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Fearful inhibition, Inhibitory Control, and Maternal Negative Behaviors during Toddlerhood Predict Internalizing Problems at Age 6

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Abstract

Many, but not all, young children with high levels of fearful inhibition will develop internalizing problems. Individual studies have examined either child regulatory or environmental factors that might influence the level of risk. We focused on the interaction of regulation and environment by assessing how early fearful inhibition at age 2, along with inhibitory control and maternal negative behaviors at age 3, interactively predicted internalizing problems at age 6. A total of 218 children (105 boys, 113 girls) and their mothers participated in the study. Results indicated a three-way interaction among fearful inhibition, inhibitory control, and maternal negative behaviors. The correlation between fearful inhibition and internalizing was significant only when children had low inhibitory control and experienced high levels of maternal negative behaviors. Either having high inhibitory control or experiencing low maternal negative behaviors buffered against the adverse effect caused by the absence of the other. These findings highlight the importance of considering associations among both within-child factors and environmental factors in studying children's socioemotional outcomes.

Keywords

fear; shyness; fearful inhibition; inhibitory control; maternal negative behaviors; internalizing problems

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Early temperament is part of the foundation for children's socioemotional development, with fear and shyness as two of the most stable temperament characteristics influencing outcomes (Rothbart & Bates, 2006). Fear is often operationalized during early development as wariness or distress in the presence of novel physical objects and social stimuli (Gartstein & Rothbart, 2003) and during later development as unease or nervousness related to anticipated distress or potentially threatening situations (Putnam, Gartstein, & Rothbart, 2006). Shyness is often conceptualized as wariness or anxiety in the face of social novelty and perceived social evaluation (Buss, 1985). Leve and colleagues (2005) suggested that fear and shyness might share some genetic similarities with depression and anxiety and, thus, they combined fear and shyness into one temperamental dimension in their study of internalizing problems. Likewise, we integrated fear and shyness, creating the generalized temperament construct of fearful inhibition (Rothbart, Ellis, & Posner, 2004). Using Rothbart's model, we conceptualized fearful inhibition as a reactive component of temperament (Rothbart & Bates, 2006; Rothbart, Sheese, Rueda, & Posner, 2011). It is similar to many other constructs studied in previous research, including fear, shyness, behavioral inhibition, and fearfulness.

Fearful inhibition is a risk factor for developing internalizing difficulties, which are among the most common childhood psychiatric disorders (Fox & Pine, 2012; Karevold, Ystrom, Coplan, Sanson, & Mathiesen, 2012; Prior, Smart, Sanson, & Oberklaid, 2000). Internalizing problems typically manifest as anxiety, depression, withdrawal, and/or somatic complaints (Achenbach, 1991). Not all children with high levels of fearful inhibition will develop serious internalizing problems, however (Rubin, 1993; Buss, 2011). Thus, it is important to understand within-child factors that put children with fearful inhibition at high risk (Eisenberg & Fabes, 1992), as well as to study environmental factors that influence the levels of risk (Buss & McDoniel, 2016; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Morales, Perez-Edgar, & Buss, 2015). For example, Degnan and Fox (2007) note there are multiple protective factors in the link between fearful inhibition and later developing anxiety, including child regulation skills and parenting behaviors. Previous research, however, has focused on either child or environmental factors in this link between early temperament and later disorders. To the best of our knowledge, there is no study examining both internal and environmental factors and their mutual influence on the development of children with fearful inhibition. In the current study, we examined how regulatory aspects of temperament (Rothbart & Ahadi, 1994) and maternal negative behaviors interactively influence internalizing behaviors of children with fearful inhibition.

Fearful Inhibition and Inhibitory Control

Inhibitory control (IC) is a form of self-regulation that emerges at the end of the first year and is closely related to the development of attention networks (Posner & Rothbart, 2000). IC refers to the ability to inhibit or suppress dominant thoughts or actions and pursue a subdominant one. It also involves controlling emotion-related behaviors (Rothbart & Posner, 1995; Eisenberg et al., 1996). IC is an important component of the higher order regulatory construct of temperament called effortful control, which also includes attention focusing, attention shifting, and activation control (Rothbart, Ahadi, Hershey, & Fisher, 2001). In tasks

that require toddlers to inhibit behavior, children's performance increases significantly by 30 months of age, with high accuracy by 36–38 months of age (Posner & Rothbart, 1998).

Regulatory aspects of temperament exert substantial influence on children's behaviors by allowing them to adjust affect or arousal (Rothbart, Ellis, & Poster, 2004). Lower levels of IC undermine young children's ability to regulate the expression of their negative emotions (Carlson & Wang, 2007). The ability to control undesirable thoughts and behaviors appears to be particularly important for children who are likely to experience intense negative emotions (Oldehinkel, Hartman, Ferdinand, Verhulst, & Ormel, 2007). When examining links between regulatory aspects of temperament and children's socioemotional development, researchers have focused more often on externalizing rather than internalizing outcomes (Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Utendale & Hastings, 2011) and on the construct of overall effortful control (Muris & Ollendick, 2005; Oldehinkel et al., 2007). There is evidence, however, that the individual components of effortful control, such as IC, play different roles in the association between fearful inhibition and internalizing problems (Eisenberg et al., 2009).

At a more basic level, it is possible that the individual components of effortful control exhibit different influences on the reactive aspects of temperament. For example, Eggum-Wilkens and colleagues reported that higher IC at 42 months is related to faster decreases in shyness between 42 and 84 months, whereas higher attention shifting at 42 months is related to slower decreases in shyness across the same developmental period (Eggum-Wilkens, Reichenberg, Eisenberg, & Spinrad, 2016). This link between IC and shyness is not prominent in the developmental literature, however. As noted by Eggum and colleagues (2016), associations between IC and shyness show no consistent pattern in studies reporting simple correlations.

Development is complex and, thus, simple correlations may not capture the intricacies of early temperament reactivity, regulation, and later socioemotional outcomes. The inconsistent patterns between IC and shyness suggest that IC may be only one aspect of the link between early shyness and later internalizing problems. Reactive and regulatory aspects of temperament rarely show a direct link with behavioral outcomes, such as internalizing problems anxiety disorders. They do so only in combination with particular environments. Examination of the complex interplay between temperament and parenting is more likely to promote our understanding of children's socioemotional development than examination of either child factors or environmental factors (Bates, Pettit, Dodge, & Ridge, 1998; Putnam, Sanson, & Rothbart, 2002)

Fearful Inhibition and Maternal Negative Behaviors

Quality of parenting, in complex interplay with children's fearful inhibition, has been broadly associated with children's risk for internalizing problems. In particular, negative parenting behaviors (e.g., intrusiveness and negative affect) expressed during interactions with young children may amplify risks associated with fearful inhibition (Taylor, Eisenberg, Spinrad, & Widaman, 2013; Eisenberg, Taylor, Widaman, & Spinrad, 2015; Rubin, Burgess, Dwyer, & Hastings, 2003). For example, maternal negativity moderates the association

between children's 4-year social reticence/inhibition and 7-year social withdrawal. Specifically, social reticence/inhibition correlates with higher levels of social withdrawal only when mothers exhibit higher negative affect and exert more negative control (Hane, Cheah, Rubin, & Fox, 2008). In addition, consistently high behavioral inhibition across childhood predicts higher adolescent social anxiety symptoms when mothers show high control/intrusiveness. High behavioral inhibition across childhood shows no association with adolescent social anxiety symptoms when children experience low maternal control/intrusiveness (Lewis-Morrarty et al., 2012). Over controlled patterns of parenting may intensify children's negative arousal and do harm to the development of emotion regulation skills (Eisenberg, Cumberland, & Spinrad, 1998).

The studies noted above had a focus on negative parenting while ignoring children's individual characteristics that may influence development, especially the development of children with fearful inhibition. Regulatory aspects of temperament may serve as protective factors, making it essential to consider how children's individual characteristics affect their unique responses to risk (Lengua, 2002).

Fearful Inhibition, Inhibitory Control, and Maternal Negative Behaviors: A Three-Way Interaction

Our study contributes to the literature by including both internal and environmental factors that may operate as vulnerable or resilient processes in predicting internalizing problems of children with fearful inhibition. We focused particularly on IC and maternal negative behaviors. Empirical evidence suggests that children who can regulate their emotional and behavioral responses in high-risk environments are as well adjusted as children without high IC who are in low-risk environments. However, children in a high-risk context but with low IC tend to have more maladaptive outcomes (Lengua, 2002). Therefore, children with fearful inhibition who have low IC and experience high maternal negative behaviors may have greater internalizing problems.

For children with fearful inhibition, having high IC is expected to mitigate the adverse effects caused by negative parenting. According to the differential susceptibility model, children vary in their sensitivity to parenting depending on their temperament (Slagt et al., 2016, with children with low IC disproportionately affected by negative parenting behaviors. Specifically, maternal negative behaviors are related to increased internalizing problems for children with low effortful control (of which IC is a component); however, this is not the case for children with high effortful control (Lengua, Bush, Long, Kovacs, & Trancik, 2008). Authoritarian parenting (i.e., verbal hostility, intrusiveness, and physical coercion) predicts higher levels of internalizing problems only when children have low effortful control, but not when they have medium or high effortful control (Muhtadie, Zhou, Eisenberg, & Wang, 2013).

On the other hand, children with fearful inhibition and low IC may benefit from mothers with low negative parenting. Previous research has suggested that appropriate parenting might provide a compensating form of regulation that helps prevent distress to novelty from growing into internalizing problems (Bates, Goodnight, & Fite, 2008). For example, mothers

with low negative affect are less hostile, more sensitive and supportive (Rueger, Katz, Risser, & Lovejoy, 2011). Mothers who provide support to children's negative emotions generally have children who engage in effective and constructive emotion regulation strategies (Spinrad, Stifter, Donelan-McCall, & Turner, 2004). In addition, less intrusive mothers appear to understand children's social development needs. They offer children more opportunities to explore contexts on their own (Degnan, Henderson, Fox, & Rubin, 2008), which is beneficial to social development. Thus, mothers can help children with fearful inhibition attain adaptive social outcomes even if the children have low IC. In this instance, IC may not be required as an essential regulatory characteristic that protects children from internalizing problems, or perhaps the protective effect may not be obvious.

Summary and Hypotheses

According to the above-mentioned findings, children with fearful inhibition are likely to develop in maladaptive ways if they lack high IC or if they have mothers who engage in negative parenting behaviors. When considering both internal and environmental factors, we proposed that low IC and high maternal negative behaviors can be cumulative risk factors and increment each other in predicting internalizing problems (Putman et al., 2002). Either having high IC or experiencing low maternal negative behaviors will buffer against the negative effects of high maternal negative behaviors or low IC, respectively. Specifically, we expected that fearful inhibition would be associated with internalizing problems only when children have low IC and experience high maternal negative behaviors. When maternal negative behaviors are low, we predicted that fearful inhibition would not be associated with internalizing problems, much the same as with high maternal negative behaviors and high IC. (See Fig. 1 for model.)

Our work offers a unique perspective in that most research on the moderating role of IC focuses on externalizing outcomes and does not consider parenting. We examine both IC and maternal negative behaviors as moderators of the association between fearful inhibition and internalizing problems. In addition, we focus on internalizing problems at age 6, which allows us to highlight an important period in socioemotional development associated with early school experience.

Method

Participants

Children visited the laboratory when they were 2 years, 3 years, and 6 years old of age. Children were two cohorts of a larger longitudinal study focused on individual differences in the development of cognition and emotion. The children were initially recruited as infants and had been in the research lab for several visits across infancy and early childhood. The two cohorts were recruited by two research locations. Of the 218 children in the final sample, 57 were seen at the Blacksburg, VA location, a small rural university town in the southeast, while the remaining 161 children were seen at the Greensboro, NC location, a moderate size city in the southeast.

We chose to study all the participants who had data for the dependent variable (i.e., internalizing problems) and at least one data point for the independent variables (i.e., fearful inhibition, IC, maternal negative behaviors). Among the 224 children who satisfied these criteria, two were excluded because fathers, rather than mothers, participated in the parent-child interaction tasks. Four were excluded from analyses because they were later diagnosed with neurological or developmental delays. The final sample included 218 children (105 boys, 113 are girls; 164 Caucasian, 38 African American, 16 Multi-Racial). Regarding maternal education, 3.2% of their mothers did not complete high school, 9.2% completed high school, 26.3% had a technical degree, 35.9% had a bachelor's degree, 20.3% had a master's degree, and 5.1% had a doctoral level degree. With respect to employment, 67.7% of the mothers currently had a job and 32.3% were not employed. For marital status, 72.8% of the mothers were married, 4.1% were single but living with child's father, 12.4% were single, 5.1% were divorced, 3.7% were separated, .9% were widowed, and .9% did not disclose their marital status.

Demographics of the participants recruited at each site reflected the demographics of the area where each research lab was located. Thus, the Greensboro site had a greater number of ethnic minority participants, $X^2(2, 218) = 16.70, p < .001$. Children at the sites did not differ in terms of gender, maternal education level, maternal marital status, or maternal employment status (all p 's $> .06$). Furthermore, children at the sites did not differ in terms of fearful inhibition, IC, maternal negative behaviors, or internalizing behaviors, all F 's $< .74$, all p 's $> .39$.

Procedure

Identical protocols were created and used to collect data at both research locations. Research assistants from each location were trained together by the project's Principal Investigator (the 3rd author) on protocol administration, as well as on behavioral data collection and coding. A series of steps were taken to ensure that identical protocol administration and coding criteria administration were maintained between the labs. For example, the Blacksburg lab periodically watched DVD recordings collected by the Greensboro lab, and the Blacksburg team provided reliability coding for behavioral data coded by the Greensboro team. The Blacksburg lab coded all mother-child interaction data collected by both labs.

At the beginning of each visit, study procedures were described by the experimenters. Signed consent was provided by the mother, and verbal assent was obtained from the child. Children were given a small gift and parents received an honorarium as compensation for each assessment. Study procedures were approved by the Virginia Tech institutional review board for the Blacksburg data collection and by the University of North Carolina at Greensboro institutional review board for the Greensboro data collection.

Before the age 2 visit, mothers were mailed the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006). Mothers brought the completed questionnaire with them when they visited the laboratory for the cognitive and interactive tasks (not part of this analysis). For the age 3 assessment, a series of IC tasks and mother-child interaction tasks were administered. For the age 6 assessment, mothers completed the

Child Behavior Checklist (CBCL; Achenbach, 1991) and children completed cognitive tasks (not part of this analysis).

Measures

Fearful inhibition at age 2.—Early Child Behavior Questionnaire (ECBQ; Putnam et al., 2006) is a widely used parent report of children's temperament from ages 1.5 to 3 years of age. Parents responded on a 7-point Likert scale ranging from 1 = never to 7 = always. Two subscales in the ECBQ are used: fear (11 items; e.g., "While in a public place, how often did your child show fear when the caregiver stepped out of sight?"); shyness (12 items; e.g., "When approached by an unfamiliar person in a public place, how often did your child pull back and avoid the person?"). We computed a fearful inhibition composite by combining the two scales ($r = .41$, $p < .001$). Cronbach's alpha of the fearful inhibition scale was .85.

IC at age 3.—The crayon delay task has been used in developmental research to assess child's IC (Calkins, 1997). At the beginning of the task, mother was given a magazine with a note on the cover page requesting her to please appear to be "busy" by reading the magazine and to minimize conversation her child. The experimenter told the child that she wanted to draw pictures with him/her and placed a new box of crayons and a blank piece of paper on the table in front of the child. She then said she had to leave room to find something and instructed child not to touch the crayons, crayon box, or paper before she came back. The experimenter then left the room for 120s. Children's behavior during the delay was scored on a 6-pointed scale (0 = colors with crayons, 1 = takes crayons out of box, 2 = picks up box, 3 = touches box, 4 = touches paper, 5 = does not touch).

The procedures for the tongue task were based on those described by Kochanska, Murray and Harlan (2000). It required the child to hold a goldfish cracker on his/her tongue without eating it. The experimenter demonstrated by showing the child how she held the goldfish cracker on her tongue without eating it. Then child was given his/her own crackers and instructed that he/she must wait to eat the cracker until the experimenter eats hers (three trials with delays of 10s, 20s, and 30s). Performance was the proportion of successful trials. Inter-rater reliabilities (intraclass correlations; 25% coding overlap) were acceptable for both IC tasks (ICC's = .95 and .92, respectively).

Descriptive statistics for the child IC measures can be found in Table 1. When possible, it is ideal to create a composite score of a latent variable from correlated indicators, since such composite variables are most reliable measures of the latent construct (Rushton, Brainerd, & Pressley, 1983). To compute a composite score, individual scores on crayon delay and tongue task ($r = .28$, $p < .001$) were standardized, averaged, and standardized again to yield an IC composite z score. The first principal component analysis explained 64% of the variance ($\lambda = .80$). This IC composite z score was used in the correlation and regression analyses.

Maternal negative behaviors at age 3.—Mothers were observed as they interacted with their children during two puzzle tasks. The experimenter instructed mother and child to work together on the two puzzles like they would at home for about 6 min total. During this interaction, mother and child sat on adjacent sides of a table. A camera was focused on both mother and child, and maternal behavior was videotaped for off-line coding by trained

research assistants. Interactions were coded for intrusiveness and negative affect on a 4-point scale (1= none; 2=low; 3=moderate; 4= high).

Intrusiveness means the extent to which an interaction is mother centered, instead of child centered. Specific behaviors include: failing to modulate performance such that the child turns away from, defends against, or expresses negative affect to mother; offering a continuous barrage of stimulation or toys; over-whelming and not allowing the child to influence the pace or focus of play or interaction by ignoring what the child shows interest in or by presenting a new toy while the child is still focused on another; taking away objects while the child still appears interested; not allowing the child to handle toys he/she reaches for; pulling the child's hand(s) off objects he/she is holding; and intrusive physical manipulations, such as grabbing the child's face and moving it back when the child has turned away. *Negative affect* refers to the degree of negative affect/hostility expressed by mother during the interaction, such as using impatient, forceful, threatening, angry, or affectively negative tone. Coding schemes were adapted from Smith, Calkins, Keane, Anastopoulos, and Shelton (2004). Behavior was coded in 30-s epochs, which were then summed across epochs and divided by the number of epochs to get a mean value. Inter-rater reliabilities (Spearman's rho; 20% coding overlap) were acceptable for negativity (.62) and intrusiveness (.75).

Descriptive statistics for the maternal behaviors measures can be found in Table 1. To compute a composite score, maternal intrusiveness and negative affect ($r=.26$, $p<.001$) were standardized, averaged, and standardized again to yield a maternal negative behaviors composite z score. The first principal component analysis explained 61% of the variance ($\lambda = .78$). Maternal negative behaviors outliers were handled through winsorization, such that scores that fell outside 3 SD of the mean were replaced by the next closest maternal negative behaviors score. This technique was applied to eight total outliers. The maternal negative behaviors composite z-score with winsorization was used in the correlation and regression analyses.

Internalizing problems at age 6.—Child Behavior Checklist (CBCL; Achenbach, 1991) is a 118-item parent report widely used to examine child's social and emotional problems from 4 to 18 years of age. Each item is reported on a 3-point Likert scale ranging from 0 = not true to 2 = very/often true. Previous research has shown good reliability and validity for the CBCL (Achenbach & Rescorla, 2001). Our primary interest was the Internalizing Problem scale (Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints), which is reported as a composite raw score ($\alpha=.82$).

Data Analysis Strategy

First, relations between the predictor variable (fearful inhibition at age 2), moderators (child IC and maternal negative behaviors at age 3), and outcome variable (internalizing problems at age 6) were examined. Second, in order to take full advantage of the data, we tested for moderation patterns among age 2 fearful inhibition, age 3 IC and maternal negative behaviors, and age 6 internalizing problems by running Mplus 7.4 (Muthén & Muthén, 2015) with a maximum likelihood estimation method and 5000 bootstrap samples. We

followed recommendations for moderation analyses by Hayes (2013) based on the codes developed by Stride, Gardner, Catley, and Thomas (2015). Missing values were handled with full information maximum likelihood estimation. Third, we followed Aiken, West, and Reno's (1991) suggestion of using one standard deviation plus and minus the mean of moderator to plot the variables and to test the statistical significance for each simple slope.

Results

Table 2 shows the results of bivariate correlations between child fearful inhibition, IC, maternal negative behaviors, and child internalizing behaviors. As expected, child fearful inhibition at age 2 correlated positively with internalizing problems at age 6.

The model was saturated, $\chi^2=.00$, $df=218$, CFI=1.00, RMSEA=.00, SRMR=.00. Together, fearful inhibition, IC, maternal negative behaviors, and their interactions accounted for 11% of the variance in internalizing problems. The standardized parameter estimates for the model are presented in Fig. 2. The three-way interaction term predicted IP ($b = -.73$, $SE = .31$, $p = .02$; see Fig. 2).

Specifically, when children experience high maternal negative behaviors, fearful inhibition predicts internalizing problems only when children have low IC ($b = 2.45$, $SE = .58$, $p < .01$), but not when they have high IC ($b = .44$, $SE = .75$, $p = .56$). When children experience low maternal negative behaviors, fearful inhibition does not predict internalizing problems no matter the level of IC ($b = -.20$, $SE = .58$, $p = .74$ and $b = .73$, $SE = .77$, $p = .35$, respectively for low and high IC; see Fig. 3).

Discussion

Our study extends previous research by demonstrating how child fearful inhibition, child IC, and the quality of parenting behaviors jointly predict socioemotional outcome in a longitudinal design. As hypothesized, child fearful inhibition at 2 years of age predicted internalizing symptoms at age 6. Moreover, this association was moderated by an interaction between child IC and maternal negative behaviors at age 3. Specifically, the relation between fearful inhibition and internalizing symptoms was significant only if children had low IC and also experienced high maternal negative behaviors.

Our findings are consistent with prior research indicating that early fearful inhibition increases the risk for developing psychological problems. Although correlations between fearful inhibition and internalizing problems are usually moderate (Prior et al., 2000), fearful inhibition puts many children at risk for developing internalizing symptoms. Previous research demonstrates that shyness and fear increase the probability for later developing problems (Colder, Mott, & Berman, 2002; Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004). Research by Buss, however, suggests that not all children who present with fearful inhibition are at risk for developing anxiety (Buss, 2011; Buss & McDoniel, 2016). Our moderation analyses confirm that other processes are involved in the associations between early fear and later internalizing.

Our study highlights the importance of considering both child and environmental factors, and most importantly their interaction, in predicting developmental outcomes. A unique contribution of our study is that we considered not only a temperament by environment interaction, but we also took into account the interaction between two temperament characteristics, one concerning reactivity and the other focused on regulation. Among the very few empirical studies that have incorporated different aspects of temperament and environmental factors, Crockenberg and Leerkes (2006) reported a similar three-way interaction among infant reactivity to novelty, infant regulatory behaviors, and maternal parenting in predicting children's later anxious behavior. High reactivity to novelty, together with poor regulatory skills, predicted anxious behavior only when mothers were less engaged or less sensitive. No prediction occurred when mothers were more sensitive or engaged. This finding with infants is consistent with our results with young children, supporting the perspective that multiple mechanisms across different levels contribute to an ideal developmental outcome (Degnan & Fox, 2007). If one mechanism is absent, such as IC, another mechanism, such as appropriate parenting, can help maintain adaptive development (Cummings, Davies, & Campbell, 2000). When cumulative risk factors are present, however, children are at higher risk for having behavioral problems (Appleyard, Egeland, Dulmen, & Alan Sroufe, 2005).

Our study demonstrates that IC is a protector for children with fearful inhibition when maternal behaviors are negative. This finding is consistent with previous research in suggesting the protective effect of IC (Oldehinkel et al., 2007). There are studies, however, that failed to find a protecting effect of IC or even reported the opposite effect. For example, Moran, Lengua, and Zalewski (2013) reported that IC did not moderate the correlation between fear and internalizing problems. On the other hand, White and colleagues reported that IC exacerbated the adverse effect of behavioral inhibition on anxiety (White, McDermott, Degnan, Henderson, & Fox, 2011). Neither of these studies, however, considered contextual factors, such as maternal parenting behaviors. Our data suggest that the role of IC may vary depending on the environments in which children are situated. We show that the protecting effect of IC is more salient when children experience high maternal negative behaviors. Thus, disregarding environmental factors may explain the results that failed to show the effect of IC as an effective way to regulate negative affectivity and thus reduce the risk of developing internalizing problems.

Alternatively, the measurement of fearful inhibition may play a role. For example, observation and maternal report may capture some overlapping but not identical aspects of fearful inhibition. Observation may reflect a more intense level of fearful inhibition exhibited by children who are in an unfamiliar laboratory environment with strangers. That may be why the combination of extreme behavioral inhibition and IC may lead to an over-controlled system in the White study (White et al., 2011). Thus, it may be important for future research to apply multiple measures to assess fearful inhibition when examining reactive and regulatory aspects of temperament and later outcomes.

Given that a three-way interaction was found in predicting internalizing symptoms, it is important to consider possible mechanisms underlying the role of IC in situations where maternal negative behaviors are high and when they are low. High maternal negative

behaviors cause intense negative emotions, especially for children with high levels of reactivity (Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007; Kochanska, Aksan, & Joy, 2007). Furthermore, mothers who show high negative affect may not have the emotional resources available to assist a temperamentally negative child with an effective way to regulate his/her negative emotions (Crawford, Schrock, & Woodruff-Borden, 2001). Under such circumstances, having high IC may help children manage their negative emotions by employing more effective coping strategies (Carlson & Wang, 2007; Fox & Calkins, 2003). Likewise, intrusive mothers tend to be over-controlling and children may feel incompetent and frustrated, leading to negative interactions. High levels of IC, however, may facilitate better social interactions with an intrusive mother. Furthermore, children characterized by good IC are better able to obey game rules and wait their turn (Diamond & Lee, 2011). This could improve peer acceptance of children with fearful inhibition (Eggum-Wilkens et al., 2016). High IC is concurrently and longitudinally associated with high levels of committed compliance (Kochanska, Coy, & Murray, 2001), which is a characteristic appreciated by caregivers. Thus, children with high IC may get more support from their peers and other caregivers, which attenuates the adverse influence caused by the negative maternal behavior. When children experience high negative parenting behaviors but have low IC, they lack the ability to regulate negative emotions, to develop adaptive interpersonal skills, and are thus less likely to receive social support. As a result, they are at the highest risk for developing internalizing symptoms.

Interestingly, our study suggests that for children who experience low maternal negative behaviors, fearful inhibition is not correlated with internalizing symptoms regardless of the level of IC. This finding is consistent with previous research in suggesting that children in low-risk contexts experience optimal development even without high IC (Lengua, 2002). Low maternal negative affect has been linked to more secure child attachments and more maternal warmth (Kochanska, Clark, & Goldman, 1997). Likewise, toddlers are more likely to develop secure attachment if their caregivers are less intrusive (Swanson, Beckwith, & Howard, 2000). Behaviorally inhibited children who are securely attached are less likely to have anxiety disorders than BI children who are insecurely attached (Warren et al., 1997). These links between attachment and fewer anxiety disorders may be because securely attached children regard the environment as controllable and predictable. They may be more likely to have a sense of autonomy or personal competence when approaching novelty (Bögels & Brechman-Toussaint, 2006). In addition, low maternal negative affect has been associated with high self-esteem in children (Rudy & Grusec, 2006). Less intrusive mothers encourage children's autonomy in ways that promote children's self-esteem and self-efficacy (Baumrind, 2005), thus reducing the risk for internalizing problems (Kim & Cicchetti, 2003; Bosacki, Dane, Marini, & YLC-CURA, 2007). Therefore, children with fearful inhibition are less likely to have internalizing problems when experiencing low maternal negative affect and intrusiveness, even without high IC.

Some limitations of our study warrant discussion. First, we relied on maternal report to measure fearful inhibition at 2 years and to measure internalizing symptoms at 6 years old. It is possible that mothers with greater levels of negativity may over report child symptoms. Although we trust mothers as reliable reporters and know that the ECBQ and CBCL exhibit good validity and reliability (Rothbart & Bates, 2006; Achenbach & Rescorla, 2001), it

would be ideal to include multiple measures in addition to maternal report, such as observational ratings and physiological measures, in future studies. Second, we report that when mothers show high level of negative behaviors, children with good IC are less likely to have internalizing symptoms. The mechanisms associated with this process, however, remain unexplored. Future research should examine the mechanism by which IC affects the relation between negative affect and socioemotional functions. Third, regarding parenting factors, we focused on maternal negative affect and intrusive behaviors. It is possible that maternal negative behaviors are a proxy for mood or anxiety disorder history in the mothers. Thus, it is particularly important to take maternal mood state, depression, and anxious symptoms into account. Furthermore, additional family members, the interactions among different settings in which the child may be situated, and even the larger social and cultural background may influence maternal behaviors (Bronfenbrenner, 1977). Tschann, Kaiser, Chesney, Alkon, & Boyce (1996) reported that children who live in high-conflict families and who have high negative temperament characteristics had the most internalizing problems. Future studies, therefore, should examine if other contextual factors moderate the interaction between fearful inhibition and IC in predicting internalizing problems. Fourth, we should note that the overall levels of maternal negative behaviors, especially negative affect, measured in our study were low, and therefore the moderating effect of maternal negative behaviors should be interpreted with caution. The results suggest, however, that even low-to-moderate degrees of maternal negative behaviors can impact child outcomes. Lastly, most of the mothers in our study had some level of higher education, which limits the generalizability of the results. Future research may want to replicate the results with mothers with more varying levels of education.

Despite these limitations, our study extends previous research in numerous ways. Our study is the first to examine how child fearful inhibition, IC, and maternal negative behaviors jointly influence children's internalizing symptoms from toddlerhood through middle childhood. We showed that children with a high level of fearful inhibition could use IC as a positive coping strategy as early as 3 years old, and that this ability was moderated by the caregiving context in which they were situated. We incorporated different measures, including maternal report, standard behavioral tasks, and observations, which were administrated at different times between ages 2 and 6 years. The children in our study were a community sample instead of a risk-selected sample (e.g., behaviorally inhibited children or those with dysregulated fear), which improves the generalizability of our results. Finally, our findings have implications for what, who, and when should be targeted for preventing the development of internalizing symptoms. In order to reduce the risk for having internalizing symptoms by school age, programs that aim to improve IC should be implemented during toddlerhood. Equally or even more importantly, interventions aimed at reducing maternal negative behaviors, either by improving parenting quality or taking a further step to treat mothers' underlying symptomatology, should be pursued.

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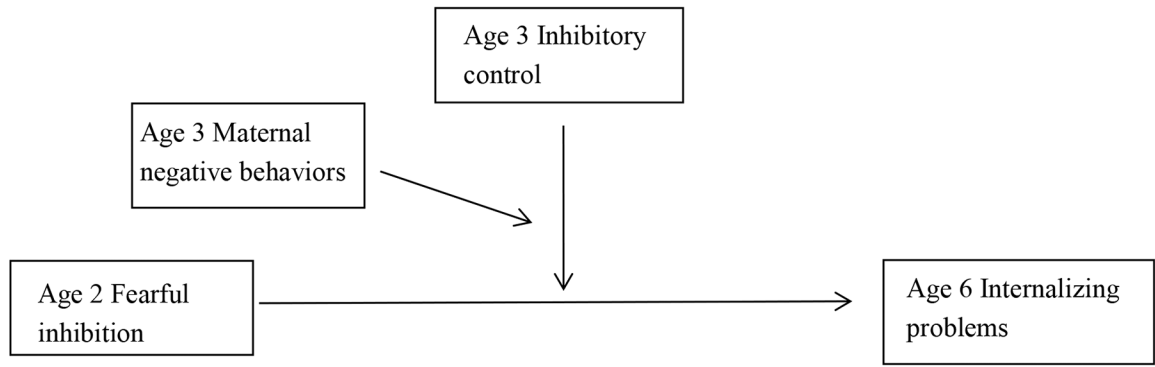


Fig. 1.
Conceptual diagram of the moderated moderation model

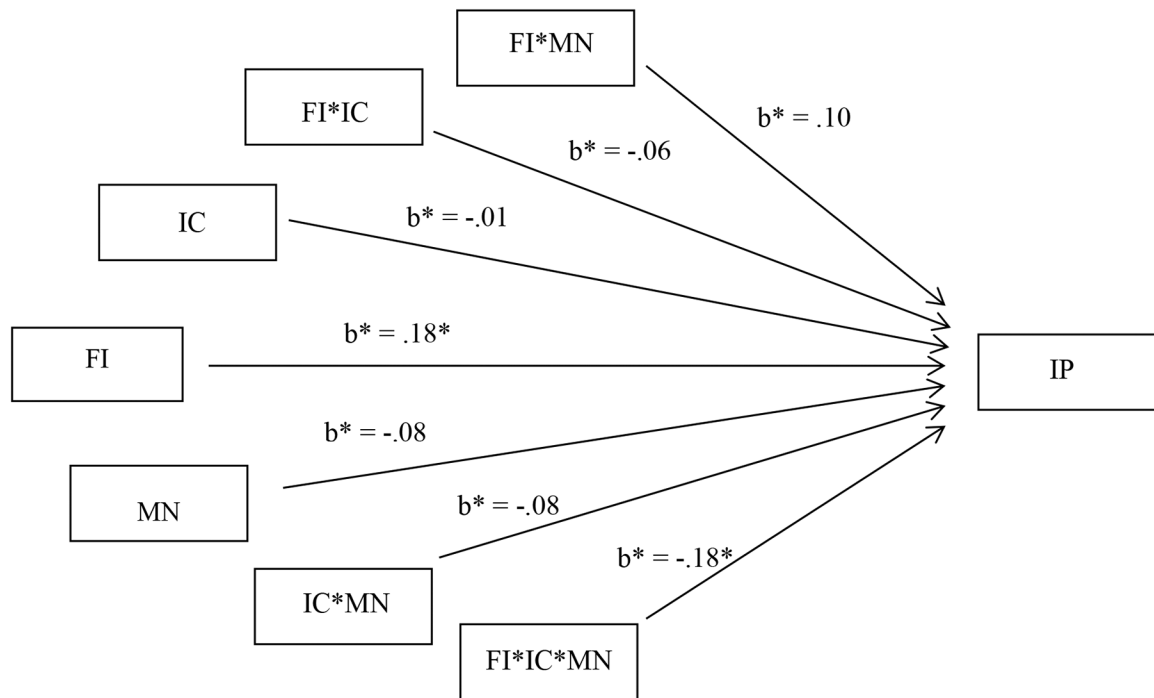


Fig. 2. Summarized model fitting results of the path model of associations among fearful inhibition, inhibitory control, and maternal negative behaviors predicting children's internalizing problems. Standardized estimates (b^*) are presented. FI= Fearful inhibition; IC= Inhibitory control; MN= Maternal negative behaviors; IP= Internalizing problems. $*p < .05$.

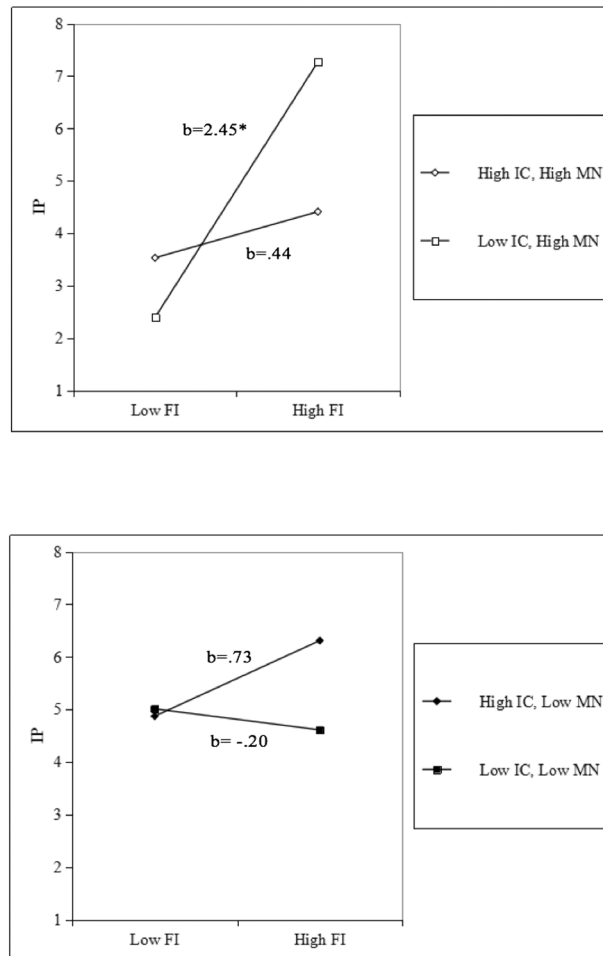


Fig. 3. Associations between fearful inhibition and internalizing problems at low and high IC among children who experience high frequencies of maternal negative behaviors (top) and who experience low frequencies of maternal negative behaviors (bottom) Low/High= $\text{mean} \pm 1\text{SD}$; FI= Fearful inhibition, IC= Inhibitory control, MN= Maternal negative behaviors, IP= Internalizing problems. $*p < .05$.

Table 1

Descriptive statistics (n=218)

Measure	Mean	Max	Min	SD
Age 2 FI ^a composite	.00	2.50	-2.75	1.00
Fear	2.67	4.91	1.00	.81
Shyness	3.42	6.00	1.00	.96
Age 3 IC ^b composite	.00	1.18	-2.95	1.00
Crayon delay	4.59	6.00	1.00	1.41
Tongue task	.70	1.00	0.00	.41
Age 3 MN ^c composite	-.02*	2.82	-.71	.92*
Intrusiveness	1.23	2.5	1.00	.27
Negative affect	1.01	1.30	1.00	.05
Age 6 IP ^d	4.95	38	0	4.77

Note.

^aFI = fearful inhibition;^bIC = inhibitory control;^cMN = maternal negative behaviors.

* MN composite z-score was winsorized such that scores that fell outside 3 SD of the mean for each time point were replaced by the next closest maternal negative behaviors score. This technique was applied to eight total outliers of the data. This mean is for MN after winsorization.

^dIP = internalizing problems.

Table 2

Correlations between child fearful inhibition, inhibitory control, maternal negative behaviors, and internalizing problems

Measures	IC	MN	IP ^d
FI ^a	-.03	.06	.17*
IC ^b		-.10	-.07
MN ^c			.00

Note.

^aFI = fearful inhibition (composite z-score);

^bIC = inhibitory control (composite z-score);

^cMN = maternal negative behaviors (MN is composite z-score with winsorization);

^dIP = internalizing problems.

* $p < .05$.