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Preschoolers' Self-Regulation Moderates Relations between Mothers' Representations
and Children's Adjustment to School

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Abstract

Consistent with models of environmental sensitivity (Pluess, 2015), research suggests that the effects of parents' behaviors on child adjustment are stronger among children who struggle to regulate their thoughts, feelings, and behaviors compared to children with better self-regulation. This study extended prior research by assessing maternal representations of the child, which presumably underlie mothers' parenting behaviors, to evaluate the moderating influence of preschoolers' self-regulation on relations between mothers' representations and changes in children's negative and positive developmental adjustment outcomes from preschool to first grade. Participants were 187 mothers and their preschoolers. Mothers' representations were assessed via the coherence of their verbal narratives regarding their preschooler and teachers reported on preschoolers' self-regulation. In preschool and first grade, examiners rated children's externalizing behavior problems and ego-resilience, and teachers rated children's externalizing behavior problems and peer acceptance. Consistent with the environmental sensitivity framework, the coherence of mothers' narratives predicted changes in adjustment among children with self-regulation difficulties, but not among children with better self-regulation. Preschoolers with self-regulation difficulties whose mothers produced incoherent narratives showed increased externalizing behavior problems, decreased ego-resilience and lower peer acceptance across the transition to school. In contrast, preschoolers with better self-regulation did not evidence such effects when their mothers produced incoherent narratives. The implications of these findings for understanding and supporting children's adjustment during the early school years are discussed.

Keywords: Coherence; Environmental sensitivity; Five Minute Speech Sample; Representations; Self-regulation

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Children's adjustment during the transition from preschool to first grade is influenced by their self-regulation (i.e., redirecting, controlling, or modifying arousal within and across multiple systems, such as emotion and behavior; Calkins & Fox, 2002; Ursache, Blair, & Raver, 2012) and parenting practices (Pianta, Nimetz, & Bennett, 1997). These dual influences may be especially salient during the transition to school because individual differences in child adjustment tend to stabilize during this developmental period (Downer & Pianta, 2006; Mesman, Bongers, & Koot, 2001; Olson, Sameroff, Lunkenheimer, & Kerr, 2009). Thus, clarifying how self-regulation and parenting factors support or hinder children's adjustment during the transition to school has significant implications for developmental science and practice.

The framework of environmental sensitivity (Pluess, 2015) posits interactive influences of child characteristics, such as self-regulation, and environmental factors, such as parenting, on child development. This framework suggests that parenting will have comparatively weak effects on less sensitive children, such as those with better self-regulation, and subsumes specific models that offer competing hypotheses about the nature of parenting effects on environmentally sensitive children, such as those with self-regulation difficulties. On the one hand, dual risk models (Paris, 2000) suggest that children will evidence the poorest adjustment outcomes, such as behavior problems, only if low-quality parenting co-occurs with child self-regulation difficulties. On the other hand, vantage sensitivity models (Pluess & Belsky, 2013) posit that some child characteristics confer increased responsiveness to positive, but not negative, environmental experiences. According to these models, high quality

parenting will contribute to the best adjustment outcomes, such as peer acceptance, among children with self-regulation difficulties. Finally, differential susceptibility models (Belsky & Pluess, 2009) represent a combination of dual risk and vantage sensitivity models, in that they conceptualize child characteristics, such as self-regulation difficulties, as a hypersensitivity to *both* positive and negative environment influences. These models posit that low and high quality parenting will predict the poorest and the best adjustment outcomes, respectively, among children with self-regulation difficulties.

The current study extended prior research on children's environmental sensitivity in two important ways. First, we focused on parents' *representations* (i.e., beliefs and expectations) of their child. Previous studies have examined how children's self-regulation moderates the effects of parental *behaviors* (e.g., parental sensitivity, Pluess & Belsky, 2010) on children's adjustment during the transition to school (e.g., Stright, Gallagher, & Kelley, 2008). However, because parents' representations of their child guide their interpretation and responsiveness to their child's signals (Slade, Belsky, Aber, & Phelps, 1999; Stern, 1991), the evaluation of parents' representations can explain individual differences in parenting behaviors (Benoit, Zeanah, Parker, Nicholson, & Coolbear, 1997; Zeanah & Barton, 1989). Thus, the study of parental representations is an important compliment to extant studies of observed parenting, one that is vital for designing effective parent-child interventions (Dozier & Sepulveda, 2006; Benoit et al., 1997) to support children's successful transition to school.

Second, we examined multiple domains of children's adjustment to school, including child pathology in terms of externalizing behavior problems (e.g., aggressive behavior), and child competence in terms of peer acceptance and ego-

resilience (i.e., the capacity to negotiate uncertainty and stress in a way that is flexible, resourceful, and adaptive; Sroufe, 1991). In doing so, this investigation answered recent calls to examine a range of negative and positive adjustment outcomes to evaluate differential susceptibility patterns (Belsky & Pluess, 2009), and to document whether or not differences in environmental sensitivity affect various developmental domains equally (Hartman & Belsky, 2015; Pluess, 2015).

The Effects of Self-Regulation and Parenting on School Adjustment

During the transitional years from preschool to school, children encounter numerous social, emotional, and academic challenges (Love, 1992). Self-regulation, particularly children's capacities to modulate expressions of anger and inhibit behavioral responding in accordance with contextual demands (i.e., inhibitory control; Posner & Rothbart, 2000), influences their ability to negotiate these challenges (Eisenberg, Valiente, & Eggum, 2010). Children with less anger and more inhibitory control evidence better adjustment, including a) fewer externalizing behavior problems (Eisenberg, Spinard, & Eggum, 2010), b) greater capacities to cope with challenges (i.e., ego-resilience; Eisenberg et al., 2004; Taylor, Eisenberg, Spinard, & Widaman, 2013), and c) more constructive and appropriate interpersonal interactions with peers and teachers (Rhoades, Greenberg, & Domitrovich, 2009). Thus, self-regulation is positively related to school engagement and achievement, particularly during the early school years (Ursache et al., 2012).

In addition to the well-established influence of parents' behaviors on children's adjustment during these transitional years (e.g., Campbell, Matestic, von Stauffenberg, Mohan, & Kirchner, 2007; Martin, Ryan, & Brooks-Gunn, 2010), parents' representations of the child may shape children's adjustment by influencing the quality of the parent-child relationship. Attachment theory and research define

parental representations as complex cognitive-affective structures that guide the flexibility and accuracy with which parents interpret their children's signals and, in turn, shape parents' emotional, cognitive, and behavioral responses to their children (Benoit et al., 1997; Main, Kaplan, & Cassidy, 1985). Thus, representations are conceptualized as a dimension of parenting that is distinct from observed practices, one that can explain why parents behave the way they do towards their child (Koren-Karie, Oppenheim, Dolev, Sher, & Etzion-Carasso, 2002; Zeanah & Barton, 1989).

Parents' undistorted, multifaceted, and well-integrated representations of their child guide their accurate interpretation of the child's behavior and promote supportive responses to the child. In contrast, parents' distorted, one-sided, or poorly integrated representations, hinder accurate interpretations of the child's signals, and may lead to negative parenting behaviors, such as hostility and intrusiveness (Bowlby, 1969/82; Main et al., 1985; Slade et al., 1999). In turn, the quality of parents' behaviors shape the child's sense of security and competence in exploration, as well as her/his expectations of the parent-child relationship, and these patterns carry over to other relational contexts, such as with teachers and peers (Matas, Arend, & Sroufe, 1978). Thus, a child with a parent who constructs multifaceted and undistorted representations would be more likely to experience supportive parenting and would be apt to negotiate the challenging transition from preschool to school in a positive and confident manner (Pianta et al., 1997). Consistent with these assertions, research supports positive relations between parents' multifaceted and well-balanced representations and child adjustment (Benoit et al., 1997; Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002), yet studies with parents of preschoolers remain rare (Oppenheim, Goldsmith & Koren-Karie, 2004).

In sum, prior studies indicate that children's self-regulation and parents'

representations may have discrete effects on children's adjustment to school.

Moreover, models of environmental sensitivity (Pluess, 2015) suggest that children's self-regulation may moderate the adaptive significance of parents' representations on children's positive and negative adjustment during the crucial transition from preschool to first grade.

Interactive Effects of Children's Self-Regulation and Parents' Representations on School Adjustment

Relations between children's self-regulation and parenting processes have taken on increased salience in contemporary efforts to understand stability and change in children's adjustment generally (e.g., Kochanska & Kim, 2013), and in their school adjustment in particular (e.g., Pluess & Belsky, 2010). Drawing on models of environmental sensitivity, prior studies of observed parenting behaviors suggest that their effects on child adjustment to school are moderated by children's self-regulation and related constructs, such as negative emotionality/affectivity (i.e., child anger/frustration and fearfulness; Belsky, Hsieh, & Crnic, 1998) or difficult temperament (i.e., child proneness to sadness, fear, frustration or disinhibition; Kochanska & Kim, 2013).

In line with dual risk models, some research indicates that negative parenting behaviors, such as low responsiveness and high intrusion, magnify the risk for externalizing behavior problems, poor peer relationships, and noncompliance among children with poor self-regulation or a difficult temperament, but not among children with strong self-regulation or an easy temperament (e.g., Kochanska & Kim, 2013; Smeekens, Riksen-Walraven, & van Bakel, 2007). To our knowledge, vantage-sensitivity models have not been examined in isolation from tests of differential susceptibility in studies of observed parenting and school adjustment. However,

several investigations support models of differential susceptibility. For example, children with a difficult temperament show the poorest adjustment when the quality of observed parenting is low, but outperform children with an easy temperament in terms of fewer externalizing problems and better social and academic competence when the quality of observed parenting is high (e.g., Bradley & Corwyn 2008; Pluess & Belsky, 2010; Stright et al., 2008).

The current study sought to clarify if and how competing models of environmental sensitivity might explain relations between parents' representations of the child and children's adjustment to school as a function of children's self-regulation. As reviewed earlier, parents' representations may be multifaceted and well balanced or inconsistent and one-sided. Parents who construct multifaceted and undistorted representations of their child with poor self-regulation acknowledge that their child has difficulties with self-regulation, but are not overwhelmed or unduly influenced by them. As a result, these parents may be more likely to accept the child's self-regulation difficulties, accurately interpret the child's signals, and respond in a supportive fashion (Bretherton, 1990; Oppenheim, 2006). The effect of such sensitive parenting may be especially pronounced among children with self-regulation difficulties because, relative to their better-regulated peers, they are more dependent on the parent to provide external support for self-regulation (Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007).

Likewise, children with poor self-regulation may be particularly vulnerable to the effects of inconsistent or one-sided parental representations because such representations undermine the parent's capacity to provide sensitive caregiving to the child despite the child's disproportionate need for such support. Distorted representations can take one or more of several forms with corresponding disruptions

in parenting. Some parents may construct idealistic representations that dismiss or deny the child's vulnerabilities and impair parents' capacity to respond to the child in times of need. Other parents may form unilaterally negative representations that overemphasize their child's vulnerabilities (Kochanska & Kim, 2012). These negative representations may fuel parents' negatively biased attributions about the child's behavior (Silverman & Lieberman, 1999; Oppenheim et al., 2004), potentially decrease their motivation or ability to support the child's development of self-regulation, and/or contribute to coercive parent-child interactions that result in decreased adjustment (Patterson, 1982; Olson, 1992). In other cases, parents may construct representations that are dominated by concern about their child. When the child struggles with emotion or behavior regulation, these parents might respond with overly solicitous, overprotective, and intrusive behaviors, instead of setting appropriate limits and scaffolding the child's emergent self-regulation (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Muller-Nix, 2011; Schechter et al., 2008). Importantly, these different types of distorted representations may co-occur. For example, a parent may fluctuate between aversion and overwhelmed concern for the child. Nevertheless, all types of one-sided or poorly integrated representations may render children with self-regulation difficulties at increased risk for poor adjustment across the transition to school.

The Current Study

To our knowledge, this study was the first to evaluate the interactive effects detailed above between child self-regulation and parental representations on child adjustment. Analyses drew on data from an ongoing longitudinal study wherein measures of children's self-regulation and mothers' representations were obtained during the preschool period and negative and positive adjustment outcomes, including

externalizing behavior problems, ego-resilience and peer acceptance, were assessed by examiners and teachers during preschool and again in first grade.

Attachment theory suggests that representations are expressed through the organization of an individual's thought and language about the relationship (Hesse, 2008; Main et al., 1985). Thus, we evaluated the extent to which mothers' representations were multifaceted and undistorted via the coherence of their verbal narrative about their child in terms of its clarity, consistency, multidimensionality and authenticity (Oppenheim, 2006). Narratives were elicited using the Five Minute Speech Sample procedure (FMSS; Magaña et al., 1986), which prompts parents to speak for five uninterrupted minutes about their thoughts and feelings regarding their child and their relationship. Although brief, the FMSS requires the parent to narrate without the aid of prompts or responses from the interviewer. Hence, this approach maximizes the projection and expression of the parent's internal emotions, thoughts, and attitudes about the child in the narrative (Gottschalk & Glesser, 1969).

We hypothesized that preschoolers' self-regulation difficulties and mothers' incoherent narratives would each be associated with increased externalizing behavior problems, lower ego-resilience and decreased peer acceptance from preschool to first grade (i.e., main effects). In addition, in line with the environmental sensitivity framework (Pluess, 2015), we hypothesized that preschoolers' self-regulation would moderate expected associations between the coherence of mothers' narratives about the child and changes in children's adjustment from preschool to first grade (i.e., interaction effects). Specifically, we hypothesized that mothers' narrative coherence would have a stronger effect on changes in the adjustment of children with relatively poor self-regulation as compared to their better self-regulated peers.

As reviewed above, there is evidence for both dual risk and differential

susceptibility patterns in prior studies of child self-regulation and observed parenting (e.g., Kochanska & Kim, 2013; Pluess & Belsky, 2010). Moreover, there is a striking dearth of environmental sensitivity research examining parents' representations. Thus, we employed a confirmatory and competitive model-testing approach to evaluate the fit of alternate models of environmental sensitivity, including dual risk, vantage sensitivity, and differential susceptibility, across multiple adjustment outcomes.

First, consistent with dual risk models, we evaluated whether preschoolers with self-regulation difficulties would show greater vulnerability to mothers' distorted and inconsistent representations than children with better self-regulation. In this model, we expected that children with self-regulation difficulties would show the poorest adjustment to school if their mothers provided incoherent narratives, but their adjustment would not be significantly different from better self-regulated children if the mother provided a coherent narrative. Second, consistent with vantage sensitivity models, we tested whether children with self-regulation difficulties would evidence disproportionately beneficial effects as a result of mothers' multifaceted and undistorted representations, such that they would show improved adjustment to school if their mothers provided coherent narratives, but their adjustment would not be significantly different from those of better self-regulated children if their mother produced an incoherent narrative. Third, consistent with differential susceptibility models, we examined if, relative to their better-regulated peers, children with self-regulation difficulties would show the poorest adjustment to school when their mothers provided incoherent narratives, but the best adjustment when their mothers provided coherent narratives.

Method

Participants

Participants were drawn from a longitudinal study of self-regulation and representation among 250 preschooler-caregiver dyads. Dyads were excluded from these analyses if the caregiver was not the biological mother ($n = 25$, 10.00%), if the child was not attending preschool at the time of the first interview ($n = 36$, 14.40%), or the mother's FMSS was invalidated by administration errors ($n = 2$, .08%). The remaining 187 participating mothers self-identified as Hispanic (57.75%), Black (17.65%), White (18.18%), or multiethnic/other (6.42%). The sample was representative of the diverse community from which it was drawn (U. S. Census Bureau, 2011). Of participating children, 49.73% were females. The mean age of participating children was 49.20 months ($SD = 2.82$) at Time 1, and 73.43 months ($SD = 2.62$) at Time 2. At Time 1, mothers' average age was 30.51 years ($SD = 6.09$) and 81.3% were married or in a committed relationship. Average family socioeconomic status (SES), based on the Hollingshead (1975) Four-Factor Index, was 31.85 ($SD = 12.25$), which corresponded to clerical/sales work. There were no significant differences in family demographics between the 187 participating dyads and the 63 dyads that were excluded from these analyses (all $ps > .09$), except that mothers in participating dyads were younger ($M = 30.51$, $SD = 6.09$) than caregivers, who were primarily extended kin (e.g., grandmothers), in non-participating dyads ($M = 34.86$, $SD = 10.23$), $t(77.33) = 3.19$, $p = .002$.

Procedure

Mothers were recruited via flyers posted in childcare centers. Exclusionary criteria included children who were developmentally disabled, outside 45-54 months of age, and/or not able to understand English. The Hispanic sub-sample was primarily

US-born (65.35 %). All mothers reported English use in the home, and 40.9% reported exclusive English use. At each time point, dyads completed a 3-hour laboratory visit, which included a range of standardized assessments (e.g., The Pictorial Scale of Perceived Competence and Social Acceptance; Harter & Pike, 1984) and tasks (e.g., The MacArthur Story Stem Battery; Emde, Wolf, & Oppenheim, 2003) completed by the child, as well as an extensive life history interview and standardized adjustment measures (e.g., The Brief Symptom Inventory; Derogatis, 1993) completed by the mother in a separate room. Teachers provided questionnaire data by mail approximately 3 months following each laboratory visit. Mothers' informed consent was obtained in writing. Mothers were paid \$75, children received a small bag of toys totaling \$5-10, and teachers received a \$15 gift card at each time point. The Human Research Review Board of the participating university approved all procedures.

Measures

Child self-regulation. At time 1, teachers completed the anger/frustration proneness and inhibitory control scales of the Children's Behavior Questionnaire – Short Form (CBQ-SF; Putnam & Rothbart, 2006). Each scale consisted of 6 items (e.g., anger/frustration: “Gets angry when cannot find something s/he wants to play with;” inhibitory control: “Can wait before entering into new activities if s/he is asked to”), which were rated on 7-point scales from 1 (*extremely untrue*) to 7 (*extremely true*). Following recommendations to minimize artificially inflating relations among related constructs in prior work (e.g., Eisenberg et al., 2005), we removed the item “Has temper tantrums when s/he doesn't get what s/he wants” from the anger/proneness scale given its similarity to items on the examiner (“temper tantrums or hot temper”) and teacher (“temper tantrums, hot temper, or seems angry”) reports

of child externalizing behavior problems described next. The CBQ-SF has been validated across diverse samples (de la Osa et al., 2013; Putnam & Rothbart, 2006), and the internal consistency of both scales in the current study was good (anger/frustration: $\alpha = .78$; inhibitory control: $\alpha = .75$). Given their strong correlation ($r [187] = -.63, p < .001$), the two scales were aggregated (after reversing the inhibitory control scale) to form a composite measure of child self-regulation difficulties.

Maternal FMSS-coherence. Mothers were audio-recorded while speaking for five uninterrupted minutes about what kind of a person their child is, and how the two of them get along, using the Five Minute Speech Sample procedure (FMSS; Magaña et al., 1986). Mothers were given the option of responding in English or Spanish. The FMSS of the 5 (2.67%) mothers who opted to respond in Spanish were translated to English for coding and back translated by two native Spanish speakers. Transcripts were assigned double-blinded serial codes to avoid recognition of the family, and then coded using the FMSS-Coherence Scales (Sher-Censor & Yates, 2012), which were adapted from the Insightfulness Assessment (Koren-Karie & Oppenheim, 2004).

Transcripts were first rated on six 7-point scales tapping salient dimensions of coherence, including *Focus*; *Elaboration*; *Separateness*; *Concern/worry*; *Acceptance/rejection*; and *Complexity* (see Sher-Censor & Yates, 2015, for further detail). Based on these scale scores and an evaluation of the overall organization, internal consistency, and authenticity of the FMSS, a global FMSS-coherence rating was assigned on a 7-point scale. The lower part of the scale (scores of 1 to 4) indicates an incoherent FMSS, which can feature a) a meager, emotionally disengaged narrative, b) a one-sided narrative that is overly positive, overly negative, or overwhelmed with concern, and/or c) a narrative that includes contradictory

statements. The upper part of the scale (scores of 5 to 7) indicates a coherent FMSS, in which the parent creates a consistent, elaborated, complex, and believable portrayal of the child. FMSS-coherence coding has been validated in prior studies wherein the coherence of parents' FMSS has been associated with fewer preschooler behavior problems (Sher-Censor & Yates, 2015) and more positive depictions of the parent-child relationship in preschoolers' play-narratives (Sher-Censor, Grey, & Yates, 2013).

Some researchers have called for the consideration of continuous representation scores, rather than categorical classifications (i.e., in Adult Attachment Interview research, see Fraley & Roisman, 2014). However, we dichotomized coherence scores to best address the ordinal properties of the scale given the disproportionate conceptual distance between scores of 4 and 5, to deemphasize individual differences within the coherent range and within the incoherent range, and to maintain comparability with prior studies using the FMSS (e.g., Sher-Censor et al., 2013; Sher-Censor & Yates, 2015), the Insightfulness Assessment (e.g., Koren-Karie et al., 2002) from which the FMSS-coherence rating scheme was adapted, and other parental narrative measures (e.g., Working Model of the Child Interview; Benoit, Parker, & Zeanah, 1997). Of note, and as described later, post-hoc comparative analyses using the continuous FMSS-coherence scale proved less sensitive than the categorical approach employed here.

The first author, who did not take part in data collection or child adjustment ratings, coded all FMSS. A second coder scored 24% of the cases for reliability. Of the cases that were evaluated by the second coder, 13.13% of the FMSS and 8.33% of the child data were collected by this same coder. However, as mentioned above, FMSS-coherence was coded from transcripts that omitted all identifying information

(e.g., names, places) and were double-blinded using serial codes to avoid recognition of the mother or the child by the second coder. Disagreements between coders were resolved through discussion until a consensus was reached. Inter-coder reliability across dichotomized coherence scores was excellent ($Kappa = .83$).

Child externalizing behavior problems – Examiner reports. The child's examiner reported on externalizing behavior problems (e.g., defiance) based on the child's 3-hour laboratory assessment at each time point using the Test Observation Form (TOF; McConaughy & Achenbach, 2004). The TOF is a standardized form for rating behavior, affect, and test-taking style during assessments with children aged 2 to 18. Immediately after each laboratory visit, the examiner rated the child's behavior on 125 problem items, using a 4-point scale, from 0 (*no occurrence*) to 3 (*definite occurrence with severe intensity*). The TOF was validated in a diverse sample of clinically referred and non-referred children from varied ethnic groups. As in prior studies (e.g., Marcelo & Yates, 2014; Rettew, Stanger, McKee, Doyle, & Hudziak, 2006), TOF scores were based on a single rater. The standardized externalizing *t*-scores were used in these analyses.

Child ego-resilience. The same child examiner who rated the child's externalizing problems completed the California Child Q-Set (CCQ; Block & Block, 1980) following each laboratory assessment at each time point using the common language adjustments provided by Caspi and colleagues (1992). Children were rated on 100 descriptors using a 9-point scale from 1 (*extremely uncharacteristic*) to 9 (*extremely characteristic*) in a forced distribution using the computerized Riverside Accuracy Project (2010) Q-Sorter Program. Ratings of each child across the 100 items were correlated with the expert-defined ego-resilient prototype (e.g., high ratings on "resourceful in initiating activities") to yield a single concordance score with positive

values reflecting more ego-resilience and lower scores reflecting lower concordance with the prototype, or ego-brittleness (Block, 2008). Prior research has demonstrated the validity of the CCQ ego-resilience profile in diverse ethnic groups (Arend, Gove, & Sroufe, 1979; Block, 2008; Flores, Cicchetti, & Rogosch, 2005).

Child externalizing behavior problems – Teacher reports. The child's preschool and first grade teachers reported on the child's externalizing behavior problems (e.g., defiance) using the Caregiver-Teacher Report Form (C-TRF; Achenbach & Rescorla, 2000) and the Teacher Report Form (TRF; Achenbach & Rescorla, 2001), respectively. The C-TRF and the TRF are widely used measures of child behavior problems and have been validated across cultures (Rescorla et al., 2012). The C-TRF and the TRF were designed to assess the behavior problems of children aged 1.5-5 and school-aged children, respectively. In both measures, teachers were asked to rate the frequency of 99 child behaviors during the preceding 2 months from 0 (*not true*) to 2 (*very true or often true*). The externalizing standardized *t*-scores were used for these analyses.

Peer acceptance. At each time point, the same teacher who rated the child's externalizing behavior problems completed the peer acceptance scale of the MacArthur Health and Behavior Questionnaire (HBQ; Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment, 2003). The scale consisted of 10 items (e.g., "is liked by other children who seek him/her out for play") that were rated on a 4-point scale from 1 (*not at all like*) to 4 (*very much like*). The HBQ was validated in diverse samples of young children (Ablow et al., 1999; Lemery-Chalfant et al., 2007). Internal consistency in the current study was excellent (Time 1 alpha = .89; Time 2 alpha = .94).

Child IQ. Children completed the Vocabulary and Block Design subtests of the Wechsler Preschool and Primary Scale of Intelligence – III (WPPSI-III) at Time 1, which yielded an abbreviated assessment of child IQ (Wechsler, 2002). Verbal IQ was assessed using the Vocabulary subtest, including a receptive test in which children younger than 48 months point at pictures to identify orally presented words, and an expressive test in which children 48 months and older verbally explain what orally-presented words mean. Performance IQ was assessed using the Block Design subtest in which children were asked to assemble blocks to match models.

Maternal receptive vocabulary. Mothers completed the vocabulary subscale of the Shipley Hartford Institute of Living Scale (SILS; Shipley, 1940) to assess their receptive vocabulary at Time 1. Mothers were asked to circle a word with the same meaning as a target word from four options. Correct answers were summed over 40 items. The SILS is widely used as a brief assessment of intellectual ability, and has been employed in samples with ethnic minority adults (Bowers & Pantle, 1998).

Data Preparation and Analytic Plan

All variables were sufficiently normal to render parametric statistics valid (Afifi, Kotlerman, Ettner, & Cowan, 2007). Of the 187 families, 6.42% of the mothers did not complete the SILS, and Time 1 examiner ratings of ego-resilience were missing for 15.51% of the children. In addition to the 12.30% of dyads that did not complete the Time 2 assessment, examiner ratings of ego-resilience and externalizing behavior problems were missing for 1.07% and 1.60% of the children at Time 2, respectively. Finally, 18.18% and 23.53% of the participants were missing teacher reports at Time 1 and Time 2, respectively. Missing data were estimated using the expectation maximization (EM) algorithm in SPSS 20.0 as supported by Little's

(1988) MCAR test, $\chi^2(258) = 266.34, p = .347$. The significance of findings was the same with and without EM.

Preliminary analyses included correlations to examine associations of family SES, child age, child IQ, mother's age, maternal receptive vocabulary, and single parent status with the study variables. One-way analyses of variance tested mean differences in the study variables by child gender and maternal race/ethnicity. Intercorrelations among study variables were examined next, followed by linear regressions to evaluate the main and interactive effects of preschoolers' self-regulation and mothers' FMSS-coherence on changes in children's externalizing behavior problems, ego-resilience and peer acceptance from Time 1 (preschool) to Time 2 (grade 1). Predictors were measured at Time 1, and continuous predictors were centered to minimize collinearity (Kraemer & Blasey, 2004). All analyses included the relevant child adjustment variable at Time 1 to control for differences in adjustment outcomes that were better accounted for by prior adjustment. Hayes' (2013) PROCESS routine probed the simple slopes of significant interaction (i.e., environmental sensitivity) effects.

Significant indications of environmental sensitivity were further probed using Widaman's technique, wherein regression models were re-parameterized to distinguish ordinal from disordinal interactions, which reflect dual risk and differential susceptibility, respectively (Widaman et al., 2012; Belsky, Pluess, & Widaman, 2013). The re-parameterization yields the crossover point of predicted values and its interval estimates. Consistent with prior studies of environmental sensitivity that probed interactions between a dichotomous environmental predictor and a continuous individual predictor using Widaman's approach (e.g., Plak, Kegel, & Bus, 2015; van den Berg & Bus, 2014; van IJzendoorn & Bakermans-Kranenburg,

2015), we tested if the estimated crossover point and its interval estimates fell within (i.e., disordinal) or outside (i.e., ordinal) the range of maternal FMSS-coherence (0,1). Thus, these analyses followed a confirmatory and competitive model-testing approach to evaluate the relative fit of alternative models of environmental sensitivity as informed by initial regression analyses.

Results

Descriptive and Bivariate analyses

Descriptive statistics and bivariate correlations are shown in Table 1. In light of moderate correlations between examiner- and teacher-reported externalizing behavior problems within and across time (r range = .33-.54), they were combined for these analyses. However, all results were the same when analyses were run separately for examiners and teachers. The following background variables were related to child self-regulation difficulties, maternal FMSS-coherence, and/or child adjustment indices at Time 2: Family SES, child IQ, single parent status, and mothers' receptive vocabulary scores. To minimize collinearity concerns, and in light of significant relations among family SES, child IQ, and mothers' receptive vocabulary, we included one child variable, namely child IQ, and one orthogonal family variable, namely single parent status, as covariates in the regression models. Child gender was also included as a covariate in the regression analyses given that teachers rated boys as having more self-regulation difficulties ($M = 3.47$, $SD = 1.06$) than girls ($M = 2.91$, $SD = 1.02$; $F[1, 179] = 13.91$, $p < .001$). Maternal race/ethnicity was not related to the study variables and thus was not included in further analyses.

As shown in Table 1, child self-regulation difficulties were associated with more externalizing behavior problems at both time points, lower ego-resilience at

Time 1, and lower peer acceptance at both time points. Maternal FMSS-coherence was not associated with preschoolers' self-regulation difficulties, nor with child externalizing behavior problems or peer acceptance at either time point. However, maternal FMSS-coherence was positively related to child ego-resilience at both time points. Child outcomes were associated across time and informants in expected directions.

Regression analyses

Preschoolers' self-regulation difficulties predicted increased externalizing behavior problems and decreased peer acceptance, but did not predict changes in ego-resilience from preschool to first grade (see Table 2). Although there was no main effect of maternal FMSS-coherence on changes in child adjustment, there were significant interaction effects of child self-regulation difficulties and maternal FMSS-coherence across all three indices of child adjustment (see Table 2).

As shown in Table 2 and Figure 1, simple slope analyses indicated that maternal incoherence in the FMSS was related to increased child externalizing behavior problems as well as to decreased ego-resilience and peer acceptance among preschoolers with relatively poor self-regulation (i.e., children who scored 1 SD above the mean on teacher-rated self-regulation difficulties). However, there were no significant associations between maternal incoherence in the FMSS and the three child adjustment indices among preschoolers who were better self-regulated (i.e., children who scored 1 SD below the mean on teacher-rated self-regulation difficulties).

Importantly, these results replicated when regression analyses were not adjusted for child adjustment in preschool. When not controlling for Time 1 adjustment, maternal incoherence in the FMSS predicted more externalizing behavior

problems ($b = -3.01$, $SE = 1.16$, $p = .010$), lower ego-resilience ($b = .18$, $SE = .06$, $p = .003$), and lower peer acceptance ($b = .34$, $SE = .12$, $p = .004$) only among first graders with poor self-regulation (i.e., children who scored 1 SD above the mean on teacher-rated self-regulation difficulties), but not among those who were better self-regulated (i.e., children who scored 1 SD below the mean on teacher-rated self-regulation difficulties; $b = 1.71$, $SE = 1.21$, $p = .159$; $b = -.04$, $SE = .06$, $p = .487$; $b = -.18$, $SE = .13$, $p = .148$, respectively).

Likewise, the moderation effects of child self-regulation difficulties on the associations between maternal coherence in the FMSS and children's adjustment across the transition to school showed a similar pattern across analyses employing the dichotomized versus continuous FMSS-coherence scores. Yet, the effects on children's externalizing behavior problems and ego resilience were significant only when employing the dichotomized FMSS-coherence score. These findings lend further support to our categorical conceptualization of coherence, as the dichotomous FMSS-coherence scores resulted in a more sensitive analytic approach than the continuous FMSS-coherence scores.

As described earlier, we followed Widaman and colleagues' (2012) procedures for estimating the crossover points and their confidence intervals (CIs) to evaluate whether the obtained interactions between maternal FMSS-coherence and preschoolers' self-regulation difficulties on changes in child adjustment from preschool to first grade were ordinal and thus met the criteria for dual risk, or disordinal and thus met the criteria for differential susceptibility. The estimated crossover points for the three regression models predicting changes in child adjustment fell within the 0,1 range of maternal FMSS-coherence ($\hat{C}_{\text{externalizing behavior problems}} = .79$; $\hat{C}_{\text{ego-resilience}} = .39$; and $\hat{C}_{\text{peer acceptance}} = .61$), which indicates that the

interactions were disordinal (i.e., reflected a differential susceptibility pattern). However, the estimated confidence intervals (CIs) covered values to the right of the crossover points that fell outside the 0,1 range of the maternal FMSS-coherence variable ($CI_{\text{externalizing}} = .710-3.00$; $CI_{\text{ego-resilience}} = .237-1.291$; $CI_{\text{peer acceptance}} = .610-2.295$). Thus, the possibility of ordinal interactions (i.e., a dual risk pattern) in the population could not be rejected.

Discussion

This study evaluated the main and interactive contributions of preschoolers' self-regulation and mothers' representations regarding their child to children's negative and positive adjustment outcomes from preschool to first grade. In line with the literature on children's self-regulation (e.g., Eisenberg, Spinrad, & Eggum, 2010), higher anger and lower inhibitory control in preschool predicted increased externalizing behavior problems and decreased peer acceptance from preschool to first grade. Importantly, self-regulation also moderated the effects of maternal representations on changes in externalizing behavior problems, ego-resilience and peer acceptance from preschool to first grade.

These interactive effects support the environmental sensitivity framework (Pluess, 2015) in that only preschoolers with relatively poor self-regulation, but not better self-regulated preschoolers, were sensitive to the influences of mothers' representations on later adjustment. Although the effects accounted for relatively small changes in the explained variance across child outcomes, they are comparable with prior studies (e.g., Stright et al., 2008) and extend them by focusing on maternal representations regarding the child rather than on observed parenting. Moreover, these findings contribute to the literatures on child self-regulation and attachment by

highlighting the importance of assessing both self-regulation and parental representations to achieve a comprehensive understanding of continuities and discontinuities in children's adjustment across the transition to school. In the absence of this joint consideration, studies may overestimate the effects of parents' representations among well-regulated children and/or underestimate their impact among children with self-regulation difficulties.

Our study suggests that children with self-regulation difficulties show increased externalizing behavior problems, decreased ego-resilience and decreased peer acceptance when their mothers hold distorted and/or inconsistent representations, as reflected by one-sided (positive, negative, or overwhelmed with concern), emotionally disengaged, and/or contradictory narratives about the child. Parents with incoherent representations might ignore the child's signals when they are incongruent with the parent's beliefs and expectations, withdraw from the child, or respond to the child's needs in an overly solicitous manner (Bretherton & Munholland, 1999). These disruptions in parenting may be especially pernicious for children with self-regulation difficulties because they need more external support to develop constructive coping skills and behaviors (Taylor et al., 2013).

Despite convincing evidence of environmental sensitivity, our data did not provide a definitive answer to the open question of whether or not children's self-regulation difficulties moderate the impact of parents' representations on development only by increasing vulnerability to parents' distorted and/or inconsistent representations (i.e., dual risk) or also by increasing the positive impact of parents' multifaceted and undistorted representations (i.e., differential susceptibility). In accordance with dual risk models, the data indicate, as mentioned above, that mothers' distorted and/or inconsistent representations, as reflected in incoherent

FMSS, are particularly detrimental for children with self-regulation difficulties. Although our data also suggest that mothers' consistent and multifaceted representations, as reflected in coherent FMSS, are more beneficial for children with self-regulation difficulties than for children with better self-regulation, examination of the intervals around the point estimates of the crossover points indicated that this differential susceptibility pattern may not replicate in the population. Thus, additional studies are needed to further clarify the specific nature of these environmental sensitivity effects.

The longitudinal design of this investigation and our careful consideration of potential temporal and informant influences on the obtained findings are clear strengths of the current study. However, several limitations of this investigation warrant consideration to inform future research. First, given theoretical postulates (Bretherton, 1990; Main et al., 1985) and empirical evidence suggesting that the effects of parental representations on child adjustment are mediated by the quality of observed parent-child interactions, in particular parental sensitivity (e.g., Koren-Karie et al., 2012), and that observed parenting behaviors have stronger effects on the adjustment of children with a difficult temperament or negative emotionality (e.g., Pluess & Belsky, 2010), future studies should evaluate this mediation link using the interactive frame of environmental sensitivity examined here.

Second, despite our investigation of changes in child adjustment over time, our findings are limited by our unitary assessments of child self-regulation and maternal representations at the first time point. Importantly, maternal FMSS-coherence was not associated with child self-regulation difficulties, which suggests that it is not necessarily easier for a parent to narrate coherently about a child who is better self-regulated. However, this does not obviate the possibility that children's self-regulation

difficulties and attendant adjustment problems may reciprocally influence maternal representations over time. Likewise, maternal representations (and the parenting behaviors they support) may facilitate the development of children's self-regulation (Blair, Raver, Berry, & Family Life Project Investigators, 2014; Fay-Stammbach, Hawes, & Meredith, 2014; Lengua, Honorado, & Bush, 2007), which, in turn, may influence child adjustment (Eisenberg, Spinard & Eggum, 2010). In future research, fully cross-lagged models will support the examination of the likely transactional relations among child self-regulation, maternal representations, and child adjustment.

Third, the current sample size precluded a direct examination of ethnocultural influences on the obtained relations. Our research joins the handful of studies that have sampled mostly ethnic minority families when investigating the interactive effects of child self-regulation and parenting (Feng et al., 2009; Morris et al., 2002), and, to the best of our knowledge, is the first study to include a large proportion of Hispanic families. Moreover, the apparent significance of maternal coherence in this investigation supports prior suggestions that the importance of parental coherence extends across cultures (van IJzendoorn & Bakermans-Kranenburg, 2010). However, future studies with larger subsamples of ethnic minorities are needed to evaluate the consistency of individual and interactive contributions of parent representations and child self-regulation to child adjustment within and across ethnic groups.

Fourth, the current findings are of limited generalizability beyond the mother-child dyad. Prior observational studies of parenting among mothers and fathers (e.g., Martin et al., 2010), and of co-parenting (Schoppe-Sullivan, Weldon, Cook, Davis, & Buckley, 2009), suggest that mothers and fathers have distinct influences on children's adjustment to school. Thus, future research would benefit from assessing paternal representations of the child.

Despite these caveats, the present study contributes to our understanding of changes in children's adjustment across the critical transition to school and during a period of development when early adjustment pathways begin to consolidate across time and contexts (Downer & Pianta, 2006; Mesman et al., 2001; Olson et al., 2009). As such, our findings have important implications for practice with families of young children. First, our results may contribute to improved screening procedures. Specifically, preschoolers who experience self-regulation difficulties *and* whose parents hold distorted and/or inconsistent representations may be at elevated risk for poor adjustment during the transition to school.

Second, the current findings support recent calls for greater consideration of parents' representations as an important port of therapeutic entry (see Dozier and Sepulveda, 2006, for discussion). Routine clinical assessments should include measures of parents' representations because they can illuminate specific distortions that may underlie observed parenting problems, and, thusly, inform the selection and modification of optimal intervention approaches for a given parent-child dyad. Moreover, our study refines this general call given the current evidence that such assessments may be particularly important for families of children with self-regulation difficulties.

Finally, the present findings build on emerging evidence (Sher-Censor et al., 2013; Sher-Censor & Yates, 2015) that the brief FMSS-coherence assessment captures a meaningful aspect of parenting. As the FMSS probe is similar to questions asked during intake interviews, and the administration and coding procedures are relatively cost effective and time efficient, this study supports the utility of FMSS-coherence for research, as well as for screening, intervention, and prevention programs for families of young children.

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Table 1
Descriptive Statistics and Bivariate Correlations among Study Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Child age in months - T1	---													
2. Maternal age in years – T1	.02	---												
3. Family SES - T1	-.08	.24**	---											
4. Single parent status - T1 ^a	-.06	.03	.18*	---										
5. Child IQ - T1	-.13	.24**	.28***	.09	---									
6. Maternal receptive vocabulary - T1	-.19*	.12	.40***	.11	.31***	---								
7. Child self-regulation difficulties – T1	-.02	.10	-.08	-.07	-.25***	.08	---							
8. Maternal FMSS-coherence – T1 ^b	.04	.005	.08	.09	.15*	.24**	.01	---						
9. Child externalizing - T1	-.10	-.07	-.15*	-.15*	-.22**	-.01	.71***	.03	---					
10. Child externalizing - T2	.02	.02	-.26**	-.23**	-.13	-.08	.50***	-.05	.61***	---				
11. Child ego-resilience - T1	.15*	.02	.15*	.15*	.27***	.13	-.22**	.24**	-.40***	-.25***	---			
12. Child ego-resilience - T2	-.03	.06	.10	.02	.23**	.07	-.12	.15*	-.16*	-.31***	.41***	---		
13. Child peer acceptance - T1	-.05	-.12	.09	.11	.22**	-.11	-.63***	-.10	-.58**	-.49***	.25***	.16*	---	
14. Child peer acceptance - T2	-.09	.04	.21**	.30***	.08	.27***	-.39***	.08	-.41***	-.72***	.19*	.23**	-.33***	-.47***
<i>Mean</i>	49.20	30.51	31.85	---	96.08	24.97	3.19	---	55.11	56.51	.26	.24	3.30	3.31
<i>SD</i>	2.82	6.09	12.25	---	13.26	5.04	1.07	---	7.73	6.39	.32	.28	.53	.63

Note. T1 = Time 1; T2 = Time 2.

^a Single parent status is coded as follows: 0 = single ($n = 35, 18.72\%$), 1 = partnered ($n = 152, 81.28\%$).

^b Maternal FMSS-coherence is coded as follows: 0 = incoherent ($n = 128, 68.45\%$), 1 = coherent ($n = 51, 31.55\%$).

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

Table 2

Regressions of Child Adjustment at Time 2 on Child Self-Regulation Difficulties, Maternal FMSS-Coherence, and their Interactions at Time 1

Variables in regression	Externalizing behavior problems – T2			Ego-resilience – T2			Peer acceptance – T2		
	<i>b</i>	<i>SE</i>	ΔR^2	<i>b</i>	<i>SE</i>	ΔR^2	<i>b</i>	<i>SE</i>	ΔR^2
Child gender ^a	.26	.76		.02	.04		.09	.08	
Child IQ – T1	.004	.03		.003	.002		-.002	.003	
Single parent status ^b - T1	-2.60***	.94		-.03	.05		.43***	.10	
Child adjustment - T1 ^c	.41***	.07		.30***	.06		.50***	.10	
Child self-regulation difficulties – T1	1.6***	.57		-.04	.03		-.17**	.05	
Maternal FMSS-coherence ^d – T1	-.76	.79		.04	.04		.13	.08	
Child self-regulation difficulties * maternal FMSS-coherence – T1	-2.12**	.69	.03***	.09**	.04	.03**	.28***	.07	.05***
Child self-regulation difficulties (+1SD)	-3.03**	1.06		.13*	.05		.43***	.11	
Child self-regulation difficulties (-1SD)	1.51	1.11		-.08	.06		-.18	.11	
Total <i>R</i> ²		.44			.22			.37	
Final model			F (7, 179) = 20.07***			F (7, 179) = 7.05***			F (7, 179) = 14.90***

Note. T1 = Time 1; T2 = Time 2; *SD* = Standard deviation.

^a Child gender is coded as follows: 0 = male (*n* = 94, 50.27%), 1 = female (*n* = 93, 49.73%).

^b Single parent status is coded as follows: 0 = single (*n* = 35, 18.72%), 1 = partnered (*n* = 152, 81.28%).

^c Child adjustment refers to child's baseline scores in preschool (e.g., for the regression analysis predicting externalizing behavior problems in Time 2, child adjustment refers to externalizing behavior problems at Time 1).

^d Maternal FMSS-coherence is coded as follows: 0 = incoherent (*n* = 128, 68.45%), 1 = coherent (*n* = 51, 31.55%).

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

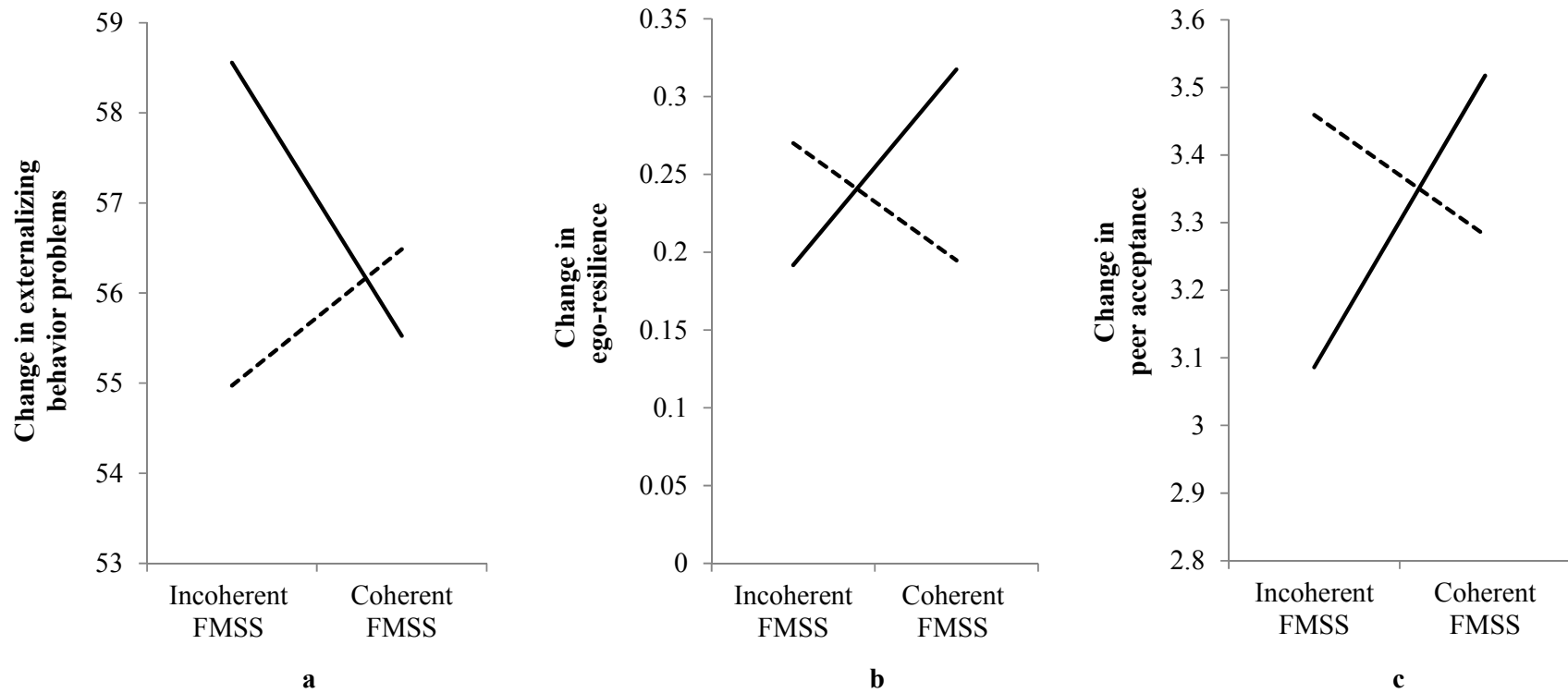


Figure 1. Relations between maternal FMSS-coherence and changes in child adjustment from preschool to first grade as moderated by child self-regulation difficulties across a) externalizing behavior problems; b) ego-resilience; and c) peer acceptance. Solid lines represent the significant simple slopes of children with self-regulation difficulties (i.e., +1 SD). Dashed lines represent the non-significant simple slopes of children with better self-regulation (i.e., -1 SD).