

Application to Intervention and Policy

This study underscores the importance of maternal cognitions for parenting and child behaviors. SIP theory appears to partially explain parenting and child behaviors, and applying some aspects of this theory to intervention approaches may be beneficial. For example, the results of this study suggest that a focus on reducing harsh verbal parenting behaviors may do little on its own to affect child conduct problems, whereas improving maternal emotion control and executive functioning may result in reductions in child conduct problems. Maternal emotion control may be especially important to address in interventions where the goal is to reduce harsh verbal parenting practices or hostile attributions about child behavior. For interventions designed to promote authoritative parenting attitudes, the present study suggests that attention to parental executive functions may also be a necessary step to successfully reduce high-control (e.g., authoritarian) parenting attitudes. There is a successful precedence for including emotion and cognitive control components in home-visiting programs designed to improve parenting (i.e., see Bugental et al., 2002), which may be a useful guide for program directors on how to most effectively incorporate emotion and cognitive capacities into intervention work. Future additional research that assesses the impact of maternal cognitions in parenting skills education interventions would be valuable to improving intervention quality.

Conclusion

This is the first time, to our knowledge, that SIP theory has been empirically tested measuring maternal emotion and cognitive control capacities in relationship to parenting. Our results partially substantiate the theory: Maternal emotion and cognitive control capacities as well as maternal cognitions help explain child conduct problems, but in our study, only maternal emotion control was associated with maternal harsh verbal parenting. A critical next step for future research is to use longitudinal data to test these relationships and also other parenting and child behaviors not measured in this study. Findings from this study

and future longitudinal studies may be helpful in further refining SIP theory or other theories that help to explain the role of maternal cognitive control on their parenting behaviors.

Acknowledgments

This research was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) grants HD57319 and HD60110. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NICHD or National Institutes of Health. Funding for the first author's initial doctoral training was provided by the National Institute of Mental Health's Child Mental Health Services and Service System Research Program (T232MH019545).

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Appendix

Table A1

Full Structural Model Standardized Results Controlling for Shared Method Bias ($N = 146$)

Predictor	Social Cognitions																	
	EC			EF			HCPA			HAB			Harsh verbal parenting			Child conduct problems		
	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>	β	SE	<i>p</i>
Covariates																		
Maternal age	−0.03	0.12	.791	0.02	0.09	.817												
Maternal PPVT	0.04	0.12	.755	0.50	0.10	<.001												
SES risks	−0.33	0.13	.009	−0.44	0.12	<.001												
Child developmental problems	−0.20	0.09	.029	−0.08	0.08	.361												
Study site	−0.01	0.10	.887	−0.15	0.09	.088												
EC							−0.11	0.11	.282	−0.26	0.09	.003	−0.50	0.11	<.001	−0.29	0.13	.026
EF							−0.80	0.06	<.001	−0.22	0.13	.084	−0.27	0.32	.387	−0.54	0.27	.049
HCPA													−0.45	0.25	.073	−0.28	0.25	.275
HAB													0.06	0.13	.664	0.29	0.10	.005
Harsh verbal parenting																0.11	0.16	.468
Correlations																		
Executive functioning with EC	−.33 ^a	0.17	.059															
HCPA with HAB	−.18 ^a	0.12	.137															

Note. Model fit: root mean square error of approximation = .028, comparative fit index = .958. EC = emotion control; EF = executive functioning; HAB = hostile attribution bias; HCPA = high control parenting attitudes; PPVT = Peabody Picture Vocabulary Test; SES = socioeconomic status.

^aCorrelations are *r*, not β .

Figure 1.

The social information processing (SIP) model for maternal parenting, adapted from Azar et al. (2008). Black, solid lines indicate pathways tested in the final model. Gray dotted lines are a part of SIP theory that were not tested in this study.

Figure 2.

Structural equation model of maternal emotion and cognitive control processes, social cognitions, harsh verbal parenting, and child conduct problems (children aged 3–7 years), $N = 146$. Root mean square error of approximation = .028. Comparative fit index = .958. $\chi^2(1196) = 1331.68$, $p = .004$. Solid lines indicate statistically significant paths, and dotted lines are not statistically significant. Effect sizes are standardized betas. The model includes a common latent factor to control for shared method bias and was adjusted for the following covariates: maternal age, child development problems, maternal Peabody picture vocabulary test, study site, and household socioeconomic risks.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1

Item Correlations Between Covariates and Major Study Constructs

	1	2	3	4	5	6	7	8	9	10	11
1. Maternal age	—										
2. Maternal PPVT	.32***	—									
3. SES risks	-.47***	-.58***	—								
4. Child gender	-.06	.12	-.07	—							
5. Child age	-.12	-.18*	.17*	-.23**	—						
6. Child developmental problems	.05	.02	.06	-.08	.09	—					
7. Maternal emotion control	.13	.22**	-.32***	.04	-.13	-.21*	—				
8. Maternal executive functioning	.21**	.50***	-.53***	.04	-.07	.11	.05	—			
9. High control parenting attitudes	-.34***	-.56***	.56***	-.07	.11	.07	-.25**	-.49***	—		
10. Hostile attribution bias	-.17*	-.30***	.31***	-.10	.02	-.02	-.25**	-.25***	.25**	—	
11. Maternal harsh verbal parenting	.05	.08	.03	-.06	.08	-.05	-.42***	-.03	.00	.15	—
12. Child conduct problems	-.15	-.19*	.26**	-.02	-.05	.08	-.39***	-.19*	.32***	.35***	.42***

Note. PPVT = Peabody Picture Vocabulary Test—4; SES = socioeconomic status.

*
 $p < .05$.**
 $p < .01$.***
 $p < .001$.