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Does Warmth Moderate Longitudinal Associations Between Maternal Spanking and Child Aggression in Early Childhood?

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This study examines whether maternal warmth moderates the association between maternal use of spanking and increased child aggression between ages 1 and 5. Participants were 3,279 pairs of mothers and their children from a cohort study of urban families from 20 U.S. cities. Maternal spanking was assessed when the child was 1 year, 3 years, and 5 years of age. Maternal warmth and child aggressive behavior were measured at 3 years and 5 years of age. Models controlled for demographic characteristics (measured at the child's birth), child emotionality (measured at age 1), and maternal psychosocial risk factors (measured when children were 3 years old). Cross-lagged path models examined the within-time and longitudinal associations between spanking and child aggression. Results indicated that maternal spanking at age 1 was associated with higher levels of child aggression at age 3; similarly, maternal spanking at age 3 predicted increases in child aggression by age 5. Maternal warmth when children were 3 years old did not predict changes in child aggression between 3 and 5 years old. Furthermore, maternal warmth did not moderate the association between spanking and increased child aggression over time. Beginning as early as age 1, maternal spanking is predictive of child behavior problems, and maternal warmth does not counteract the negative consequences of the use of spanking.

Keywords: Fragile Families and Child Wellbeing Study, physical punishment, corporal punishment, maternal responsiveness, transactional model

Research has established that the more often mothers physically punish their children, the more likely their children are to experience a range of negative outcomes, including increased aggression and antisocial behavior (Gershoff, 2002, 2010). The negative effect of maternal spanking is evident even after accounting for the reciprocal associations between maternal physical punishment and

child aggression over the first 5 years of life (Berlin et al., 2009; Maguire-Jack, Gromoske, & Berger, 2012; Taylor, Manganello, Lee, & Rice, 2010). The adverse child outcomes associated with physical punishment are also robust to cultural group differences in acceptance of and more frequent use of physical punishment (Gershoff et al., 2010; Gershoff, Lansford, Sexton, Davis-Kean, & Sameroff, 2012). Yet despite longitudinal research demonstrating the potential risks of physical punishment, many American parents continue to physically punish their young children, with *spanking* (typically defined as hitting a child on the behind with an open hand) being the most common form of physical punishment. In a large community sample of urban families, approximately one third of 1-year-old children (Maguire-Jack et al., 2012) and 65% of 3-year-old children had been spanked at least once in the prior month (Taylor, Lee, Guterman, & Rice, 2010; Taylor, Manganello, et al., 2010).

The physical and emotional pain associated with spanking may make it a salient event for children, thus leading to the strong associations of spanking with child outcomes; but any single form of discipline is but one of a host of behaviors parents direct toward their children. Taken together, these behaviors form what has been described as a parent's overall "parenting style" (Darling & Steinberg, 1993). Although parenting styles may influence parents' choice of discipline techniques in particular situations, parenting styles underlie parents' behaviors across all interactions with their children (Darling & Steinberg, 1993). The extent to which a parent's style can be characterized by warmth has garnered par-

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ticular attention. Warmth involves affection, comfort, concern, nurturance, support, and good old-fashioned love; the antithesis of warmth is rejection (Rohner, 2004). A parenting style characterized by warmth and responsiveness promotes trust and reciprocity between parent and child (Darling & Steinberg, 1993; Maccoby & Martin, 1983; Pappalardo & Maccoby, 1985). This mutual trust, in turn, is thought to promote reciprocity and children's appropriate behaviors with their parents; indeed, maternal warmth has been associated with fewer oppositional child behaviors (Stormshak, Bierman, McMahon, & Lengua, 2000). The converse has also been found, such that low levels of maternal warmth have been found to predict lower self-regulation and subsequently higher levels of child externalizing behavior problems (Eiden, Edwards, & Leonard, 2007).

Parenting theory has long argued that warmth promotes positive child development but physically controlling behavior does not (Maccoby & Martin, 1983). Yet research to date has demonstrated that parental warmth and controlling behaviors, such as spanking, are not mutually exclusive. A study of parents in eight countries found that parental warmth and controlling behaviors were either not significantly correlated or were positively correlated (Deater-Deckard et al., 2011); in other words, warmth and parental control can co-occur in families.

Because harsh or controlling behaviors, such as spanking, and warmth can co-occur in families, it has also been argued that parental warmth may serve as a moderator of the effects of certain discipline techniques on children (Darling & Steinberg, 1993), including the effects of spanking (Baumrind, Larzelere, & Cowan, 2002; Benjet & Kazdin, 2003). Any form of discipline, including spanking, is thought to be more effective in the context of parental warmth because a positive parent-child relationship motivates children to take on the values and behaviors endorsed by their parents (Grolnick & Farkas, 2002) and to reciprocate positive behaviors from parents with positive behaviors of their own (Maccoby & Martin, 1983). In particular, because parental warmth engenders trust and reciprocity toward parents (Grusec & Goodnow, 1994; Maccoby & Martin, 1983), warmth has been hypothesized to act as a buffer against potential negative effects of spanking on children (Deater-Deckard & Dodge, 1997).

In support of this hypothesis, several studies have found that parents' use of spanking or other forms of physical punishment is not associated with increased child behavior problems when it occurs within a parenting style characterized by high levels of warmth. In a study of 169 families, the association between harsh parenting (a combination of verbal and physical methods) and child aggression was strongest when the mother-child relationship was low in warmth (Deater-Deckard, Ivy, & Petrill, 2006). A study of 451 families found that a composite of maternal warmth, induction, and monitoring moderated the associations between harsh physical punishment and child aggression, such that the relationship was strongest when maternal warmth, induction, and monitoring were low (Simons, Wu, Lin, Gordon, & Conger, 2000). In another study with a larger sample of over 2,500 youth, the association between slapping or hitting and child behavior problems was no longer significant after accounting for parental warmth (McKee et al., 2007).

These studies examined a range of questions related to the associations among maternal warmth, spanking, and child aggression, but they did not directly address the question of the current

study, that is, whether warmth moderates the transactional associations (i.e., cross-lagged associations over time; Sameroff, 2009) between maternal spanking and child aggression during the first 5 years of life, when parental spanking is most common. Furthermore, none of the studies cited above examined spanking alone, but rather used some composite of physical punishment that included either other methods of discipline or potentially abusive parenting techniques. For example, Simons and colleagues (2000) included potentially abusive methods in a composite of physical punishment (three items: spanking; hitting with a belt, paddle or something else; hitting, pushing, grabbing, or shoving). In addition, two of these studies examined use of physical punishment among older children, beginning at age 10 (McKee et al., 2007) or in seventh grade (Simons et al., 2000); levels of physical punishment are generally much lower for older children (Straus & Stewart, 1999). These samples were racially/ethnically homogeneous (mostly White) and were characterized by relatively high levels of family income and more stable family and parenting configurations, factors that may have served as confounds when attempting to isolate whether parental warmth was a moderator of the relationship between physical punishment and child aggression (McKee et al., 2007; Simons et al., 2000). Most importantly, the use of cross-sectional data (Deater-Deckard et al., 2006; McKee et al., 2007; Simons et al., 2000) precludes examination of transactional processes that are known to occur between parents and children, and limits the ability to draw causal inferences regarding the role of maternal warmth or spanking.

The most compelling evidence supporting the buffering effects of maternal warmth against the negative consequences of spanking comes from a longitudinal study of 1,900 children (followed from preschool through fifth grade), who were born to young women in a nationally representative panel study of youth (McLoyd & Smith, 2002). What the authors labeled as "emotional support" (the same measure used in the current study as "warmth") moderated the extent to which the average of maternal spanking across the two study waves was associated with growth in child aggression across the same period. Although the generalizability of these findings are strengthened by the use of a large national sample and assessments of spanking and warmth alone (i.e., not combined with other parent behaviors), the use of an average measure of spanking that spans the same time period as the growth of child aggression (ages 4-5 through 10-11) precludes the time precedence needed to infer a causal relationship. Furthermore, the developmental period covered by the data in the McLoyd and Smith (2002) study collected does not capture the period of time when spanking typically occurs most frequently, which is around age 3 (Straus & Stewart, 1999).

There is competing evidence from a longitudinal study of preschoolers (U.S. Department of Health and Human Services, 2002) that the association between parental spanking and children's externalizing behaviors is not moderated by maternal warmth. Beginning when children were 14 months of age and using a racially/ethnically diverse sample of nearly 3,000 families, two recent studies found no evidence of an effect of the interaction between maternal warmth and spanking on child aggression (Berlin et al., 2009; Stacks, Oshio, Gerard, & Roe, 2009). Although these studies (Berlin et al., 2009; Stacks et al., 2009) also used large, national studies with longitudinal data, their findings are at odds with McLoyd and Smith (2002), thus the question remains of

whether spanking in the context of a warm parenting style can predict positive changes in child behavior.

The current study contributes to the debate on whether a warm maternal parenting style moderates the association of maternal spanking with child aggression by using a research design with several advantages over previous studies. A key strength is our use of a cross-lagged longitudinal design, which allowed us to include the bidirectional effects between child aggression and maternal use of spanking. The fact that parents use punishments generally, and physical punishment in particular, more in reaction to their children's aggressive and antisocial misbehaviors (Holden, Coleman, & Schmidt, 1995) suggests that the effects may not be unidirectional but rather bidirectional or transactional in nature (Bell, 1968; Sameroff, 2009). Specifically, it is likely that a child effect, by which child externalizing behavior elicits subsequent parent physical punishment, operates simultaneously with a parent effect, in which parent physical punishment produces more child externalizing behavior. Some researchers have gone so far as to argue that the child effect of aggression eliciting later spanking is stronger than the parent effect of spanking leading to increases in aggression (Baumrind et al., 2002), although the few studies that have addressed this question directly have generally found support for both parent and child effects (Gershoff et al., 2012; Kandel & Wu, 1995; Sheehan & Watson, 2008), whereas one has found only a parent effect (Berlin et al., 2009). We used multiple-group structural equation modeling (SEM) to examine whether maternal warmth moderated all of the transactional pathways in the model. Ours is the first study of which we are aware to examine warmth as a moderator of these cross-lagged relations.

Another important strength of our study is that we focus on the development of aggression in early childhood, from ages 1 to 5. The timing of our assessments is particularly important because approximately one third of parents begin using physical punishment at or before their child turns 1 year of age (Maguire-Jack et al., 2012) and is highest when children are 3 years old (Straus & Stewart, 1999). Studies that begin when children are older may miss the real-time impacts of spanking and are less able to tease apart the directionality of the association between parental spanking and child aggression.

Additionally, we controlled for numerous potential confounds of the association between maternal physical punishment and child aggression, including standard demographic control variables (family income, mothers' age, race/ethnicity, education level, and relationship status), child gender (boys experience more spanking than girls; Gershoff, 2002), and family race/ethnicity (African American parents spank more often than White, Hispanic, or Asian American parents; Gershoff et al., 2012). Because the maternal-child relationship develops in the context of overall maternal functioning, models also controlled for psychosocial stressors, namely mothers' parenting stress (Taylor, Manganello, et al., 2010), depressive symptoms (Berlin et al., 2009), alcohol use (Miller, Smyth, & Mudar, 1999), and intimate partner aggression (Taylor, Lee, et al., 2010) that may elevate mothers' use of spanking and have independent effects on the development of children's aggression.

In summary, in this study we used a cross-lagged model with three waves of data collected from a diverse and national sample of urban families to examine two key questions: (a) Are spanking and maternal warmth independently associated with changes in

child aggression over time? and (b) Does maternal warmth moderate the extent to which increases in maternal spanking predict increases in child aggression over time?

Method

Data Set

Data from mothers who participated in the Fragile Families and Child Wellbeing Study (FFCWS) core interviews and the add-on In-Home Longitudinal Study of Pre-School Aged Children were used in this study (FFCWS, 2009; Reichman, Teitler, Garfinkel, & McLanahan, 2001). FFCWS is a birth-cohort study ($N = 4,898$) conducted in 20 U.S. cities with populations over 200,000. The FFCWS purposively oversampled nonmarital births, thus the sample has an overrepresentation of African American and Hispanic parents because nonmarital births are more common among these groups. Mothers were recruited at hospitals. Verbal and written informed consent were obtained from participants at each interview. A detailed description of the FFCWS sampling strategy and interview protocol has been published elsewhere (Reichman et al., 2001).

FFCWS core interviews occurred at multiple waves: soon after the target child's birth (Wave 1) and then at 1 (Wave 2), 3 (Wave 3), and 5 years (Wave 4) following the target child's birth. Mothers who completed the core interviews at Wave 3 and Wave 4 were invited to participate in an add-on study called the *In-Home Longitudinal Study of Pre-School Aged Children* (FFCWS, 2009). Measures of maternal warmth and child behavioral assessments were collected during the In-Home Study, which occurred during Waves 3 ($n = 3,288$) and 4 ($n = 3,024$) following the core interview. Our analyses included mothers who participated in both the core interview and In-Home Study at Wave 3 ($n = 3,288$); nine families were excluded from analyses because basic maternal demographic information was not available, yielding a final sample of 3,279.

Participants

Half the mothers indicated that their race or ethnicity was Black (49%), whereas roughly one quarter of the sample reported being Hispanic (26%), and nearly one quarter reported being White (22%). Most mothers were not married at the time of their child's birth and were either in a cohabiting relationship with their child's father (36%) or neither married nor cohabiting (39%). Relatively few mothers had a college degree or higher (11%); most had less than a high school degree (34%), followed by a high school degree or equivalent (30%) and some college or technical school (25%). At the 3-year core interview, target children were on average 35.6 months old ($SD = 2.5$ months). At the 5-year core interview, target children were on average 57.2 months old ($SD = 17.2$ months). See Table 1 for all sample descriptive statistics.

Measures

Maternal spanking. Maternal spanking was based on mothers' responses to two questions, assessed when the child was 1 year (Wave 2), 3 years (Wave 3), and 5 years (Wave 4) of age: "Sometimes children behave pretty well and sometimes they don't.

Table 1
Sample Characteristics

Characteristic	Full sample (<i>N</i> = 3,279) % or <i>M</i> (<i>SD</i>)
Maternal warmth age 3 (range = 0–1) [‡]	.85 (.23)
Maternal warmth age 5 (range = 0–1) [‡]	.77 (.26)
Maternal age at child's birth (range = 14–47)	25.13 (6.05)
Relationship status: Married	24%
Cohabiting	36%
Not married or cohabiting	39%
Race/ethnicity: White	22%
Black	49%
Hispanic	26%
Other race	4%
Education level	
Less than high school	34%
High school degree or equivalent	30%
Some college/tech school	25%
College or higher	11%
Household income (range = \$0–\$133,750)	\$31,747 (\$31,054)
Parenting stress (range = 1–5) [‡]	2.10 (0.72)
Major depression	22% (yes)
Heavy alcohol use	12% (yes)
Intimate partner aggression	30% (yes)
Child sex	
Male	52%
Female	48%
Child emotionality age 1 (range = 1–5) [‡]	2.83 (1.06)

Note. Column percentages may not equal 100% due to rounding.

[‡] Higher scores indicate higher levels of the construct.

In the past month, have you spanked (child) because (he/she) was misbehaving or acting up?" (1 = *no*, 2 = *yes*). If the respondent indicated that she had spanked the child in the past month, she was subsequently asked, "Did you do this . . . (1 = *everyday or nearly everyday*, 2 = *a few times a week*, 3 = *a few times this past month*, or 4 = *only once or twice*?)" As has been done in previous studies (Lee, Perron, Taylor, & Guterman, 2011; Taylor, Manganello, et al., 2010), responses to these two variables were combined to create an ordinal variable of spanking (0 = *never in the past month*, 1 = *only once or twice or a few times this past month*, 2 = *a few times a week or every day or nearly every day*).

Maternal warmth. Maternal warmth was based on observer ratings using the Warmth/Responsivity subscale of the Home Observation for Measurement of the Environment (HOME) Inventory (Caldwell & Bradley, 1984) at 3 years of age (Wave 3) and 5 years of age (Wave 4). At both waves, In-Home Study interviewers were asked to rate maternal warmth on the basis of interviewer's observations of maternal-child interactions while the interviewer was conducting the In-Home Study interview and family assessment. The measure of warmth used at Wave 3 is the average of seven items, indicating whether the interviewer observed the mother (0 = *no*, 1 = *yes*), for example: respond verbally to the child's vocalizations; spontaneously praise the child at least twice; convey positive feelings toward the child through her tone of voice ($\alpha = .77$). The measure of warmth used at Wave 4 is the average of nine items, indicating whether the interviewer observed the mother (0 = *no*, 1 = *yes*), for example: use some term of endearment/diminutive for child's name when talking; caress, kiss, or cuddle child once during visit; or convey positive feelings toward

the child through her tone of voice ($\alpha = .81$). Studies of large representative samples of young children indicate that the HOME Maternal Warmth subscale demonstrates reasonable predictive and concurrent validity with respect to children's behavioral and cognitive outcomes (Fuligni, Han, & Brooks-Gunn, 2004; Leventhal, Martin, & Brooks-Gunn, 2004), as well as cross-cultural validity (Bradley, 2004) and validity and reliability with children from a range of socioeconomic backgrounds (Leventhal et al., 2004).

For the multigroup analyses, described in more detail below in the Results section, mothers were divided into three groups. A high proportion of mothers were rated as exhibiting all seven of the warmth behaviors during the observation period ($n = 1,181$); we designated these mothers as being in the *high-warmth* group. Mothers who did not exhibit all possible warmth behaviors were further divided into two additional groups; mothers who exhibited a majority of (four to six), but not all, possible warmth behaviors were designated as being in the *middle-warmth* group ($n = 571$), whereas those mothers who exhibited fewer than half (zero to three) of possible warmth behaviors were designated as being in the *low-warmth* group ($n = 337$). The high-, middle-, and low-warmth groups were selected on the basis of substantive considerations about the number of warmth behaviors exhibited by mothers (e.g., all warmth behaviors, most warmth behaviors, or few warmth behaviors) and the frequency distribution of these data. For about one third of mothers, observer ratings of warmth were missing, and they could not be included in multigroup analyses ($n = 1,191$).

Child aggressive behavior. Child aggressive behavior was measured using the Child Behavior Checklist 1[1/2]–5 (CBCL; Achenbach & Rescorla, 2000) and administered during the In-Home Assessment when children were 3 years (Wave 3; $\alpha = .87$) and 5 years (Wave 4; $\alpha = .85$) of age. Mothers' assessment of child aggression was based on responses to 19 statements at Wave 3 and 20 statements at Wave 4 (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*) such as: "(He/she) is defiant," "(He/she) is easily frustrated," and "(He/she) is disobedient." Mean scores were created with higher numbers indicating greater aggressive behavior.

The CBCL Aggression subscale items administered during the 5-year In-Home Assessment at age 5 were largely the same as those items measured at 3 years, with slight modifications to reflect the developmental changes that take place between age 3 and age 5. Some items were added, such as "showing off or clowning around" and "is easily jealous," whereas other items were removed such as "can't wait turn" and "selfish/won't share."

Maternal psychosocial risk factors. Four psychosocial risk factors, all assessed at Wave 3 when children were 3 years of age, were included in the analyses as control variables.

Parenting stress. The Personal Distress subscale of the Parenting Stress Index-Short Form (Abidin, 1995) was given during the In-Home Study when the child was 3 years of age. Mothers indicated their agreement (from 1 = *strongly agree* to 4 = *strongly disagree*) with 11 items, including "Being a parent is harder than I thought it would be" and "I feel trapped by my responsibilities as a parent" ($\alpha = .87$). A mean score was created, such that higher numbers indicated more parenting stress.

Major depression. The Composite International Diagnostic Interview-Short Form (CIDI-SF), Section A (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998) was used to measure major

depression through self-reports collected from mothers at Wave 3. The CIDI-SF uses the criteria set forth in the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition to determine the probability that the respondent would be diagnosed with major depression if given the full CIDI interview. Major depression is indicated by feelings of depression or anhedonia experienced for most of the day, everyday, for at least 2 weeks. Participants were classified as likely to have major depression if they endorsed the screening items and three or more depressive symptoms (e.g., losing interest, feeling tired, change in weight) (0 = *no*, 1 = *yes*).

Heavy alcohol use was assessed at Wave 3, indicated by a dichotomous variable with four or more drinks consumed in a single day in the past 12 months coded "1"; mothers reporting having consumed three or fewer drinks in a single day in the past 12 months were coded as "0." Alcohol use questions were based on the CIDI-SF alcohol dependence questions. However, few women in the FFCWS met the CIDI-SF criteria, indicating probability of alcohol dependence. Therefore, we created a variable to indicate heavy alcohol use. Though less stringent than the CIDI-SF alcohol dependence criteria, this variable approximates the National Institute on Alcohol and Alcoholism's definition of a heavy drinking day, indicated by ≥ 4 drinks in a single day for women (National Institute on Alcohol Abuse and Alcoholism, 2005).

Intimate partner aggression. A dichotomous variable (0 = *no*, 1 = *yes*) was created to assess mothers' report of any physical or psychological aggression from her spouse or current partner at Wave 3, based on four items assessing psychological aggression (e.g., "He tries to keep you from seeing or talking with your friends or family") and three items assessing physical aggression (e.g., "He slaps or kicks you") (Straus, Hamby, Boney-McCoy, & Sugarman, 1996).

Socioeconomic and demographic control variables were assessed at baseline when the child was born: mother's age, race/ethnicity (1 = *White*, 2 = *Black*, 3 = *Hispanic*, 4 = *other race/ethnicity*), relationship status (1 = *married*, 2 = *cohabiting*, 3 = *not married or cohabiting*), and education level (1 = *less than high school*, 2 = *high school degree or GED*, 3 = *some college/technical school*, 4 = *college or higher*). Total household income was assessed by asking, "Thinking about your income and the income of everyone else who lives with you, what was your total household income before taxes in the past 12 months?" ($M = \$31,747$, $SD = \$31,054$).

Child characteristics. Child gender (0 = *girl*, 1 = *boy*) was included as a control variable in the path models. In addition, child emotionality at age 1 was used as a control for child aggression and maternal spanking at age 3 and was assessed with the Emotionality, Activity, and Sociability Temperament Survey for Children (Mathiesen & Tambs, 1999). Mothers indicated (from 1 = *not at all like my child* to 5 = *very much like my child*) the extent to which their child: "often fusses and cries," "gets upset easily," and "reacts strongly when upset" ($\alpha = .60$).

Analytic Strategy

Path model and multigroup analyses were conducted in Mplus 6.1 (Muthén & Muthén, 1998–2011). Unlike regression analyses, path models can account for covariances among independent variables, allowing us to estimate within-time associations as well as

across-time effects, and allow the simultaneous estimation of multiple relationships among variables. A robust weighted least squares (WLSMV) estimator was used for analyses because it is appropriate for use with ordinal variables, such as the spanking variable in this study. However, WLSMV may not be as robust to nonnormality as the maximum likelihood estimator with robust standard errors (MLR; L. Muthén, personal communication, April 19, 2010); thus, path models were also estimated with the MLR estimator, which yielded very similar results to those reported here based on the WLSMV estimator. The comparative fit index (CFI) and the root-mean-square error of approximation (RMSEA) were used to evaluate fit between the hypothesized models and observed data, with cutoff values of .95 for CFI and .06 for RMSEA, establishing good fit (Hu & Bentler, 1999). Nested models were evaluated using the chi-square difference test calculated using the DIFFTEST option. Our analytic strategy was to incrementally build the path model representing relationships among maternal spanking, maternal warmth, and child aggression by adding key paths one at a time and testing their significance. First, we tested the significance of paths between maternal spanking and child aggression; then, we tested paths between maternal warmth and child aggression. After establishing the path model, we assessed the extent to which relationships in the model were moderated by maternal warmth by incrementally testing whether paths differed across warmth groups using the multigroup comparison approach for analyzing moderation in structural equation modeling (SEM) outlined by Bowen and Guo (2012).

Throughout the analytic models, every key variable was regressed on all of the control variables. Across all control variables, data were missing in less than 0.5% of cases. Data for mothers' spanking at Waves 2, 3, and 4 were missing in 4.4%, 0.4%, and 6.8% of cases, respectively. With regard to mothers' warmth, data were missing in 36.2% of cases in Wave 3. Given that maternal warmth was assessed by interviewer observation using the HOME scale, the high level of missing data is in part the result of 692 cases in which the interview was conducted over the phone, and thus it was not possible for observational assessment of warmth to be conducted (FFCWS, 2009). For our final sample of families, data on child aggression were missing in 1.2% and 24.9% of cases for Waves 3 and 4 respectively. The Wave 4 variables were assessed 5 years following baseline, thus there is significant attrition in the sample. Similar to the approach taken by Cooper, McLanahan, Meadows, and Brooks-Gunn (2009), we considered all cases and missing data patterns in our analyses through the use of full information maximum likelihood (FIML) estimation in Mplus, so as to avoid missing data bias and maximize the sample size. FIML is a preferred method of model estimation with missing data (Allison, 2003), and estimating models with missing data rather than using listwise deletion is preferable when data do not appear to be missing completely at random (Allison, 2003; Graham, 2009).

Results

Child Aggression and Maternal Spanking by Maternal Warmth

We first examined the extent to which both mothers' frequency of spanking and children's levels of aggression varied according to

maternal warmth. As seen in Table 2, child aggression was highest in the groups characterized by low warmth at both age 3 and age 5. In contrast, spanking was largely unrelated to maternal warmth; mothers high in warmth were slightly less likely to report having spanked when their children were 1 year of age, but by the time children were 3 and 5, maternal warmth was unrelated to maternal spanking.

Main Cross-Lagged Panel Model

The bivariate correlations forming the basis of our structural models are presented in Table 3. To establish the cross-time associations between maternal spanking and child aggression, we tested a set of nested models, incrementally adding key paths among these variables using chi-square difference tests (see Table 4). All path models included within-time associations between variables and controlled for maternal psychosocial risk factors and demographic variables. We began with a model with only autoregressive paths (Model 1a; CFI = .991; RMSEA = .018), $\chi^2(19) = 40.22$, $p < .001$, which was significantly improved by including the parent effect paths from spanking (Wave 2 and Wave 3) to child aggression (Wave 3 and Wave 4) (Model 1b: CFI = .992; RMSEA = .018), $\Delta\chi^2(2) = 10.17$, $p < .01$, and then improved again by adding the child effect path from child aggression (Wave 3) to spanking (Wave 4) (Model 1c: CFI = .996; RMSEA = .013), $\Delta\chi^2(1) = 17.04$, $p < .001$. We thus accepted the model with all of the autoregressive, parent effect, and child effect pathways as best fitting the data. The main structural path coefficients and the R^2 s for the endogenous variables are presented in Figure 1a.

Results indicated that greater use of spanking by mothers was associated within time with higher child aggression both when the children were age 3 and when they were age 5 ($r = .13$, $p < .001$; and $r = .14$, $p < .001$, respectively). Across time, greater maternal spanking when children were age 1 was predictive of higher child

aggression when children were age 3 ($\beta = .05$, $p < .05$); likewise, greater maternal spanking when children were 3 was predictive of higher child aggression when children were 5, even after controlling for child aggression at age 3 ($\beta = .06$, $p < .001$). Because this cross-lagged model includes autocorrelations between maternal spanking over time and child aggression over time, the downstream variables in each autoregressive path can be considered change scores. Thus, this latter path indicated that increases in mothers' spanking from Wave 2 to Wave 3 were found to predict increases in child aggression across the subsequent lag from Wave 3 to Wave 4 ($\beta = .06$, $p < .001$), over and above initial levels of child aggression. A corresponding child effect on mothers' use of spanking was also found; higher child aggression when children were 3 predicted an increase in maternal spanking between Waves 3 and 4 ($\beta = .12$, $p < .001$), over and above mothers' initial levels of spanking. Thus, our model confirmed the transactional nature of the relations between maternal spanking and child aggression over time, with 38% of the variance in spanking and 35% of the variance in child aggression at Wave 4 explained by the model.

Cross-Lagged Panel Model With Maternal Warmth

In Model 2, we examined the impact of adding maternal warmth to Model 1c above. Adding the cross-lagged parent effect from maternal warmth (Wave 3) to child aggression (Wave 4) did not significantly improve the model (Model 2a: CFI = .996; RMSEA = .013), $\Delta\chi^2(1) = .18$, *ns*, nor did adding the cross-lagged child effect from child aggression (Wave 3) to parent spanking (Wave 4) (Model 2b: CFI = .996; RMSEA = .014), $\Delta\chi^2(1) = .01$, *ns*. Path coefficients and R^2 s for Model 2b are presented in Figure 1b. Although maternal warmth was associated with less child aggression within the same time point both when children were 3 ($r = -.09$, $p < .001$) and when they were 5 ($r = -.06$, $p < .05$), maternal warmth did not predict any change in

Table 2
Child Aggression and Maternal Spanking by Maternal Warmth

Variable	Full sample (<i>N</i> = 3,279) % or <i>M</i> (<i>SD</i>)	Mothers with data on warmth (<i>n</i> = 2,097)			<i>F</i> (<i>df</i>) ^a or χ^2 (<i>df</i>)
		Low warmth (<i>n</i> = 338; 16%)	Moderate warmth (<i>n</i> = 572; 27%)	High warmth (<i>n</i> = 1,187; 57%)	
CBCL Aggression age 3 (range = 0–1.95) ^b	0.62 (0.36)	0.76 (0.41) _{a,b}	0.66 (0.36) _a	0.62 (0.36) _b	<i>F</i> (2) = 19.0***
CBCL Aggression age 5 (range = 0–1.80) ^b	0.54 (0.32)	0.62 (0.37) _a	0.57 (0.33)	0.54 (0.31) _a	<i>F</i> (2) = 5.24**
Maternal spanking age 1:					$\chi^2(4) = 12.4^*$
0 times/past month	73%	66%	69%	74%	
1–2 times/past month	15%	17%	19%	14%	
3+ times/past month	13%	17%	13%	12%	
Maternal spanking age 3:					$\chi^2(4) = 0.50$
0 times/past month	47%	46%	45%	45%	
1–2 times/past month	27%	29%	27%	28%	
3+ times/past month	26%	26%	28%	27%	
Maternal spanking age 5:					$\chi^2(4) = 3.6$
0 times/past month	52%	48%	49%	52%	
1–2 times/past month	31%	33%	30%	30%	
3+ times/past month	18%	19%	21%	18%	

Note. Column percentages may not equal 100% due to rounding. Chi-square test significant results are denoted * $p < .05$. CBCL = Child Behavior Checklist.

^a One-way analysis of variance significant differences (** $p < .01$; *** $p < .001$) between-cell pairs are denoted by letter subscript pairs, from Dunnett Time adjusted post hoc comparisons. ^b Higher scores indicate higher levels of the construct.

Table 3
Study Variables Correlation Matrix

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Maternal warmth age 3	—																				
2. Maternal warmth age 5	.20*	—																			
3. CBCL Aggression age 3	-.14*	-.08*	—																		
4. CBCL Aggression age 5	-.09*	-.12*	.56*	—																	
5. Maternal spanking age 1	-.07*	-.00	.12*	.09*	—																
6. Maternal spanking age 3	.01	-.01	.19*	.18*	.35*	—															
7. Maternal spanking age 5	-.03	-.04	.20*	.24*	.30*	.60*	—														
8. Maternal age	.11*	.15*	-.10*	-.11*	-.14*	-.11*	-.14*	—													
9. Relationship status	-.13*	-.17*	.12*	.16*	.09*	.04*	.06*	-.34*	—												
10. Race/ethnicity: White	.19*	.17*	-.03	-.03	-.11*	.03	-.01	.18*	-.31*	—											
11. Race/ethnicity: Black	-.20*	-.17*	.03	.04	.22*	.09*	.12*	-.15*	.34*	-.52*	—										
12. Race/ethnicity: Hispanic	.04*	.04	-.02	-.02	-.14*	-.12*	-.12*	-.03	-.06*	-.31*	-.58*	—									
13. Race/ethnicity: Other	.04*	-.01	.01	-.00	-.03	-.01	-.03	.05*	-.10*	-.10*	-.19*	-.11*	—								
14. Education level	.22*	.19*	-.12*	-.15*	-.05*	.04*	-.00	.40*	-.34*	.30*	-.11*	-.20*	.10*	—							
15. Household income	.16*	.14*	-.11*	-.14*	-.10*	.00	-.05*	.31*	-.42*	.33*	-.24*	-.07*	.08*	.48*	—						
16. Parenting stress	.16*	-.13*	.35*	.26*	.07*	.13*	.08*	-.06*	.14*	-.08*	.04*	.02	.04*	-.18*	-.15*	—					
17. Major depression	-.04	-.06*	.18*	.16*	.08*	.10*	.07*	-.04*	.06*	-.01	.06*	-.06*	-.00	-.06*	-.08*	.26*	—				
18. Heavy alcohol use	.07*	.03	.01	.01	-.03	.05*	.02	-.01	-.02	.07*	-.07*	.02	-.01	.04*	.08*	-.02	.03	—			
19. Intimate partner aggression	.05*	.02	.09*	.06*	.01	.09*	.03	.11*	-.19*	.05*	-.13*	.06*	.10*	.08*	.12*	.08*	.06*	.06*	—		
20. Child sex	-.03	-.06*	.07*	.05*	.06*	.06*	.07*	-.01	.01	.00	.00	-.02	.02	.01	-.02	.03	.01	-.01	-.06*	—	
21. Child emotionality age 1	-.08*	-.05*	.30*	.26*	.14*	.09*	.08*	-.09*	.10*	-.12*	.10*	.01	-.03	-.16*	-.11*	.16*	.09*	-.00	.04*	.03	—

Note. CBCL = Child Behavior Checklist.
* $p < .05$ (or lower).

Table 4
Fit Statistics and Chi-Square Comparisons for All Models

Models tested	χ^2	<i>df</i>	CFI	RMSEA	$\Delta\chi^2$	<i>p</i>
Model 1: Cross-lagged model of maternal spanking and child aggression						
Model 1a. Model with autoregressive paths only	40.22	19	.991	.018	—	—
Model 1b. Paths from spanking (W2, W3) to aggression (W3, W4) added	34.14	17	.992	.018	10.17	.006
Model 1c. Path from aggression (W3) to spanking (W4) added	24.48	16	.996	.013	17.04	.000
Model 2: Warmth added to cross-lagged model						
Model 2a. Path from warmth (W3) to aggression (W4) added to Model 1c	23.70	15	.996	.013	0.18	.670
Model 2b. Path from aggression (W3) to warmth (W4) freed	23.15	14	.996	.014	0.01	.911
Multigroup models for moderation by maternal warmth						
Model 3a. Fully constrained model with all paths across warmth groups fixed (no moderation)	163.33	147	.991	.013	—	—
Model 3b. Autoregressive paths and within-time covariances between spanking and aggression freed across warmth groups; all paths from control variables remain fixed	154.41	141	.993	.012	10.66	.100
Model 3c. Paths from spanking (W2, W3) to aggression (W3, W4) freed; all paths from control variables remain fixed	150.61	137	.992	.012	4.52	.341
Model 3d. Path from aggression (W3) to spanking (W4) freed; all paths from control variables remain fixed	149.73	135	.992	.013	0.61	.737
Model 3e. Fully unconstrained model with all paths freed to vary across warmth groups (full moderation)	42.61	30	.993	.025	96.99	.699

Note. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; W = Wave. Dashes indicate baseline model.

child aggression across the period from age 3 to age 5. The reciprocal relationships between maternal spanking and child aggression remained largely unchanged with the addition of maternal warmth to the cross-lagged panel model, and there was no increase in the amount of variance in child aggression explained (R^2 remained at .35).

Moderation of Main Cross-Lagged Panel Model by Maternal Warmth

Although warmth did not have a main effect on child aggression over and above the effect of spanking, it would still be possible for maternal warmth to moderate the cross-lagged associations between spanking and child aggression; in other words, warmth may still moderate the reciprocal processes through which maternal spanking and child aggression influence each other across time. To test this possibility, we conducted a series of multigroup analyses to compare these reciprocal processes between maternal spanking and child aggression in each of three maternal warmth groups. Families were divided into three warmth groups (as described in the Measures section) on the basis of independent observers' ratings of mother's warmth when children were age 3. We opted for assessing moderation using a multigroup strategy rather than entering an interaction term between spanking and warmth, because this approach allowed us to examine whether maternal warmth moderated the entire set of reciprocal processes between maternal spanking and child aggression. Both multigroup and interaction approaches are widely used for examining moderation (Kline, 2005); however, the multigroup approach has a number of advantages within the SEM framework (Bowen & Guo, 2012). In the analyses presented here, the multigroup approach allowed us to incrementally examine whether warmth moderated any of the structural paths within our model, including relationships between maternal spanking and child aggression in either direction and at different points in time. In other words, we were able to determine not only whether warmth moderated the impact of maternal spanking on child aggression but also whether warmth moderated the reciprocal effects of child aggression on maternal spanking, and

we were able to examine whether warmth moderated these relationships differently at different ages. Examining moderation of the complete set of reciprocal processes among multiple variables presented in our model is only possible through the multigroup SEM approach used here.

Multigroup moderation analyses were carried out by comparing nested models for improved fit to the data as a result of allowing relationships in the model to vary across warmth groups (see Models 3a through 3e in Table 4). We began with a multigroup model in which all associations were fixed to be equal across maternal warmth levels (Model 3a: no moderation) and incrementally released constraints allowing different paths to vary across warmth groups. In Model 3b, we freed the autoregressive paths between spanking variables across time and aggression variables across time, as well as the within-time covariances between them. In Model 3c, we freed the predictive paths from maternal spanking to child aggression, then in Model 3d, we freed the path from child aggression to spanking. In all three cases, model fit did not improve when paths were allowed to vary across maternal warmth groups, indicating that none of these relationships are significantly moderated by maternal warmth. Finally, we considered a fully unconstrained model (Model 3e: full moderation); the fact that this model was not a significant improvement to the fully fixed model (Model 3a) indicated that there was no added benefit to model fit when all model parameters were estimated separately for each warmth group, $\Delta\chi^2(117) = 96.99, p = .70$.

As a robustness check, we tested model differences by incrementally adding constraints to a fully unconstrained model. Results similarly indicated lack of moderation at every step. We also assessed whether warmth moderated the relationships between maternal spanking and child aggression only at certain time points (i.e., between ages 1 and 3, or between ages 3 and 5) by separately freeing paths between Waves 2 and 3, and then between Waves 3 and 4; again, there was no improvement in model fit in either case (results available from the authors upon request). Thus, we concluded that maternal warmth does not

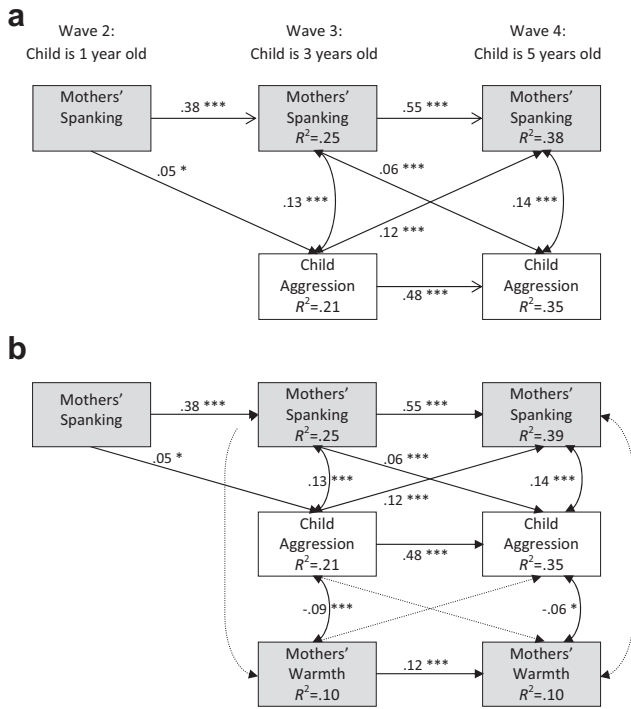


Figure 1. a: Cross-lagged associations among mothers' spanking and child aggression across three waves (Model 1c). b: Cross-lagged associations among mothers' spanking, mothers' warmth, and child aggression across three waves (Model 2b). Standardized path coefficients are presented. All of the variables displayed in the models above were controlled for children's gender and emotionality at age 1; mothers' parenting stress, depression, alcohol use, intimate partner violence in the home, race, age, education, relationship status, and family income. Dotted lines indicate nonsignificant relationships. * $p < .05$. *** $p < .001$.

moderate the within-time or across-time relationships between maternal spanking and child aggression. Regardless of mothers' warmth, greater use of spanking is associated with increases in child aggression from age 3 to age 5, and child aggression at age 3 is associated with increases in maternal spanking from age 3 to age 5.

Discussion

In the current study, we tested the contention that mothers' use of spanking would predict positive outcomes for young children when it is used in the context of a warm and loving parent-child relationship (Baumrind et al., 2002; Benjet & Kazdin, 2003). We first confirmed that, consistent with prior research (Deater-Deckard et al., 2011), spanking and maternal warmth are not associated; that is, spanking is used equally by mothers characterized as being high, moderate, or low in warmth. We next demonstrated that even after accounting for initial levels of aggression at age 3 and the strong stability in child aggression between age 3 and age 5, increases in spanking between ages 1 and 3 predicted increases in child aggression between age 3 and age 5. A child effect was also present with child aggression at age 3 predicting increases in mothers' spanking between age 3 and age 5. We thus found no evidence that maternal warmth transforms the experience

of being spanked such that children's behavior improves over time. We also found no evidence that maternal warmth buffered against the tendency for increases in maternal spanking to predict increases in child aggression. Instead, these results are suggestive of a coercive cycle (Patterson, 1982), such that maternal spanking contributes to the escalation of child aggression over the first 5 years of life, and, in parallel, increased child aggression elicits increased maternal spanking over time. In other words, spanking is ineffective at reducing child aggression regardless of maternal warmth and rather appears to have the iatrogenic effect of increasing the very child behaviors it is trying to reduce.

Child aggression appeared to be more reactive to mothers' use of spanking than to their levels of warmth; mothers' spanking at age 3 predicted increases in child aggression between age 3 and 5, whereas mothers' warmth at age 3 did not significantly predict any change in child aggression across the same period. Nor was maternal warmth reactive to child aggression, as indicated by the nonsignificant path between child aggression at age 3 and mothers' warmth at age 5. With all of these paths estimated simultaneously in the second cross-lagged model, our results indicated that spanking predicts increases in children's aggression over time even when accounting for maternal warmth at age 3, the association between warmth at age 3 and child aggression at age 5, and children's initial levels of aggression. Maternal spanking was found to predict increases in child aggression even when mothers' warmth was included in the model and controlling for important confounds such as parenting stress and depression (Berlin et al., 2009; Taylor, Manganello, et al., 2010). Clear evidence of a child effect was found, such that adding the pathway from child aggression to spanking significantly improved model fit (see Table 4, Model 1c). This finding suggests that previous studies that did not model the transactional nature of the associations between spanking and child aggression over time were misspecified.

Furthermore, our results indicated that maternal warmth did not moderate the longitudinal associations between maternal spanking and child aggression at ages 1, 3, and 5 years of age. Spanking was similarly associated with higher levels of child aggression regardless of whether a mother's parenting style was characterized by low, moderate, or high levels of maternal warmth. Our results are consistent with two prior longitudinal studies using large national samples (Berlin et al., 2009; Stacks et al., 2009). However, both of these studies used different analytic approaches than the current study, and their sample of young children from Early Head Start is less socioeconomically and racially/ethnically diverse than the FFCWS sample. The use of cross-lagged models in the current study, accounting for the reciprocal nature of mother-child relationships, and the use of multiple group analysis of moderation by warmth provides a stronger assessment of the hypothesis that warmth moderates the effects of spanking on child aggression. Therefore, the current findings lend further support to the generalizability of the finding that maternal warmth does not moderate the association between spanking and child aggression in the first 5 years of life using a more sophisticated modeling approach than that which has been used in other studies.

Our findings are specific to processes in the first 5 years of a child's life. Understanding these processes among younger children is particularly important because studies have shown that parental use of spanking generally declines following the toddler years (Straus & Stewart, 1999). Finally, this study is unique in

using a multigroup SEM approach to examine the moderating effects of warmth on the reciprocal and longitudinal relationships between maternal spanking and child aggression, allowing us to simultaneously assess whether maternal warmth affects all relationships between spanking and aggression. Prior research has assessed the impact of the interaction of warmth and spanking on child aggression (e.g., Berlin et al., 2009), which assesses the effect of the product of mean warmth and mean spanking on child aggression but does not assess the effect of warmth on the complex relationships between spanking and aggression.

Our findings that spanking and warmth have differential effects on changes in child aggression over time and that spanking and warmth are not significantly associated within time provide additional evidence that parents' use of corporal punishment and warmth are not mutually exclusive (Deater-Deckard et al., 2011). That is, knowing how often parents spank their children does not allow us to predict how warm they are with their children, nor does knowing how warm they are change the ability of spanking to predict increases in child aggression over time. Although prior theorizing underscored the belief that a positive parenting style may consist of both strict discipline and warmth (Darling & Steinberg, 1993), the results of the current study cast doubt on the use of spanking as an effective disciplinary approach with young children regardless of parenting warmth. Even in the context of an otherwise warm and loving parent-child relationship, spanking increases the likelihood that children act aggressively, which is often the very behavior parents wish to eliminate when they spank their children. Although parental warmth creates trust and reciprocity (Grusec & Goodnow, 1994; Maccoby & Martin, 1983), spanking may compromise those bonds and thus contribute to coercive processes that reinforce the child's use of aggression.

Limitations and Considerations for Future Research

It is important to note several limitations of the current study. The FFCWS is a sample of families drawn exclusively from large cities. Therefore, it is possible that study results would not generalize to individuals living in nonurban geographical areas. There was a high level of missing data on the moderator variable measuring maternal warmth due to the fact that a number of interviews were conducted over the phone, precluding observers' ratings of maternal warmth; it is possible that more complete data may have provided greater statistical power to detect moderation effects.

The measures of child aggression and spanking were based solely on maternal self-report and thus may be subject to reporting biases that are known to occur with self-report measures. The use of mothers to report both key constructs may also introduce shared measurement error, which was in part accounted for by within-time correlations in the model. By considering only maternal parenting behaviors, we most likely underestimated the exposure to spanking among children in two-parent families, who are likely to be spanked by both parents (Taylor, Lee, et al., 2010). An important future direction for research is to examine paternal spanking, paternal warmth, and child aggression, in addition to maternal warmth.

Finally, we note that our study only addresses the link between spanking and child aggression during the first 5 years of life. It is worth considering whether these associations may change over time as children age and develop. For example, another study

found a moderating effect of warmth (McLoyd & Smith, 2002), but among older children (5–12 years old). It is possible that warmth may moderate the link between spanking and child aggression in later childhood because older children may have greater understanding of the context in which physical punishment occurs.

Conclusion

The utility of spanking continues to be publicly debated, even though the academic literature on the child outcomes associated with parents' use of spanking is clear: the more often parents spank their children, the more likely their children are to experience a range of negative outcomes, including higher levels of aggression (Gershoff, 2002, 2010). However, despite this evidence, spanking by American parents is remarkably common, and rates of spanking of young children in particular have remained consistently high in the past three decades (Straus, 2010). Using a large, diverse sample of mothers of young children, the results of the current study extend the growing evidence against spanking as a child-rearing practice by showing that maternal warmth does not moderate the influence of spanking on child aggression. At all time points, maternal spanking was associated with increased subsequent child aggression, regardless of whether the mother-child relationship was characterized by low, moderate, or high levels of warmth, and even after accounting for transactional parent-child associations. In sum, we found no support for the conditional spanking position, with evidence instead indicating that spanking is ineffective at reducing aggressive child behavior in the first 5 years of life and, in fact, leads to increased child aggression.

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