

Exploring Goodness of Fit, Mother-Child Relationships, and Child Risk

by

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ABSTRACT

Despite the compelling nature of goodness of fit and widespread recognition of the concept, empirical support has lagged, potentially due to complexities inherent in measuring such a complicated, relational construct. The present study examined two approaches to measuring goodness of fit in mother-child dyads and prospectively explored associations to mother-child relationship quality, child behavior problems, and parenting stress across the preschool period. In addition, as goodness of fit might be particularly important for children with developmental delays, child developmental risk status was considered as a moderator of goodness of fit processes. Children with ($n = 110$) and without ($n = 137$) developmental delays and their mothers were coded while interacting during a number of lab tasks at child age 36 months and during naturalistic home observations at child age 48 months. Mothers and father completed questionnaires at child ages 36 and 60 months assessing child temperamental characteristics, child behavior problems, and parenting stress. Results highlight child-directed effects on mother-child goodness of fit processes across the early child developmental period. Although there was some evidence that mother-child goodness of fit was associated with parenting stress 2 years later, goodness of fit remains an elusive concept. More precise models and expanded developmental perspectives are needed in order to fully capture the transactional and dynamic nature of goodness of fit in the parent-child relationship.

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Introduction

Goodness of fit is a highly intuitive and conceptually appealing concept, particularly for research on transactional processes in parent-child relationships. However, decades after Thomas, Chess, and Birch's original formulation (1968), goodness of fit remains a relatively poorly operationalized construct with insufficient supporting empirical evidence. Thomas and Chess' (1977) frequently cited definition posits that "goodness of fit results when the properties of the environment and its expectations and demands are in accord with the organism's own capacities, characteristics, and style of behaving" (p. 11). Goodness of fit in the parent-child relationship is thus inherently linked to child functioning, with good fit, or "consonance" between an individual and the greater environment, thought to be related to better child behavioral outcomes than poor fit, or "dissonance" between an individual and the context (Chess & Thomas, 1999; Thomas & Chess, 1977, 1986). The breadth of the concept provides a richness for relationship theory, but complications for empirical research. In the extant research addressing goodness of fit, a number of methodological strategies have attempted to address the construct with varying degrees of success. Stronger operational approaches, however, can take fuller advantage of the compelling theoretical framework to better capture goodness of fit processes.

Goodness of fit is an entirely relational, rather than individual, construct (Lerner, Lerner, Windle, Hooker, Lerner, & East, 1986). There exists an underlying assumption that there are interactional effects of child characteristics and contextual factors (e.g., parenting behaviors) that are meaningful over and above the singular or additive effects

of child and context (Sanson, Hemphill, & Smart, 2004). Yet, despite the relational nature of the construct, surprisingly little research has addressed the connection between goodness of fit and overall parent-child relationship quality. Further, although children's difficult temperamental traits have been studied extensively as a challenge to goodness of fit, little research examines goodness of fit for children experiencing other forms of developmental risk. The presence of early developmental delay requires multiple adjustments to family processes, as early delay is associated with increased stress for parents and increased behavior problems for children (Baker, Blacher, Crnic, & Edelbrock, 2002; Baker, McIntyre, Blacher, Crnic, Edelbrock, & Low, 2003). As a result, relations among goodness of fit, parent-child relationships, and subsequent child functioning may vary more dramatically for families with a child with early developmental risk, suggesting that this population may be especially informative for understanding such complex relational processes.

Operationalizing goodness of fit is a necessary task for the field of developmental psychopathology so as to better understand the complex parent-child interactions that contribute to later child adjustment. The current study proposes a model that tests the ways in which goodness of fit, individual parent and child characteristics, and parent-child relationship quality contribute to the development of child psychopathology and parenting stress during early childhood. By contrasting different approaches to analyzing fit, a more comprehensive understanding of goodness of fit will emerge. In addition, the proposed study will examine the ways in which these processes may vary in children at high developmental risk.

Definitions and Interpretations of Goodness of Fit

Although early research on parenting and child development focused on a parent-driven model, with parents seen as the most important predictor of child outcomes, Bell (1968) called attention to the substantial impact of children on parental behaviors and shifted the field to recognize bidirectional influences in the parent-child relationship (Pettit & Arsiwalla, 2008). A focus on these bidirectional processes, emphasizing both parents' influence on their children and children's influence on their parents, was apparent in the work of Thomas, Chess, and Birch (1968; Chess & Thomas, 1996) when they devised the concept of goodness of fit. Much of their thinking emerged through work on the New York Longitudinal Study (NYLS), a longitudinal investigation of over 130 children beginning in 1956. The initial purpose of NYLS was to systematically study behavioral individuality in young children, and findings from NYLS research spurred discussion of the goodness of fit concept (Thomas & Chess, 1977; Chess & Thomas, 1996).

The goodness of fit framework emphasizes the contextual specificity required to predict child outcomes, and the nearly endless array of factors in open systems that should be considered to truly understand the contributions to children's functioning. Indeed, although the present investigation focuses on fit in the parent-child relationship, goodness of fit can be studied at a variety of levels. Research has used goodness of fit as a framework to study children's fit in daycare or school settings (e.g., Churchill, 2003; De Schipper, Tavecchio, Van IJzendoorn, Van Zeijl, 2004; Keogh, 1986; Lerner, Lerner, & Zabski, 1985), and with peers (East, Lerner, Lerner, Soni, Ohannessian, & Jacobson,

1992; Talwar, Nitz, & Lerner, 1990). Whether in the parent-child relationship or in another setting, a key tenet of goodness of fit is the focus on relationships, over and above individual child, parent, or contextual influences (Chess & Thomas, 1999; Lerner et al., 1986; Sanson et al., 2004).

A number of approaches have been put forth by other researchers and scholars to further elaborate, interpret, and operationalize the goodness of fit concept from the original Thomas and Chess descriptions. One approach, used extensively by Lerner, Lerner, and colleagues, has focused on the match or mismatch between parents', teachers', or peers' expectations and children's actual behavioral or temperamental characteristics (Lerner & Lerner, 1987; Lerner et al., 1986; Lerner, Lerner, & Zabski, 1985; Windle & Lerner, 1986). Accordingly, the predominant methodological approach for this research strategy defines fit as the discrepancy between some measure of child temperament or behavior and the expectations or desired behaviors that others (e.g., parents or teachers) have for children. Specifically, a questionnaire measure that assesses temperamental attributes of children is compared to a measure that asks parents how much they want their children to express these given attributes, and a large discrepancy in scores is seen as an indication of poor fit (e.g., Lerner & Lerner, 1987).

Although the discrepancy score methodology is relatively direct and uncomplicated, the discrepancy approach has a few notable limitations (Plomin & Daniels, 1984; Windle & Lerner, 1986). Most concerning, the expectations of parents and teachers in these studies may represent "ideal" traits for children, rather than specific expectations or desires for an individual child. There may be little variability in

expectations for child behavior, especially within the same culture. Further, this approach focuses on degree of similarity between parent expectations and child behaviors, ignoring any interactions among parent and child characteristics. Despite these limitations, this general approach has been used in later research, with slight changes in the assessment strategy. For instance, Feagans, Merriwether, and Haldane (1991) created a goodness of fit measure which required mothers to indicate which child behaviors they found most and least desirable, and then to rate their children on each of the behaviors and characteristics. If the undesirable behaviors signified by mothers are exhibited frequently by their children, children are considered to have a poor fit with their environment. Studies using this conceptualization of fit have produced some evidence that fit is predictive of aspects of child and adolescent adjustment (Bird, Reese, & Tripp, 2006; Churchill, 2003; Feagans et al., 1991; Lerner, 1983; Lerner, Lerner, & Zabski, 1985; Patterson & Sanson, 1999; Talwar et al., 1990).

Perhaps the most commonly utilized approach to measuring goodness of fit involves comparing parent and child characteristics to determine which combination of traits or behaviors relates to optimal child functioning. An interaction between any specified parent and child traits or behaviors that predicts child adjustment, over and above the additive effects, is seen as an indication of fit. This method was the recommended statistical approach for uncovering goodness of fit, in order to address the limitations of the discrepancy score approach (Bates, 1989; Plomin & Daniels, 1984). Although this approach may not capture the full spirit of the original goodness of fit conceptualization, it does provide a statistical and systematic approach to study goodness

of fit. The interactional strategy can be used to compare parents and children on the same characteristics (e.g., the temperamental trait of rhythmicity for both infants and families; Sprunger, Boyce, & Gaines, 1985; novelty seeking in children and parents; Rettew, Stanger, McKee, Doyle, & Hudziak, 2006) or on somewhat different behavioral traits (e.g., parents' emotion coaching styles and children's emotion regulation; Lagacé-Séguin & Copeland, 2005).

Using statistical interactions to define fit, an expansive body of interactional research that does not explicitly purport to study goodness of fit can be seen as quite consistent with the overarching framework. For instance, a number of studies have investigated interactions between child temperament and parenting behaviors (see table in van Aken, Junger, Verhoeven, van Aken, & Dekovic, 2007; Belsky, Hsieh, & Crnic, 1998; Lengua, Wolchik, Sandler, & West, 2000). The specificity found between the particular child temperamental traits and parenting behaviors that predict child behavior problems provides evidence for goodness of fit. Thus, this methodology implies that goodness of fit is defined as the interplay of parent and child characteristics that produces favorable child outcomes; in other words, optimal parent characteristics depend on child characteristics, and vice versa. With this approach, the link between parents' and children's traits and children's outcomes is inextricable, creating difficulty in testing goodness of fit without looking to later adjustment.

In addition to these prevalent methods, still others have used more idiosyncratic approaches to study fit. For instance, some use a different but theoretically related construct as a proxy of goodness of fit, such as considering high levels of parenting stress

to be an indication of poor fit (Bogenschneider, Small, & Tsay, 1997). Although the value of this methodological strategy likely depends on the particular construct chosen as a substitute for fit, the strategy invariably fails to fully achieve the relational and interactional nature of goodness of fit. Another technique involves creating goodness of fit groups based on combinations of parent and child constructs that are proposed to represent fit (Kochanska, 1997; Lester et al., 1995; Sanson & Smart, 2001). Creating good and poor fit groups allows for a theoretically-driven exploration of particular combinations of parent and child characteristics that may be predictive of child developmental outcomes. Although this approach has garnered support for the match between specific maternal parenting behaviors and young children's levels of fearfulness (Kochanska, 1997), it has not been used with much frequency in empirical investigations.

The study of goodness of fit is fundamentally tied to child functioning, and the concept proves most significant in the potential ability to predict later child competence or psychopathology. When fit is conceptualized as a concrete measure, as in the discrepancy score approach, associations between goodness of fit and developmental outcomes can be compared in a relatively straightforward manner. Despite the limitations, the discrepancy score approach has shown relations between good fit and school achievement (Churchill, 2003; Feagans et al., 1991; Lerner et al., 1985; Talwar et al., 1990), social competence (Churchill, 2003; East et al., 1992; Patterson & Sanson, 1999), and behavior problems (Patterson & Sanson, 1999). In contrast, statistical interaction approaches to goodness of fit provides results that are more precise, albeit also somewhat more difficult to generalize the direct contributions of fit. For example, the

associations between maternal parenting behaviors and young children's compliance appear to vary depending on the child's level of temperamental fearfulness or approach (Dennis, 2006; Kochanska, 1995). Also, infants' temperamental proneness to distress may interact with particular maternal personality characteristics to predict secure attachment relationships (Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990). Finally, children with more difficult temperamental characteristics appear most susceptible to negative parenting behaviors, as evidenced by the greater behavior problems developed by children who both possess difficult temperamental traits and experience poor parenting (Belsky et al., 1998; Bradley & Corwyn, 2008; Lengua et al., 2000). These examples suggest that the fit or match between specific parent and child characteristics may contribute to the development of child behavioral outcomes. Although significant gaps in the literature still remain regarding the predictions of goodness of fit to later child development, the existing research supports a model wherein goodness of fit predicts child adjustment.

Goodness of fit has proven to be both a clinically and empirically useful concept, despite the fact that it is lacking a clear operationalization. An area that has received minimal attention is the relation between goodness of fit and overall parent-child relationship quality. Seifer and Sameroff (1986) proposed that temperament and goodness of fit should be seen as fully relational constructs, such that child characteristics, parent expectations and behaviors, and the family environment all interact and can only be understood within the context. Others have speculated that goodness of fit may be a component of attachment security (Mangelsdorf et al., 1990). These

perspectives could provide a rationale for relating goodness of fit to relationship quality. However, to date there has been no empirical research testing this potentially meaningful association.

Further, the extant literature has not examined the potentially meaningful influence of goodness of fit in the parent-child relationship on parenting stress. Increased parenting stress, often conceptualized as the negative response associated with the everyday hassles and frustrations surrounding child behavior and childrearing (Cnic & Greenberg, 1990), is related to poorer parent and child functioning (Cnic & Low, 2002). In addition, parent factors, child characteristics, and the parent-child relationship are likely all important contributors to levels of parenting stress (Cnic & Low, 2002; Deater-Deckard, Smith, Ivy, & Petril, 2005). Thus, it may be especially important to understand the parent, child, and relational contributors to parenting stress as a key process associated with understand goodness of fit.

Child and Parent Characteristics: Contributions to Goodness of Fit and the Emergence of Behavior Problems

To fully understand the important interactional and relational issues associated with the goodness of fit concept, there must also be an awareness of the individual characteristics that comprise fit. Temperament is often seen as a key component of goodness of fit, as it captures individual differences between children. Although the present study is primarily focused on behavioral characteristics of children that can be seen as proxies to specific temperamental traits, temperament provides an organizing framework for viewing the particular child behaviors that affect parenting, as well as the

development of later behavior problems. As previously mentioned, Thomas, Chess, and colleagues initiated the systematic study of temperament, and, through their research on the NYLS, they created nine categories of temperament and the often-discussed three overarching clusters (easy, difficult, and slow to warm up; Thomas, Chess, & Birch, 1968; Thomas, Chess, Birch, Hertzog, & Korn, 1963). Similar to goodness of fit, temperament has been conceptualized in a variety of ways since this initial investigation, with four distinct yet overlapping approaches driving the field (Goldsmith, 1996; Goldsmith et al., 1987; Seifer & Sameroff, 1986). Previous work (Goldsmith, 1996) has briefly described these four approaches as focusing on behavioral styles (Thomas & Chess, 1977, 1989), regulatory abilities (Rothbart, 1989; Rothbart & Derryberry, 1981; Strelau, 1989), initial precursors to adult personality (Buss, 1989; Buss & Plomin, 1984), and emotion-related elements of behavior (Goldsmith & Campos, 1986; 1990). Each of these approaches corresponds to a set of proposed dimensions of temperament.

Considering the vast writings on the subject of temperament, creating a shared definition creates a substantial challenge. However, some have attempted to find commonalities among the approaches to create a more unified definition of temperament. To this end, most agree that temperament: 1) is, to an extent, biologically based, 2) involves individual differences in behaviors, 3) is present very early in life, and 4) exhibits some consistency across contexts and time (Bates, 1989; De Pauw & Mervielde, 2010; Goldsmith et al., 1987). In addition, temperament is perceived as developing over time, both through maturational changes in behavioral expression and environmental influences (Goldsmith et al., 1987; Rothbart & Bates, 2006).

Accepting this broad definition, there are also a number of qualities or dimensions of temperament which are most accepted or widespread among the extant research and theory. Synthesizing the major temperament approaches, the common dimensions that emerge usually include negative emotionality (also referred to as reactivity or irritability), sociability (or, on the opposite end, inhibition), self-regulation (involving effortful control of attention and emotions), and a smaller factor of activity level (De Pauw & Mervielde, 2010; Mervielde & Asendorpf, 2000; Rothbart, Ahadi, Hershey, & Fisher, 2001; Sanson, Hemphill, & Smart, 2004). These categories may be combined somewhat differently and given alternate labels in various studies (e.g., a surgency dimension may encompass activity level and sociability traits; Rothbart et al., 2001). In addition, there are likely developmental changes in temperament dimensions, both in the way temperament is behaviorally expressed and in the categories that emerge. For example, effortful control appears to emerge in toddlerhood, whereas negative emotionality/reactivity is present in infancy (Putnam, Ellis, Rothbart, 2001; Putnam, Sanson, Rothbart, 2002). Although no single list of temperamental dimensions can satisfactorily address all of the categories included in temperament theories, these overarching traits provide a structure from which to discuss the individual qualities that affect the parent-child relationship and the development of behavior problems.

Temperament and parenting are related in both expected and somewhat counterintuitive ways. The majority of research focuses on the effects of difficult, negative children on parenting behaviors, possibly because these children are susceptible to developing behavior problems (Belsky & Jaffee, 2006). There is some evidence that,

as would be expected, difficult temperamental traits may be directly related to negative or unresponsive parenting behaviors (Lee & Bates, 1985; Linn & Horowitz, 1983; Spangler, 1990). Similarly, difficult temperament may be linked to increased levels of parenting stress (Östberg & Hagekull, 2000; Rodenburg, Meijer, Deković, & Aldenkamp, 2007). However, there are also numerous studies with the opposite findings, wherein child irritability or difficultness are associated with more positive, sensitive, and engaged parenting behaviors (Crockenberg & Smith, 1982; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996; Washington, Minde, & Goldberg, 1986). A harder-to-manage child may elicit more sensitive and responsive parenting. This contradictory literature truly calls for additional complex interactional and transactional models with an empirical focus on goodness of fit (Crockenberg, 1986; Crockenberg & Leerkes, 2003).

Temperament also shows important links to emerging behavior problems. With the abundance of evidence suggesting that global measures of early “difficult” temperament are directly related to later behavior problems in children (e.g., Bates & Bayles, 1988; Guerin, Gottfried, & Thomas, 1997; Maziade et al., 1990; Rothbart & Bates, 2006), temperament is sometimes seen as a vulnerability or predisposing factor to the development of behavior problems (Sanson, Letcher, Smart, Prior, Toumbourou, & Oberklaid, 2009). Some work has also differentiated particular temperamental traits or dimensions, rather than an overall measure of difficult temperament, which are most directly related to symptoms. For examples, reactivity/negative emotionality shows important relations to both internalizing and externalizing behavior problems (Brendgen, Wanner, Morin, & Vitaro, 2005; Compas, Connor-Smith, & Jaser, 2004; Nelson, Martin,

Hodge, Havill, & Kamphous, 1999; Stringaris, Maughan, & Goodman, 2010; Zhou, Lengua, & Wang, 2009), temperamental inhibition corresponds to the development of internalizing disorders (Kagan & Snidman, 1999; Prior, Smart, Sanson, & Oberklaid, 2000; Sanson, Pedlow, Cann, Prior, Oberklaid, 1996), and effortful control/self-regulation appears inversely related to externalizing problems (Kochanska & Knaack, 2003; Krueger, Caspi, Moffitt, White, Stouthamer-Loeber, 1996). A cluster approach, wherein temperamental dimensions are grouped in meaningful ways, also yields clues as to how temperament is linked to behavior problems. For instance, Caspi, Henry, McGee, Moffitt, and Silva (1995) created a lack of control cluster, consisting of high levels of emotional lability, restlessness, negativity, and short attention span, and children labeled as such are more likely to develop externalizing problems. Although many of the relations above could be accounted for by the similar and somewhat overlapping content measured by temperament and behavior problem assessments, there is evidence that the associations remain after accounting for the overlapping measures (Lemery, Essex, & Smider, 2003; Lengua, West, & Sandler, 1998).

In addition to child-directed effects, there may be specific qualities of parenting that are central to relational goodness of fit processes and emerging child psychopathology. Supportive maternal parenting characteristics may contribute to goodness of fit or, if lacking, may lead to poor parent-child fit. Furthermore, there is substantial evidence linking negative parenting behaviors to the emergence of child behavior problems (Campbell, 2006; O'Leary, Smith Slep, & Reid, 1999; Stormshak, Bierman, McMahon, & Lengua, 2000), and effective parenting to a decreased likelihood

of a child developing behavior problems (Pettit, Bates, & Dodge, 1997). Many have searched for the qualitative features of maternal parenting that are most supportive of a child's development. For example, Clarke-Stewart (1973) proposed that "optimal parenting" for young children includes responsiveness, positive emotions, and stimulation, and these broad qualities, among others, are echoed in other work (Campbell, 2006; National Institute for Child Health and Human Development, 2004; Pettit et al., 1997). Certainly, a variety of supportive parenting characteristics may contribute to goodness of fit in the parent-child relationship.

Maternal sensitivity is generally defined as maternal behavior that is child-centered, appropriate, and responsive, and sensitivity has been seen as a key factor responsible for child attachment security (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1982; de Wolff & van IJzendoorn, 1997). Given its roots in attachment, maternal sensitivity may be an essential component of a positive mother-child relationship, as a sensitive parent will likely be best able to respond to a temperamentally difficult child and be able to produce a good fit (Lamb & Easterbrooks, 1981). Further, sensitive parenting has shown links to lower levels of child behavior problems (Rothbaum & Weisz, 1994). Within the affectively rich context of the mother-child relationship, maternal positive affect is another crucial aspect of supportive parenting (Biringen & Robinson, 1991; Kochanska & Aksan, 1995). Warmth and positivity in parenting likely reflect a positive parent-child relationship and may be related to decreased child behavior problems and better overall functioning (Dix, 1991; Kochanska & Aksan, 1995; Russell & Russell, 1996; Spinrad et al., 1999). Positive affect and

sensitivity are highly compatible parenting characteristics that serve to provide children with “affective-emotional support” (Landry, Taylor, Guttentag, & Smith, 2008).

Additionally, maternal involvement is associated with positive adjustment in children and adolescents (Grolnick & Ryan, 1989; Kim, Ge, Brody, Conger, Gibbons, & Simons, 2003).

Responsive and supportive parenting also involves appropriate stimulation, which may be captured by maternal scaffolding behaviors. Scaffolding refers to a parent’s ability to support and structure an activity to help a child succeed at a level beyond what the child would be able to achieve independently (Maslin-Cole & Spieker, 1990; Vygotsky, 1978). Effective scaffolding requires awareness of the child’s needs, as well as responding in a non-intrusive manner. Although scaffolding is often conceived of as most relevant to children’s cognitive processes, it can refer to a range of contexts, and effective scaffolding shows important relations to children’s development (Baker, Fenning, Crnic, Baker, Blacher, 2007; Hoffman, Crnic, Baker, 2006). These supportive parenting qualities may be most helpful in buffering the effects of a difficult child temperament to create goodness of fit in the parent-child relationship, as well as support positive child adjustment.

Children at Risk and the Influence on Goodness of Fit

In addition to children’s temperament, a variety of other child characteristics may contribute to and shape parent-child goodness of fit. Understanding goodness of fit processes is especially important for children at risk for developing behavior problems, as fit in the parent-child relationship may act as a protective factor to prevent these adverse

outcomes or, alternatively, a lack of fit may be particularly detrimental for children already experiencing conditions of risk. One specific child risk factor that affects family processes and the parent-child relationship is the presence of early developmental delay in a child. Children with developmental delays reflect a specific subset of developmental risk, and these children experience increased behavior problems, with rates estimated at approximately three times as high as typically developing children (Abbeduto, Seltzer, Shattuck, Krauss, Orsmond, & Murphy, 2004; Baker et al., 2002; 2003; Feldman et al., 2007; Linna et al., 1999). These increased behavior problems are likely at the root of a number of parental difficulties associated with child developmental delay, such as increased levels of distress and psychopathology (Feldman, McDonald, Serbin, Stack, Secco, & Yu, 2007; Olsson & Hwang, 2001; White & Hastings, 2004) and marital difficulties (Floyd & Zmich, 1991; Risdal & Singer, 2004). Despite these stressors, many of the associations to problematic outcomes are not as grim as previously thought, with some research highlighting the positive aspects of having a child with developmental delays (Blacher & Baker, 2007; Hastings & Taunt, 2002; Risdal & Singer, 2004).

There has been little research comparing temperamental differences of typically developing children with children with developmental delays. As particular difficult temperamental traits are linked with the development of behavior problems, and children with delays are at increased risk for behavior problems, there is increased need to identify these risk factors among children with delays. Further, difficult temperament may be particularly stressful for parents of children with developmental delays (Thomas & Chess, 1977). Temperament research on children with Down syndrome, which represents the

largest proportion of temperament research on children with delays, suggests heterogeneity in temperament ratings, much like in typically developing children. In general, infants with Down syndrome tend to be rated as more difficult than typically developing children, but the findings reverse as children move in toddlerhood, with children with Down syndrome rated more highly in easy temperament traits (e.g., positive mood, approach) than their non-delayed peers (Goldberg & Marcovitch, 1989).

When comparing children with different etiologies, research is, again, highly mixed. For example, children with unexplained developmental delays have been rated as less active and less distractible than children with identified diagnostic syndromes (Marcovitch, Goldberg, MacGregor, & Lojkasek, 1987). Others suggest that children with developmental delays exhibit lower positivity and approach than typically developing children (Van Tassel, 1984), and still others find few differences in temperamental traits between the two groups (Zion & Jenvey, 2006). Importantly, there may be a large discrepancy between maternal ratings of children on temperamental traits and maternal impressions of the easiness or difficulty of their children (Marcovitch et al., 1987). Thus, research on temperament in children with developmental delays suggests wide variation in temperament ratings. Further, generalization across studies may be difficult; much of the research suffers from small sample sizes, and a range of comparison groups are used between studies.

Considering child possible temperament difficulties, increased behavior problems, and parental stress, the pervasive influence of a child with developmental delays on the family is apparent, and children with delays may act as a stressor that affects goodness of

fit in the parent-child relationship. Insight into goodness of fit may be found through research on the dyadic interactions between parents and children with developmental delays, showing that parent-child interactions are somewhat altered in the presence of delay. Parents may exhibit more directiveness, persistence, and intrusiveness in interactions with their children with delays (Costigan, Floyd, Harter, & McClintock, 1997; Floyd, Harter, & Costigan, 2004; Marfo, 1990). Although parental directiveness is often considered undesirable, it may be helpful for structuring interactions for children with developmental delays (Marfo, 1990, 1992). Further, these parents may be more focused on teaching during interactions with their children, rather than simply playing (Hodapp, 2002). In addition, parents of children with delays may express more negativity in dyadic interactions (Beck, Daley, Hastings, & Stevenson, 2004; Newland & Crnic, 2010) though this evidence is mixed (Costigan et al., 1997; Floyd et al., 2004).

The increased parenting stress experienced by parents of children with delays (Baker et al., 2002; Baker et al., 2003) has negative implications for the child functioning, parenting behaviors, and the parent-child relationship (Crnic & Low, 2002; Crnic, Gaze, & Hoffman, 2005; Mitchell & Hauser-Cram, 2010). Considering these adverse consequences, understanding the determinants of parenting stress may be particularly important for children with developmental delays (Davis & Carter, 2008), as there is evidence that quality parenting may ameliorate some of the challenging outcomes. Maternal sensitivity is inversely linked to the development of behavior problems for children with developmental delays, just as it is with typically developing children (Niccols & Feldman, 2006). In fact, responsive parenting may be especially

important and influential for children at risk, as these children may require additional support and assistance from parents (Landry, Smith, & Swank, 2006). Further, there is evidence that the stresses associated with a child with delay may decrease and parent-child relationship quality may increase as children get older (Glidden & Schoolcraft, 2003; Lounds, Seltzer, Greenberg, & Shattuck, 2007). As the presence of familial or child risk may produce more adverse maternal responses to children's difficult behavioral characteristics (Crockenberg & Leerkes, 2003) and fit may be more naturally achieved in non-stressed families (Allen & Prior, 1995), families of children with developmental delays may offer unique perspectives in understanding goodness of fit processes. In fact, goodness of fit may be best understood within the context of children at risk, as fit may be both most difficult to accomplish and most essential for these children.

The Present Study

Despite the widespread acceptance of goodness of fit as a useful construct, research is limited and impeded by the methodological complexities inherent to the constructs. The proposed research explores contrasting measurement strategies, as well as the interrelations among parent and child constructs, in order to understand the complex contributions to emerging child psychopathology and parenting stress. It is expected that goodness of fit will be uniquely predictive of these outcomes. This study represents an important advance in that it systematically investigates theoretically-driven approaches to goodness of fit, as well as considering the impact of fit on relational and individual constructs. Further, these processes have not been explored in families of children with developmental delays, although they may have particular relevance for these families.

The current study tested a number of hypotheses designed to address four primary aims. First, goodness of fit was examined through two methodologically and conceptually different approaches. The first approach statistically tested the interaction between mother and child behaviors in order to examine the main and interactive effects of these behaviors in the prediction of later outcomes. The second strategy drew on research that has created goodness of fit groups and involved developing a goodness of fit index based on mother and child characteristics that were theoretically expected to represent fit. It was expected that each approach would provide unique but complementary information about how goodness of fit is related to the constructs in the model. Using both approaches allows for an examination of which provides the most sound and informative methodology with which to study goodness of fit.

Second, through an investigation of the association between goodness of fit and mother-child relationship quality, it was hypothesized that good fit would be related to better relationship quality. Specifically, the presence of good fit, as indicated by the goodness of fit index, would be predictive of mother-child relationship quality one year later. Using the statistical interaction approach, it was expected that, for the most difficult children (high negative affect and activity, low sustained attention and inhibitory control), the effects of supportive parenting (high sensitivity, high positive affect, effective scaffolding, and low detachment) on relationship quality would be stronger.

Third, the current study explored the contributions of parent and child characteristics, goodness of fit, and relationship quality to child behavior problems and mothers' parenting stress. It was predicted that more supportive parenting, easy child

characteristics, good fit, and good relationship quality would be predictive of fewer child behavior problems and less parenting stress (see Figure 1 for conceptual model).

Fourth, the present study identified how child risk status moderated the goodness of fit processes. It was anticipated that good parent-child relationship quality may be especially important for children with developmental delays. Thus, the paths between relationship quality and both behavior problems and parenting stress were expected to be magnified for the developmentally delayed group, although these would be directionally similar to the families of typically developing children. In the same way, the match between parent and child characteristics may be an especially important contributor to relationship quality for a child with developmental delays, and thus the path between goodness of fit and relationship quality was expected to be stronger for children at risk.

The findings from the current study provided a rigorous examination of the complex mechanisms through which children at risk develop psychopathology and provided a more sound empirical basis for the theoretically rich goodness of fit concept.

Method

Participants

Participants included 247 children between the ages of 36 and 60 months and their mothers. Participants were drawn from a larger longitudinal investigation, the Collaborative Family Study, which prospectively explores family processes, emotion regulation, and the emergence of behavior problems in typically developing and developmentally delayed children ages 3 to 9. Children were classified as either typically developing or developmentally delayed based on scores on the Mental Developmental

Index (MDI) subscale of the Bayley Scales of Infant Development II (BSID II, Bayley, 1993) administered at age 3. Children who scored below 75 were classified as delayed ($n = 110$; Mean MDI = 60.05, $SD = 12.82$), and children who scored 85 or above were classified as typically developing ($n = 137$; Mean MDI = 104.57, $SD = 11.70$). A small number of children were classified as borderline ($n = 12$), with MDI scores between 75 and 85. Given the risk inherent in early borderline functional status, these children were included with the DD group. Participants were recruited from central Pennsylvania and southern California through community agencies, including early childhood centers, family resource centers, preschools, and early intervention programs, and through flyers posted in the community. Families were excluded from the larger study if the child had severe neurological impairment, was non-ambulatory, or had a history of abuse, as assessed through parent-report or observation by study staff. In addition, any child with an identified syndrome or specific developmental diagnosis (e.g., autism) was excluded at initial recruitment, as children with undifferentiated early developmental delays were of focal interest.

Ethnicity was representative of the populations at each site (see Table 1). Demographic characteristics of the sample by group status (developmentally delayed vs. typically developing) are shown in Table 2, and a few significant differences were observed. Families of children with developmental delays have lower levels of education and lower family incomes, both of which are components of socioeconomic status. Parents of developmentally delayed children are also less likely to be married and more likely to have other adults living in the home. Finally, there are a greater number of

males with developmental disabilities, which is consistent with prevalence rates of mental retardation (American Psychiatric Association, 2000).

Procedures

In the larger study, participants were seen at 6-month intervals from child ages 3 to 5 years old and were subsequently seen at yearly intervals. For the current investigation, all procedures were completed at child ages 36, 48, and 60 months.

Initial assessment. Upon being identified as a potential participant for the larger study, families were contacted by phone and scheduled for an initial visit to the home when the child was approximately 36 months old. During this initial home visit, a trained graduate student administered the BSID II, in order to classify children as typically developing or developmentally delayed. Demographic information was also collected from the families during this visit, including information on income, ethnicity, marital status, parental education level, employment status, and health history.

Lab observations. Children and mothers visited the laboratory at 36 months old. Trained graduate students led the participants through a structured protocol. First, the child and the mother were given a basket of age-appropriate toys, and the experimenter left them alone for 10 minutes, during which they could play with the toys in whatever manner they wished. Subsequently, the experimenter presented three joint-problem solving tasks. The first task, a foam puzzle, was an easy task which the child should have been able to complete without any or with very little assistance from his or her mother. The second was a moderately challenging task, requiring children to build a tower to match an already-assembled tower, which the child should have been able to complete

with minimal assistance. The third task, a complicated activity involving manipulating a small ball with two metal rods, was difficult and was designed so that children would not be able to complete it, even with considerable adult help. The problem solving tasks were allotted 2, 3, and 5 minutes, respectively, and the experimenter left the room while the child completed the tasks. For each task, mothers were told to allow the child a chance to complete the task on their own but then give any assistance they felt was needed. Tasks were also differentially graded between the developmentally delayed and typically developing groups at each age to reflect equivalent levels of challenge (e.g., a more challenging maze was given for the typically developing children than for the children with developmental delays). Following the joint-problem solving tasks, a delay of gratification task was presented. The delay of gratification task involved presenting the child with a toy covered by a blanket and leaving the child alone after being told not to touch or play with the toy. Finally, the child was instructed to clean up the toys at the end of the tasks.

Home observations. A home visit was conducted when children were 48 months old, to obtain naturalistic observational data. The observations lasted approximately 90 minutes, during which time 2 graduate students collected information over 6 periods of coding. Each period lasted 10 minutes, followed by a 5 minute period wherein coders rated the behaviors and interactions.

Questionnaire data. Each year within 2 weeks of the child's birthday, mothers and fathers independently completed a series of questionnaires to assess child and family

functioning, and returned them by mail. Parents also completed several brief questionnaires at the beginning of the yearly home observations.

Measures

Developmental status. Developmental status of the child was assessed using the Mental Development Index (MDI) subscale of the Bayley Scales of Infant Development II (BSID-II), a widely used measure of mental development in children (Bayley, 1993; Robinson & Mervix, 1996). A trained graduate student administered the BSID-II to all child participants at the initial home visit at 36 months. The MDI is normed, with a mean of 100 and a standard deviation of 15. According to the MDI standards, children who score under 75 are classified as delayed, and children who score between 75 and 85 are classified as borderline (Bayley, 1993). For the current study, the delayed and borderline children were combined to form a group of developmentally delayed children who scored one standard deviation below the mean ($MDI < 85$). All other children who scored within one standard deviation of the mean or greater ($MDI \geq 85$) were classified as typically developing. The developmentally delayed and typically developing groups differed significantly on their mean MDI scores ($t = 28.48, p < .001$). Developmentally delayed children had a mean MDI of 60.05, and typically developing children had a mean MDI of 104.57.

Child behavioral characteristics. A selection of child behavioral characteristics at 36 months (inhibitory control, activity level, sustained attention, and negative mood) was chosen to reflect difficult temperament traits that are associated with more adverse developmental outcomes. Further, a combination of parent-report scales and observed

behaviors coded by independent observers were used in a multiple-method approach to create the construct of interest.

The Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith, 1988; Goldsmith, Elliot, & Jaco, 1986) was completed by mothers at child age 36 months. The 65-item questionnaire asks parents to report on the frequency of behaviors over the past month. The scale scores include activity level, pleasure, social fear, interest, anger, sadness, inhibitory control, and soothability. Inhibitory control was used for the present study. The inhibitory control scale includes questions regarding the child's ability to wait for something and follow instructions. Reliability was acceptable for inhibitory control (Cronbach's $\alpha = .82$).

Children's behavioral characteristics were also assessed observationally using the Parent-Child Interaction Rating System (PCIRS; Belsky, Crnic, & Gable, 1995; relevant codes included in Appendix A). Children were observed while interacting with their mothers during free play, the three joint-problem solving tasks, the delay of gratification task, and clean up. Trained coders used the PCIRS to assess positive mood, negative mood, lively/active, sociability, sustained attention, and demandingness on a 5-point scale from low to high. The current study used the sustained attention, negative mood, and activity (lively/active) scales, each composited across tasks, with the exception of the delay of gratification task, which involved somewhat different demands for the child. Sustained attention measures children's ability to maintain involvement with objects, parents, and/or the physical world. A high score on the sustained attention scale would reflect a child who is focused, interested, and involved, rather than distracted or apathetic.

Negative mood is considered the child's expressions of negativity or discontent (e.g., fussiness, crying, tantrums) and includes both the frequency and the intensity of negative mood exhibited during the tasks. The activity scale measured the extent to which a child was motorically active during the tasks and considers the speed, intensity, and duration of motor activity, as well as the child's preference for activity. Reliability was acceptable for sustained attention ($\alpha = .77$), negative mood ($\alpha = .66$), and activity ($\alpha = .71$).

Supportive parenting. Four measures of parenting behaviors (positive affect, sensitivity, detachment, and scaffolding) were chosen to indicate supportive parenting. The PCIRS was used to code maternal behaviors during the lab tasks at 36 months. The same tasks were used to code maternal behaviors as were used to assess child behaviors, other than the delay task, in which mothers did not participate. Trained coders used the PCIRS to measure opportunity for interaction, positive affect, negative affect, sensitivity, intrusiveness, detached manner, and stimulation of cognitive development on a 5-point scale from low to high. Positive affect, sensitivity, and detached manner, each composited across tasks, will be used. Positive affect is considered the mothers' expressions of positive affect, positive regard, affection, and warmth toward the child, taking into account mothers' content and tone, as well as the intensity and frequency of the expressions and behaviors. Sensitivity measures interactions that are child-focused, wherein mothers' are aware of children's needs and responsive. Detached manner, in contrast, assesses passivity, disengagement, and an unawareness of children's needs. Reliability was acceptable for positive affect ($\alpha = .83$), sensitivity ($\alpha = .85$), and detachment ($\alpha = .72$).

Maternal scaffolding was assessed during the 36 month lab tasks using the Maternal Scaffolding Coding System (Maslin-Cole & Spieker, 1990). This 5-point scale measures the effectiveness of maternal scaffolding during the problem solving and clean up tasks. Three dimensions of scaffolding were coded and composited for the present study. Motivational scaffolding reflects the mother's ability to help the child become engaged and maintain enthusiasm. Technical scaffolding measures the mother's ability to structure the task to allow the child to complete the task successfully. Emotional scaffolding assesses the mother's ability to make the task a positive experience for the child. Reliability for maternal scaffolding overall was acceptable ($\alpha = .84$).

Goodness of fit. Goodness of fit in the mother-child relationship was assessed by combining the four difficult child behavioral characteristics (inhibitory control, activity level, sustained attention, and negative mood) and the four supportive parenting traits (positive affect, sensitivity, detachment, and scaffolding). The approaches used to create the goodness of fit construct will be further discussed below.

Mother-child relationship quality. The PCIRS was also used during the naturalistic home observations to assess dyadic relationship quality, in addition to a number of other behaviors. At child age 48 months, the mother-child dyadic pleasure scale was used, composited across the six observation periods. Mother-child pleasure measures the level of joyfulness, enthusiasm, and the sense that mothers and children enjoy being together. Reliability of mother-child dyadic pleasure across each observation period was acceptable ($\alpha = .78$).

Child behavior problems. Mothers and fathers completed the Child Behavior Checklist (CBCL; Achenbach, 1991) at child age 60 months. The measure includes 113 items listed in alphabetical order of child problems, for which the respondent indicates if the item was (0) 'not true', (1) 'somewhat or sometimes true', or (2) 'very true or often true' within the past 6 months. Subscales are computed for internalizing and externalizing behavior problems, in addition to more specific subscales. For the proposed study, the total behavior problem sum scores completed by both mothers and fathers were used. Mother and father reports of total behavior problems were composited, with an acceptable reliability ($\alpha = .74$).

Parenting stress. Parents completed the Parenting Daily Hassles self-report questionnaire (PDH; Crnic & Greenberg, 1990) during a home observation at 5 years. The PDH includes questions on child and family hassles and on general life hassles. The two scales reflect the frequency and the perceived intensity of hassles. The perceived intensity of child and family hassles, completed by mothers, were used in the current study. Acceptable reliability (Cronbach's $\alpha = .90$) has been previously reported (Crnic et al., 2005).

Coding reliability. To establish reliability for all observational scales (i.e., the PCIRS and the Maternal Scaffolding Coding System), observers were trained by watching videotaped lab observations until they reached sufficient reliability (over 70% exact agreement and 95% agreement within one scale point with the criterion coder). Individual observers were paired to code the videotapes, and the criterion coder watched

20% of all tapes. Reliability was maintained for all coded measures at a kappa of .6 or greater.

Results

Data Analytic Plan

All statistical procedures described below were analyzed using full information maximum likelihood (FIML) estimation in Mplus 6.12 (Muthén & Muthén, 2010). When possible, the overall fit of the models was tested with χ^2 , root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and comparative fit index (CFI). Good fit was defined as CFI values $\geq .95$, RMSEA values $\leq .06$, and SRMR values $\leq .08$ (Hu & Bentler, 1999). When fit indices were not available, fit of nested models were compared using loglikelihood difference tests to determine the best fitting model.

Data reduction and factor analysis. For the observed lab and home assessments, each rating was composited as described above.

A two-factor confirmatory factor analysis (CFA) using structural equation modeling (SEM) was run to assess whether the data forms the hypothesized latent factors. It was expected that the child behavioral characteristics factor, which has a positive valence, would include inhibitory control, activity, negative mood, and sustained attention, and the supportive parenting factor would include positive affect, sensitivity, detached manner, and scaffolding.

Hypothesis testing. Two measures of goodness of fit were created for the first hypothesis. The first method of assessing goodness of fit involved analyzing latent

variable interactions in SEM (Kelava et al., 2012; Klein & Moosbrugger, 2000). This approach required use of a latent moderated structural equations approach (LMS), to assess the predicted nonlinear effects between child behavioral characteristics and supportive parenting. Use of LMS in Mplus has been found to produce reliable estimates for latent interactions (Moosbrugger, Schermelleh-Engel, Kelava, & Klein, 2009).

For the second measure, a factor score was computed using the above factor analysis for each child and each mother; scores were calculated using the expected a posteriori (EAP) approach in Mplus. The goodness of fit index was subsequently formed based on the theoretical and empirical literature. High supportive parents (above the median on the parent factor score) and least difficult children (above the median on the child factor score) were given a score of 4 to represent best fit. High supportive parents and most difficult children were given a score of 3, based on findings suggesting the importance of good parenting for difficult children. Low supportive parents and least difficult children were given a score of 2, and low supportive parents and most difficult children were given a score of 1.

The second and third hypotheses were jointly tested with path models in SEM (see Figure 1 for conceptual model). Two models were analyzed, one for each of the proposed goodness of fit measurements, to simultaneously test the anticipated interrelations of the constructs. Direct and indirect paths between the constructs were included. Demographic variables that significantly differentiated the typically developing and developmentally delayed groups and were associated with the outcomes were considered as covariates in the analyses. Maternal education was explored as a possible

covariate in all analyses, as it is correlated with socioeconomic status and parenting behaviors (Bornstein, Hahn, Suwalsky, & Haynes, 2002). Covariates that significantly predicted variables in the models were retained.

To test the fourth hypothesis in the model that included a latent variable interaction, a multiple group latent class model with known classes (typically developing and developmentally delayed) was run, given the more complex analysis type needed. For the basic SEM model using the goodness of fit index approach, stacked models split by delay status were used. To test group differences, equality constraints were specified for the paths for which moderation was expected. Chi-square or loglikelihood difference tests were computed to assess whether the constrained parameters caused significant deterioration in fit and, thus, indicated a moderated path.

Factor Analysis

Multiple measures were used to create the two latent factors (child behavioral traits and supportive parenting). Descriptive statistics of each of the variables in the latent factors are shown in Table 3 and are shown split by developmental status in Table 4. Correlations among the variables are shown in Table 5 and are shown split by developmental status in Table 6. With the full sample, correlations among the variables of the hypothesized latent factors ranged from small to large effects. For the child behavioral traits factor, the error variances between the observed measures (sustained attention, negative mood, and activity level) were covaried; it was assumed that there may be covariation due to the observed variables being a part of the same coding system. All other error variances were assumed to represent measurement error. The loading for

one variable for each latent factor was set to 1.00, so as to set the metric for the factor. Both of the variables chosen to set the metric for the factors were positive traits (i.e., child sustained attention and maternal sensitivity), and thus both factors represent positive child and mother traits.

Results from the CFA are shown in Table 7. The CFA provided an acceptable fit to the data: $\chi^2(16) = 38.18, p < .01$; CFI = .96; RMSEA = .08; SRMR = .05. All loadings were in the expected direction and were significant at the $p < .01$ level. Further, child positive behavioral traits were significantly positively correlated with supportive parenting.

Latent Variable Interaction Approach to Assessing Goodness of Fit

Analyses involving the latent variable interaction term were run in Mplus using the LMS approach. The analyses use the MLR estimator, which corrects for non-normality. Standard model fit indices are not presented, as they are not available with the “type = random” option in Mplus, which is required to test latent variable interactions. Further, the conventionally used fit indices are likely not appropriate for nonlinear structural equation models (Mooijart & Satorra, 2009).

The full model including the latent variable interaction term is shown in Figure 2, and the parameter estimates are shown in Table 8. Covariates are not depicted in the figure for ease of readability but are shown in the table.

Results indicated that mother-child relationship quality at 48 months was not significantly predicted by child behavioral traits, supportive parenting, or the interaction of the two constructs. A pleasurable mother-child relationship at 48 months was

significantly negatively associated with later parenting stress at 60 months. Positive child behavioral traits at 36 months were significantly negatively associated with both child behavior problems and parenting stress at 60 months. The interaction between child behavioral traits and supporting parenting at 36 months was associated with parenting stress at 60 months at the $p = .053$ level. It should be noted that SEM models estimating latent variable interactions have very low statistical power to detect effects (Cham, West, Ma, & Aiken, 2012). Thus, although the interaction only approached significance, it was still probed. The interaction effect is depicted in Figure 3. Results from the interaction suggest that for children with average or above average (i.e., less difficult) behavioral characteristics, increased positive parenting is related to increased parenting stress, contrary to expectation. For children with the most difficult behavioral characteristics, the level of supportive parenting did not appear to be related to the level of parenting stress. Moreover, parenting stress was the highest for this group and the lowest for the less difficult children. For the overall model, 40.9% of the variance in parenting stress and 53.2% of the variance in child behavior problems was accounted for.

Given that conventional fit indices were not available and the interaction term was only marginally significant, the model including the interaction was compared to a nested model that did not include the interaction term but was otherwise identical (not shown). Results from an adjusted loglikelihood comparison test found that removing the interaction term did not cause significant deterioration of fit, $\Delta\chi^2(3) = 5.51, p = .14$, suggesting that the interaction did not significantly add to the model. In addition, the Bayesian Information Criteria (BIC) without the interaction term decreased from 7337.43

to 7327.33. Finally, the variance accounted for in parenting stress or child behavior problems does not decrease substantially when removing the interaction term (40.0% and 52.9%, respectively).

Given that the interaction term was marginally significant, and did not appear to substantially improve the fit of the model, a more parsimonious model without a latent variable interaction was tested. In light of model fit issues with the latent variables, the model was run using the factor scores created for child behavioral characteristics and supportive parenting at 36 months. Parameter estimates are shown in Table 9, and the model is shown in Figure 4. The model was a good fit to the data: $\chi^2(4) = 2.14, p = .71$, CFI = 1.00, RMSEA = .00, SRMR = .01. Many similar relations emerged as were found in the model with the interaction term; child behavioral traits at 36 months and mother-child relationship at 48 months predicted parenting stress at 60 months, and child behavioral traits at 36 months predicted child behavior problems at 60 months. In addition to these similar relations, there was a significant positive association between supportive parenting at 36 months and child behavior problems at 60 months, such that increased positive parenting was related to more behavior problems.

Goodness of Fit Index Approach to Assessing Goodness of Fit

For the second approach to assessing goodness of fit, factor scores for each mother and each child were computed, and each pair were given a score on the goodness of fit index, as discussed above. Descriptive statistics for the key variables based on goodness of fit index score are presented in Table 10. As expected, those with a score of 4, representing the best parent-child fit, had the most positive mother-child relationship,

the fewest child behavior problems, and the lowest parenting stress. However, contrary to expectations, those with a score of 3 (high supportive parents and most difficult children) had the least positive mother-child relationship, the most child behavior problems, and the lowest parenting stress. A one-way ANOVA was performed to determine if these mean level differences were significantly different across goodness of fit groups. Mother-child relationship quality was not significantly different across groups, $F(3, 217) = 1.21$, $p = .31$. In contrast, child behavior problems were significantly different across goodness of fit groups, $F(3, 212) = 9.55$, $p < .01$. Specifically, those with a goodness of fit score of 4 reported significantly fewer behavior problems than those with a goodness of fit score of 1, and those with a fit score of 3 had significantly more behavior problems than those with a fit score of 4 or 2. Parenting stress was also significantly different across goodness of fit groups, $F(3, 214) = 3.01$, $p = .03$. Specifically, those with a fit score of 4 reported significantly less parenting stress than those with a fit score of 3.

The goodness of fit index was then entered into an SEM model. Factor scores were again used for child behavioral characteristics and supportive parenting, rather than the latent variables, due to model fit issues. The model was a good fit to the data: $\chi^2(4) = 2.26$, $p = .69$, CFI = 1.00, RMSEA = .00, SRMR = .01. However, very few relations emerged between the constructs in the model, as shown in Figure 5, with parameter estimates in Table 11. The goodness of fit index, based on mother and child scores at 36 months, was not predictive of the mother-child relationship at 48 months, child behavior problems at 60 months, or parenting stress at 60 months.

Moderation by Developmental Delay Status

To address the final aim of moderation by developmental delay status, the two primary models (the latent variable interaction and the goodness of fit index) were run while specifying developmental risk group within the models. For the model with the latent variable interaction, known classes were specified, and an adjusted loglikelihood comparison test was calculated to compare models. The fully constrained model caused a deterioration of fit that approached significance from a model in which all paths were unconstrained except the initial factor analysis, $\Delta\chi^2(12) = 20.21, p = .06$, suggesting that there may be moderation in some paths of the model.

Given the trend-level significance of the full model moderation, individual paths were constrained and compared to models in which the individual paths were freely estimated, to determine if any particular relations in the model were moderated by developmental delay status. Neither the association from child behavioral characteristics at 36 months nor from supportive parenting at 36 months to the mother-child relationship at 48 months was moderated by child developmental delay. However, when the relation between the interaction of child characteristics and parenting at 36 months and the mother-child relationship at 48 months was constrained by group, the deterioration in the model approached significance, $\Delta\chi^2(1) = 3.28, p = .07$. Further exploring the interaction term by group, the interaction in the typically developing group was not significant, $p = .71$, whereas the interaction in the developmentally delayed group approached significance, $p = .053$. The interaction of child characteristics and parenting predicting the mother-child relationship in the developmentally delayed group is depicted in Figure 6. Probing the interaction for children with developmental delays, it appears that, for the most

difficult children (one standard deviation below the mean on child behavioral characteristics), increased levels of supportive parenting were unrelated to improvements in the mother-child relationship. Mother-child relationship quality was the lowest in this group of children. For children at the mean and one standard deviation above the mean of child characteristics, higher levels of supportive parenting were related to improvements in mother-child relationship quality at 48 months. For the developmental delayed group, the individuals with the most supportive parents and the least difficult children had the most pleasurable mother-child relationship.

Next, moderation in the paths that predicted child behavior problems at 60 months were explored in the model including the latent variable interaction. The paths from supportive parenting at 36 months, the interaction of child behavioral characteristics and supportive parenting at 36 months, or mother-child relationship quality at 48 months to child behavior problems at 60 months were not significantly moderated by developmental delay status. However, constraining the path from child behavioral characteristics at 36 months to child behavior problems at 60 months caused significant deterioration of fit from a model in which the path was freely estimated, $\Delta\chi^2(1) = 4.97, p = .03$. The negative relation between child behavioral characteristics and child behavior problems was stronger for children with developmental delays.

Moderation in the paths that predicted parenting stress at 60 months was then tested in the model including the latent variable interaction. None of the predictors of parenting stress were significantly moderated by delay status.

Finally, the model using the goodness of fit index was run in a stacked model, and moderation by delay status was explored. The fully constrained model caused a significant deterioration of fit from a model in which all paths were freely estimated, $\Delta\chi^2(12) = 21.05, p < .05$, suggesting that the full model was moderated by developmental delay status. As in the previous model, the individual paths were further explored, to determine which paths were moderated by delay status.

A majority of the individual paths in the model were not significantly moderated by child developmental delay. Moderation approached significance in the prediction from child behavioral characteristics at 36 months to child behavior problems at 60 months, $\Delta\chi^2(1) = 3.26, p = .07$, in that the negative association was stronger for typically developing children than for children with developmental delays. In addition, constraining the path from child behavioral characteristics at 36 months to parenting stress at 60 months caused significant deterioration of fit, $\Delta\chi^2(1) = 11.47, p < .01$. The individual parameter estimates suggest that, for children with developmental delays, there was a significant negative relation between positive child behavioral characteristics and parenting stress, whereas the association was not significant for typically developing children. Finally, the path from the goodness of fit index to parenting stress was significantly moderated by developmental delay status, $\Delta\chi^2(1) = 4.56, p < .05$, but the path estimate was not significant in either group.

Discussion

Despite the intuitive appeal of goodness of fit in the parent-child relationship, empirical support has lagged, likely due to the complexities associated with this very

individualized concept. The present study aimed to explore goodness of fit using two contrasting approaches and to consider the potentially important influence of child developmental status on goodness of fit processes, in order to provide a more rigorous understanding and a direction for future investigation of this conceptually important construct. Results highlight child-driven effects on parent-child goodness of fit across the preschool period. Overall, goodness of fit remained an elusive concept to uncover, even with the complex modeling attempted in the present investigation. Given the transactional and developmentally-specific nature of goodness of fit, the findings of the present study suggest a need for the development of more precise models that could incorporate the many additional components that might affect parent-child goodness of fit across early child developmental periods.

Comparison of Goodness of Fit Approaches

Two unique but complementary approaches were explored to assess parent-child goodness of fit. In general, quite similar associations emerged within each model, such that child behavioral characteristics were associated with both child behavior problems and parenting stress in both models. Moreover, relations indicative of goodness of fit were not readily apparent in either model before considering additional moderators, likely due to very low statistical power (Cham et al., 2012; MacCallum, Zhang, Preacher, & Rucker, 2002) and because the analytic approach may have taken the highly individualized concept of goodness of fit and over-generalized it by creating factors and index scores across dyads. The interaction approach was the recommended methodological strategy for studying goodness of fit (Bates, 1989; Plomin & Daniels,

1984); the more contemporary statistical approach of latent variable interactions allows for multiple measures of parent and child characteristics to be tested simultaneously without artificially reducing the data. In contrast, the creation of a goodness of fit index allowed for a more conceptually-driven examination of the parent and child characteristics that may produce goodness of fit. Both the interaction approach and the goodness of fit index approach allowed for broad generalizations to be made on the effects of supportive parenting for children with different levels of temperamental difficulty. However, both approaches may have masked more specific findings. For example, if the match between maternal scaffolding and child inhibitory control represented optimal goodness of fit, this specific effect would not be uncovered when exploring latent variables or by creating index scores. It may be that fit across more specific constructs should be understood before creating larger factors or index scores.

In the present study, the most notable advantage of the goodness of fit index approach over the latent variable interaction approach was the ability to tease apart mother-child dyads at different levels of goodness of fit. Specifically, comparisons revealed that the mother-child dyads with the most supportive mothers and the most difficult children at 36 months exhibited the highest levels of parenting stress and child behavior problems at 60 months. This additional specificity is crucial in identifying and understanding the intricacies of parent-child goodness of fit, which suggests that refining the goodness of fit index, or utilizing another similar approach, may be advantageous for future study in order to better understand the individual components that make up a good fit across parent-child dyads.

Associations between Goodness of Fit and Parent-Child Relationship Quality

Given the inherently relational nature of goodness of fit (Seifer & Sameroff, 1986), it was expected that goodness of fit, as assessed by both methodological approaches, would be related to parent-child relationship quality. However, when examining children with developmental delays and typically developing children together, no connections emerged between the two constructs. Reasons for this lack of association could be purely methodological; power within the models may have been too low to detect these relations. Alternatively, the constructs of goodness of fit and mother-child relationship quality might not always be analogous, particularly within the contexts of the present study. Goodness of fit represents the optimal match between a child and his or her environment that produces favorable child developmental outcomes overall (Chess & Thomas, 1999; Thomas & Chess, 1977, 1986; Thomas et al., 1968). The observed traits coded by the dyadic mother-child pleasure construct, including joyfulness, enthusiasm, and a sense of mutual enjoyment of each other's company, may not always be congruent with the various parenting strategies needed to produce positive child outcomes, at least within all situations.

Grusec and Davidov (2010) highlighted the importance of domain-specific parental behavior, arguing that effective parenting styles and mechanisms of socialization cannot be universal across all contexts. Indeed, goodness of fit represents not only a match between child and parent, but also a consideration of the context in which the parent and child are interacting. In the current study, mother-child relationship quality was assessed during a naturalistic home observation, and as such, the specific contexts of

the interactions vary across families. Although some parent-child dyads may have been playing together during the observation period, others may have been eating dinner or engaging in a bedtime routine. Effective parenting for children with various temperaments, particularly during the latter contexts, might require more directive parenting and gentle discipline. Although appropriate discipline is associated with reduced behavior problems (Kerr, Lopez, Olson, & Sameroff, 2004; Pettit et al., 1997), mother-child interactions that are observed while parents are exerting authority may not be assessed as highly mutually enjoyable and full of enthusiasm by the coding system. Thus, good fit may not, and should not, always correspond to pleasurable, joyful mother-child interactions within all contexts. However, despite results from the present study, it remains possible that mother-child goodness of fit would be associated with positive mother-child relationship quality overall, when relationship quality is aggregated across all interactions, particularly during low demand, free play scenarios. Indeed, goodness of fit should lead to long-term positive developmental outcomes, and thus parenting goals that facilitate optimal child outcomes, even if not enjoyable or pleasurable moment-by-moment, may represent goodness of fit over time.

Relations among Parent and Child Characteristics, Relationship Quality, Parenting Stress, and Child Behavior Problems

Similar relations among the constructs of interest emerged from both the interaction approach and the goodness of fit index approach. Difficult child behavioral characteristics at child age 36 months were associated with increased behavior problems

and parenting stress two years later. In addition, a pleasurable mother-child relationship at 48 months was associated with lower levels of parenting stress one year later.

Difficult child behavioral characteristics were assessed via observations and questionnaire data measuring low sustained attention, low inhibitory control, high negative mood, and high activity level. Consistent with the current findings, these temperamental traits, individually and in combination, are frequently associated with increased child behavior problems (e.g., Caspi et al., 1995; Rothbart & Bates, 2006; Sanson et al., 2009). Evidence suggests that child temperament uniquely contributes to the emergence of behavior problems, above and beyond any shared measurement variance (Lemery et al., 2003; Lengua et al., 1998). Not surprisingly, children's early difficult temperamental characteristics were also associated with later perceived intensity of parenting daily hassles, consistent with previous literature (Östberg & Hagekull, 2000; Rodenburg et al., 2007), whereas, a positive mother-child relationship appeared to protect against later parenting stress. Although the relations between mother-child relationship quality and parenting stress have typically been studied in the inverse direction (i.e., parenting stress predicting relationship quality; e.g., Crnic et al., 2005), there is reason to believe that parent-child relationship quality would be an important determinant of maternal parenting stress. Of note, these everyday parenting stressors, which appear to be partially determined by child characteristics, can have significant consequences on parenting behaviors (Crnic & Low, 2002), which may, then, set into motion problematic mother-child transactions throughout childhood.

Utilizing the interaction approach, there was some evidence that goodness of fit at 36 months predicted parenting stress at 60 months, although the goodness of fit interaction did not quite reach significance. The interaction suggested that, for temperamentally difficult children, parenting stress was perceived as high regardless of the quality of parenting behaviors. In contrast, and contrary to expectation, for less difficult children, parenting stress increased slightly as supportive parenting increased. Although parenting stress still remained low for parents of children with easy behavioral characteristics, the reason for this complex interaction deserves consideration. Similar to the curvilinear relations suggesting that performance improves up to a certain level of psychological arousal (Yerkes & Dodson, 1908), it may be that mild to moderate levels of daily parenting stress are advantageous, so as to motivate supportive, engaged parenting. In other words, a mild amount of parenting stress may be most reflective of a mother who is appropriately involved with her child, whereas very low levels of perceived parenting stress may indicate more detached parenting (Abidin, 1992). Still, given that the interaction did not reach significance, more evidence is needed to better understand this counterintuitive finding.

The goodness of fit index approach yielded a finding which brings an understanding of the association between difficult children and increased parenting stress one step further; highly supportive mothers of difficult children were found to experience the highest level of parenting stress. Temperamentally difficult children may elicit more positive parenting behaviors from some, but not all, mothers (Crockenberg & Smith, 1982; Seifer et al., 1996). The mothers who respond to their behaviorally challenging

children in the most supportive manner, who are most engaged, involved, and in-sync with their difficult children, may report a higher intensity of parenting daily hassles than the mothers of difficult children who simply disengage. However, in the current study, these difficult children did not appear to benefit from more supportive parenting, as there was no evidence of an interaction between difficult child characteristics and supportive parenting producing fewer behavior problems. In contrast to expectations from the differential susceptibility hypothesis (Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007; Belsky & Pluess, 2009), which would propose that the most difficult children are both most vulnerable to poor parenting but also most susceptible to the effects of sensitive, supportive parenting, it could be that children with particular characteristics, such as low agreeableness or more negativity, may not be able to benefit from maternal supportiveness in the same way as do easier children (Meunier, Roskam, & Browne, 2011).

The associations between higher levels of supportive parenting and increased parenting stress, both in easy and more difficult children, have two general implications for understanding goodness of fit. First, goodness of fit involves powerful child-directed effects in the early childhood period. Not only do children's behaviors and temperamental traits directly contribute to maternal parenting stress, but child characteristics interact with parenting behaviors in complex ways (i.e., difficult children may evoke more supportive, sensitive parenting), which may indirectly increase later parenting stress in these more engaged parents. Children play a crucial, yet still understudied, role in shaping parenting and family processes (Pardini, 2008; Pettit &

Arsiwalla, 2008), and the preschool period may be an especially important time to understand these child-directed effects, as children both want more autonomy and have more cognitive abilities to negotiate processes within the family (Cummings & Schermerhorn, 2003). In addition, child noncompliance might be especially challenging for parents during the early childhood period, producing more salient child effects (Shaw, Bell, & Gilliom, 2000).

Second, parent-child goodness of fit may not equally benefit both children and parents. Although children, especially more temperamentally difficult children, are likely to benefit from supportive, sensitive parenting and positive child developmental outcomes would be expected, mothers might become more stressed in response to the increased effort required to produce a good fit with a difficult child. Moreover, the long-term effects of this supportive yet stressed mother on her difficult child and the parent-child relationship are unclear; a more stressed mother might begin to interact more negatively with her child over time, emphasizing the need to view these processes as fully dynamic. A good fit during the early childhood period may not persist later on, if parenting stress continues to increase and parent-child interactions become more negative. As goodness of fit research is often focused on the best person-environment match that produces a positive child outcome, these potentially deleterious effects on parents have not been sufficiently explored.

Effects of Child Risk on Goodness of Fit

As children with developmental delays are at greater risk for developing behavior problems than typically developing children, parent-child goodness of fit may especially

important for these children at risk. In the present study, children with developmental delays had higher levels of negative mood and lower levels of sustained attention and inhibitory control than typically developing children, consistent with some (Van Tassel, 1984), but not all (Zion & Jenvey, 2006), research on temperament in children with developmental delays. Mothers, in response, were less positive and sensitive and exhibited lower levels of appropriate scaffolding when interacting with the children with delays.

The increased risk exhibited by both children and parents of children with developmental delays highlights the potential impact of a good parent-child fit on more favorable family processes and child developmental trajectories. Indeed, results suggest that goodness of fit in the parent-child relationship is associated with mother-child relationship quality only for children with developmental delays. For children with developmental delays but with easier temperamental characteristics, relationship quality increased as supportive parenting increased. In contrast, difficult children with developmental delays exhibited the lowest level of parent-child relationship quality, regardless of the quality of parenting received. This finding adds further complexity to the suggestion that goodness of fit is more easily achieved for non-stressed families (Allen & Prior, 1995). Mothers may be able to adjust their parenting to create a positive relationship with their children when faced with one stressor – a child with a developmental delay. However, when a child exhibits difficult temperamental traits and possesses an additional risk factor of developmental delay, the combination may be

particularly difficult to overcome (Crockenberg & Leerkes, 2003), even in the face of positive, supportive parenting.

Similarly, the association between difficult child characteristics and increased parenting stress was stronger for children with developmental delays than for typically developing children. Parents of children with delays report higher levels of parenting stress overall (Baker et al., 2002; 2003). But, it may be that child developmental delay in combination with particularly difficult temperamental traits is especially burdensome for parents, as suggested by Thomas and Chess (1977), whereas a child with developmental delays but an easy temperament would not have the same deleterious effects on parenting stress. Parenting stress in these families likely increases through a dynamic process. As parents interact with their high-risk children, parenting behaviors might become more negative, intrusive, and demanding over time, thereby producing more problematic parent-child interactional patterns and greater difficulty establishing good fit. Child behaviors, in turn, become more challenging and difficult temperamental traits are maintained and strengthened. Thus, parenting stress may be increased not just as a direct result of having a child at developmental risk but rather by a dynamic interplay of parent and child factors.

Limitations and Future Directions for Goodness of Fit Research

Despite the many strengths of the current study, including the multi-method longitudinal design, several limitations should be noted. First, the sophisticated analytic methods utilized in the study, and in particular, the reliance on detection of interaction effects, require a large sample size for adequate power. Thus, potentially important

effects may have been left undetected given the relatively small sample, and moderation by child developmental status may have been especially difficult to uncover. Second, just as much of the research on bidirectional parent-child relationships neglects fathers (Meunier et al., 2011; Pardini, 2008), only mothers were included in the current study. Given the distinct nature of fathering and father-child relationships (Lamb & Lewis, 2010), goodness of fit processes in the father-child relationship may be quite different from those in the mother-child relationship and merit attention in their own right. Third, although utilizing composites and latent factors allows for an examination of qualities that are more fully representative of certain constructs, they may produce a loss of specificity of parenting and child behaviors that, together, produce good fit. Fourth, the present study included children with developmental delays, so as to consider families along a continuum of risk status. Some of the findings may be specific to this particular risk group, and future investigation should consider families facing a variety of risk conditions.

The most significant limitation of the present study, and a pressing future direction for goodness of fit research, lies in the complexity of multiple moderators that likely operate to affect the development and maintenance of goodness of fit in the mother-child relationship. Although the current investigation uncovered interesting findings that help understand parent-child goodness of fit, many expected relations were not detected. Some associations may have remained hidden because the approach used might have over-generalized the true nature of goodness of fit. That is, many factors were not considered that might have an important effect on the complexities of mother-child

goodness of fit. For example, maternal characteristics, including personality traits and mental health problems, may affect the ways in which mothers and children interact (e.g., Belsky & Barends, 2002; Downey & Coyne, 1990). Additionally, the demographic factors that were considered as covariates might, instead, moderate some of the goodness of fit relations, including mothers' marital status, race, and socioeconomic status. So, a fuller understanding of goodness of fit depends on a consideration of these many additional factors that likely influence goodness of fit in individual mother-child dyads.

Summary and Conclusions

Goodness of fit remains an elusive concept; one that is appealing to discuss but difficult to operationalize and thoroughly investigate. The current study extended models of goodness of fit by including two different approaches of study and identifying child developmental risk as a moderator of goodness of fit processes. Findings underscore the challenge that parents face to attain good parent-child fit with a temperamentally difficult child, and especially with a difficult child who is also facing developmental risk. Still, the complexities of the models in the present investigation do not yet match the dynamic, transactional, and developmental nature of goodness of fit. Expanded developmental perspectives will continue to broaden our understanding of the mechanisms by which goodness of fit is created in the parent-child relationship and the complex trajectories set into motion by a good or poor parent-child fit.

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Table 1

Participant Ethnicity

	African-American	Asian	Caucasian	Hispanic	Other
Child	7.3%	2.4%	60.7%	16.6%	13.0%
Mother	7.3%	4.9%	63.3%	21.1%	3.2%
Father	6.5%	3.6%	61.9%	16.2%	5.7%

Table 2

Demographic Characteristics of Delayed and Non-Delayed Samples

Variable	Delayed (n=110)	Non-Delayed (n=137)	t Score	Chi Square
<i>Child Variables</i>				
Bayley Scale: MDI Mean Score ^a	Mean=60.05 SD=12.82	Mean=104.57 SD=11.70	28.48**	
Gender (% male)	66.4%	51.1%		5.84*
Race (% Caucasian)	60.0%	61.3%		.04
Siblings (% only children)	29.1%	29.2%		.00
<i>Parent Variables</i>				
Marital Status at child age 3 (% married)	79.1%	89.8%		5.48*
Other adults in home	25.8%	14.3%		4.65*
Mother's Race (% Caucasian)	60.0%	66.4%		1.09
Mother's Education (% college degree)	29.1%	60.5%		24.32**
Father's Race (% Caucasian)	64.6%	66.9%		.13
Father's Education (% college degree)	33.0%	57.4%		12.98**
Biological Father	92.9%	97.0%		2.09
Median Family Income	\$35,001-50,000	\$50,001-70,000	3.67**	

^aMental Development Index* $p < .05$, ** $p < .01$

Table 3

Descriptive Statistics of Key Variables

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	Median	Skew-ness	Kurtosis	Range
<i>Child behavioral traits, 36 months</i>							
Sustained attention	243	4.01	.75	4.20	-1.10	.86	1.40-5.00
Inhibitory control	239	3.38	.83	3.90	-.26	-.28	1.60-5.78
Negative mood	243	1.37	.46	1.20	2.24	7.66	1.00-4.20
Activity level	243	3.52	.53	3.40	.11	.32	2.00-4.80
<i>Supportive parenting, 36 months</i>							
Sensitivity	243	3.25	.76	3.20	.05	-.419	1.40-5.00
Scaffolding	237	3.48	.71	3.42	-.40	-.24	1.33-5.00
Positive affect	243	2.94	.72	2.80	.19	-.43	1.20-4.80
Detachment	243	1.33	.46	1.20	2.20	5.45	1.00-3.20
<i>Dyadic relationship, 48 months</i>							
Mother-child pleasure	221	1.55	.55	1.33	1.60	3.57	1.00-4.33
<i>Parent & child outcomes, 60 months</i>							
Child behavior problems	216	35.08	23.5 1	31.25	1.46	3.31	0-152
Parenting stress	218	59.10	15.6 2	58.50	.51	.27	25-107

* $p < .05$, ** $p < .01$

Table 4

Descriptive Statistics of Key Variables Split by Developmental Status

Variable	Delayed	Non-Delayed	<i>t</i> Score
<i>Child behavioral traits, 36 months</i>			
Sustained attention			6.89**
Mean	3.65	4.29	
SD	.84	.53	
N	106	137	
Inhibitory control			3.87**
Mean	3.61	4.02	
SD	.86	.75	
N	106	133	
Negative mood			-4.41**
Mean	1.52	1.25	
SD	.56	.33	
N	106	137	
Activity level			-1.66
Mean	3.58	3.46	
SD	.64	.43	
N	106	137	
<i>Supportive parenting, 36 months</i>			
Sensitivity			4.25**
Mean	3.03	3.43	
SD	.79	.68	
N	106	137	
Scaffolding			4.13**
Mean	3.27	3.64	
SD	.71	.67	
N	103	134	
Positive affect			2.83*
Mean	2.79	3.06	
SD	.69	.73	
N	106	137	
Detachment			-.45
Mean	1.34	1.32	
SD	.47	.45	
N	106	137	
<i>Dyadic relationship, 48 months</i>			
Mother-child pleasure			.71
Mean	1.52	1.58	
SD	.56	.55	
N	97	124	

Table 4, continued

Variable	Delayed	Non-Delayed	<i>t</i> Score
<i>Parent & child outcomes, 60 months</i>			
Child behavior problems			-4.76**
Mean	43.89	28.54	
SD	26.45	18.64	
N	92	124	
Parenting stress			-1.53
Mean	49.86	47.19	
SD	14.00	10.80	
N	92	126	

* $p < .05$, ** $p < .01$

Table 5

Intercorrelations of Key Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Child sustained attention, 36 mos.	—	.33**	-.37**	-.55**	.25**	.38**	.22**	-.04	.06	-.37**	-.21**
2. Child inhibitory control, 36 mos.		—	-.23**	-.21**	.16*	.17*	.18**	-.07	.10	-.52**	-.46**
3. Child negative mood, 36 mos.			—	.11	-.06	-.24**	-.14*	.09	-.08	.24**	-.01
4. Child activity, 36 mos.				—	-.17**	-.25**	-.13*	.05	-.01	.20**	.17*
5. Maternal sensitivity, 36 mos.					—	.54**	.67**	-.46**	.14*	-.05	.01
6. Maternal scaffolding, 36 mos.						—	.59**	-.44**	.07	-.21**	-.18**
7. Maternal positive mood, 36 mos.							—	-.46**	.08	-.13	-.03
8. Maternal detachment, 36 mos.								—	-.15*	-.01	.07
9. Mother-child pleasure, 48 mos.									—	-.11	-.24**

Table 5, continued

Variable	1	2	3	4	5	6	7	8	9	10	11
10. Child behavior problems, 60 mos.										—	.47**
11. Parenting stress, 60 mos.											—

Note. Pairwise deletion was used; *n* ranged from 209 to 243.

p*<.05, *p*<.01

Table 6

Intercorrelations of Key Variables Split by Developmental Status

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Child sustained attention, 36 mos.	—	.27**	-.26**	-.57**	.05	.30**	.05	.06	.13	-.29**	-.36**
2. Child inhibitory control, 36 mos.	.31**	—	-.23*	-.22*	.07	.17	.17	-.01	.17	-.49**	-.58**
3. Child negative mood, 36 mos.	-.32**	-.06	—	.14	.09	-.20*	-.08	.18	-.11	.12	.10
4. Child activity, 36 mos.	-.53**	-.16	-.04	—	-.17	-.27**	-.13	.08	-.08	.18	.24*
5. Maternal sensitivity, 36 mos.	.32**	.13	-.08	-.12	—	.43**	.65**	-.44**	.04	.13	.12
6. Maternal scaffolding, 36 mos.	.33**	.05	-.17	-.18*	.57**	—	.55**	-.41**	.02	-.17	-.24*
7. Maternal positive mood, 36 mos.	.31**	.13	-.13	-.11	.68**	.58**	—	-.45**	.10	.02	-.04
8. Maternal detachment, 36 mos.	-.15	-.10	-.04	.01	-.48**	-.48**	-.48**	—	-.05	-.09	-.03
9. Mother-child pleasure, 48 mos.	-.06	.03	-.02	.10	.22*	.10	.05	-.23*	—	-.22*	-.23*

Table 6, continued

Variable	1	2	3	4	5	6	7	8	9	10	11
10. Child behavior problems, 60 mos.	-.24**	-.47**	.22*	.15	-.06	-.08	-.16	.02	.01	—	.59**
11. Parenting stress, 60 mos.	.08	-.31**	-.26**	.03	-.05	-.07	.01	.16	-.24**	.29**	—

Note. Correlations above the diagonal represent the scores for children with developmental delays; scores below the diagonal represent the scores for typically developing children. Pairwise deletion was used; *n* for the children with developmental delays ranged from 88 to 106 and *n* for typically developing children ranged from 121 to 137.

* $p < .05$, ** $p < .01$

Table 7

Parameter Estimates of Confirmatory Factor Analysis

Variable	B (SE)	β	<i>p</i> -value
<i>Loadings on Latent Factors</i>			
Child behavior, 36 mos.			
Sustained attention	1.00 (.00)^a	.72	--
Inhibitory control	.75 (.25)	.49	<.01
Negative mood	-.36 (.09)	-.43	<.01
Activity level	-.44 (.09)	-.45	<.01
Parenting, 36 mos.			
Sensitivity	1.00 (.00)^a	.79	--
Scaffolding	.86 (.08)	.72	<.01
Positivity	1.01 (.08)	.83	<.01
Detachment	-.43 (.05)	-.57	<.01
<i>Covariances</i>			
Sustained attention with negative mood, 36 mos.	-.02 (.04)	-.09	.60
Sustained attention with activity level, 36 mos.	.09 (.05)	-.36	<.01
Negative mood with activity level, 36 mos.	-.02 (.02)	-.10	.39
Child behavior with parenting, 36 mos.	.14 (.03)	.43	<.01

Note. Bolded values are significant at $p < .05$.

^aFor each of the latent factors, one variable loading was constrained to 1.00, so as to identify the metric for the latent factor. Thus, significance values are not calculated for each of the constrained variables.

Table 8

Parameter Estimates of Latent Variable Interaction Model

Variable	B	SE	<i>p</i> -value
<i>Loadings on Latent Factors</i>			
Child behavior, 36 mos.			
Sustained attention	1.00^a	.00	--
Inhibitory control	1.72	.37	<.01
Negative mood	-.35	.11	<.01
Activity level	-.45	.11	<.01
Parenting, 36 mos.			
Sensitivity	1.00^a	.00	--
Scaffolding	.83	.09	<.01
Positivity	1.00	.08	<.01
Detachment	-.43	.06	<.01
<i>Longitudinal Pathways</i>			
Child behavior, 36 mos. → M-C pleasure, 48 mos.	.18	.12	.15
Parenting, 36 mos. → M-C pleasure, 48 mos.	.10	.06	.08
Child X parent, 36 mos. → M-C pleasure, 48 mos.	.15	.15	.33
Bayley MDI, 36 mos. → Child behavior problems, 60 mos.	-.19	.06	<.01
Child behavior, 36 mos. → Child behavior problems, 60 mos.	-45.19	9.36	<.01
Parenting, 36 mos. → Child behavior problems, 60 mos.	5.81	4.04	.15
Child X parent, 36 mos. → Child behavior problems, 60 mos.	-6.66	10.25	.52
M-C pleasure, 48 mos. → Child behavior problems, 60 mos.	-.89	2.94	.76
Marital status, 36 mos. → Parenting stress, 60 mos.	-1.89	.78	.02
Child behavior, 36 mos. → Parenting stress, 60 mos.	-20.72	4.63	<.01
Parenting, 36 mos. → Parenting stress, 60 mos.	2.69	1.80	.13
Child X parent, 36 mos. → Parenting stress, 60 mos.	6.35	3.29	.053
M-C pleasure, 48 mos. → Parenting stress, 60 mos.	-4.08	1.33	<.01
<i>Covariances</i>			
Sustained attention with negative mood, 36 mos.	-.08	.03	<.01
Sustained attention with activity level, 36 mos.	-.16	.03	<.01
Negative mood with activity level, 36 mos.	.01	.02	.69
Child behavior with parenting, 36 mos.	.08	.03	<.01
Child behavior problems with parenting stress, 60 mos.	21.93	26.67	.41

Note. Standardized path estimates (β) are not available for the “type = random” option in Mplus. M-C = mother-child. MDI = Mental Development Index. Bolded values are significant at $p < .05$.

^aFor each of the latent factors, one variable loading was constrained to 1.00, so as to identify the metric for the latent factor. Thus, significance values are not calculated for each of the constrained variables.

Table 9

Parameter Estimates of the Structural Equation Model without Interaction Term

Variable	B (SE)	β	<i>p</i> -value
Child behavior, 36 mos. → M-C pleasure, 48 mos.	.07 (.10)	.06	.48
Parenting, 36 mos. → M-C pleasure, 48 mos.	.10 (.08)	.10	.20
Bayley MDI, 36 mos. → Child behavior problems, 60 mos.	-.18 (.06)	-.18	<.01
Child behavior, 36 mos. → Child behavior problems, 60 mos.	-25.77 (4.32)	-.47	<.01
Parenting, 36 mos. → Child behavior problems, 60 mos.	6.84 (3.03)	.16	.02
M-C pleasure, 48 mos. → Child behavior problems, 60 mos.	-3.16 (2.51)	-.07	.21
Marital status, 36 mos. → Parenting stress, 60 mos.	-1.97 (.79)	-.14	.01
Child behavior, 36 mos. → Parenting stress, 60 mos.	-9.89 (2.17)	-.35	<.01
Parenting, 36 mos. → Parenting stress, 60 mos.	2.16 (1.73)	.09	.21
M-C pleasure, 48 mos. → Parenting stress, 60 mos.	-4.97 (1.40)	-.22	<.01
<i>Covariances</i>			
Child behavior problems with parenting stress, 60 mos.	89.65 (16.45)	.40	<.01

Note. M-C = mother-child. MDI = Mental Development Index. Bolded values are significant at $p < .05$.

Table 10

Descriptive Statistics of Outcome Variables by Goodness of Fit Index Group

Variable	Goodness of Fit = 1	Goodness of Fit = 2	Goodness of Fit = 3	Goodness of Fit = 4
Mother-child pleasure, 48 mos.				
Mean	1.51	1.50	1.48	1.65
<i>SD</i>	.59	.41	.56	.57
<i>N</i>	72	35	36	78
Child behavior problems, 60 mos.				
Mean	40.49	32.09	47.04	25.68
<i>SD</i>	21.44	24.53	28.72	17.88
<i>N</i>	70	35	36	75
Parenting stress, 60 mos.				
Mean	49.44	47.97	52.47	45.47
<i>SD</i>	13.17	13.69	12.33	10.08
<i>N</i>	70	36	36	76

Table 11

Parameter Estimates of the Structural Equation Model with the Goodness of Fit Index

Variable	B (SE)	β	<i>p</i> -value
Child behavior, 36 mos. → M-C pleasure, 48 mos.	.09 (.11)	.07	.40
Parenting, 36 mos. → M-C pleasure, 48 mos.	.14 (.11)	.14	.21
Goodness of fit, 36 mos. → M-C pleasure, 48 mos.	-.02 (.05)	-.06	.65
Bayley MDI, 36 mos. → Child behavior problems, 60 mos.	-.17 (.06)	-.18	<.01
Child behavior, 36 mos. → Child behavior problems, 60 mos.	-26.89 (4.66)	-.49	<.01
Parenting, 36 mos. → Child behavior problems, 60 mos.	4.98 (4.19)	.11	.23
Goodness of fit, 36 mos. → Child behavior problems, 60 mos.	1.25 (.194)	.07	.52
M-C pleasure, 48 mos. → Child behavior problems, 60 mos.	-3.11 (.251)	-.07	.21
Marital status, 36 mos. → Parenting stress, 60 mos.	-1.95 (.80)	-.14	.01
Child behavior, 36 mos. → Parenting stress, 60 mos.	-10.39 (2.36)	-.37	<.01
Parenting, 36 mos. → Parenting stress, 60 mos.	1.31 (2.36)	.06	.58
Goodness of fit, 36 mos. → Parenting stress, 60 mos.	.58 (1.09)	.06	.60
M-C pleasure, 48 mos. → Parenting stress, 60 mos.	-4.95 (1.49)	-.22	<.01
<i>Covariances</i>			
Child behavior problems with parenting stress, 60 mos.	89.28 (16.42)	.06	<.01

Note. M-C = mother-child. MDI = Mental Development Index. Bolded values are significant at $p < .05$.

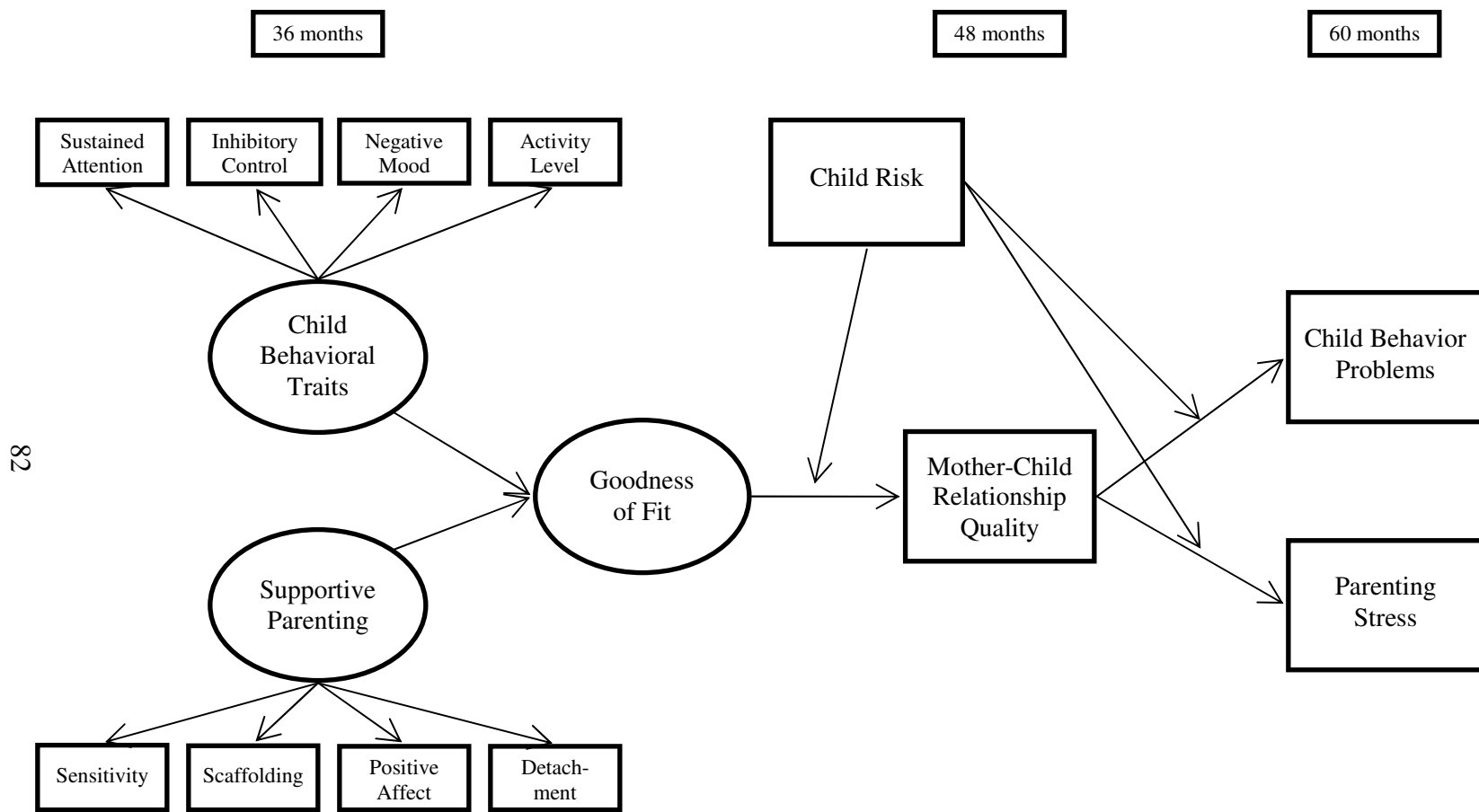


Figure 1. Conceptual model.

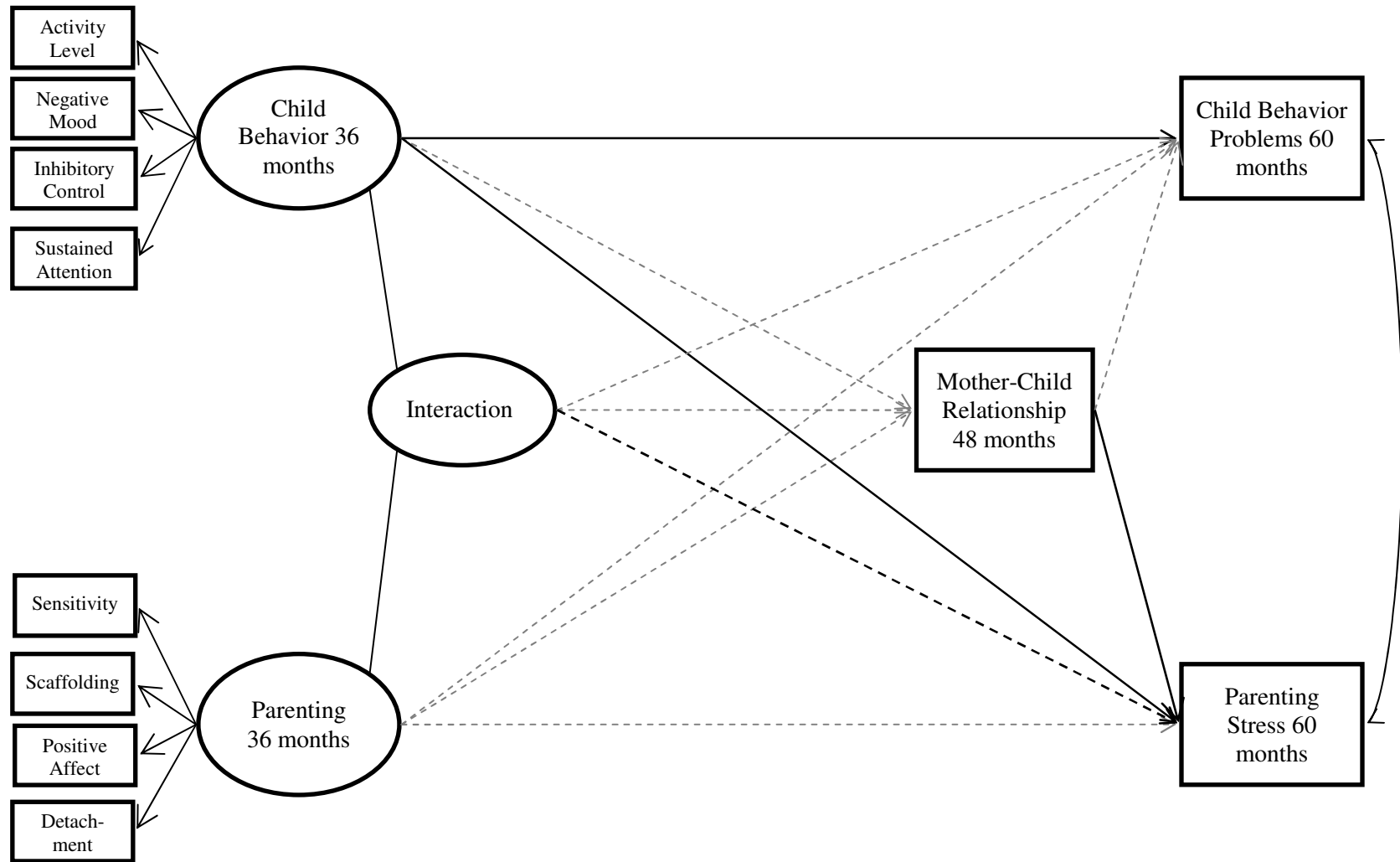


Figure 2. Latent variable interaction model. Covariates are not shown for ease of readability. Black lines indicate significant path estimates at $p < .05$. Black dashed lines indicate marginally significant paths at $p < .06$. Grey dashed lines indicate nonsignificant paths.

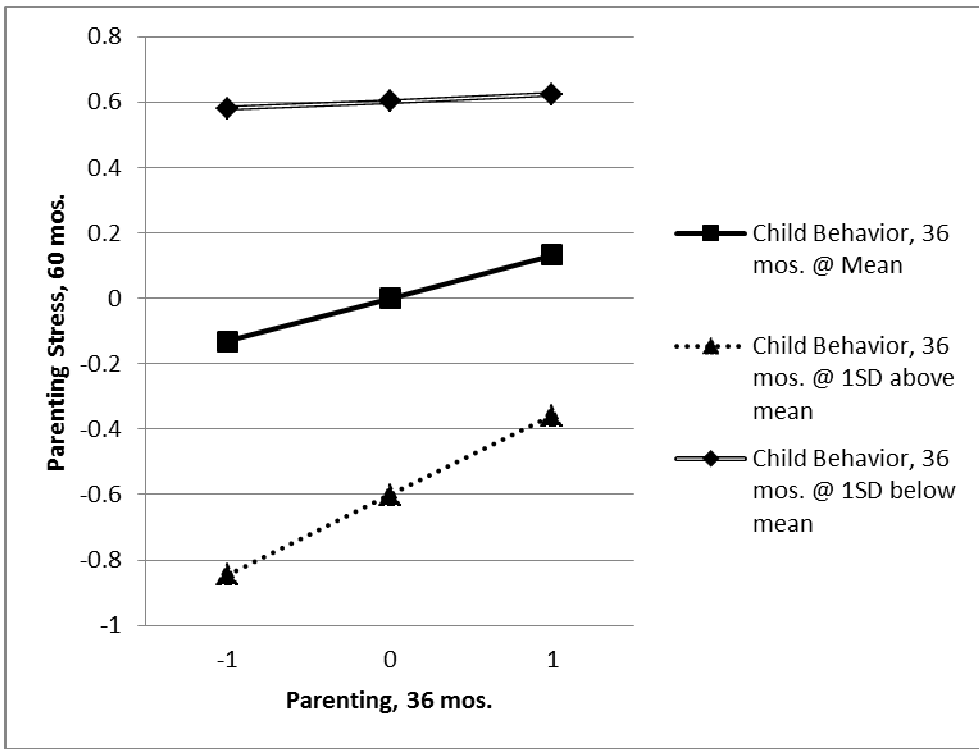


Figure 3. Probed interaction between child behavioral traits and supportive parenting at 36 months on parenting stress at 60 months.

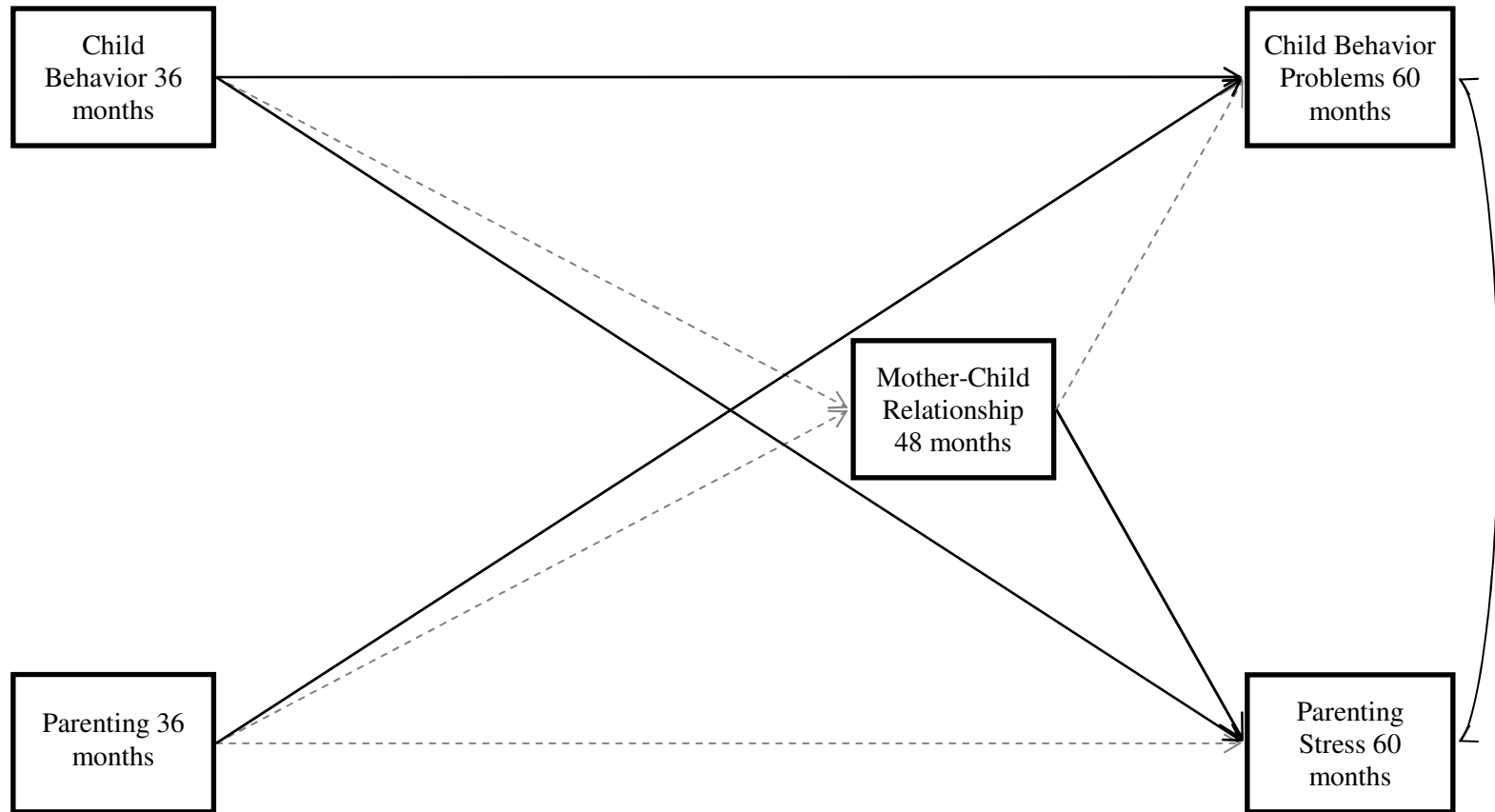


Figure 4. Path model without interaction term. Covariates are not shown for ease of readability. Black lines indicate significant path estimates at $p < .05$. Grey dashed lines indicate nonsignificant paths. Model provides an adequate fit to the data: $\chi^2(4) = 2.14, ns$, CFI = 1.00, RMSEA = .00, SRMR = .01.

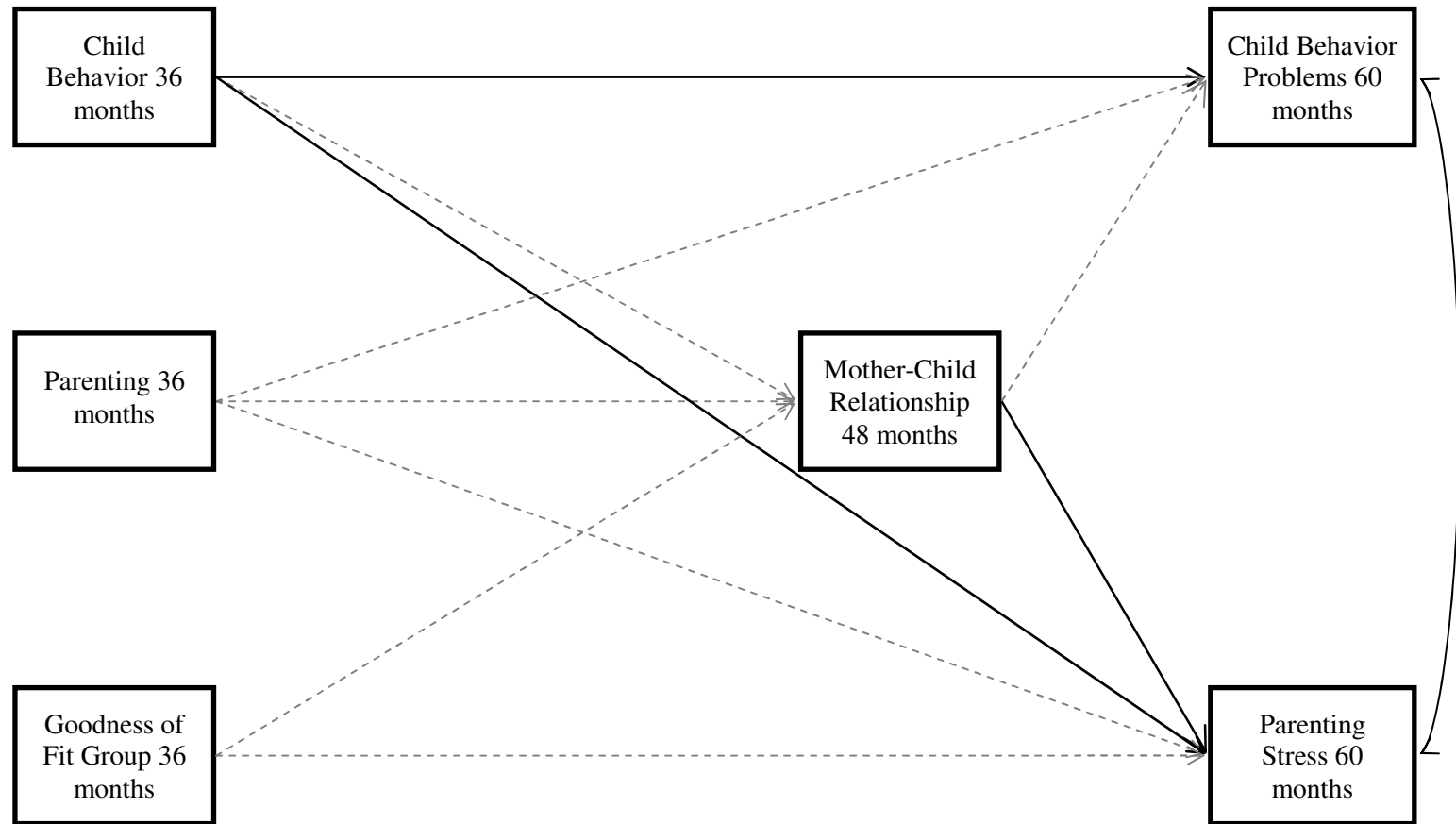


Figure 5. Model using goodness of fit index scores. Covariates are not shown for ease of readability. Black lines indicate significant path estimates at $p < .05$. Grey dashed lines indicate nonsignificant paths. Model provides an adequate fit to the data: $\chi^2(4) = 2.26$, $p = .69$, CFI = 1.00, RMSEA = .00, SRMR = .01.

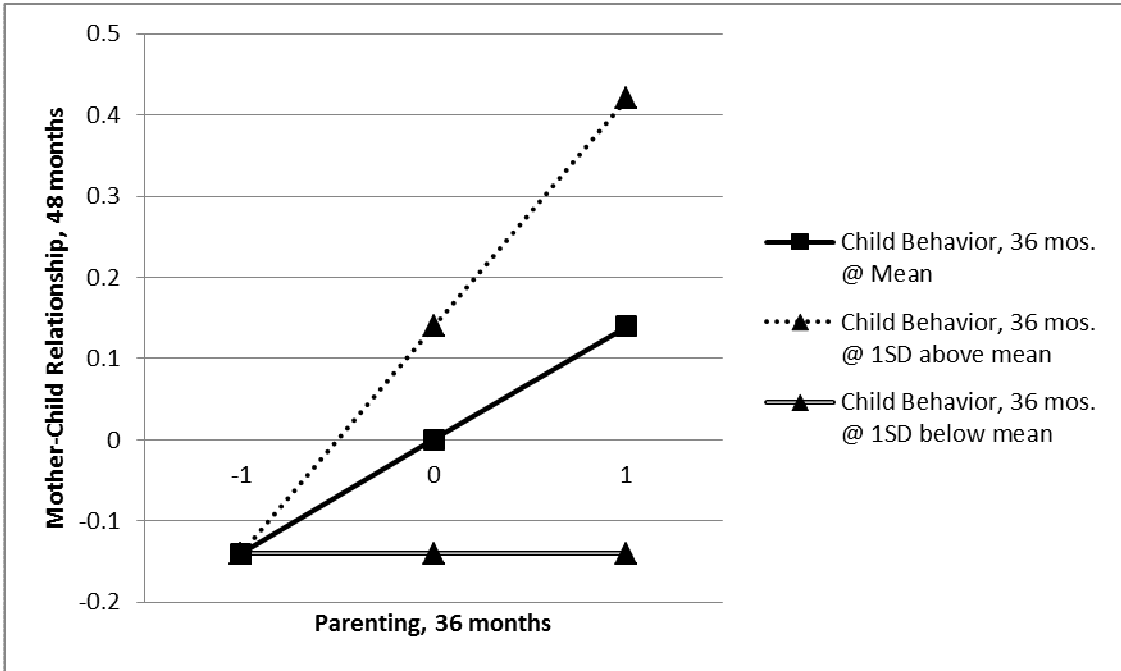


Figure 6. Probed interaction in the DD group between child behavioral traits and supportive parenting at 36 months on the mother-child relationship at 48 months.

APPENDIX A

PARENT-CHILD INTERACTION RATING SYSTEM USED TO CODE CHILD
BEHAVIORAL CHARACTERISTICS, SUPPORTIVE PARENTING, AND MOTHER-
CHILD RELATIONSHIP QUALITY

PARENT RATINGS

Positive Affect

Expression of positive regard or affect, warmth, affection. The parent's positive feelings toward the child, expressed during interaction with the child, taking into account particularly the intensity of these feelings. Speaks in warm tone of voice, has expressive face, smiles, laughs, with child, is relaxed and at ease, is enthusiastic about child, praises child, seems to enjoy child, listens, watches, remains attentive, looks into child's face when talking to him/her, spontaneity refers to taking advantage of an opportunity for interaction as it is presented. Keep in mind the uniformity of positive affect, and also be aware of a the "brightness" in vocal quality.

Positivity Ratings

- 1** = Not at all positive -- Parent does not display true positive regard for the child, either in words or expressions. If positive expressions (laughing, smiling) do occur, they appear to be inappropriate to the situation or an inaccurate reflection of the parent's feelings.
- 2** = Minimally positive (lukewarm) -- Infrequent or weak signal(s) of positive affect are shown. The intensity and frequency are low.
- 3** = Moderately positive -- greater frequency and intensity of positive affect is shown, as compared to the rating of 2, but the parent demonstrates virtually no spontaneity.
- 4** = Very positive -- greater frequency and intensity of positive affect is shown, compared to the rating of 3, also evidence of some spontaneity is observed in parent's demonstration of positive affect. What makes this rating different than a score of 5 is that the parent is not characteristically positive; there may be rare moments of flat negative affect.
- 5** = Predominantly positive -- Parent is predominantly positive, both in terms of facial and vocal expressiveness. The parent does not appear to be bored, discontent, or vocally harsh, and disruptive. Affect is consistently positive and spontaneity is characteristic and appropriate. Parent shows a range of expressions that are virtually always positive.

Sensitivity

The key defining characteristic of a sensitive interaction is that it is child-centered. The sensitive parent is tuned to the child and manifests awareness of the child's needs, mood, interests, and capabilities, and allows this awareness to guide his/her interaction with the child.

If the child is upset, the parent takes time to soothe and calm the child. The parent responds to signals of the child's distress (e.g., crying, fretting, frowning) by acting a) promptly; b) appropriately; and c) consistently. (Mild fussing does not require the parent to respond as quickly as does the child's acute distress).

If the child initiates social gestures and expressions (e.g., looking at the parent, smiling at the parent, talking, reaching toward the parent, waving, clapping hands, handing objects), or makes demands, demonstrates desires or requests (e.g., stretching arms to be picked up, reaching for toys the parent is holding, asking for something), the parent responds appropriately.

If the child is uninterested, the parent takes time to re-engage the child in a manner that demonstrates sensitivity to the child's mood. When the child is bored or frustrated, the parent offers toys or other distractions. When a child is interested and involved with toys, the sensitive parent allows the child to independently explore the toys. During play, the sensitive parent provides one toy or game at a time and bases continuation on the child's response. How the parent gears the play and what they gear the play towards is determined by whether or not the child seems to be enjoying the activity. The parent does not persist with an activity or toy that the child is obviously not enjoying.

A sensitive parent provides stimulation that is developmentally appropriate and facilitates exploration and actions that the child is capable of achieving. She/he may encourage the child to develop new skills, but does not evidence expectations that are clearly beyond the child's developmental capabilities. A sensitive parent provides the child with contingent vocal stimulation and acknowledges the child's interest, efforts, affect, and accomplishments.

Sensitive parents can spend some time watching the child, but the difference between them and the detached parent is that the sensitive parent seems to be actively taking an interest in the child's activities, as evidenced by comments and embellishments when the child loses interest. It is at these times-- when the child loses interest or is detached-- that the difference between the sensitive parent and the detached, understimulating parent is most easily seen. The detached parent is either not responding, responding in a listless manner, or responding with developmentally inappropriate comments and behavior.

Sensitive interaction is well-timed and paced to the child's responses, a function of its child-centered nature. The parent paces games or toy presentation to keep the child engaged and interested, but also allows him/her to disengage, to calm down, and reorganize his/her behavior. Sensitivity involves judging what is a pleasurable level of arousal for the child and helping the child to regulate arousal and affect. When the child loses interest, the sensitive parent switches to a new tactic or toy and observes the child's reaction.

Markers of sensitivity include acknowledging child's affect; contingent vocalizations by the parent; facilitating the manipulation of an object or child movement; appropriate soothing and attention focusing; evidence of good timing paced to child's interest and arousal level; picking up on the child's interest in toys or games; shared positive affect; encouragement of the child's efforts; providing an appropriate level of stimulation when needed; sitting on floor or low seat, at child's level, to interact.

Thus, the sensitive parent demonstrates the ability to adapt interactions to child's mood and level of development. The parent neither over- nor under-stimulates. The parent knows when it is time to increase or reduce the amount of stimulation the child is experiencing. For example, parent discontinues an activity that is beyond the child's capacity for response or introduces a new activity when child appears bored.

Ratings for sensitivity should be conceptualized as falling on a continuum of low to high levels of sensitivity. Insensitivity, as opposed to a lack of sensitivity, is captured elsewhere.

Sensitivity Ratings

- 1** = Not all characteristic-- There are almost no signs of parent sensitivity. The parent rarely responds appropriately to the child's cues.
- 2** = Minimally sensitive/responsive-- Parent is occasionally sensitive; maybe 1 or 2 instances of sensitivity.
- 3** = Parent is moderately sensitive and responsive to child; Inconsistently sensitive, hard to categorize.
- 4** = Mostly sensitive/responsive-- Here the balance shifts to the parent being more often sensitive than not.
- 5** = Highly sensitive/responsive-- The parent displays consistent sensitivity to the child throughout the rating period.

Detached Manner

The detached parent appears unaware of the child's needs for appropriate interaction to facilitate involvement with objects or people, or parent is unable to provide such interaction. Parent is disengaged from the child. Behaviors typical of detached parents include not facing or making eye contact with the child, and/or not talking to the child. This parent does not react contingently to the child's vocalizations or actions, and does not provide the scaffolding needed for the child to explore objects. Detached, under stimulating parents "miss" the child's looks towards them or reaches towards a toy, and their timing is out of synchrony with the child's affect and responses (although not the overwhelming barrage of stimulation that intrusive parents present). The detached, under stimulating parent is passive and his/her non-involvement lacks the alertness of that of the sensitive parent.

Detachment and under stimulation can be marked by putting the child so he/she faces away from the parent; presenting toys without first engaging the child, or without showing, or explaining to him/her how to manipulate or use the toys; rarely talking to the child; not responding to the child's comments, smiles, or reaches for toys; an unawareness of the child's capabilities and developmentally appropriate activities; positioning the child so that he/she cannot reach, manipulate, or use a toy. Behaviors such as cleaning, soothing, talking to, or feeding the child are carried out in a mechanical, detached, distant manner without social interaction. Parents ignore the interesting things the child does, and let the child play unsupervised. Simply going through the motions when interacting with the child. Also, think about bids for interaction on the part of the child toward the parent; the detached parent will remain detached even in the face of these.

Detached Ratings

- 1** = Not at all detached -- There are virtually no signs of parent detachment or under-involvement. When interacting with the child, the parent is clearly involved.
- 2** = Minimally detached -- While the parent is sometimes non-involved, the parent is clearly more involved than not.
- 3** = Equally detached and involved -- The parent demonstrates the ability to remain involved and interested in the child as well as demonstrating the tendency to act in an uninterested or detached manner. Difficult to characterize.
- 4** = Moderately detached-- Here the balance shifts to the parent being relatively more non-involved than involved.
- 5** = Highly detached-- The child lies or sits without parent attention virtually all of the time, while the parent remains within a suitable distance for interacting. In the

minimal instances of involvement, parents' behaviors are simple, mechanical, stereotyped, bland, blank, and repetitive.

CHILD RATINGS

Negative Mood

This scale assesses the extent to which the child cries, fusses, tenses body while crying, throws “temper tantrums,” and otherwise expresses his/her discontent. Bear in mind the frequency and intensity of negatively affective behavior when making this rating.

Negativity Ratings

- 1** = Not all discontented -- no signs of negative affect.
- 2** = Occasional mild distress -- minimal level of fussiness, easily soothed, may be upset for brief periods of time. Mild negative affect.
- 3** = Moderately distressed -- upset and negatively affective for under half of the epoch; increased levels of intensity during episodes of negative affect; child is soothable.
- 4** = Noticeably distressed -- displays negative affect for half or more than half of the epoch; periods of negative affect are characterized by increased intensity and frequency from a rating of 3; child needs persistent parental soothing to calm, and thus can show some periods of calmness.
- 5** = Constantly negative -- crying, or angry most of the observation; much stronger and more explicit expressions of anger or distress, which could include, but is not limited to more screaming, hostile verbalizations, or intense body language; resistant to parental attempts to soothe; rarely to never content or positively affective.

Lively/Active

The extent to which the child is motorically active during the observation. This includes: the speed of motor activity (moving fast, whether walking, crawling, squirming, or running), the frequency of motor activity (spending a lot of time in high-energy activities), the amplitude or intensity of motor activity (jumping high, bouncing vigorously), the duration of motor activity (persisting in energetic activity longer than other children), the preference for motor activity (choosing high-energy games, activities), and a negative reaction to enforced non-activity (reacting with restlessness). Be aware that these ratings are context-sensitive within each episode, different activities pull for a different level of motor activity (e.g., dinner table vs. playing outside). Structured activities (e.g. board game) may look different.

Activity Ratings

1 = Not all active/lively-- Child typically stays in one place not moving arms, legs, hands or feet; sits quietly.

2 = Minimally active/lively-- Child exhibits some active movements but periods of non-movement exceed those of movement.

3 = Average-- About average in activity, sometimes active, sometimes inactive; difficult to characterize.

4 = Moderately active-- Child is predominantly active but has a few periods of inactivity. Periods of movement exceed those of non-movement.

5 = Highly active-- Child is constantly moving some body part, something is moving at all times; Child prefers active games and activities to non-active ones.

Sustained Attention

This scale assesses the child's sustained involvement with the physical world and objects. The involved child initiates contact with objects and sustains it. If objects are within reach, the child seeks the toys out, looks at them, touches them, explores them; and may comment on them. He/she seems interested in the objects and what can be done with them. Sustained attention or involvement can also include attention to the parent. Enjoyment and interest are separate, but related constructs to higher levels of sustained attention. Therefore, enjoyment/interest and sustained attention do not need to co-occur, but quite often will and this can be used for discriminating judgements.

The uninvolved child may appear apathetic, bored, distracted, or distressed. Be aware that these ratings are both context-sensitive and age-dependent.

Attention Ratings

1 = Not characteristic -- Child does not display sustained attention. Instead, she/he moves from object to object in a non-systematic manner, without seeming to focus on what the objects have to offer.

2 = Minimally characteristic -- Child is minimally involved with objects and sustains attention for only brief periods of time, or displays only one incident of any marked attention.

3 = Somewhat characteristic -- Child maintains involved for relatively longer periods of time than a rating of 2, but does experience some periods of distraction.

4 = Moderately characteristic -- Child maintains more time involved in interactions with things and seems to enjoy them. Child is more involved than not.

5 = Highly characteristic -- The child is clearly involved, interested, and/or focused for most of the time. Child is interested, and/or focused for most of the time. When child is playing with objects, he/she is interested in playing with objects; when eating, he/she is interested in eating.

DYADIC RELATIONS

Dyadic Pleasure

Enthusiasm, joyfulness, mutual enjoyment, a sense of dyadic 'joie de vivre.' A general sense that these two people enjoy being with one another. This may be reflected in energy level, facial expressions, cheerfulness, positive tone and content of conversation between the two individuals.

Pleasure Ratings

- 1** = No mutual enjoyment and/or dyadic enthusiasm (no smiling, no animation).
- 2** = Slight mutual enjoyment and/or dyadic enthusiasm (1-2 smiles, slight animation).
- 3** = Moderate enjoyment and/or enthusiasm (3-4 smiles, moderate animation) across more than 1 situation/interaction, or one extended period of mutual enjoyment.
- 4** = Considerable enjoyment and/or enthusiasm.
- 5** = Characteristically joyful and enthusiastic.

APPENDIX B
MATERNAL SCAFFOLDING CODING SYSTEM

Maternal Scaffolding Coding System

Overview

The scales described here are designed to assess the effectiveness of maternal scaffolding of toddler play. The concept of scaffolding used here is defined as the process of providing the support and assistance necessary to enable a child to succeed at a level beyond what he/she can attain independently. Effective scaffolding involves a process of simultaneously monitoring both the difficulty level of the task and the child's independent ability to succeed at that task, and then providing appropriate assistance and support so that the child can (at least partially) bridge the gap between these two. To be effective, scaffolding support must be presented at a pace that is supportive and facilitative to the child, rather than intrusive, and at a level of complexity that is understandable by the child.

We define **motivational support** as the scaffolder's ability to recruit the child's interest in the chosen task and to maintain the child's enthusiasm for and engagement with the task. A scaffolder who provides effective motivational support is able to clearly communicate the nature and purpose of the task, to offer frequent and appropriate encouragement to the child, to praise the child's attempts at the task (even when not successful), to maintain a high degree of enthusiasm for and persistence toward the end-goal herself, and to modify the end goal of the task as necessary to keep a moderately challenging task before the child.

Technical support is defined as the scaffolder's ability to structure and simplify the task so that it is "do-able" by the child, that is, within the child's ability to complete with the support provided by the scaffolder. Effective technical support includes explicit, well-timed demonstrations of the steps of the task, structuring the task into a series of sub-steps and filling-in those sub-steps that are too difficult for the child (simplification), giving feedback to the child about the task (marking critical features), and smooth organization of and transitions between tasks.

Emotional support is defined as the scaffolder's ability to make the experience a positive and enjoyable one for the child and one which will contribute to the child's sense of accomplishment and effectance. A scaffolder who provides effective emotional support shows a high acceptance of and value for the child's attempts to do the task even if incorrect (e.g., non-critical tone of voice, patience, regular and genuine praise), high sensitivity to the child's emotional state, including responses that effectively reduce child frustration (e.g. empathy), and frequent eye contact, shared smiles or other signs of affective sharing and attunement.

To obtain the highest effectiveness scores, a scaffolder needs to appropriately coordinate these three aspects of support such that no aspect of support is compromised or ignored and that the various types of support are smoothly and appropriately integrated. For mothers who receive high effectiveness ratings, the responses of their children are positive-- their children understand what is expected of them, show a willingness to keep trying to achieve the end goal or participate in the activity (if there is

no end goal), succeed in completing at least part of the steps involved in the task of activity, and show signs of enjoyment and feeling good about themselves (e.g., mastery smiles, enthusiastic gestures), regardless of how successful they actually are.

Each component of scaffolding (i.e., motivational, technical, and emotional support) is evaluated using a 5-point scale. Descriptions of the scale sub-components for the low (score 1), medium (score 3) and high (score 5) points on the scale are to be consulted when assigning scores. Scores of 2 and 4 are given when the observed behavior falls midway between two defined scale points.

MATERNAL CODES

I. Motivational Support Scale

Score 1:

- A. Engagement with the task (as designed by mother) is minimal. The mother has difficulty keeping her child engaged in the task for more than brief periods of time. Even then, the level of child engrossment tends to be low (i.e., the child is very casual about his/her manipulations of the toy, or the child is easily distracted). When attempting to switch to a new toy, the mother loses her child's attention in the process. If the child continues to work on the task throughout all or part of the session, it is a reflection of the child's independent motivation rather than the mother's ability to motivate the child.
- B. The mother shows little persistence herself when working on the task. She shows little follow through, having once recruited (or attempted to recruit) her child. She may give up trying to recruit, she may try to switch to a new toy(s), or she may become uninvolved, as if to allow her child to pursue his/her own interests independently. This is most likely to be the case if her attempts to refocus and keep her child engaged are not successful. In this latter case, the mother and child appear to be unengaged or detached for a significant part of the session.
- C. The overall goal of the task is not clearly communicated to the child. An occasional attempt to communicate the overall goal may be made using demonstrations, however, it is unclear. A verbal explanation does not usually accompany it or the mother relies on repetitious, vague statements. The mother may make brief, initial statement of the overall goal (such as, recruitment attempt as a statement of end goal. The child appears to not understand what is expected of him/her. (This score implies that the mother is either unable or unwilling to communicate the end goal clearly and specifically enough so that the child has a sense of the end goal).
- D. Attempts to refocus the child attention back to task or to switch attention to a new task are generally ineffective. Whether the mother uses this technique frequently or infrequently her attempts are generally not successful. The child

tends to not comply with her requests, and may either pursue his/her own interests or generally uninvolved during the session.

- E. Encouragement and praise are given infrequently, and they may be given at inappropriate times (e.g., failing to reinforce or encourage after several successful at sub-steps of the task, then given a strong, almost overly-enthusiastic praise for a minor sub-step). The mother's tone of voice may be impatient or half-hearted. When praise is used, it tends to be implicit (e.g., a head nod or an "OK") rather than more enthusiastic and explicit praise (e.g., "Good Boy!", "You did it!").
- F. Modification of the end goal is inappropriate or does not occur when needed. The mother fails to set a goal of appropriate challenge for her child: If the initial task is too easy and the child masters it fairly quickly, the mother makes not attempt (or only a weak attempt) to change the end goal or introduce a new task. She fails to set a goal of appropriate challenge for the child.

If the chosen task is too difficult for the child, the mother does not modify the end goal of the existing task (e.g.; change the goal from putting all the legos together to putting them together in sets of two) nor does she introduce a new, easier task. Again, the mother fails to set a task of appropriate difficulty.

If the chosen task is the appropriate level of difficulty, the mother **inappropriately** attempts to switch the child to a different task before the child has had sufficient opportunity to try the current one. (In the latter case, the mother may give the impression of being disorganized--see Organization in Technical Support).

Score 3:

- A. Engagement with the task is moderate. The mother is able to keep the child engaged and working on the task for about half of the session, although she loses the child's interest for part of the session, or the child shows some work on a task independent of the mother's motivational attempts.
- B. The mother shows moderate persistence at the chosen task, showing some willingness to stick with it even if the child is having difficulty or is becoming disinterested. If the mother switches to a new task, it is only after a period of trying to stick with the existing task. If the mother chooses to switch tasks, she loses the child's attention at least temporarily during the transition.
- C. An attempt to communicate the end goal is made, but the communication lacks clarity or is incomplete (e.g., the mother may communicate the sub-

steps fairly clearly but not the overall goal). However, the child is usually able to infer the end goal from nonverbal cues (e.g., demos, prompts, and gestures) and appears to understand what is expected of him/her.

- D. Attempts to refocus the child's attention on the task are moderately effective and their frequency is generally appropriate. The child is compliant to some maternal requests for attention and attempts at task. However, the mother is **not** able to keep her child engaged with the task for the entire session. Either the child's attention wanders to a new task or the child resists some of the mother's attempts to refocus.
- E. Encouragement and praise are moderately frequent and generally appropriate in timing. Explicit praise is used at least some of the time. The mother may miss some instances, which deserve praise or she may "over-reinforce" a bit and, consequently, interfere with the child. However, the mother's encouragement and praise appears to contribute to the child's continued work on the task, or the child shows some renewed enthusiasm for the task.
- F. Modification of the end goal is moderately appropriate and the mother sets an appropriate difficult task for the child for at least half of the session:
If the initial task is too easy, the mother makes more than one attempt to change it or introduce a more challenging task, and the attempts are at least partially successful (i.e., the child gives some attention to the new task or tries it briefly, at least).
If the initial task is too difficult, the mother is able to introduce a new task moderately easy or fill in for the child. However, timing may be somewhat inappropriate (i.e., attempts to modify the goal too soon). The mother has some difficulty recruiting the child to the new task.

Score 5:

- A. Engagement with the task is high. The mother is able to keep the child engaged and working on a task for all (or almost all) of the session (very brief periods away from the task are OK). The child's enthusiasm is generally quite high. If the child's attention wanders, the mother is able to easily and smoothly draw the child's attention back to the task. If the mother switches toys, she is able to keep her child interested through the transition and the child easily engages with the second toy.
- B. The mother is very persistent in her attempts to keep her child interested and engaged. She shows persistence in working toward an end goal, often staying with the same toy for the entire session and working toward completion of the task. The mother continues to work to keep her child focused and working toward the end goal, even if her child's interest wanes.

- C. Communication of the end goal is clear and appropriately timed. The mother tells (and may also demonstrate) what the end goal is early on in the session. She also clearly communicates the necessary sub-steps leading to the goal. (Explicit demonstrations, pointing or gesturing, and clear verbal about end goals is appropriate and effective (i.e., they are frequent enough so that the child has a clear sense of what the necessary steps are without being overloaded with information about what to do next).
- D. Attempts to refocus the child back to task are very successful. The mother is able to quickly and effectively draw her child's attention back to task should his/her attention wander. A positive tone of voice is used (i.e., not critical or impatient) and the child is readily compliant to most requests.
- E. Encouragement and praise are given frequently and enthusiastically. Explicit praise, which is genuine and enthusiastic, is used. Praise is well-timed and effective, occurring continually to child attempts and success at task. Praise serves to keep the child motivated and interested in continuing work on the task.
- F. Modification of the goal or the setting of a new goal is very appropriate, based on the child's ability to succeed at the appointed task. The mother is able to keep an appropriately difficult task before the child throughout the session. For example, the mother quickly simplifies a goal that is initially too hard. Likewise, if the child seems to have mastered a task, the mother either increases the complexity or difficulty of the existing task or presents a new task that is challenging for the child. The mother's timing and pacing during the goal modification is excellent and the child is easily recruited to and remains engaged with the new task.

II. Emotional Support

Score 1:

- A. Little or no acceptance of the child is indicated by the mother, which can be shown in one of the following ways.
 - 1. The mother often rejects the child's attempts at task either by giving feedback to the child that is rejecting or negating in tone, by responding to child attempts with "No", by physically blocking the child's attempts at task, by "undoing" the child's attempts (e.g., taking cups out, undoing legos) presumably because the child has not done it "right", or chastising the child in some way. These mothers are often intrusive, physically and/or verbally. Their feedback lacks constructive comments and the child is left knowing what not to do but is given little or no information about how to do the task correctly. The mother's tone of voice is

impatient or abrupt, and she seems to place little value on the child's ideas or strategies about how to do the task.

2. Alternately, the mother shows little acceptance and support of the child and his/her attempts at task. In this case, the mother is under-involved and appears to be emotionally detached. Emotional detachment is often indicated in body posture, such as, sitting up and away from the child or off to the side of the child, and making little eye contact with the child.
- B. Praise is given infrequently and may be completely absent. If it does occur, it is implicit (e.g., a nod of the head or a shrug) or it lacks enthusiasm (e.g., half-hearted or impatient in tone).
 - C. Little sensitivity to the child's emotional state is observed. The mother appears either to be unaware of her child's emotional feelings or ignores them. She may be detached and unsupportive or she may be involved but insensitive to the child's emotional state. She makes no attempt to reduce the child's frustration if it occurs (e.g., she fails to empathize with the child and fails to appropriately reduce the degrees of freedom for the child). She may contribute to the child's sense of frustration through inappropriate pacing or timing of her scaffolding behaviors (e.g., continuing to push the child despite signs of frustration, or interfering with child attempts despite some degree of success on the child's part). The child may direct his/her frustration toward the mother by hitting her, kicking her, pushing her away, or other aggressive behavior. Often, these mothers seem uncomfortable with their child's frustration and seem to lack strategies for effectively handling it. They may respond to their child's frustration with frustration of their own.
 - D. Mutual eye contact may occur occasionally during the session, but there are no shared smiles or "four-eyed" smiles. If the child does share an emotional expression with the mother, it is rarely reciprocated.
 - E. Little vicarious enjoyment of the child's successes (or partial successes) is shown. The mother shows little or no vested interest in how well her child succeeds and little or no enthusiasm for the task.
 - F. The mother's contribution to her child's sense of accomplishment and mastery is minimal. If her child does succeed, she does not respond in a manner that would contribute the child's positive feelings about his/her own sense of effectance. Some mothers who receive this score may simply lack positive responses to success. Others who receive this score may respond in negating, critical, or mocking ways that would be expected to be destructive to the child's sense of effectance.

Score 3:

- A. Moderate acceptance and support of the child is shown by the mother. However, the mother's acceptance and support is either an inconsistent during the session or is consistent, but at a moderate level only.
- If inconsistent:** The mother is tuned in, supportive, and accepting during part of the session, but is also tuned out, detached, impatient, rejecting, or negating at other times.
- If consistent:** The level and quality of emotional acceptance and support is moderate. In this case, the mother generally accepts the child's attempts at task, however, she may be matter-of-fact in tone, or restricted in emotional expression or a little impatient (e.g., too task-directed). She does not outrightly reject her child's attempts at task, however, her indications of acceptance may be implicit rather than explicitly stated.
- B. Some praise is given to child, however it is either consistent but restricted or inconsistent and conditional.
- If consistent but restricted:** Frequency of praise is consistent but it is restricted in emotional expressiveness (i.e., not delivered in an animated enthusiastic way). It may seem perfunctory.
- If inconsistent and conditional:** Praise is given inconsistently during the session, which may take several forms—e.g., the mother withholds praise until full completion of the task, failing to praise the child for success on intermediate steps of the task; or the mother praises some steps toward completion, delivering more praise seems appropriate for these steps; or the mother praises intermediate steps more than full completion, delivering more praise than seems warranted for the intermediate steps. (One mother was observed to reinforce her child's success only on the substeps of the task on which the mother had helped him succeed, but to withhold praise when the child succeed on his own).
- C. Moderate sensitivity to the child's emotional state is observed. For part of the session, the mother appears to be sensitive to the child's emotional state and responds appropriately at least half of the time. The mother makes at least one attempt to reduce her child's frustration, however she does not respond on an emotional level (e.g., by making an empathetic statement). Instead, reducing frustration takes the form of technical support (e.g., filling in for the child, repeating a demo, or marking a critical feature). Attempts to reduce frustration are somewhat successful in that the child returns to task and tries again at least for a short period of time. At other times, the mother seems insensitive and unaware of her child's emotional experience. Her pacing and timing or scaffolding behaviors may contribute to her child's frustration.

- D. Affective sharing occurs at a moderate level. The dyad shares some mutual smiles and makes eye contact more than occasionally. Some emotions, especially positive ones, are reciprocated, although some of the mother's responses lack enthusiasm or are a bit curtailed or perfunctory. The mother may also be inconsistent, responding contingently and enthusiastically to the child some times yet failing, to respond or responding in a restricted way other times. Some mothers who fell in this category were observed to occasionally respond in what seemed an incongruous manner, that is, an overly bright response or an appropriately timed response. (If inappropriateness and/or incongruity of responses were frequent, the mother would receive a lower score). The child does not seem hesitant to share emotional expressions with the mother.
- E. Moderate vicarious enjoyment of the child's success is shown. The mother shows moderate enthusiasm for her child's attempts, indicated by sustained attention. However, the mother does not seem especially vested in whether her child does well at the task and her indications of vicarious enjoyment tend to be expressed briefly (e.g., a fleeting smile or quick nod of the head) or are somewhat restricted in expression (e.g., mother looks away or down as she smiles at her child's attempts, rather than enthusiastically stating her pleasure).
- F. The mother's responses contribute moderately to her child's sense of accomplishment and mastery. However, her responses to success are either inconsistent or her response is at times restricted, low-level, or conditional. At times, she may appear to value the end goal over the quality of her child's emotional experience.

Score 5:

- A. Acceptance and support of the child is very high. The mother uses a positive tone of voice throughout, even if her child is not particularly cooperative. She is very supportive of her child's attempts and respects her child's ideas and strategies about how to solve the task (for example, she may modify the approach she is taking to include a strategy offered by her child). When she does give feedback to the child, it is done in a sensitive and supportive way and feedback is excellent, and is not distracting to the child's attempts to work on the task. (See comments below re: contributions to child's sense of effectance). The mother is not rejecting of, critical of, or impatient with the child (e.g., she does not mock her child's attempts).
- B. Praise and encouragement are give frequently and enthusiastically. Praise is often explicit and is used regularly throughout the task, but is not so frequently as to be distracting or disruptive. The timing of praise is very

appropriate and may result in the sharing of positive emotion between mother and child (e.g., “four-eyed” smiles).

- C. High sensitivity to the child’s emotional state is shown. The mother seems very tuned into her child’s emotional state. For example, if the child becomes frustrated the mother is quick to offer encouragement, reduce degrees of freedom, or offer other support. If the child seems to need a brief respite from the task, the mother is quick to offer a temporary alternative or allow a brief diversion. Mothers who receive this score are able to effectively reduce their child’s frustration, and often respond to child frustration with an empathetic statement in addition to any filling in or other technical support they may give. They are also likely to verbalize feelings about the tasks (e.g., “You like that, don’t you?” or “I know...it’s hard”).
- D. Affective sharing occurs regularly throughout the session and it is positive and enthusiastic in tone. Much mutual eye contact occurs, fairly frequent positive emotion is shared (e.g., “four-eyed smiles”) and the dyad may share some negative emotion, such as frustration. However, if the child is frustrated, it is clear that he/she is frustrated with the task and does not direct that frustration toward the mother in any kind of angry or aggressive gesture. Rather, the child seems to look to the mother for help and support when frustration is encountered. Neither the mother or child show signs of restricting emotional communication with each other. The mother and child seem to be having fun together.
- E. The mother seems to derive much vicarious enjoyment from her child’s success (partial or complete). She seems very invested in the outcome of her child’s attempts and shows high enthusiasm for the task. She seems to take her job of providing needed support seriously, in that she wants her child to succeed and shows a strong commitment to her part in making that happen. She tends to express her delight and pleasure openly.
- F. The mother’s response to her child’s success contributes strongly to the child’s sense of accomplishment and mastery. She creates a positive environment for work on the task. Her responses are consistent, enthusiastic, and explicit. (For example, she tends to directly attribute success to the child by using “you” statements, e.g., “You did it!”). Even if her child does not succeed technically, he or she still derives feelings of pleasure and accomplishment from working on the task. She clearly values the quality of the emotional experience that the child has while working on the task.

III. Technical Support

Score 1:

- A. Demonstrations are ineffective. They are poorly timed, are performed without explanation, and/or are infrequent. Those demonstrations that are done may be repetitive or done so quickly or incompletely that the child cannot derive much knowledge of the task from them. The mother often fails to get her child's attention before doing a demonstration (as if she is doing it for herself) or she fails to give other forms of technical support (e.g., a verbal explanation) to accompany the demo. After the demo, the mother's behavior may imply an attitude towards the child of "it's all yours...I've done my part".
- B. Marketing of critical features is very infrequent. Any attempts at marking critical features are ineffective due to lack of explicitness (e.g., no accompanying verbal explanation), poor timing or poor relevance of the information to the specific obstacle facing the child.
- C. Simplification (or reducing degrees of freedom) is either done infrequently and is ineffective, or is so frequent that the mother virtually does the task for the child.

In the first case, the mother does not break the task down into steps that are easily completable by the child, or her attempts to fill in or break steps down are poorly timed, or the steps are of an inappropriate size, or the mother shows considerable disorganization of substeps. For example, the mother may make a few weak efforts to break steps down for the child but she offers no additional technical support to supplement the attempt to fill in. or the mother may overlook many instances in which her child was not able to do the task. The mother is likely to be "under-involved" and she may be repetitious in her attempts to break down the task.

In the second case, the mother oversimplifies and fills in for the child too much, completing the task for the child. Her pace is likely to be too fast and she appears to be "overloading" the child. The child either no longer finds the mother's intrusiveness and over-assistance. In the situation, many children show signs of frustration or boredom.

Simplification usually does not result in much success by the child, due to inadequate support by the mother.

- D. Organization of the tasks is very poor. The mother shows no signs of advance planning concerning selection of tasks or physical arrangement of tasks. Her task selection lacks continuity (fragmented) and may be abrupt. The mother may collect some things together at the start, but even then she does not appear to have thought out what and how she will present the task.

Score 3:

- A. Demonstrations are moderately effective, resulting in some goal-directed effort by the child. However, the mother shows some inconsistency in the quality of her demonstrations or in the appropriateness of their timing. Some of her demonstrations are well timed (occurring when the child needs additional information about how to do the task) and are clear. However, at other times, the mother misses instances in which a demonstration is needed, or her demonstration is repetitive or a bit confusing.
- B. Some marketing of critical features occurs, however, they are inconsistent in quality or are of moderate quality only. Explicitness, timing, and relevance of the marking either consistently lack quality, or quality is inconsistent and variable. For example, explicitness may be consistently vague or alternate between very explicit and very confusing. Timing may be well synchronized at one point and intrusive or distracting at another point. Relevance of the information being presented may be very high at one point, yet seem irrelevant or lacking at another. Mothers who receive this score often show a combination of the above, e.g., scoring fairly high on timing of marking critical features but only moderately or even poorly on explicitness or relevance.
(For score 3, the mother **does** make some attempt to mark critical features. If not, or if the attempts are vague, then she would receive a lower score).
- C. Simplification by the mother partially meets the child's need for help and filling in, however, the mother's support is lacking in frequency (amount), clarity, timing/pacing, or organization of the substeps. For example, the mother may be inconsistent, doing an adequate job of filling in and simplifying for part of the session but failing to fill in adequately during other parts of the session. Alternately, the mother may show some disorganization in her attempts to break the task down into substeps, or may move to the next sub-step too quickly, or may offer too much help at times. Consequently, the child may achieve partial success on the task, but the task is sometimes too hard for the child or the task is oversimplified at times and **completion** of the task by the child is usually not achieved.
- D. Organization of the task is moderate. Organization may occur several times during the session but is inconsistent in quality, or the mother may organize the first task well but show some disorganization or confusion in selecting, organizing or presenting subsequent tasks. She may "jump around" some (switching toys) or may seem to have a trial and error approach to task selection at times. However, these signs of disorganization are also accompanied by some signs of organization and advance planning.

Score 5:

- A. Demonstrations are well-timed and are consistently accompanied by a clear verbal explanation or prompt. They occur at a point when the child needs more information and are repeated as necessary. They are modified or embellished as needed, in order to give the child information about how to modify his/her attempts at task. Demonstrations typically occur in conjunction with other forms of technical support, such as, marking critical features or simplifications, and coordination between the various forms of technical support is high.
- B. Marking of critical features is explicit, well-timed, and very relevant to the obstacle or problem facing the child. The mother is very explicit in her use of this technique, she paces her explanations very well so that the child can easily understand, and the information she conveys is directly relevant to success at the task. Gestures, pointing, or demonstrations in addition to a verbal explanation are typically used.
- C. Simplification and filling in occur regularly and consistently throughout the session, as the mother sets-up and fills in appropriately for her child. Timing and pacing are excellent. The degree and level of filling in is consistently appropriate for the child's ability, that is, the mother fills in the more difficult steps, allowing the child to attempt those steps that are within his/her reach. The mother does not overstructure nor is she overbearing. Simplification usually ends in a high level of success by the child.
- D. Organization is excellent, occurring initially and throughout the session as needed. It is done smoothly, with minimal distraction of or interference with the child. Organization is also very effective, in that the mother's organization contributes positively to the child's engagement with and success at the designed task. The mother shows clear signs of advance planning in her initial selection of task and in subsequent selections (if applicable). Her decisions to switch toys are well-timed and the transitions are smooth.