Bidirectional Relations Between Temperament and Parenting Predicting Preschool-age Children's Adjustment

Melanie R. Klein

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Committee:

Liliana J. Lengua, Ph.D.

Kevin King, Ph.D.

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Abstract

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Melanie R. Klein

Chair of Supervisory Committee:
Professor Liliana J. Lengua
Department of Psychology

This study examined the bidirectional associations between child temperament (fear, frustration, positive affect, effortful control) and parenting behaviors (warmth, negativity, limit setting, scaffolding, responsiveness) in predicting preschool-age children's adjustment problems and social competence. Using a community sample (n = 306) of children and their mothers assessed at three time points (children's ages 36, 54, and 63 months), observational measures of child temperament and parenting were obtained during laboratory tasks. Cross-lagged analyses were performed to examine whether temperament and parenting predict changes in one another, whether they each contribute independently to children's adjustment (total problems and social competence), and whether these transactional relations account for adjustment outcomes. There was no evidence of bidirectional relations between fear and parenting. Maternal negativity at 36 months predicted child frustration at 54 months. Maternal negativity and executive control predicted decreases in each other, whereas, scaffolding and executive control predicted increases in each other over time. Frustration, effortful control, warmth, negativity, responsiveness, and scaffolding each independently predicted child adjustment problems. Maternal negativity predicted decreases in child social competence, while child effortful control predicted increases in child social competence. The findings suggest that temperament and parenting have

independent and additive effects on child adjustment, with some support for a transactional relation between temperament and parenting.

Parenting has a unique and enduring influence on child outcomes, including their social, emotional, and behavioral adjustment (Galambos, Barker, & Almeida, 2003). However, parenting does not happen in isolation, and child characteristics, such as temperament, might shape or evoke particular parenting behaviors. In turn, parenting behaviors might shape child temperament, with this transaction between parenting and temperament contributing to child adjustment (Kiff, Lengua, & Zalewski, 2011). Therefore, examination of the relations between temperament and parenting can clarify their unique, additive, and bidirectional relations, and elucidate developmental pathways to child adjustment. Although there are numerous studies examining this reciprocal association, few have examined specific temperament dimensions and a range of distinct parenting behaviors. This study examines the bidirectional relations of temperament (fear, frustration, positive affect, effortful control) and parenting behaviors (warmth, negativity, limit setting, scaffolding, and responsiveness) in relation to preschool-age children's adjustment (total problems and social competence). We hypothesize a transactional relation, where temperament and parenting mutually influence each other over time, and together contribute to child adjustment outcomes during the preschool period.

Temperament and Child Adjustment

Temperament is defined as physiologically-based individual differences in reactivity and self-regulation and is determined by genetics, stable over time, and yet influenced by the environment (Rothbart & Bates, 1998). Reactivity refers to a combination of arousal, affect, and motivation (Putnam & Stifter, 2008), and includes the intensity and quantity of those reactive behaviors as a response to change in internal or external stimuli (De Pauw & Mervielde, 2010). Rothbart (1989) posits two independent reactivity systems in her theoretical model: negative affect (including fear and frustration) and positive surgency (Rothbart & Bates, 1998; Rothbart,

2007). Self-regulation refers to the ability to control one's reactivity in response to the environment (Rothbart, 1989), including inhibitory control and attention regulation (Rothbart & Bates, 2006). An executive based core of self-regulation, effortful control, is the ability to inhibit a dominant response in favor of a non-dominant response. Effortful control includes both executive control (the cognitive piece of effortful control) and the ability to delay gratification (the emotional piece of effortful control; Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009). Although these components often work together to regulate behavior, research has recently demonstrated that they may follow unique patterns of development and differentially predict child adjustment (Colder & O'Connor, 2004; Eisenberg et al., 2001; King, Lengua, & Monahan, 2013; Moran, Lengua, & Zalewski, 2013; Li-Grining, 2007) and therefore should be examined independently.

Temperament is thought to contribute to child adjustment by influencing development directly, in addition to shaping adjustment indirectly through interactions with peers and parent-child relationships (Rothbart, Ahadi, & Evans, 2000), and has been demonstrated to predict child adjustment problems (Eisenberg et al., 2009; Lengua, 2003) and social competence (Eisenberg, Fabes, Guthrie, & Reiser, 2000). The value of examining the effects of specific dimensions of temperament separately has been suggested as they may operate differently with parenting and adjustment outcomes (Sanson & Rothbart, 1995).

Fear, frustration, positive affect, and effortful control each show unique patterns of association with child adjustment. High fear reactivity has been shown to predict internalizing symptoms (Schwartz, Snidman, & Kagan, 1999), while low fear is a risk factor for externalizing behaviors (Kochanska, Aksan, & Joy, 2007). Children high in fear and low in attention regulation may have trouble shifting attention away from negative emotionality, resulting in

increased risk for internalizing problems. Children low in fear may not be sensitive to consequences for engaging in prohibited behavior, resulting in externalizing problems. Fear in infancy has also been related to prosocial behaviors such as empathy and guilt in childhood (Rothbart, Ahadi, & Hershey, 1994).

Frustration in children has been consistently associated with behavior problems (Eisenberg et al., 2001; Krueger, Caspi, Moffitt, White, & Stouthamer-Loeber, 1996; Rothbart et al., 1994; Zhou et al., 2008) and poor social adjustment (Lengua & Kovacs, 2005). Children higher in frustration might respond more immediately or intensely with anger, resulting in emotion dysregulation and negative interactions with others.

Positive affect has been associated with higher social competence (Denham, McKinley, Couchoud, & Holt, 1990; Eisenberg, Wentzel, & Harris, 1998; Lengua, 2003), fewer internalizing problems (Lengua, Sandler, West, Wolchik, & Curran, 1999; Lonigan, Phillips, & Hooe, 2003; Zhou, Lengua, & Wang, 2009), and fewer externalizing problems (Eisenberg et al., 1996; Lengua et al., 1999; Lengua, Wolchik, Sandler, & West, 2000; Lengua, West, & Sandler, 1998). However, positive affect has also been related to more externalizing behaviors in early childhood (Putnam & Sifter, 2005) and middle childhood (Zhou et al., 2009). Positive affect may be beneficial for children in forming social relationships, but these children may also have difficulty regulating their behavior when excited about a reward, putting them at risk for later externalizing problems (Dollar & Buss, 2014).

Finally, effortful control has been related to multiple indicators of child adjustment, such as increased emotional competence (e.g., Eisenberg et al., 2003), better academic competence (e.g., Valiente, Lemery-Calfant, & Castro, 2007), social competence (e.g., Raver, Blackburn, Bancroft, & Torp, 1999), and fewer externalizing and internalizing problems (e.g., Lengua,

2006). Children who are lower in self-regulation may have difficulty regulating their behavior, affect, and attention, putting them at increased risk for behavior and academic problems. Children with difficulty regulating their behavior will likely have trouble making friends and have greater conflict with peers (Calkins, Gill, Johnson, & Smith, 1999). Both executive control and the ability to delay gratification have independently been associated with child adjustment. Higher executive control predicted fewer internalizing and externalizing problems (Rettew & McKee, 2005), and difficulty delaying gratification was associated with more externalizing problems (Krueger et al., 1996). While fear, frustration, positive affect, and effortful control have been found to relate to child adjustment, they do not do so in isolation of other factors, such as parenting.

Parenting and Child Adjustment

Parenting behaviors tend to be conceptualized along two dimensions: the affective quality of the parent-child relationship and parental control (Mcleod, Wood, & Weisz, 2007). The affective quality of the parent-child relationship includes parental warmth and negative affect, and is measured by parental tone of voice and expressivity during parent-child interactions. Control strategies have been delineated along two dimensions: behavioral control (e.g., limit setting, discipline) and psychological control (e.g., autonomy granting, scaffolding). Increasing research has recognized an additional parenting behavior important for child adjustment, responsiveness to child emotions, which includes understanding and responding appropriately to child cues, emotions, and needs. Responsiveness is measured by the timing of the parent's response to the child and the developmental appropriateness of the response. The optimal parenting strategies change as the child develops.

Parenting is a key predictor of children's adjustment, with evidence of it playing a role in adjustment problems and social competence (Galambos et al., 2003). Parental warmth and positive affect relate to positive child adjustment, such as fewer behavioral problems, increased regulatory skills, and better social competence (Davidov & Grusec, 2006). Parental warmth and control have been found to relate to fewer internalizing and externalizing behaviors in children (Galambos et al., 2003) and increased social competence (Lengua, Honorodo, & Bush, 2007). Responsive parenting predicted positive child outcomes (Davidov & Grusec, 2006) and fewer externalizing behaviors (Lahey et al., 2008). Specifically, parental responsiveness to child negative reactivity has been shown to predict higher social competence in middle childhood (Davidov & Grusec, 2006). One of the possible mechanisms that might account for the effects of parenting on child adjustment is the influence children's temperament has on parenting, discussed next.

Bidirectional relations between Temperament and Parenting

Findings that temperament predicts parenting behaviors provide preliminary evidence for bidirectional relations between temperament and parenting. For example, fear, frustration, positive affect, and effortful control appear to independently predict different parenting behaviors. Child fear was found to predict increases in maternal warmth in toddlers (Belsky, Rha, & Park, 2000) and increases in maternal acceptance in middle childhood (Lengua & Kovacs, 2005). Child negative reactivity, a combination of fear and frustration, leads to an increase in negative parenting behaviors (Calkins, 2002) and decreases in responsiveness and sensitivity to the child (Fish, Stifter, & Belsky, 1991; Crockenberg & McClusky, 1986). Research has consistently shown that child frustration increases, and may prompt, negative parenting behaviors, although there are no known studies looking at this in the preschool period

(for review see Kiff et al., 2011). Child positive affect has also been associated with increases in positive parenting (Sanson & Rothbart, 1995) and warmth (Kochanska, Friesenborg, Lange, & Martel, 2004). Finally, effortful control has predicted changes in parenting. In infants and toddlers, effortful control was associated with less parental hostility and fewer coercive behaviors (Morrell & Murray, 2003; Bridgett et al., 2009). These relations have been studied in infancy and adolescence, but there is a gap in the literature in the preschool period (Kiff et al., 2011).

Although evidence suggests that child temperament might shape or evoke different parenting behaviors, research also shows that parenting predicts temperament. Lower maternal responsiveness and higher maternal negative affect have been linked to infant negative reactivity (Spinrad & Stifter, 2002; Malatesta & Haviland, 1982). In addition, negative parenting behaviors predicted increases in child negative reactivity in toddlers (Scaramella, Sohr-Preson, Mirabile, Robison, & Callahan., 2008). Parental responsiveness was higher for parents of toddlers who decreased in reactivity over time compared to parents of highly reactive toddlers who remained highly reactive (Belsky, Fish, & Isabella, 1991). In middle childhood, maternal responsiveness to child negative reactivity predicted decreases in negative reactivity (Davidov & Grusec, 2006). Maternal warmth and responsiveness predicted increases in effortful control (e.g., Bernier, Carlson, & Whipple, 2010). Parental control strategies, such as consistent limit setting and scaffolding, were associated with increases in effortful control (e.g., Hammond, Muller, Carpendale, & Bibok, 2011; Lengua et al., 2007; Lengua et al., 2013). In addition, parental punitive discipline and coercion was associated with lower effortful control (Kochanska, Askan, Prisco, & Adams, 2008). Although the research on the effects of temperament on parenting and

vice versa are suggestive of bidirectional relations, tests of transactional models are required to draw more solid conclusions.

Studies reviewed above examine directional effects of temperament and parenting: temperament predicting parenting or parenting predicting temperament. However, parenting and temperament are commonly thought to have a bidirectional relation, with parenting and temperament influencing each other over time. To examine these bidirectional relations, longitudinal data must be used to control for prior levels of the variables and tease apart directional relations. Although there is evidence of this bidirectional relation between temperament and parenting in infancy and later childhood, there is much less evidence during early childhood or the preschool period.

In infants, irritability (similar to frustration) predicted decreases in maternal responsiveness, and maternal responsiveness predicted decreases in infant irritability (Van den Boom & Hoeksma, 1994). Similarly, a mother's ability to sooth her infant determined her later frustration and sensitivity (Calkins et al., 1999). Low parental responsiveness may decrease infant soothability and increase infant negative reactivity, which may lead to decreases in maternal sensitivity (Ghera, Hane, Malesa, & Fox, 2006). Similar patterns are seen in middle childhood. Child irritability predicted greater maternal inconsistent discipline, and inconsistent discipline predicted greater irritability and fear (Lengua & Kovacs, 2005). Lengua & Kovacs (2005) also found fear and positive affect predicted increases in maternal acceptance. Child negative reactivity in middle childhood predicted parental self-reported punitive and distress reactions, which was associated with later child negative emotions (Eisenberg et al., 1999). Using self-reported measures, child irritability predicted increases in maternal inconsistent discipline, while higher maternal rejection was associated with increases in child irritability

(Lengua, 2006). The same study also found that effortful control predicted decreases in maternal rejection, and child fear predicted decreases in maternal rejection and inconsistency. Taken together, these findings suggest that temperament and parenting mutually change each other over time.

Few longitudinal studies examine the bidirectional relations between temperament and parenting in early childhood. In toddlers, harsh parenting increased child negative reactivity, but child negative reactivity failed to predict changes in harsh parenting (Scaramella et al., 2008). This suggests that in toddlerhood, parenting may have a greater impact on temperament than temperament has on parenting. Another study examining bidirectional relations in toddlers found parental perception of child shyness predicted less parental encouragement of independence 2 years later, but parent encouragement of independence did not predict child shyness (Rubin, Nelson, Hastings, & Asendorpf, 1999). The mutual influences between children and their parents may decrease as the child ages, as both temperament and parenting may become more stable over time (Scaramella & Leve, 2004).

It is important to note that parenting is more often studied as a predictor of temperament, with fewer studies examining temperament predicting parenting. In addition, few studies have examined child positive affect in relation to parenting, indicating the need to study the full range of temperamental characteristics. These studies often examine few temperament or parenting variables, which may result in missing important indicators of the bidirectional relation and child adjustment.

Present study

Although there is evidence of a bidirectional relation between temperament and parenting, there are no known studies examining the wide array of temperament characteristics

and parenting behaviors in the preschool period. There are four main gaps in the literature: limited literature using rigorous analyses, few parenting and temperament dimensions examined, lack of studies with preschool children, and few observational measures used. First, most studies have not used rigorous bidirectional analyses to examine the mutual effects of temperament and parenting. Relatively few previous studies have looked at this bidirectional relation longitudinally, while considering the stability of these characteristics and behaviors over time. Second, few studies examine multiple temperament characteristics while concurrently and independently examining multiple parenting behaviors (e.g., Lengua & Kovacs, 2005; Lengua, 2006). The relation between temperament and parenting behaviors are complex, and examining only a few variables may not provide an accurate perspective of the associations. Third, many previous studies have examined temperament and parenting in middle childhood or preadolescence, although many of these patterns of behavior between parent and child may already be established by that age. This study examined these associations during the relatively understudied preschool period, when a child's emotional reactivity and self-regulation may be more amenable to parental influence, and emerging temperament may begin to evoke a broader range of parenting behaviors.

Finally, unlike previous studies which relied on parent questionnaires, the present study will rely solely on observational measures for the temperament and parenting variables. While parent questionnaire measures can provide us with useful information about children's behaviors across situations or time, they also may reflect parental biases. Observed measures may be more informative when examining how child actions and parent behaviors influence each other. Parents are responding to their child's external behaviors, and therefore observing child behaviors will help decipher the link between temperament and parenting. Examining the

observed bidirectional relations between temperament and parenting on child adjustment may clarify specific pathways to child maladjustment.

We have two hypotheses based on previous evidence. First, we hypothesized a transactional relation where parenting and temperament mutually influence each other over time. We hypothesized three predictive relations between specific temperament characteristics and parenting behaviors: (1) child frustration and maternal negativity, (2) child fear and maternal warmth, and (3) child effortful control and maternal scaffolding. There is relatively less evidence examining the bidirectional relations between child positive affect and parenting, so specific hypotheses were not formulated for positive affect. Second, we hypothesized the transactional relation between temperament and parenting would explain child adjustment with the effects of parenting and temperament being accounted or mediated by each other. In addition, temperament and parenting were expected to each independently contribute to child adjustment, indicating additive effects.

Method

Participants

Participants for this study were 306 mother-child dyads recruited from a hospital birth register, public and privately funded organizations such as daycares, libraries, and agencies serving low-income families around King County, Washington. Families were recruited when children were 36-40 months old. Families participated in four assessments, each 9 months apart. The study oversampled low-income families, with 29% of the participants at or near poverty, 27% with an income below the local median income, 25% above the median income up to $100K, and 18% upper income (above $100K). Exclusions were made to children with disabilities and families with language barriers that prevented comprehension of the tasks.

Children who participated included 50% girls, 9% African Americans, 3% Asian Americans, 2% Native Americans, 10% Latino or Hispanic, 64% European Americans, and 12% children with other or multiple ethnic or racial backgrounds.

Families missing data at any of the three time points were compared to families missing no data to assess the extent of bias due to missing data. All participants had complete data available for family income and child gender. Complete data were available for 94% of families on parenting for the 36-month visit and 89% for the 54-month visit. For reactivity measures, 94% were collected at the 36-month visit and 92% at the 54-month visit. For effortful control, there was complete data on 88% of children at 36-months and 93% at 54-months. At 36-months, only 45% of adjustment problems and 41% of social competence measures were collected, as many children were not yet in school. At 63-months, 77% of adjustment problems were collected, and 76% of social competence. Participants with missing data for any of the study variables (n = 226) were compared to participants with no missing data (n = 80). Participants with missing data had lower parental warmth at the 36-month old visit compared to participants without missing data (*M* missing =0.35, no missing = 0.38, $t(288) = 2.38$, $p = .02$). There was no difference between the participants with missing data and no missing data for the temperament or adjustment variables.

Procedures

The families participated in four 2-hour assessment sessions. Children were brought to the study research offices once every 9 months beginning when they were 36-40 months (*M* = 37, *SD* = 0.84 months, Range = 35.52 – 40.34). This study utilizes the data from the first, third and fourth assessments, when children were 36-40 months (*M* = 36.67, *SD* = 0.84 months, Range = 35.52 – 40.34), 54 months (*M* = 55.08 months, *SD* = 1.13, Range = 51.71 – 59.56) and 63

months (*M* = 63.92, *SD* = 1.49 months, Range = 54.70 – 76.19), henceforth referred to T1, T2 and T3. Families completed neuropsychological, behavioral, and questionnaire measures administered by experimenters at each visit. Families received $70 compensation at T1, $110 at T2, and $130 at T3. Parental consent and child assent were obtained prior to data collection.

Measures

Temperament. Observed measures of children's fear, frustration, positive affect and effortful control were obtained. During the laboratory visit, tasks designed to elicit fear and frustration from children were administered by experimenters. Two tasks were adapted from the Laboratory Temperament Assessment Battery: Preschool Version (Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995) and were administered at T1 and T2 to assess reactivity. These tasks were administered at both time points without the child's mother present. Undergraduate research assistants unfamiliar with the hypothesis of the study coded the children's behavioral responses to the tasks.

Fear reactivity was determined by coding children's behavioral and emotional response to a toy spider. A research assistant prompted the child to approach and pet a toy spider that was triggered to jump when touched. Latency to touch the spider was recorded, ranging from 0 to 5 seconds, as well as physical reactivity (e.g., jumping, shaking), facial movements (e.g., tensing face), and vocalizations (e.g., fearful noises, refusals). Behaviors were coded based on intensity of behavior, ranging from 0 (no observed response) to 2 (obvious, strong response). There were three prompts for the child to touch the spider, and the child was assigned an overall fear reactivity score for each prompt based on the total number of behaviors. The ratings of fear reactivity across each prompt were averaged into a total score. Based on double coding 20% of the cases, the inter-rater intraclass correlation coefficient (ICC) was 0.97 at T1, and 0.98 at T2.

Child frustration was assessed by The Transparent Box Task, which included locking a desired toy in a clear box that cannot be opened. Children were asked to take the prize out of the translucent box, but were given the wrong keys to open the box. Without interaction from the experimenter, the children worked on opening the box for 2 minutes. Body motions (e.g., frustrated hand movements), facial expressions (e.g., furrowed brow), vocalizations (e.g., sighs), and annoyance with the experimenter (e.g., glancing at the experimenter) were coded in 4 30-second epochs. Coded behaviors ranged from 0 (no observed response) to 2 (obvious, strong response). An overall frustration reactivity score was assigned based on the total number of behaviors in each epoch. Total scores were the average of overall frustration behaviors across each epoch. Based on double coding 20% of the cases, the inter-rater ICC at T1 was 0.79, and at T2 was 0.72.

Child positive affect was assessed during the introduction/instructions to the Monkey Dragon task (described below) and at the end of the Transparent Box Task, after the child obtained the toy locked inside. Positive affect was coded for 1 minute in each task, and these 2 task scores were averaged for an overall positive affect score across tasks. Positive affect was coded based on tone of voice (e.g., excitement, enthusiasm), facial expressions (e.g., smiling, laughing), and body language (e.g., hugging, closeness). Positive affect was scored on a 0 to 3 scale, with 0 indicating no positive affect and 3 indicating intense or frequent positive affect. Inter-rater ICC at T1 was .79 and at T2 was.74.

Effortful control included two dimensions, executive control and delay ability, assessed using behavioral and neuropsychological measures of attention regulation, inhibitory control, and delay of gratification. These tasks were chosen to be of varying difficulty for the children so identical measures could be administered at each age. A developmental neuropsychological

battery from the NEPSY-II (A Developmental Neuropsychological Assessment Version 2; Korkman, Kirk, & Kemp, 2007) was used, in addition to tasks created by Murray & Kochanska (2002).

Six tasks were used to assess executive control. Two subscales of the NEPSY-II, *Inhibition* and *Auditory Attention*, were used. Although these scales were designed for children 5 and older, they were administered to the children in this study younger than five as the aim of the study was to assess the development of executive control over time. For the *Inhibition* subscale, children were shown squares and circles and asked to label each shape the opposite while being timed. This task was designed to assess the ability to inhibit a dominant response in favor of a non-dominant response. In the *Auditory Attention* subtest, children listened to a series of words and were asked only to respond when they heard a specific word, while abstaining from responding to all other words. This task was designed to assess the ability to maintain selective auditory attention. Total scores for both subscales were the proportion of correct responses. At T1, the average score for *Auditory Attention* was 0.09 (*SD* = 0.24) and the average for *Inhibition* was 0.14 (*SD* = 0.28).

The *Monkey-Dragon* task (Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996) was used to assess behavioral inhibitory control. This task required children to perform actions when commanded by a monkey puppet, but not a dragon puppet. Scores ranged from 0-3 with children's actions rated as performing no movement, a wrong movement, a partial movement, or a complete movement. Again, total scores were the proportion of correct responses in Monkey-Dragon. At T1, the average score was 0.62 (*SD* = 0.20).

The *Day-Night* task (Gerstadt, Hong, & Diamond, 1994) was used to assess cognitive inhibitory control. This task required the child to say "night" when shown a picture of the sun,

and say "day" when shown a picture of the moon and stars. Actions were scored 0 for providing the dominant response and 1 for providing the correct non-dominant response. Total scores were the proportion of correct responses. At T1, the average score was 0.44 (*SD* = 0.33).

The *Head, Toes, Knees, Shoulders* (HTKS) task is designed to assess both attention control and inhibitory control (Ponitz et al., 2008). Children were asked to enact the opposite of what the experimenter requests (e.g., touch knees when asked to touch shoulders). Children's behaviors were coded as a 0 if the child touched the directed body part, 1 point if the child self-corrected the behavior, and 2 points if the child only touched the opposite (correct) body part. Total scores were the proportion of correct items. The average score for T1 was 0.03 (SD = 0.09).

Finally, *The Dimensional Change Card Sort* (Zelazo, Muller, Frye, & Marcovitch, 2003) was administered to assess inhibitory control, attention focusing, and set shifting. Children were presented with two boxes with target cards attached to the front of each box. The target cards were a star on a blue background and a truck on a red background. First, children were instructed to sort cards according to the shape, then according to color (6 trials each). If the children sorted >50% of the cards correctly, they advanced to the next level. In the advanced level, the target cards were a blue star and red truck with white backgrounds. Again, children sorted the cards according to shape, and then color (6 trials each). The final level required the children to sort the card by color if the card had a border on it, and by shape if there was no border (12 trials total). Total scores were the proportion of correct trials. The average score for T1 was 0.42 (*SD* = 0.20). Coders independently re-scored 20% of all executive control tasks to assess inter-rater reliability, which ranged from 0.72-0.98. Executive control scores were considered missing if less than 50%

of the scores were missing (3.6% at T1). Internal consistency of the executive control measure was 0.67, and the inter-rater reliability was 0.83.

Children's ability to delay gratification was assessed with the gift-delay task (Kochanska et al., 1996). In the gift-delay task, the child was told that he/she would receive a present, but the experimenter wanted to wrap it first. The child was asked to sit facing the opposite direction while the experimenter loudly wrapped the present. Peeking behaviors (frequency of peeking, degree of peeking, latency to peek, latency to turn around) and difficulty with the delay (fidgeting, tensing, getting out of seat, grimacing, and talking) were rated for each child. Behavior scores were converted to proportions of total possible scores and averaged. Higher delay scores indicated a greater ability to delay gratification. At T1, the average total scores was 0.62 (*SD* = 0.25). Internal consistency of the composite delay ability measure was 0.77 ($\alpha = .91$).

Parenting. Parenting was observed during a 25-minute parent-child interaction. This interaction was administered in four segments. The first segment (7 minutes) was a restricted play task, in which the parents were instructed not to allow the children to play with restricted toys. This activity permitted the observation of parental control and consistency of directive enforcement. The second segment (7 minutes) was unrestricted play, in which children were permitted to play with previously restricted toys, which allowed for observation of maternal responsiveness, involvement, and positive affect. The third segment (7 minutes) was a Lego figure task, where parents were asked to help children build a difficult structure. This activity encouraged the display of maternal scaffolding, including guidance and intrusiveness. The fourth segment was a cleanup task (3 minutes), which was designed to observe control strategies and consistency of maternal behavior. The parent-child interaction was administered at each time point.

Parenting behaviors were coded based on the coding system adapted from The System for Coding Interactions and Family Functioning (Lindahl & Malik, 2000), The Parenting Style Ratings Manual (Cowan, 1992), and the Parental Warmth and Control Scale (Rubin & Cheah, 2000). The parent-child interaction was coded globally based on frequency of behaviors and affect. The parenting behaviors coded were warmth (positive affect and interactiveness), negativity (negative tone and expressions), limit setting (clarity and consistency of directives), scaffolding (negative control, autonomy, guidance), and responsiveness (sensitivity to cues of child). Mothers' behaviors were coded based on quality and quantity of behaviors during the tasks, as well as positive and negative emotions. The measures were rated on a 5-point Likert scale with 1 indicating the lowest and 5 the highest level of behavior. These behaviors were coded minute-by-minute, and then averaged across epochs and tasks. Undergraduate research assistants coded these behaviors from videotapes and were unfamiliar with participants and hypotheses of this study. Inter-rater reliability was assessed using 20% of the interactions. The intra-class ICC warmth was 0.80 at T1 and 0.85 at T2, negativity was 0.75 at T1 and 0.80 at T2, limit setting was 0.73 at T1 and 0.83 at T2, scaffolding was 0.81 at T1 and 0.85 at T2, and responsiveness was 0.67 at T1 and 0.86 at T2.

Child adjustment. Teachers rated children's social competence and problem behaviors using the preschool teacher version of the Social Skills Rating System (SSRS; Gresham & Elliot, 1990). Social competence included ratings of children's self-control, assertiveness, and cooperation (30 items). Total problems included ratings of children's hyperactivity (six items), internalizing problems (six items), and externalizing problems (seven items). The SRSS was standardized on a large national sample and validity was established based on the Child Behavior Checklist- Teacher report form (Achenback & Edelbrock, 1986). This scale shows good internal

reliability (r = .90), test-retest reliability (r = .84-.85), and validity (r = .32-.56; Rich, Shepherd, & Nangle, 2008). This measure was administered at each time point, but for the purposes of this study we will use the measures from T1 and T3.

Results

Cross-lagged panel path models were used to examine the bidirectional associations between temperament and parenting over time and their prediction of children's adjustment. First, correlations among the variables were examined. Second, child gender and family income were examined as potential covariates. Finally, path models were used to examine the associations among temperament, parenting, and child adjustment.

Descriptive statistics for all variables at each time point are summarized in Table 1. Bivariate correlations among the variables are reported in Table 2. Temperament variables were uncorrelated to moderately correlated with each other and demonstrated moderate stability across time points. Parenting variables were moderately intercorrelated and stable over time. Among variables at T1, fear was positively associated with limit setting. Positive affect was positively associated with scaffolding. Executive control and delay ability were positively correlated with warmth, limit setting, scaffolding, and responsiveness, and negatively associated with negativity. These correlations provide preliminary evidence of the plausibility of bidirectional associations between temperament and parenting.

Child gender and family income were examined as potential covariates. At T1, boys displayed less positive affect, had poorer delay ability, and had mothers who showed less responsiveness. At T2, boys displayed more frustration and poorer delay ability. In addition, at T3 boys displayed more adjustment problems and poorer social competence. Therefore, child gender was controlled for in subsequent analyses. At T1, family income was negatively

associated with adjustment problems and positively associated with social competence. In addition, family income was positively associated with positive affect, executive control, and delay ability. Among the parenting variables, family income was positively associated with warmth, limit setting, and scaffolding, and negatively associated with negativity. At T2, family income was negatively associated with frustration and positive affect, and positively associated with executive control and delay ability. For the parenting variables at T2, family income was positively associated with warmth, scaffolding, and responsiveness, and negatively associated with negativity. In addition, T1 family income correlated negatively with adjustment problems and positively with social competence. Given associations of family income with study variables, family income was controlled for in subsequent analyses.

The longitudinal study design allows the use of cross-lagged panel path analyses, which take into account the stability of the variables in their prediction of each other, providing more robust evidence of the direction of effects. Figure 1 illustrates the conceptual cross-lagged path model used to test the bidirectional effects of temperament and parenting variables, although analyses were conducted with all the temperament variables included simultaneously. Family income, child gender, and T1 adjustment problems and social competence were covaried in each model. Separate models were tested for each of the five parenting variables with all five of the temperament variables included simultaneously, resulting in tests of five models. Each model included stability paths from one time point to the next (e.g., T1 temperament to T2 temperament) and cross-lagged paths of the parenting variable with each of the temperament variables (e.g., T1 temperament to T2 parenting and T1 parenting to T2 temperament). Temperament and parenting variables at T1 were regressed on child gender and income. Temperament and parenting at T2 were regressed on T1 parenting and the corresponding

temperament variable. Child adjustment problems and social competence at T3 were regressed on T2 parenting and the five T2 temperament variables, controlling for adjustment problems and social competence at T1, and child gender and family income.

Mplus 6.11 was used to test cross-lagged path models (Muthen & Muthen, 2010). Mplus adjusted for missing data using full information maximum likelihood. Results of the model fit indices are shown in Table 3. The models demonstrated acceptable fit (Table 3; CFI < 0.90; RMSEA > 0.05).

Results from the cross-lagged path models are presented in Table 4 and Table 5. Autoregressive effects of temperament and parenting variables were significant with the exception of parental responsiveness, indicating both temperament and most parenting variables were moderately stable over time.

There was evidence of a bidirectional relation between negativity and executive control, with negativity predicting decreases in executive control and executive control predicting decreases in negativity. Scaffolding at T1 predicted increases in executive control at T2, while executive control approached significance in predicting increases in maternal scaffolding. Warmth also approached significance in predicting executive control, and executive control approached significance in predicting warmth.

The remaining associations between temperament and parenting appeared to be unidirectional. At T1, negativity was associated significantly with increases in child frustration and positive affect. Scaffolding and warmth at T1 predicted decreases in positive affect. Limit setting predicted increases in executive control. Delay ability predicted increases in scaffolding and responsiveness. Responsiveness approached significance in predicting increases in later executive control.

The temperament and parenting variables were found to independently predict child adjustment. Above the effects of parenting, frustration at T2 approached significance in predicting increases in adjustment problems at T3. Delay ability was associated with decreases in adjustment problems. Both executive control and delay ability were associated with increases in social competence at T3. Maternal warmth, scaffolding, and responsiveness each independently predicted decreases in adjustment problems above the effects of temperament. Maternal negativity at T2 predicted increases in adjustment problems and decreases in social competence.

Discussion

The purpose of this study was to explore the bidirectional relations between temperament and parenting and their unique effects on child adjustment. Few prior studies addressing this question have examined multiple dimensions of temperament as well as multiple specific parenting behaviors in the preschool period using a longitudinal design. This study provides evidence that some aspects of temperament and parenting mutually shape each other and influence child adjustment over three years, and that temperament and parenting independently and additively contribute to child adjustment.

Consistent with previous literature, there was some evidence of bidirectional or transactional relations between temperament and parenting. Maternal scaffolding and child executive control were mutually predictive. Maternal scaffolding predicted increases in child executive control, suggesting that parental structure and guidance of child play, while providing the child autonomy when appropriate, may promote growth in effortful control. At the same time, child executive control predicted increases in maternal scaffolding, possibly suggesting that children with greater self-regulatory capacity may present more opportunities for parents to allow greater autonomy and more effectively structure and guide their children's play. In

addition, executive control and maternal negativity were negatively associated with each other over time. Poor maternal regulation of negative emotions may negatively influence child self-regulation. Mothers may not have the skills to regulate their own behavior, and therefore, are unable to teach their children these vital skills. In addition, children with more difficulty regulating their own behavior may be more frustrating for mothers, and may elicit more maternal negative behaviors. These findings of bidirectional predictive relations point to the importance of the interplay between temperament and parenting, and identify mechanisms through which changes in each may occur.

Beyond these bidirectional associations, there was also evidence that implies that parenting might shape the expression of temperament. For example, maternal negativity, which assessed negative, harsh or critical maternal behaviors, predicted increases in children's frustration. Previous studies have shown that in middle childhood and preadolescence there is a bidirectional relation between child frustration and maternal negativity (Lengua, 2006; Lengua & Kovacs, 2005). However, child effects on parental negativity were not yet observed in this sample of preschool-age children, implying that perhaps child effects on parental negativity emerge later, as might be suggested by a negative coercive cycle (Keenan & Shaw, 1995; Patterson, 1982). This finding also implies that the preschool period may provide an optimal opportunity for intervention reducing the adverse effects of parental negativity. In addition, both child frustration and maternal negativity independently predicted child adjustment problems, suggesting that maternal negativity may shape child adjustment directly and indirectly through child frustration. Disrupting this cycle in the preschool period before it escalates may prevent the entrenchment of the negative coercive cycle later.

Another association demonstrating parenting effects on temperament was the finding that maternal limit setting predicted increases in executive control, consistent with prior evidence (Lengua et al., 2013; Lengua et al., 2007). However, executive control did not predict changes in limit setting. Clear and consistent enforcement of rules may allow children to internalize the expectations of their behavior and later use the internalized expectations to help regulate their behaviors. Mothers may show more explicit limit setting with children lower in self-regulation who need more assistance internalizing rules. In other words, children higher in self-regulation may not need as much guidance from their mothers and may have already internalized these rules, so mothers would not be as obligated to set limits.

In addition to the mutual or directional effects of temperament and parenting, they both also contributed independently to children's adjustment, as has been found in previous studies (Bates, Pettit, Dodge, & Ridge, 1998; Lengua et al., 2000; Lengua & Kovacs, 2005). This suggests temperament and parenting have unique and additive effects on child adjustment. Specifically, frustration, delay ability, warmth, negativity, scaffolding, and responsiveness each independently predicted adjustment problems. The influence of these individual variables on child adjustment points to the importance of intervening with both the child and parent to shape child adjustment. Furthermore, this underlines the significance of taking both temperament and parenting into account when identifying children at-risk for adjustment problems. Interestingly, only child effortful control and maternal negativity predicted social competence, suggesting additional factors may need to be identified to fully understand the development of social competence.

There was also evidence of temperament predicting parenting in a unidirectional path. Delay ability predicted increases in maternal scaffolding. This is noteworthy, as scaffolding was

found to have bidirectional relations with executive control, but not delay ability. Consistent with findings from previous studies showing executive control and delay ability operate differently, we found they may function uniquely in relation to parenting. The ability to wait quietly may increase a mother's willingness or ability to support her child and give him or her more independence. Delay ability may be less susceptible to change by parental behaviors than other temperamental characteristics, such as executive control. Alternatively, delay ability may be more flexible at earlier ages. More research will be needed to further assess the relation of ability to delay with parenting.

There were also some unexpected findings of this study. Contrary to expectations based on prior research, this study did not find significant associations between fearfulness and parenting, or between fearfulness and child adjustment. Previous research demonstrated child fearfulness is related to increases in maternal warmth and decreases in negative parenting behaviors (Lengua, 2006; Lengua & Kovacs, 2005; Rubin et al., 1999). Child fear has also been associated with internalizing and externalizing behaviors, regardless of parenting behaviors (Nigg, 2006). The lack of significant associations may be due to the measurements used in this study. The laboratory task used to measure fearfulness in this study may not be an accurate representation of fear in other settings. Our predictions were based on previous work, which relied on mother reports of child fearfulness, measuring how mothers expect their children to respond in fear-eliciting situations such as novel contexts or exposure to unfamiliar people, which may be very different than a response to a spider or other fear-eliciting stimulus. Mothers may be responding to how they expect their children to respond in a broader array of situations. Furthermore, we would expect fear to predict later internalizing behaviors (Colder, Mott, & Berman, 2002), and it is more difficult to detect internalizing problems at this age. In addition,

previous research has suggested fear in preschoolers is more likely to be predictive of later internalizing symptoms when expressed in a predictable, low threat situation, in contrast to the unpredictable and high threat situation used in this study (Buss, 2011).

Also contrary to our hypotheses, maternal negativity predicted increases in child positive affect, while scaffolding and warmth predicted decreases in positive affect. Previous research has found that child positive affect was associated with positive parenting behaviors (Belsky, Fish, & Isabella, 1991; Kochanska, et al., 2004; Lengua & Kovacs, 2005). These unexpected results may stem from how positive affect was measured in this study. Previous research has measured positive affect using questionnaire measures or specific tasks designed to elicit positive affect. This study did not use a specific task to measure positive affect and instead measured positive affect during neutral situations, as this study was not designed to measure positive affect. The observations of positive affect during the laboratory tasks in the present study may instead be capturing emotion dysregulation in an environment where attention and regulation are required. In addition, the temperament literature has made a distinction between low intensity pleasure (gaining pleasure from low stimulus intensity) and high intensity pleasure (gaining pleasure from situations involving high stimulus intensity or novelty; Rothbart et al., 1994). In this study we may have captured high intensity pleasure or surgency (high activity levels, impulsivity), which has been associated with behavior problems (Berdan, Keane, & Calkins, 2008; Rothbart, Ahadi, Hershey, & Fisher, 2001). Additional research is required to fully understand these results.

By examining multiple specific measures of temperament and parenting, we were able to uncover individual and unique contributions of parenting and temperament to child adjustment. Although it is well understood that negative exchanges between parents and children have implications for children's adjustment (Pike, Reiss, & Hetherington, 1996), by analyzing the

specific behaviors separately we were able to uncover specific relational transactions that occur between parents and children, contributing to the other's behavior and to child adjustment outcomes. The unique findings with the five temperament dimensions points to the importance of keeping the dimensions separate in analyses, as they seem to operate differently with regard to parenting behaviors and adjustment. For example, the two aspects of effortful control were differentially related to parenting. Delay ability was found to predict later parenting behaviors, while bidirectional effects were found only with executive control. The different role these two aspects of the same construct play in development may be important in understanding later adjustment. Similarly, by analyzing the five parenting behaviors separately we found each parenting behavior independently predicted child adjustment, but the dimensions of parenting behaviors related differently to temperament. A behavior in the affective quality of the parent-child relationship dimension, negativity, was associated with child emotional reactivity. On the control dimension, scaffolding and limit setting were associated with effortful control. Understanding how these two parenting dimensions relate differently to temperament may allow us to individualize parenting interventions based on the child's temperament.

These findings also show that during the preschool period, children who are better regulated receive more effective parenting. This effective parenting sets the children up for better adjustment outcomes. Parenting does not seem to relate to reactivity, the other piece of temperament, the same way as regulation. These findings suggest it may be importance to target young children's regulatory abilities as a way of influencing parenting behaviors, in addition to child adjustment. Further understanding of these processes may improve interventions and clarify the importance of individual differences in intervening with families.

Strengths, Limitations, and Future Research

Strengths of this study include a large sample size and a longitudinal design with high retention. Another strength of this study was the combined use of questionnaires, independent observations, and neuropsychological measures. There are some limitations to this study as well. First, the children were only observed in an unfamiliar laboratory setting, which may not be an accurate representation of the child's behavior in the real world. Although observational measures were a strength of the study, parents have the advantage of reporting on behaviors they observe in multiple settings. Second, although this study design does provide some evidence of directionality of the effects, it cannot imply causality. Intervention studies will be vital in uncovering whether intervening with parenting will influence child temperament and effect child adjustment. Third, the child adjustment measure for this study was only 9 months after the second laboratory visit. Understanding the long-term implications of how this preschool transaction shapes child adjustment in middle childhood and adolescence will be essential for future research.

This study demonstrates a complex association between temperament and parenting that shapes child adjustment throughout the preschool period. This study also points to the importance of including multiple temperament characteristics and parenting behaviors in order to better understand the transactional relation and more accurately predict child adjustment. The behaviors that both children and parents evoke from each other may change throughout development, so additional research is necessary. These behaviors may also have unique effects on adjustment, depending on the child's temperament and his or her environment.

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Figure 1. Cross-lagged panels for the bidirectional relation between temperament and parenting predicting child problem behaviors and social competence

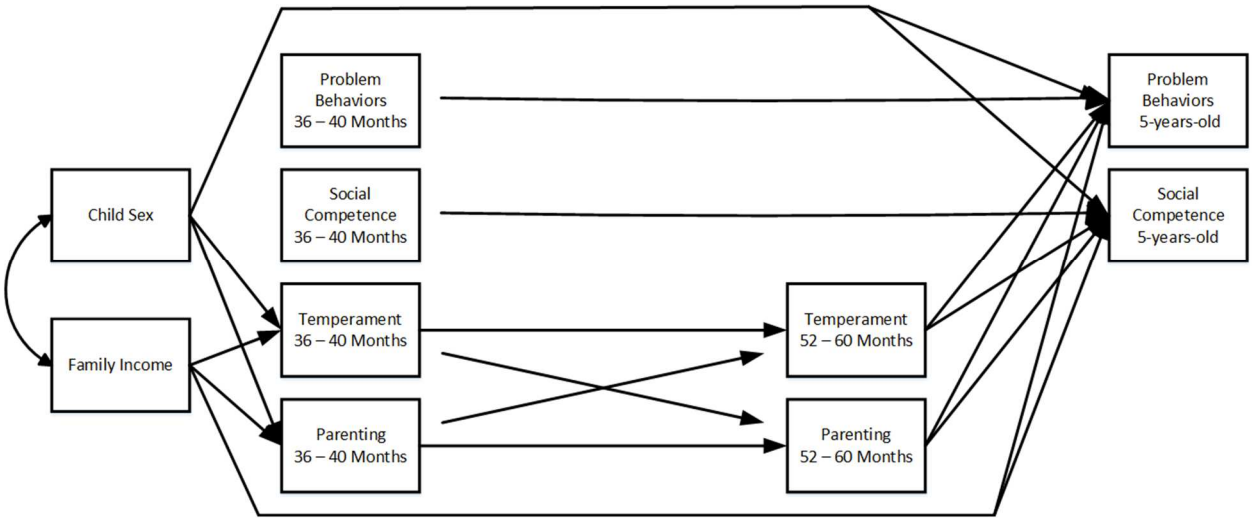

Table 1 *Descriptive Statistics*

Variable	*M*	*SD*	Range	Skew
		T1		
1. Child gender	0.50	0.50	0.00-1.00	0.01
2. Family income	8.75	3.93	0.50-14.00	-0.78
3. Adjustment problems	11.56	6.29	0.00-30.00	0.53
4. Social competence	37.38	8.73	12.69-56.40	-0.39
5. Fear	0.36	0.29	0.00-0.93	0.27
6. Frustration	0.27	0.16	0.00-0.83	0.58
7. Positive Affect	1.01	0.81	0.00-3.00	0.56
8. Executive Control	0.29	0.15	0.00-0.77	0.66
9. Delay ability	0.62	0.25	0.09 – 1.00	-0.01
10. Warmth	3.75	0.44	2.22-4.83	-0.34
11. Negativity	0.36	0.38	0.00-2.42	2.04
12. Limit Setting	4.42	0.60	2.17-5.00	-1.23
13. Scaffolding	3.47	0.55	1.54-4.38	-0.75
14. Responsiveness	4.40	0.74	0.75-5.00	2.17
		T2		
15. Fear	0.36	0.28	0.00-1.00	0.46
16. Frustration	0.22	0.13	0.00-0.78	0.79
17. Positive Affect	1.24	0.79	0.00-3.00	0.31
18. Executive Control	0.68	0.17	0.18-0.95	-0.66
19. Delay ability	0.78	0.19	0.17-1.00	-0.75
20. Warmth	3.87	0.36	2.57-4.76	-0.27
21. Negativity	0.50	0.43	0.00-2.48	1.73
22. Limit Setting	4.50	0.48	2.00-5.00	-1.44
23. Scaffolding	3.33	0.41	1.70-4.69	-.66
24. Responsiveness	4.22	0.55	2.00-5.00	-1.03
		T3		
25. Adjustment problems	9.05	7.06	0.00-30.00	0.90

26. Social competence	43.07	10.15	5.00-60.00	-0.89

Table 2 *Bivariate Correlations Among Study Variables*

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1 Child gender	-0.50	0.02	-0.13	-0.11	0.11	-0.14*	-0.09	-0.15*	-0.02	0.03	-0.04	-0.11	-0.12*	0.01	0.12*	-0.08	-0.11	-0.22**	0.01	0.04	-0.06	-0.05	0.03	0.19**	-0.20**
2 Family Income	-	-0.27**	0.33**	-0.03	-0.09	0.13*	0.19**	0.24**	0.23**	-0.26**	0.29**	0.40**	0.07	-0.06	-0.15**	-0.17**	0.24**	0.13*	0.25**	-0.31**	0.08	0.26**	0.25**	-0.27**	0.17*
3 Adjustment problems[36]		-	-0.49**	-0.09	0.27**	0.04	-0.32**	-0.29**	-0.17	0.34**	-0.23*	-0.26**	-0.03	-0.05	0.07	0.04	-0.31**	-0.12	-0.04	0.17	-0.06	-0.22*	-0.09	0.40**	-0.29**
4 Social Competence[36]			-	0.18*	-0.09	-0.02	0.35**	0.26**	0.25**	-0.37**	0.18	0.31**	0.18	0.10	-0.29**	-0.09	0.50**	0.17	0.04	-0.19*	0.22*	0.11	0.13	-0.34**	0.36**
5 Fear[36]				-	0.06	-0.01	-0.01	0.05	0.00	-0.01	0.13*	0.06	0.02	0.38**	-0.07	0.01	0.04	0.04	0.07	-0.02	0.11	0.10	0.05	-0.10	0.01
6 Frustration[36]					-	0.22**	-0.02	-0.14*	-0.08	0.10	-0.05	-0.07	-0.07	0.01	0.15*	0.08	-0.02	-0.10	-0.05	0.05	-0.09	-0.10	-0.10	0.21**	-0.16*
7 Positive Affect[36]						-	0.12*	0.03	-0.01	0.01	0.08	0.14*	0.00	0.00	0.05	0.17**	0.17**	0.08	0.01	0.04	0.08	-0.03	-0.01	-0.02	0.05
8 Executive Control[36]							-	0.26**	0.24**	-0.24**	0.15**	0.35**	0.21**	-0.06	-0.05	-0.02	0.53**	0.12*	-0.004	-0.24**	0.12	0.23**	0.09	-0.10	0.18**
9 Delay ability[36]								-	0.17**	-0.22**	0.15*	0.27**	0.19**	-0.10	-0.09	-0.09	0.29**	0.40**	0.09	-0.20**	0.12	0.27**	0.17**	-0.25**	0.21**
10 Warmth[36]									-	-0.24**	0.33**	0.50**	0.33**	0.01	-0.01	-0.14*	0.21**	0.03	0.35**	-0.20**	0.20**	0.27**	0.20**	-0.16*	0.08
11 Negativity[36]										-	-0.25**	-0.51**	-0.36**	0.01	0.13*	0.14*	-0.23**	-0.13*	-0.19**	0.38**	-0.10	-0.32**	-0.17**	0.23**	-0.32**
12 Limit setting[36]											-	0.42**	0.17**	0.00	0.05	-0.06	0.32**	0.06	0.16*	-0.17**	0.23**	0.14*	0.09	-0.12	0.13
13 Scaffolding[36]												-	0.35**	-0.07	-0.06	-0.12	0.30**	0.09	0.27**	-0.25**	0.20**	0.35*	0.15*	-0.20**	0.13*
14 Responsiveness[36]													-	-0.03	-0.09	0.02	0.18**	0.06	0.10	-0.14*	0.11	0.12*	0.00	-0.08	0.12
15 Fear[54]														-	0.06	0.04	-0.02	-0.11	-0.01	0.07	0.08	-0.07	-0.04	0.03	-0.04
16 Frustration[54]															-	0.07	-0.12*	-0.20**	-0.10	0.18**	-0.06	-0.14*	-0.22**	0.24**	-0.13
17 Positive Affect[54]																-	-0.07	-0.16**	-0.11	0.15*	-0.01	-0.15*	-0.16**	0.14*	-0.03
18 Executive Control[54]																	-	0.26**	0.10	-0.26**	0.18**	0.30**	0.07	-0.24**	0.25**
19 Delay ability[54]																		-	0.05	-0.12	0.11	0.22**	0.10	-0.29**	0.24**
20 Warmth[54]																			-	-0.32**	0.29**	0.37**	0.40**	-0.20**	-0.10
21 Negativity[54]																				-	-0.12	-0.63**	-0.48**	0.27**	-0.22**
22 Limit setting[54]																					-	0.15*	0.22**	-0.16*	0.09
23 Scaffolding[54]																						-	0.46**	-0.23**	0.15*
24 Responsiveness[54]																							-	-0.12	0.04
25 Adjustment																								-	-0.72**
Problems[63]																									
26 Social competence[63]																									-

* $p < 0.05$; ** $p < 0.01$

Table 3 *Model Fit Statistics for Cross-lagged Panels*

	χ^2 (78)	RMSEA	90% C.I.	CFI	SRMR
Warmth	112.87 p = 0.01	0.04	0.02-0.05	0.95	0.06
Negativity	147.23 p = 0	0.05	0.04-0.07	0.90	0.09
Limit setting	118.77 p = 0.003	0.04	0.02-0.06	0.94	0.07
Scaffolding	127.06 p = 0	0.05	0.04-0.07	0.92	0.07
Responsiveness	137.46 p = 0	0.05	0.04-0.06	0.90	0.07

RMSEA = room mean square error of approximation
CFI = comparative fit index

Table 4 *Unstandardized and Standardized Parameters from Cross-lagged Panel Analyses for Temperament and Parenting*

	Child[1] → Child[2]	Parent[1] → Child[2]	Child[1] → Parent[2]	Child[2] → Adjustment Problems[3]	Child[2] → Social competence[3]
Warmth and					
Fear	0.37*** (0.05)	0.01 (0.04)	0.09 (0.08)	-0.32 (1.46)	-1.4 (2.24)
	0.38	0.03	0.07	-0.01	-0.03
Frustration	0.11* (0.05)	-0.02 (0.02)	-0.05 (0.14)	6.72[t] (3.45)	-0.97 (5.20)
	0.13	-0.07	-0.02	0.13	-0.01
Positive affect	0.18*** (0.06)	-0.27** (0.11)	0.004 (0.03)	0.47 (0.52)	0.32 (0.79)
	0.18	-0.15	0.01	0.05	0.03
Executive control	0.57*** (0.06)	0.04[t] (0.02)	-0.28[t] (0.15)	-2.68 (2.54)	7.20[t] (3.98)
	0.50	0.10	-0.11	-0.07	0.12
Delay ability	0.31*** (0.04)	-0.02 (0.03)	0.03 (0.09)	-6.16** (2.10)	7.63[t] (3.35)
	0.41	-0.06	0.02	-0.17	0.15
Negativity and					
Fear	0.37*** (0.05)	0.003 (0.04)	-0.01 (0.09)	-0.39 (1.46)	-1.06 (2.23)
	0.38	0.004	-0.004	-0.02	-0.03
Frustration	0.11* (0.05)	0.04* (0.02)	-0.06 (0.16)	5.96[t] (3.48)	0.66 (5.20)
	0.13	0.12	-0.02	0.12	0.01
Positive affect	0.19** (0.06)	0.31* (0.06)	0.05 (0.03)	0.43 (0.52)	0.51 (0.79)
	0.20	0.15	0.09	0.05	0.04
Executive control	0.58*** (0.06)	-0.06* (0.02)	-0.38* (0.17)	-1.89 (2.58)	5.52 (4.01)

	0.51	-0.13	-0.14	-0.05	0.09
Delay ability	0.27*** (0.04)	-0.03 (0.03)	-0.11 (0.11)	-6.37** (2.20)	7.68* (3.32)
	0.36	-0.05	-0.07	-0.18	0.15
Limit setting and					
Fear	0.37*** (0.05)	-0.02 (0.03)	0.16 (0.10)	-0.07 (1.48)	-1.28 (2.26)
	0.39	-0.03	0.09	-0.003	-0.04
Frustration	0.12* (0.05)	0.01 (0.01)	-0.31 (0.20)	6.66^{t} (3.48)	-0.68 (5.22)
	0.14	0.06	-0.10	0.13	-0.01
Positive affect	0.19** (0.06)	-0.12 (0.08)	0.04 (0.04)	0.57 (0.52)	0.35 (0.79)
	0.19	-0.09	0.07	0.07	0.03
Executive control	0.57*** (0.05)	0.08*** (0.01)	0.25 (0.20)	-2.44 (2.58)	6.87^{t} (4.00)
	0.51	0.27	0.08	-0.06	0.12
Delay ability	0.27*** (0.04)	0.01 (0.02)	0.10 (0.12)	-5.99** (2.23)	7.57* (3.38)
	0.41	0.02	0.06	-0.17	0.15
Scaffolding and					
Fear	0.37*** (0.05)	-0.03 (0.04)	0.11 (0.08)	-0.40 (1.47)	-1.09 (2.25)
	0.39	-0.06	0.08	-0.02	-0.03
Frustration	0.11* (0.05)	-0.001 (0.02)	-0.10 (0.15)	6.65^{t} (3.48)	-0.53 (5.22)
	0.13	0.002	-0.04	0.13	-0.01
Positive affect	0.20** (0.06)	-0.23** (0.09)	-0.04 (0.03)	0.47 (0.52)	0.42 (0.79)
	0.20	-0.16	-0.08	0.05	0.03
Executive control	0.52*** (0.06)	0.06* (0.02)	0.28^{t} (0.17)	-2.03 (2.61)	6.51 (4.09)
	0.46	0.18	0.10	-0.05	0.11
Delay ability	0.32*** (0.04)	-0.01 (0.03)	0.30** (0.10)	-6.10** (2.22)	7.62* (3.37)

	0.43	-0.02	0.19	-0.17	0.15
Responsiveness and					
Fear	0.38*** (0.05)	-0.03 (0.02)	0.10 (0.12)	-0.32 (1.48)	-1.19 (2.25)
	0.38	-0.03	0.05	-0.01	-0.03
Frustration	0.14* (0.06)	-0.09 (0.06)	-0.27 (0.22)	6.69^{t} (3.56)	-1.02 (5.32)
	0.14	-0.09	-0.08	0.13	-0.02
Positive affect	0.19** (0.06)	0.02 (0.06)	-0.02 (0.04)	0.53 (0.52)	0.34 (0.79)
	0.20	0.02	-0.03	0.06	0.03
Executive control	0.59*** (0.06)	0.02^{t} (0.01)	0.09 (0.24)	-2.91 (2.57)	7.03* (3.99)
	0.52	0.10	0.02	-0.07	0.12
Delay ability	0.27*** (0.04)	0.001 (0.02)	0.23* (0.15)	-6.31** (2.23)	7.70* (3.37)
	0.36	0.003	0.11	-0.18	0.15

Note: Values are unstandardized coefficients (standard errors) and standardized coefficients. Child gender, family income, and 36 month child adjustment outcomes were specified as covariates for 63 month child adjustment outcomes.
^{t} $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 5 *Unstandardized and Standardized Parameters from Cross-lagged Panels*

	Parent[1] → Parent[2]	Parent[2] → Adjustment Problems[3]	Parent[2] → Social competence[3]
Warmth	0.26*** (0.05)	-2.65* (1.18)	-1.67 (1.80)
	0.32	-0.14	-0.06
Negativity	0.32*** (0.06)	2.30* (1.00)	-3.46* (1.50)
	0.28	0.14	-0.15
Limit setting	0.16** (0.05)	-1.41 (0.88)	0.50 (1.34)
	0.20	-0.10	0.02
Scaffolding	0.17*** (0.05)	-1.73[t] (1.04)	1.02 (1.59)
	0.23	-0.10	0.04
Responsiveness	-0.03 (0.05)	-0.29* (0.75)	-0.26 (1.15)
	-0.04	-0.02	-0.02

Note: Values are unstandardized coefficients (standard errors) and standardized coefficients. Child gender, family income, and 36 month child adjustment outcomes were specified as covariates for 63 month child adjustment outcomes. [t] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$