Published in final edited form as:

J Appl Dev Psychol. 2009 ; 30(4): 431–441. doi:10.1016/j.appdev.2008.12.024.

Stability of maternal discipline practices and the quality of mother–child interaction during toddlerhood☆

Keng-Yen Huang^{a,*}, Margaret O'Brien Caughy^b, Li-Ching Lee^c, Therese Miller^d, and Janice Genevro^d

^aNYU Child Study Center, New York University School of Medicine, 215 Lexington Ave. 14 FL, New York, NY, 10016, USA

^bUniversity of Texas School of Public Health, Dallas Regional Campus, USA

^cDepartment of Epidemiology, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, USA

^dPopulation and Family Science, School of Public Health, Johns Hopkins University, Baltimore, MD, USA

Abstract

This study examined the stability of maternal punitive/high-power discipline (PD) and inductive/authoritative discipline (ID) over the second and third years of life and the effect of maternal discipline on quality of mother–child interactions. Data from a longitudinal sample with 179 mother–toddler dyads were analyzed, and selected factors (i.e., child sex, temperament) that might moderate the association between maternal discipline and quality of mother–child interactions were also examined. Maternal discipline, quality of mother–child interactions, and temperamental moderators were measured at 16–18 months (Time 1) and 34–37 months (Time 2). Results showed that the stability of maternal use of discipline strategies over the toddler years was moderate. Lower maternal use of PD, higher maternal use of ID, and higher preference/reliance on ID (relative to PD) were associated with higher quality of mother–child interactions. Moderation effects of child temperament were also found. High ID and PD were associated with low quality of mother–child relationships in non-temperamentally difficult children but not in temperamentally difficult children.

Keywords

Maternal discipline; Stability; Attachment; Mother–child interaction; Temperament

1. Introduction

Toddlerhood can be a time of dramatic change in maternal child-rearing practices. One important area in which maternal child-rearing may change is in discipline practices. *Discipline* has been defined as the methods parents use to discourage inappropriate behaviors and to increase desired behaviors from children (Howard, 1991, 1996). Starting in the second year of life, because of children's growing needs for independence and maternal

☆This research is based on data collected from the Healthy Steps for Young Children Program, which was funded by the William T. Grant Foundation, The Amarillo Area Foundation, The Duke Endowment, The Hogg Foundation and The McLeod Foundation.

© 2008 Elsevier Inc. All rights reserved.

*Corresponding author. Tel.: +1 212 263 4719; fax: +1 212 263 4710. huangk01@med.nyu.edu (K.-Y. Huang).

role changes (e.g., preventing injuries, teaching social values and appropriate behaviors), the use of disciplinary and parental control strategies increases (Hoffman, 1983; Klimes-Dougan & Kopp, 1999; Laible & Thompson, 2002). Because of the increasing use of maternal discipline in the second year of life, studies of the stability of discipline use and the impact of different maternal discipline strategies on mother–child interaction may have important implications for understanding processes of socioemotional development as well as helping to inform early intervention and parenting education programs (Gershoff, 2002; Holden & Miller, 1999).

1.1. Theoretical perspective on the relation between maternal discipline and mother–child interaction

Many theoretical models, such as social learning theory and the contextual model have been used to guide maternal discipline studies. *Social learning theory* proposes that children's behaviors are structured by the environment and by the models and the social training practices the environment provides (Bandura, 1989). The *contextual model* focuses on direct, mediated, and contextually moderated effects of parental discipline on children (Darling & Steinberg, 1993; Gershoff, 2002). For example, parental discipline affects children's emotional understanding, moral internalization and cognitive processes, which in turn predispose children to engage in certain behaviors (Hoffman, 1983; Kochanska & Aksan, 1995; Thompson, 1994). Other contextual factors—such as characteristics of the child, parents (e.g., belief systems) and family—also serve as predictors of whether discipline is used in the first place and as moderators of the processes in the association between discipline strategies and child outcomes (Darling & Steinberg, 1993; Gershoff, 2002).

Although these models have been useful in conceptualizing how discipline might affect child development, most existing studies have mainly focused on the direct association between discipline and child development (e.g., cognitive, emotion). Little emphasis has been placed on the processes by which discipline may affect child development. Particularly, we know very little about how maternal discipline practices influence mother–child interaction, which, in turn, would influence child development. The current study explores this potential pathway by examining the association between maternal discipline practices and quality of mother–child interactions.

One model that may be useful for exploring such pathways is the control system model (i.e., Bell & Chapman, 1986). The control system model emphasizes the reciprocal nature of interactions between mother and child. This model views parent and child behaviors as mutually regulated (Bell & Chapman, 1986). Development of children's social behaviors depends on children's emotional behaviors and parental responses/attributes. These behavioral cycles, in turn, influence the parent–child relationship and lead to specific child outcomes. Also, consistent patterns of emotional behaviors in children result in consistent patterns of parental behaviors.

In addition, the model proposes that parents have an upper and lower limit of tolerance for the intensity, frequency, and situational appropriateness of their child's behavior. These parental limits are based on expectations and determined by previous interactions. When a child violates a parent's upper limits, the parent reacts by reducing or redirecting the child's excessive behavior, so the child's behavior falls back into the acceptable range. When the lower limit of a parent's tolerance is approached because of a child's low activity, inhibition, or lack of performance, the parent may draw attention to stimuli to reward or promote the child behavior. The model also specifies the child's actions. When a parent gives a child inadequate attention, approaching the child's lower limit, the child may act in away to stimulate the parent to act (Bell & Chapman, 1986). The implication for discipline research

is that mothers may use positive *or* negative discipline strategies to change their children's behavior when the mothers' upper and lower limits of tolerance are reached. Also, children may react positively or negatively in response to their mother's discipline practices when their limit of tolerance is reached. The repeated patterns of interaction shape mother–child interaction patterns and relationships.

In addition to the concept of upper and lower limits of tolerance, Bell and Chapman underscore the importance of considering child characteristics (e.g., temperament) and context factors (e.g., family poverty) in predicting mother–child interaction (Bell & Chapman, 1986). The bi-directional and contextual emphases of this model are particularly useful for the study of maternal discipline and mother–child interaction, and suggest that maternal use of discipline strategies is related to child characteristics and has consequences for mother–child interaction. Therefore, maternal discipline use may vary by child temperament. Furthermore, children with easy or difficult temperaments may perceive maternal discipline in different ways. As a result, associations between discipline and mother–child outcome may vary with child temperament.

1.2. Empirical evidence of a relation between maternal discipline and the quality of mother–child interaction

The majority of research evidence supporting addressing maternal discipline and quality of mother–child interaction focuses on negative aspects of discipline (e.g., harsh, physical discipline) rather than the link between positive aspects of discipline (e.g., reasoning) and the quality of mother–child interaction. For example, it has been found that early maternal punitive, harsh, and coercive discipline is associated with lower quality of mother–child interaction (Crockenberg, 1987; Gershoff, 2002). Also, maternal gentle discipline is associated with greater security of attachment (Kochanska, 1995). It may be that consistent messages (e.g., warmth versus confrontation/rejection) conveyed by the mother during discipline events, as well as the emotion context of a discipline incident, influence the quality of mother–child interaction and relationships (Gershoff, 2002). It may also be that children's socioemotional responses and acceptance of maternal guidance influence maternal use of discipline practices and the quality of mother–child interaction and relationships (Bell & Chapman, 1986).

Although some evidence has documented the link between maternal discipline and mother–child interaction, several issues remain in need of further investigation. For example, the majority of studies focus on the effect of a single discipline strategy on mother–child interaction, which limits our ability to compare the effects of different discipline strategies. Critical questions remain, such as whether positive (e.g., inductive discipline) and negative aspects of discipline strategies (e.g., punitive discipline) are related to the quality of mother–child interaction equally but only differ in the direction of associations, or whether positive and negative discipline predict different domains of mother–child interaction. Furthermore, studies of preference or reliance on one type of discipline practice (defined as using one type of discipline over another type of discipline) relates to mother–child interaction are needed. Whether mothers who use more positive discipline (relative to negative discipline) on average have better mother–child interactions or relationships than mothers who use more negative discipline (relative to positive discipline) remains an unanswered question.

1.3. Empirical evidence of related moderating factors

Several potential moderators have also been explored in the literature on maternal discipline, such as child sex and temperament. Studies have suggested that child sex and temperament are associated with maternal use of discipline strategies (Dumas & Wekerle, 1995; Gershoff, 2002; Grusec & Goodnow, 1994; Smith & Brooks-Gunn, 1997). For example, boys and

children with difficult temperaments are more likely to be disciplined in coercive and power-assertive ways by their mothers compared to girls and children with less difficult temperaments (Bell & Chapman, 1986; Day, Peterson, McCracken, 1998; Lytton & Romney, 1991). However, moderating relations between these factors and maternal discipline and quality of mother–child interaction need to be further explored, especially over time. For example effects of child sex may interact with child temperament (e.g., boys are more likely to have higher activity/arousal level than girls) in moderating the association between maternal discipline and mother–child interaction (Eaton & Ennis, 1986). Kochanska (1995) found that child fearfulness moderated the association between maternal gentle discipline and moral internalization in that the link was only significant for low fearful children, and Larzelere (2000) reported that spanking reduced antisocial behaviors in difficult children but increased antisocial behaviors in less difficult children. However, these studies did not report how child temperament moderated the association between discipline and mother-child interactions, nor did they report the moderation effect over time.

1.4. Stability of maternal discipline

Although toddlerhood can be a time of dramatic change in maternal discipline practices, we know less about the stability of maternal discipline practices during this critical time. Stability research from parenting literature has found that relative stability (operationalized as the consistency of rank order) tended to be higher than absolute stability (the change in mean value) in parenting measures (Dallaire & Weinraub, 2005; Holden & Miller, 1999; Loeber et al., 2000). In addition, positive aspects of parenting (e.g., sensitivity) are more stable than negative aspects of parenting (e.g., hostility) (Dallaire & Weinraub, 2005). Furthermore, maternal control strategies shift between physical and verbal control as children get older (Kuczynski, Kochanska, Radke-Yarrow, & Ginius-Brown, 1987). The proportion of maternal control strategies with *verbal* components increased with age of child, whereas the proportion of control with *physical* components decreased with age. In addition, the stability of the use of *parental control* strategies, assessed by correlations, ranged from .20 to .82 (with an overall effect size of .54) (Holden & Miller, 1999). Reasons for a wide range of stability may have been differences in methodology (e.g., observation vs. self-report) and different intervals between assessment time points (Holden & Miller, 1999).

Although existing evidence suggests some stability in parenting, there is also evidence that suggests *parenting styles* (defined as a constellation of emotional relationship, parental behaviors, and parental belief systems in parent–child interaction context) are more stable than specific parenting practices (defined as parenting behaviors that have potential to alter child behavior) (Dallaire & Weinraub, 2005). Given that discipline practices are measures of parenting practices and child behavior changes dramatically during toddlerhood, we cannot expect that maternal discipline practices will be as stable over time as parenting style measures. Because little empirical research has been conducted to systematically study the stability of different discipline strategies during toddlerhood, lack of research in this area has prevented us from fully understanding the effect of maternal discipline on processes of child development.

The objective of this study was to examine stability of maternal discipline practices and moderation effects of child sex and temperament on the relation between maternal discipline and quality of mother–child interaction across toddlerhood. Different from other discipline studies, which have largely focused on negative discipline, this study included positive aspects of discipline. Two types of maternal discipline (inductive/authoritative/positive [ID], punitive/high-power/negative [PD], and preference/reliance on one type of discipline over the other) and two aspects of quality of mother–child interaction (quality of relationships and quality of interaction) were investigated. Three specific research questions were addressed in this study.

1. Is maternal use of discipline strategies and preference for one strategy over another stable across toddlerhood?
2. Over toddlerhood, is maternal use of discipline strategies related to quality of mother–child interactions?
3. To what extent are the associations between maternal discipline and quality of mother–child interaction moderated by child sex and temperament characteristics, specifically anger proneness and/or social fearfulness?

We hypothesized that maternal discipline strategies would be stable across toddlerhood, with low absolute stability and high relative stability; that maternal PD strategies would be negatively associated with quality of mother–child interaction and ID strategies would be positively associated with quality of mother–child interaction; and that the association between maternal discipline strategies and the quality of mother–child interaction would be moderated by child sex and temperament.

2. Methods

2.1. Participants

Participants were drawn from the Healthy Steps for Young Children Embedded Observational Study. The Healthy Steps for Young Children Embedded Observational Study was a direct observational study of mother–child interaction nested within the National Evaluation of Healthy Steps, with a total of 5,565 families enrolled. Healthy Steps was initiated in September 1996 as a pediatric-based parent support program for families of newborns. Families were followed from the child's birth until three years. Healthy Steps is a package of services comprising enhanced well child visits, home visits, telephone support for developmental and behavioral concerns, child development and family health check-ups, written informational materials for parents, parent groups, and links to community resources. By design, during the first 3 years, the program offered intervention families nine standard pediatric office visits and six home visits. In addition, depending on family needs, the program offered unlimited telephone contact and participation in parenting group sessions. On average, Healthy Steps families received nine office visits, six telephone calls, two home visits, two other contacts from the specialist, and less than one parent group.

Families at 15 sites across the country participated in the national evaluation. At six sites the intervention followed a randomized design and at nine it followed a quasi-experimental design. Because data collected as part of the national evaluation were limited to self-report, two of the 15 Healthy Steps sites (one in the South West and one in the South East) were selected for participation of the Embedded Observational study. These two sites were chosen for the direct observational study because they were two of the six sites that had utilized a randomized design and because the populations served were relatively diverse. For more information on Healthy Steps and its evaluation, please see Caughy, Miller, Genevro, Huang and Nautiyal (2003, 2004), Guyer, Hughart, Strobino, Jones and Scharfstein (2000) and Minkovitz et al. (2003).

A total of 179 of the 658 eligible families (109 were intervention families and 70 were control families) who completed the 2–4 month telephone interview and two follow-up home assessments (16–18 and 34–37 month) were included in the final longitudinal study sample. The remaining 479 families were not included because of refusal ($N = 182$, 28%), inability to be located ($N = 109$, 17%), moving out of area ($N = 48$, 7%), or having participated in only one home assessment ($N = 49$, 7%). Comparison of the 179 families who participated with the 479 families not included showed that mothers who participated in the study tended to be older, $\chi^2(2, N = 657) = 13.21, p < .01$; better educated, $\chi^2(3, N =$

657) = 22.65, $p < .001$; married, $\chi^2(2, N = 657) = 9.99, p < .01$; and wealthier, $\chi^2(1, N = 588) = 5.02, p < .05$; than the mothers who did not participate in the embedded study. However, included and non-included families did not differ in maternal race/ethnicity or child sex. For this study sample, 65% of the families were European-American, 23% were African-American, and 12% were Hispanic-American. Sex of the children was evenly distributed (49% girls). Approximately 26% families were living under the poverty line.

2.2. Procedures

This was a prospective study across the toddler years. Following early assessments conducted by phone when the children were between 2 and 4 months old that provided demographic information on participants and families, there were two assessments conducted in participants' homes when the children were 16–18 months (Time 1) and 34–37 months old (Time 2). Measures included discipline, mother–child interaction and child temperament, and were assessed at each home visit, which lasted approximately 2 h. The home assessment consisted of two parts: a structured interview with the mother and direct observation of the mother and child in a series of videotaped tasks including a teaching task (6 min) and a free play task (15 min). Approximately two weeks prior to the scheduled home visit, a selection of the measures, including discipline and child temperament measures and Attachment Q-sort (AQS) items were mailed to the respondent for self-administration by the mothers. During the phone call for scheduling home visit, the interviewer asked the mother to observe her child's behaviors as listed in the AQS sheet. Mothers were also provided with a telephone number to call if they had questions. At the time of the home visit, the interviewer instructed mothers in doing the AQS and reviewed and retrieved the self-administered questionnaires. This allowed mothers to ask any additional questions about the assessment.

This study utilized data from both the 2–4 month phone interview (basic demographic information on the family) and home observations at Time 1 and Time 2. Maternal discipline, mother–child interaction, and selected moderators were collected at Time 1 and Time 2. Parents consented to participate in the study and provided their consent for their children to participate. Participating families were compensated with a \$25 check for each home assessment and a copy of their mother–child interaction video tape. The Healthy Steps Embedded Observational Study was approved by the IRB at Johns Hopkins University and the University of Texas Health Science Center Houston.

2.3. Measures

2.3.1. Maternal discipline—The measure of maternal discipline was adapted from the Parental Responses to Child Misbehavior (PCRM) scale (Holden, Coleman, & Schmidt, 1995; Holden & Zambarano, 1992). The PCRM scale is a questionnaire designed to determine techniques and frequency used by parents in response to their children's misbehaviors in an average week over the past month. It includes twelve different discipline strategies: reasoning, diversion, negotiation, threatening, time out, spanking with hand, spanking with object, ignoring, withdrawing privileges, yelling in anger, slapping the face, and slapping the hand. Each was scored on a seven point Likert scale ranging from 0 (*never*) to 6 (*nine or more times*). Previous research confirmed a two-factor model for scale items labeled Inductive/Authoritative Discipline (ID), which included diversion, reasoning, negotiation, and withdrawing privileges; and Punitive/High-Power Discipline (PD), which included slapping the hand, spanking with hand, and yelling (Caughy et al., 2003). In the Healthy Steps Embedded sample, internal reliability coefficients for these scales were .63 and .67 at T1 and .74 and .63 at T2, respectively. To create the factor scores, a mean of items assigned to each subscale was computed for each mother with data on at least two-thirds of the items. The PCRM had well-established criterion validity, with significant

associations with observed maternal behaviors (e.g., high PD was associated with low positive maternal involvement and high negativity, high ID was associated with highly sensitive and appropriate mother–child interaction). The PCRM was also sensitive to intervention, with decreased use of PD observed for the intervention families and increased use of ID observed for the intervention White families (Caughy et al., 2003).

2.3.2. Quality of mother–child interaction—Two domains of quality of mother–child interaction, quality of relationships and quality of interaction, were assessed.

The *Attachment Q-Sort* (AQS; Waters & Deane, 1985; Waters, Vaughn, Posada, & Kondo-Ikemura, 1995) was used to assess the quality of mother–child relationships.¹ Mothers were asked to observe their child's behaviors (listed on the AQS) during the two weeks before assessment. During the home visit assessment, they were instructed by an interviewer to sort 90 descriptors in terms of how like or unlike their child they were. The sorting procedure yielded nine piles of ten cards each. Pile 9 represented behaviors “very much like the child”, and pile 1 represented behaviors “very much unlike the child”. The criterion sort scoring method was used. The child's AQS description was correlated with experts' AQS description of the hypothetically “most secure child”. A Pearson correlation coefficient was derived for each child to represent the child's criterion sort score resulting in a security score ranging from +1.00 for a perfectly secure child to –1.00 for a perfectly insecure child. The higher the correlation between maternal ratings of her child and the criterion profile, the more secure the mother–child relationship was presumed to be. Because the correlation coefficients are not normally distributed, they were transformed to Fisher's *z* scores. The AQS has adequate reliability and validity for measuring the quality of the mother–child relationship. In our sample, test–retest reliability across a 16 month period was high, $r=.72$ (for the control sample). Also, consistent with the literature (Van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004), we found higher attachment scores were significantly related to lower problem behaviors, lower difficult child temperament (e.g., anger, fearfulness), higher quality of observed mother–child interaction, and lower maternal depression in our sample.

The *Parent/Caregiver Involvement Scale* (P/CIS) (Farran, Kasari, Comfort, & Jay, 1986) was used to assess the quality of mother–child interactions. The scale is a behavioral rating scale of the caregiver's interaction with young children based on observations during 15 min of free-play. It focuses on behavioral patterns of the caregiver that promote optimal development of the child. Behaviors were coded from the videotaped free play episode recorded during home interview. The scale includes 11 aspects of parent–child interaction: verbal involvement, physical involvement, responsiveness, play interaction, teaching, control of activities, directives, relationship of activities, positive statements, negative statements and goal setting. Each aspect of behavior is score on 5-point Likert scales for Amount, Quality, and Appropriateness. For example, for verbal involvement, coders would code the *amount of verbal involvement* (e.g., amount of talking, reading, singing to the child), *quality of verbal involvement* (e.g., caregivers' verbal interaction relates to comprehensibility for the child, at a rate the child can follow, and language level simple enough for the child to understand) and *appropriateness of verbal involvement* (e.g., verbal interactions focus on the relationship of the words spoken to the activities, providing active comments/or interpretation on what the child is doing).

We constructed three subscales, amount, quality and appropriateness by calculating the mean score for the 11 amount, quality, and appropriateness scores, respectively. Inter

¹The Attachment-Q-Sort is not equated to Mary Ainsworth's child–mother attachment measure, using the Strange-Situation Paradigm.

correlations among scales ranged from low to high, with lower correlations between amount and quality scales (r ranged from .17 to .31 across two time points) and between amount and appropriateness scales (.27 to .31), but with higher correlations between quality and appropriateness scales (.87 to .91). For the purpose of this study, we used only the quality and appropriateness scores and created a mean score of the two scales because these two aspects are central to the notion of maternal sensitivity and they were highly correlated. Higher mean scores indicated higher quality of mother–child interaction. Inter-rater reliability, estimated using intra class correlation (ICC) based on double-code 20% of the videotapes by two trained graduate students, was .77 at Time 1 and .85 at Time 2.

2.3.3. Effect moderators—Potential effect moderators of maternal discipline and quality of mother–child interaction included child sex and temperament. *Child temperament* was assessed at both time points using the Toddler Behavior Assessment Questionnaire (TBAQ) (Goldsmith, 1996). The TBAQ consists of 128 parent report items representing the temperamental dimensions of Activity Level, Anger Proneness, Social Fearfulness, Pleasure and Interest/Persistence. The scale was scored on a seven point Likert scale (1 = *Never*, 7 = *Always*). For the purpose of this study, only the Anger Proneness (28 items) and Social Fearfulness (19 items) dimensions were used because previous studies suggested that these dimensions are highly correlated with problem behaviors (Braungart-Rieker, Garwood, & Stifter, 1997; Rothbart, 1981). A sample item for Anger-Proneness scale is “When you removed something your child should not have been playing with, how often did s/he scream?”, and a sample item for Social-Fearfulness scale is “When the child knew the parents were about to leave her/him at home, how often did your child cry?” To create the scale scores, a mean of items assigned to each subscale was computed for cases with data on at least two-thirds of the items. The TBAQ has been shown to have high internal consistency in our sample. Chronbach alphas across time points ranged from .86 to .90 for Anger Proneness and ranged from .83 to .87 for Social Fearfulness. The TBAQ has well-established convergent validity (Goldsmith, 1996).

2.4. Statistical analyses

Descriptive analyses, including means and standard deviations, were first conducted for all study variables at each time point. Scores for maternal discipline preference/reliance were created by subtracting each mother's punitive/high-power discipline (PD) score (mean of raw scores) from her inductive/authoritative/positive (ID) score. A positive preference/reliance score indicated a mother used more ID than PD, and a negative preference/reliance score indicated a mother use more PD than ID.

To examine the stability of maternal discipline, paired t -tests were conducted and only control families were included in the stability analyses. We included only control families in the stability analyses because our sample was drawn from an intervention sample, and there was a significant intervention effect on maternal discipline. Two types of stability, absolute stability (operationalized as the change in mean value) and relative stability (operationalized as the consistency of rank order), were examined.

To examine the association between maternal discipline and quality of mother–child interactions, we included all 179 families (both control and intervention families) in the analyses. This approach was taken because preliminary analyses showed similar patterns of association between discipline and mother–child interaction (in terms of magnitude and direction of associations) in control and intervention families and it allows us to maximize analytical power. Partial Pearson correlations (adjusting for intervention status) between maternal discipline and mother–child interaction were computed first to examine bivariate associations. The generalized estimating equation (GEE) approach (Liang & Zeger, 1986;

Zeger & Liang, 1986; Zeger, Liang & Albert, 1988) was utilized next to investigate 1) the association between maternal discipline (ID, PD, or discipline preference/reliance) and quality of mother–child interaction, and 2) the moderation effect of child sex and temperament over the two time points. The GEE approach allowed us to examine the association between maternal discipline and parent–child interaction conditioned on participant characteristics including time-variant covariates, such as child temperament, and time-invariant covariates, such as child sex over the two time points. The rationale for the use of GEE versus a conventional ordinary least squares (OLS) regression approach was that GEE allowed us to include repeated measures of both independent and dependent variables simultaneously to estimate the association over time. Conventional OLS regression analyses allow for the inclusion of outcome variables at only one time point. In addition, unlike conventional repeated measures analysis which requires deleting participants with missing data at one or more time points, the GEE approach uses all available ratings of the outcomes. The GEE analysis uses time-within-individual as the unit of analysis with a regression model, and takes into account the correlations among repeated measures. We specified that the residuals of repeated measures had an exchangeable pattern of correlations, which is consistent with the assumption that mother–child pair systematically differ in their overall level of behaviors.

In the multivariate GEE models, maternal discipline practices (PD, ID, and discipline preference/reliance) were included as predictors of the quality of mother–child interaction (i.e., AQS and P/CIS). Two analytical models were conducted: one model included both ID and PD simultaneously as predictors, and the other model included discipline preference/reliance as the predictor. Analyses were conducted separately for each mother–child interaction measure, and all analyses controlled for intervention status (−1 = control, 1 = intervention). A significant discipline effect indicates a significant effect of discipline on mother–child interaction over time.

To address moderator effects, an interaction product (e.g. discipline-by-effect moderator) along with maternal discipline (ID, PD, or discipline preference/reliance), and the moderator main effect were included in the multivariate GEE model. Two sets of analyses were conducted (one for each outcome measure), and all analyses controlled for intervention status. In each GEE model, one discipline measure (ID, PD, or discipline preference/reliance), three moderators (child sex, anger proneness, social fearfulness), and the 3 interaction terms of discipline × moderator were included. The reason for including only one discipline in each multivariate GEE model was to avoid over-parameterization and the consequent insufficient statistical power for the analyses.

3. Results

3.1. Preliminary analyses

Means and standard deviations for the 12 maternal discipline strategies as well as three discipline scale scores of the control sample are displayed in Table 1. Discipline scores were normally distributed. The range of mean scores for ID was 0 to 6; the range for PD was 0 to 5, and the range for discipline preference/reliance was −2.5 to 4.17. A positive score indicated a mother used more ID than PD, and a negative score indicated a mother use more PD than ID. Partial correlations between maternal discipline and quality of mother–child interaction measures at Time 1 and Time 2 are displayed in Table 2. Mothers who used more ID tended also to use more PD, $r(174) = .22, p < .01$ at Time 1, and $r(174) = .33, p < .001$ at Time 2. Although the correlations between ID and PD achieved significance, the correlations were low in magnitude indicating that PD and ID were measuring different domains of discipline strategies.

Means and standard deviations of the discipline and mother–child interaction variables for the full sample are presented in Table 2. Means (standard deviations) for child Anger Proneness and Social Fearfulness were 3.67 (0.80) and 4.01 (0.98) at Time 1, and 3.76 (0.83) and 3.79 (0.90) at Time 2, respectively. Stability for AQS ($r = .72$) and P/CIS quality of mother–child interaction ($r = .39$) between Time 1 and Time 2 was moderate to high for the control sample. Stability for the two measures of temperament between Time 1 and Time 2 (control sample only) were moderate, $r = .55$ for anger proneness and $r = .42$ for social fearfulness.

3.2. Stability of maternal discipline

Two types of stability, absolute and relative stability, were examined using paired t -tests and the control sample. Results are presented in Table 1. Absolute stability for scale scores between Time 1 and Time 2 discipline indicated that mothers increased their use of ID strategies as their children got older but showed no significant change in their overall use of PD strategies. There was a significant decrease in the use of one strategy, hand slapping. In contrast, relative stability analyses indicated that maternal use of discipline was quite stable from Time 1 to Time 2. The rank orders (z scores) for all maternal discipline strategies and mothers' rank relative to other mothers in the sample with regard to their usage of ID or PD did not change across time.

Stability for discipline preference/reliance and other discipline strategies that were not included in the PD or ID subscales (i.e., ignore, time out, spank with object, slap face and threaten) were also examined. Absolute stability for maternal use of time-out discipline as well as preference/reliance of ID (using ID over PD) increased with child age. Relative stability for these additional discipline strategies was high (see Table 1).

3.3. Maternal discipline and quality of mother–child interaction

Next, we examined whether maternal discipline was related to the quality of mother–child interaction over time. As shown in Table 3, GEE analyses based on the full sample indicated that low maternal use of PD and high preference/reliance on ID (positive preference/reliance scores) were associated with an increase in AQS during toddlerhood. Specifically, for every point increase in punitive discipline (or 1–2 time/per week increase in use of punitive discipline), the size of effect in terms of decreasing quality of relationship was .16, Estimate/Pooled SD for the AQS = $-.04/.25$, according to Cohen (1988). For every point increase in the preference/reliance score (or use 1–2 more ID than PD per week), the size of effect in terms of increasing quality of relationship was .08. In addition, high maternal use of ID (Effect Size [ES] = .12 [= .05/.43]) or preference/reliance on ID (Effect Size = .09 [= .04/.43]) was associated higher quality of mother–child interaction as measured by the P/CIS. These results indicate that the differences between mothers who used fewer than 1 PD or ID compared to mothers who used PD or ID more than 9 times per week was “large”; effect sizes were .80 (.16 $\times$ 5) and .60 (.12 $\times$ 5), respectively. However, no significant association was found between ID and the AQS, or between maternal PD and P/CIS.

As an exploratory analysis, we examined the association between other discipline strategies not included in the ID or PD scales and mother–child interaction. We included three discipline strategies (ignore, time out, and threaten) in the GEE analyses. We did not include spank with object or slap face because they were rarely used in our sample. Results indicated that these three discipline strategies were not associated with quality of mother–child interaction as measured by the AQS and P/CIS.

3.4. Moderators of the association between maternal discipline and mother–child interaction

To explore whether the association between maternal discipline and quality of mother–child interaction was moderated by child sex and temperament, two separate sets of GEE analyses (one for each mother–child interaction measure) were conducted. Table 4 summarizes unstandardized coefficients, 95% confidence intervals, and the *p*-values of the GEE models. Only the interaction term (discipline-by-moderator) from each GEE analysis is presented because this is the primary interest of the study.

Contrary to our expectation, child sex did not moderate the association between maternal discipline and quality of mother–child interactions (measured by AQS and P/CIS), and child temperament did not moderate the association between discipline and observed mother–child interaction (measured by P/CIS). However, we found that the association between maternal discipline and mother–child relationship (measured by AQS) was moderated by child temperament. To facilitate interpretation, we graphed the theoretical slopes based on the estimation in Figs. 1 and 2.

As shown in Fig. 1, higher maternal use of PD was significantly associated with lower AQS only in children with lower anger-proneness. For children with high anger-proneness, maternal use of PD was not associated with decrease or increase of AQS. Instead, mothers of high anger-prone children tended to rate the AQS lower consistently regardless of their use of PD. These findings indicate that the association between maternal “negative discipline” and quality of mother–child relationships is most likely to be found in non-temperamentally difficult children.

A trend moderation effect was also found for child social-fearful temperament (see Fig. 2). Higher maternal use of ID was associated with lower AQS scores only in children with lower social-fearfulness. For higher socially fearful children, higher maternal use of ID was associated with higher AQS. These findings indicate that high maternal use of ID may be beneficial for children with high social fearfulness, but not for children with low social fearfulness. These results are similar to the association between discipline and AQS for low anger children, in which high maternal use of discipline (ID or PD) in these children was related to lower AQS scores. These results indicate that increased maternal use of positive or negative discipline may have a negative impact on the quality of the mother–child relationship in children without a difficult temperament, but not in temperamentally difficult children. It should also be noted that the temperament moderation effect was not confounded by child sex because we found no sex differences in child temperament in our sample.

4. Discussion

This study examined the stability of two major types of maternal discipline over toddlerhood and the influence of maternal discipline and discipline preference/reliance on the quality of mother–child interaction. Results from the stability analyses indicated that maternal PD and ID discipline displayed considerable relative stability. Mothers' rank relative to other mothers with regard to their usage of ID or PD did not change across time. However, there was no absolute stability for maternal use of ID. Mothers increased their use of ID as their children got older. Although there was an overall absolute stability for PD, there was a decrease of one component, “slap hand”, use as the child got older. Our findings on the stability of discipline use are consistent with the findings on parenting practices (e.g., Dallaire & Weinraub, 2005; Holden & Miller, 1999). These researchers found considerable relative stability (low to moderate) but not absolute stability for parenting measures. These results suggest that similar to other parenting practices, maternal discipline practices are not fixed at this age.

In examining absolute stability, we found mothers increased their use of ID (e.g., reasoning, negotiation, withdraw privileges) and decreased use of hand slapping as their children got older. For other discipline strategies not included in either our ID or PD index, we found increased maternal use of time-out and threaten strategies. Our findings are consistent with Kuczynski et al. (1987) who reported that maternal verbal control increased with child age, and physical control decreased with age. Decreased maternal use of PD may be an adaptation to children's increased language ability and to a decrease in toddlers' problem behavior, while increased maternal use of ID may be an adaptation to increased child language and cognition.

This study also examined the association between maternal discipline and the quality of mother–child interaction. The findings partially support the control system model that suggests discipline influences mother–child interaction. For example, our GEE results showed that, over time, low maternal use of PD was associated greater quality of mother–child relationships (AQS). The effect size for using PD = 1 per week compared to using PD = 9 times per week was .80. High maternal use of ID was associated with greater quality of mother–child interaction (P/CIS). The effect size for using ID = 1 per week compared to using ID = 9 times per week was .60. These large effects suggest that when mothers respond to their child's behavior in ways that are comforting to children, mother–child pairs have a higher quality of mother–child interaction. In addition to PD and ID measures, we found that preference/reliance on ID use was associated with higher quality of relationships (AQS) and higher quality of interaction (P/CIS). This suggests that discipline preference/reliance is a better predictor of mother–child interaction than ID or PD alone. Therefore, examining both PD and ID simultaneously is important in studying maternal discipline.

The findings of moderation effects suggest that the effect of maternal discipline on mother–child interaction depends on child characteristics, specifically temperament. In general, for less difficult children, higher maternal discipline use (either ID or PD) was related to lower quality of mother–child relationships (AQS). For temperamentally difficult children, the association disappeared or was even reversed. For example, we found high maternal use of PD was not associated with decrease or increase of AQS for high anger-prone children. For higher fearful children, lower ID was associated with low AQS, although this association failed to reach customary levels of statistical significance. These findings suggest we cannot assume high levels of discipline will always have negative impacts for difficult children. It may be that difficult children need more structure and power assertive discipline to get maternal messages across.

It may also be that negative discipline (e.g., PD) is not a good predictor for the quality of mother–child interaction for difficult children. For difficult children, perhaps a combination of positive, negative (power assertive) discipline, or other domains of parenting (e.g., high instruction, high structure of environment) is a better predictor of the quality of mother–child interaction. Future research may address this issue by using samples with difficult temperament children, measuring both positive and negative discipline/or parenting, and investigating moderation effects of positive and negative discipline/or parenting on mother–child interaction. Our findings of moderation effects of temperament in the association between maternal discipline and quality of mother–child interaction are generally consistent with other literature on moderation effect of difficult-children in the association between spanking and child development (Larzelere, 2000), which showed that spanking promoted child development (e.g., reduced antisocial behavior) in the difficult child group but demoted child development (e.g., increased antisocial behavior) in the less difficult child group.

Somewhat inconsistent with our expectations, we found maternal use of time-out, ignore, and threaten were not associated with any quality of mother–child interaction measures. Also, maternal use of ID alone was not associated with AQS, although preference/reliance of ID was. Moreover, the association between maternal discipline and AQS was moderated by child temperament but the association between maternal discipline and P/CIS was not. It may be that different aspects of discipline influence different dimensions of mother–child interaction. It is also possible that these results are a reflection of report bias. For example, parents of difficult children are more likely to have higher stress themselves, and may report more negative discipline use or more negative relationships with their children, which may mask an association between discipline and AQS or moderation effect testing. Future research should use objective measures (e.g., observation) of temperament and quality of relationships (e.g., observer-rated AQS), and investigate the effect of reporter-bias in assessing the association between parental discipline and quality of parent–child relationships.

One important contribution of this study is investigating the moderation effects of child sex and temperament for the association between maternal discipline and mother–child interaction using longitudinal data. This approach takes into consideration that interactions among mother, child, and personal characteristics are dynamic and changing over time. Although we did not find moderation effects for child sex, future research needs to investigate this issue in older children. It may be that sex did not moderate the association in an early age but differences may emerge as children get older.

In interpreting the findings of this study, several limitations must be kept in mind. First, this study sample is a selected sample, and the results may not be generalizable to the broader US population. Mothers who participated in the study were more likely to be older, married, well-educated, and wealthier than mothers who did not participate in the study. Thus, variability in ID and PD use in the study sample may have been lower, and this may have reduced effect sizes for the associations between discipline and quality of mother–child interaction. Second, this study was limited to exploring maternal discipline in terms of frequency. This is only one of several important maternal discipline components that may influence the quality of mother–child interaction. Qualitative aspects of discipline such as affect and appropriateness/effectiveness of discipline use were not measured in this study and may have a different association with child behaviors. Future research should systematically investigate these qualitative aspects. Third, as described earlier, with the exception of the P/CIS most of the measures included in this study were based on maternal report. This may have biased our estimations about the relations among child temperament, quality of relationship, and maternal discipline because of shared method variance (Seifer, 2005), and may contribute to the moderation findings, in which we found temperament moderation effects on maternal reported quality of interaction but not on observed quality of interaction (P/CIS).

Despite these limitations, several implications can be drawn from the results of this study. The findings suggest that ID and PD are two distinct constructs in predicting different aspects of mother–child interaction. The associations between ID and PD with mother–child interaction are not simply in opposite directions. In addition, this study provides initial evidence on the association between maternal discipline strategy preference/reliance and mother–child interaction. These findings further support the importance of studying positive and negative aspects of discipline strategies together.

From a clinical perspective, the findings suggest that teaching mothers to use ID instead of PD is not a simple solution for improving the quality of mother–child relationships or interactions. Child temperament factors may influence maternal selection of discipline

strategies. For temperamentally difficult children, more discipline may not always have negative consequences on mother–child relationships or interaction. Also, how much mothers use ID relative to their PD use needs to be considered. Therefore, when designing intervention programs, practitioners need to teach mothers both appropriate discipline strategies and effective ways of discipline practice based on their child's characteristics as well as maternal beliefs about child rearing.

References

- Bandura, A. Social cognitive theory. In: Vasta, V., editor. *Annals of Child Development*. Vol. 6. Greenwich, CT: Jai Press; 1989. p. 1–60.
- Bell RQ, Chapman M. Child effects in studies using experimental or brief longitudinal approaches to socialization. *Developmental Psychology*. 1986; 22:595–603.
- Braungart-Rieker J, Garwood MM, Stifter CA. Compliance and noncompliance: The roles of maternal control and child temperament. *Journal of Applied Developmental Psychology*. 1997; 18:411–428.
- Caughy MO, Huang K, Miller TL, Genevro JL. The effects of the healthy Steps for young children program: Results from observations of parenting and child development. *Early Childhood Research Quarterly*. 2004; 19:611–630.
- Caughy MO, Miller TL, Genevro JL, Huang K, Nautiyal C. The effects of healthy steps on discipline strategies of parents of young children. *Applied Developmental Psychology*. 2003; 24:517–534.
- Cohen, J. *Statistical power analysis for the behavioral sciences*. 2nd ed.. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
- Crockenberg S. Predictors and correlates of anger toward and punitive control of toddlers by adolescent mothers. *Child Development*. 1987; 58:964–975. [PubMed: 3608666]
- Dallaire DH, Weinraub M. The stability of parenting behaviors over the first 6 years of life. *Early Childhood Research Quarterly*. 2005; 20:201–219.
- Darling N, Steinberg L. Parenting style as context: An integrative model. *Psychological Bulletin*. 1993; 113(3):487–496.
- Day RD, Peterson GW, McCracken C. Predicting spanking of younger and older children by mothers and fathers. *Journal of Marriage and the Family*. 1998; 60:79–94.
- Dumas JE, Wekerle C. Maternal reports of child behaviors and personal distress as predictors of dysfunctional parenting. *Development and Psychopathology*. 1995; 7:465–479.
- Eaton W, Ennis L. Sex differences in human motor activity level. *Psychological Bulletin*. 1986; 100:19–28. [PubMed: 3526375]
- Farran, DC.; Kasari, C.; Comfort, M.; Jay, C. *The Parent/Caregiver Involvement Scale Manual*. Nashville, TN: Vanderbilt University; 1986.
- Gershoff ET. Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin*. 2002; 128:539–579. [PubMed: 12081081]
- Goldsmith HH. Studying temperament via construction of the toddler behavior assessment questionnaire. *Child Development*. 1996; 67:218–235. [PubMed: 8605830]
- Grusec JE, Goodnow JJ. Impact of parental discipline methods on the child's internalization of values: A reconceptualization of current points of view. *Developmental Psychology*. 1994; 30:4–19.
- Guyer B, Hughart N, Strobino D, Jones A, Scharfstein D. Assessing the impact of pediatric-based developmental services on infants, families, and clinicians: Challenges to evaluating the healthy steps program. *Pediatrics*. 2000; 105:E33. [PubMed: 10699135]
- Hoffman, ML. Affective and cognitive processes in moral internalization. In: Higgins, ET.; Ruble, D.; Hartup, W., editors. *Social cognition and social development: A sociocultural perspective*. New York: Cambridge University Press; 1983. p. 236–274.
- Holden GW, Coleman S, Schmidt K. Why 3-year-old children get spanked: Parent and child determinants as reported by college-educated mothers. *Merrill-Palmer Quarterly*. 1995; 41:431–452.
- Holden GW, Miller PC. Enduring the difference: A meta-analysis of the similarity in parents' child rearing. *Psychological Bulletin*. 1999; 125:223–254. [PubMed: 10087937]

- Holden, GW.; Zambarano, RJ. Passing the rod: Similarities between parents and their young children in orientations toward physical punishment. In: Sigel, IE.; McGillicuddy-DeLisi, AV.; Goodnow, JJ., editors. Parental belief system: The psychological consequences for children. 2nd ed.. Hillsdale, NJ: Lawrence Erlbaum Associates; 1992. p. 143-172.
- Howard BJ. Pediatric Clinics of North America. 1991; 38:1351–1369. [PubMed: 1945547]
- Howard BJ. Advising parents on discipline: What works. Pediatrics. 1996; 98:809–815. [PubMed: 8885976]
- Klimes-Dougan B, Kopp C. Children's conflict tactics with mothers: A longitudinal investigation of the toddler and preschool years. Merrill Palmer Quarterly. 1999; 45:226–242.
- Kochanska G. Children's temperament, mothers' discipline, and security of attachment: Multiple pathways to emerging internalization. Child Development. 1995; 66:597–615.
- Kochanska G, Aksan N. Mother-child mutually positive affect, the quality of child compliance to requests and prohibitions, and maternal control as correlates of early internalization. Child Development. 1995; 66:236–254.
- Kuczynski L, Kochanska G, Radke-Yarrow M, Girnius-Brown O. A developmental interpretation of young children's noncompliance. Developmental Psychology. 1987; 23:799–806.
- Laible DJ, Thompson RA. Mother-child conflict in the toddler years: Lessons in emotion, morality, and relationships. Child Development. 2002; 73:1187–1203. [PubMed: 12146742]
- Larzelere RE. Child outcomes of nonabusive and customary physical punishment by parents: An updated literature review. Clinical Child and Family Psychology Review. 2000; 3:199–221. [PubMed: 11225737]
- Liang K-Y, Zeger SL. Longitudinal data analysis for discrete and continuous outcomes using generalized linear models. Biometrika. 1986; 84:13–32.
- Loeber R, Drinkwater M, Yin Y, Anderson SJ, Schmidt LC, Crawford A. Stability of family interaction from ages 6 to 18. Journal of Abnormal Child Psychology. 2000; 28:353–369. [PubMed: 10949960]
- Lytton H, Romney DM. Parents' differential socialization of boys and girls: A meta-analysis. Psychological Bulletin. 1991; 109:267–296.
- Minkovitz CS, Hughart N, Strobino D, Scharfstein D, Grason H, Hou W. A practice-based intervention to enhance quality of care in the first 3 years of life: The healthy steps for young children program. The Journal of the American Medical Association. 2003; 290:3081–3091.
- Rothbart MK. Measurement of temperament in infancy. Child Development. 1981; 52:569–578.
- Seifer, R. Who should collect our data: Parents or trained observers?. In: Douglas, T., editor. Handbook of Research Methods in Developmental Science. Malden, MA: Blackwell Publishing; 2005. p. 123-137.
- Smith JR, Brooks-Gunn J. Correlated and consequences of harsh discipline for young children. Archives of Pediatric Adolescent Medicine. 1997; 151:777–786.
- Thompson, RA. Emotion regulation: A theme in search of definition. In: Fox, NA., editor. The development of emotion regulation: Biological and behavioral considerations. Monographs of the Society for Research in Child Development. Vol. Vol. 59. 1994. p. 25-52.(2–3 Serial No. 240)
- Van IJzendoorn MH, Vereijken CM, Bakermans-Kranenburg MJ, Riksen-Walraven M. Assessing attachment security with the attachment Q sort: Meta-analytic evidence for the validity of observed AQS. Child Development. 2004; 75:1188–1213. [PubMed: 15260872]
- Waters, E.; Deane, KE. Defining and assessing individual differences in attachment relationships: Q-methodology and the organization of behavior in infancy and early childhood. In: Bretherton, I.; Waters, E., editors. Growing points of attachment theory and research. Monographs of the Society for Research in Child Development. Vol. Vol. 50. 1985. p. 41-65.(1–2, Serial No. 209)
- Waters E, Vaughn BE, Posada G, Kondo-Ikemura K. Caregiving, cultural, and cognitive perspectives on secure-base behavior and working models: New growing points of attachment theory and research. Monographs of the Society for Research in Child Development. 1995; vol. 60 (2–3, Serial No. 244).
- Zeger SL, Liang K-Y, Albert PS. Models for longitudinal data: A generalized estimating equation approach. Biometrics. 1988; 44:1049–1060. [PubMed: 3233245]

Zeger SL, Liang K-Y. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics*. 1986; 42:121–130. [PubMed: 3719049]

Fig. 1. Moderation effect of child anger-proneness temperament on maternal punitive discipline and quality of mother-child relationship.

Fig. 2.
Moderation effect of child social-fearfulness temperament on maternal inductive discipline and quality of mother-child relationship.

Table 1

Descriptive statistics and results of paired *t*-tests for stability of discipline strategies (control sample).

Discipline	Time 1		Time 2		Absolute stability		Relative stability	
	Mean	SD	Mean	SD	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>
<i>Inductive discipline (ID)</i>	2.71	1.21	3.04	1.10	2.38*			-0.23
Reason ^a	3.51	2.03	3.97	1.62				
Diversion ^a	4.13	1.82	3.30	1.70				
Negotiate	2.26	1.85	2.74	1.57				
Withdraw privileges ^a	.99	1.34	2.13	1.53				
<i>Punitive discipline (PD)</i>	1.70	1.18	1.59	0.98	0.56			-0.21
Slap hand ^a	2.10	1.71	1.17	1.23				
Spank with hand	1.76	1.59	2.03	1.57				
Yell in anger	1.24	1.48	1.57	1.20				
<i>Other discipline</i>								
Ignore	.74	1.18	.83	1.20	-0.67			-0.14
Time out	1.51	1.56	2.80	1.59	-5.09***			-0.20
Spank with object	.32	.85	.43	.96	-0.91			-0.09
Slap face	.10	.60	.01	.12	1.18			-0.02
Threaten	1.76	1.99	2.40	2.13	-2.82**			-0.22
<i>Discipline preference/reliance (ID-PD)</i>	1.01	1.38	1.45	1.23	-2.58*			-0.04

Note. Results in this table are based on the control sample. For stability paired *t*-tests, *t*-statistics are presented. Number of cases included in the analyses varied by discipline strategies, with *N* ranging from 66 to 68 at Time 1 and from 69 to 70 at Time 2. Items are normally distributed with the exception of two items ("spank with object" and "slap face"). Stability testing for subscales ID, PD, and discipline preference/reliance were at the scale level.

An "a" indicates absolute scores for individual item between Time 1 and Time 2 was significantly different. *N*s for paired *t*-test analyses ranged from 65 to 70 (with degrees of freedom ranging from 64 to 69).

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 2

Descriptive statistics and partial correlations among discipline and mother-child interaction measures (full sample).

	Mean (SD)	1	2	3	4	5	6	7	8	9
<i>Discipline (T1)</i>										
1. Inductive discipline	2.64 (1.26)	–								
2. Punitive discipline	1.47 (1.11)	.22**	–							
3. Discipline preference/reliance	1.17 (1.48)	.69***	–.55***	–						
<i>Discipline (T2)</i>										
4. Inductive discipline	2.88 (1.23)	.49***	.05	.38***	–					
5. Punitive discipline	1.41 (0.95)	.14 ⁺	.42***	–.20*	.33***	–				
6. Discipline preference/reliance	1.48 (1.28)	.37***	–.26*	.50***	.72***	–.42***	–			
<i>Quality of P-C interactions</i>										
7. Attachment-Q-Sort (T1)	0.39 (0.25)	.11	–.13	.19*	.26**	–.09	.30***	–		
8. Attachment-Q-Sort (T2)	0.42 (0.24)	.06	–.21*	.22**	.06	–.26***	.26**	.60***	–	
9. P/CIS—interaction quality (T1)	3.51 (0.36)	.20*	.02	.15 ⁺	.14 ⁺	–.03	.15 ⁺	.28**	.24**	–
10. P/CIS—interaction quality (T2)	3.54 (0.49)	.13	–.15 ⁺	.22**	.12	–.14 ⁺	.23**	.26**	.23**	.41***

Note. Results presented in this table are based on the full sample. Partial correlation controlled for intervention status (–| = control; | = intervention). T1 = Time 1 (16–18 months); T2 = Time 2 (34–37 months). All discipline and mother-child interaction variables were normally distributed.

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

GEE estimates for the association between maternal discipline and quality of mother–child interaction.

Fixed effects	AQS—relationship quality			P/CIS—interaction quality		
	Estimate (SE)	95% confidence limit	p-value	Estimate (SE)	95% confidence limit	p-value
<i>Model 1</i>						
Inductive discipline	−0.01 (0.01)	−0.01, 0.04	.24	0.05 (0.02)	0.01, 0.09	.01
Punitive discipline	−0.04 (0.01)	−0.06, −0.02	< .0001	−0.03 (0.03)	−0.08, 0.02	.25
<i>Model 2</i>						
Discipline preference/reliance (ID–PD)	0.02 (0.01)	0.01, 0.04	.01	0.04 (0.02)	0.01, 0.08	.01

Note. All analyses were adjusted for intervention status (control = −1; intervention = 1). Inductive and punitive discipline (ID and PD) were centered at the grand mean. Discipline preference/reliance is a continuous variable (centered at 0 = no preference/reliance). Analyses were conducted separately for each mother–child interaction measure. A total of four GEE models are included in this table. Additional Analyses were also conducted by including inductive-discipline × punitive-discipline in model 1; results indicated no moderation effect on quality of mother–child interaction (result not shown).

Table 4

Estimates of the moderation model in the association between maternal discipline and quality of mother–child interaction

Moderation effects	AQS—relationship quality		<i>p</i>	P/CIS—interaction quality		<i>p</i>
	Estimate (<i>SE</i>)	95% CI		Estimate (<i>SE</i>)	95% CI	
<i>Inductive discipline (ID)</i>						
ID × sex	0.03 (0.02)	−0.01, 0.08	.18	−0.002 (0.04)	−0.07, 0.07	.96
ID × anger proneness	−0.01 (0.01)	−0.03, 0.02	.58	−0.01 (0.02)	−0.05, 0.04	.68
ID × social fearfulness	0.02 (0.01)	−0.001, 0.04	.07	−0.02 (0.02)	−0.05, 0.01	.29
<i>Punitive discipline (PD)</i>						
PD × sex	−0.01 (0.02)	−0.05, 0.03	.75	−0.07 (0.05)	−0.17, 0.03	.20
PD × anger proneness	0.03 (0.01)	0.001, 0.06	.04	0.03 (0.03)	−0.04, 0.09	.42
PD × social fearfulness	0.01 (0.01)	−0.01, 0.03	.39	−0.01 (0.03)	−0.07, 0.04	.57

Note. GEE analyses were adjusted for intervention status (−1=control; 1=intervention). ID and PD were centered at the grand mean. Analyses were conducted separately for each discipline strategies and mother–child interaction measures. In each model, one discipline, 3 moderators (sex, anger-proneness, social-fearfulness temperament), and the 3 interaction terms of discipline × moderator were included. Only results for interaction effects are shown in the table. Discipline preference/reliance results are not shown because no moderation effect was found.