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**NONMATERNAL CARE'S ASSOCIATION WITH
MOTHER'S PARENTING SENSITIVITY:
A CASE OF SELF-SELECTION BIAS?**

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ABSTRACT

With the increase in maternal employment during the first three years of children's lives, the effect of early nonmaternal care on mothers' parenting quality is an important issue. Using data from the NICHD Study of Early Child Care and Youth Development ($N = 1,233$), we examined the associations between nonmaternal care characteristics and maternal sensitivity during the first three years of children's lives. We also considered how these links vary by levels of resources, focusing on family income and marital status. Findings from fixed-effects regression models suggest that nonmaternal care characteristics generally have little influence on maternal sensitivity. Nevertheless, two interaction effects were found. Excellent-quality care was related to more sensitivity for mothers with a lower level of family income. Poor-quality care was related to lower sensitivity for single mothers. In sum, nonmaternal care characteristics do not seem to have as much influence on mothers' parenting as was previously believed.

Between 1975 and 1998, the labor force participation rate among mothers with children under age three increased from 34.3 to 62.2%. With the peak in 1998, there has been no clear trend since then (U.S. Department of Labor, 2010). The increase in maternal employment during the first three years of children's lives has led to scientific and public debates about whether early nonmaternal care might influence the mother-child relationship and the development of children (NICHD Early Child Care Research Network [NICHD ECCRN], 2005). Although research in this area has largely focused on child outcomes, researchers have also investigated whether the quality of a mother's parenting is affected by the use of nonmaternal care (e.g., Belsky, 1999; NICHD ECCRN, 1999). This is an important issue, because mothers' sensitive parenting—the extent to which mothers respond to their children's needs promptly, remain patient with their children, provide adequate stimulation, and engage in playful interactions—has a strong influence on child outcomes (Kelly & Barnard, 2000; NICHD ECCRN, 2001, 2003).

Some scholars contend that the use of nonmaternal care, especially long hours of nonmaternal care, is related to less sensitivity in mothers' parenting (Belsky, 1999; 2001). In contrast, other researchers are skeptical about nonmaternal care having much influence on mothers' parenting quality. They argue that maternal sensitivity and choices made concerning nonmaternal care might both be dependent upon unobserved maternal characteristics, such as childrearing orientation (Huston & Aronson, 2005; NICHD ECCRN, 1999). Further, other researchers have suggested that nonmaternal care might be related to maternal sensitivity, but only for disadvantaged families (Clark, Hyde, Essex, & Klein, 1997).

The purpose of this paper is to address this debate using longitudinal data from a national sample of children and their mothers, followed over the first 36 months of the child's life. In the process, we re-examine the association between nonmaternal care characteristics—type, amount,

quality, and stability—and maternal sensitivity. In addition to adjusting for observed characteristics of mothers related to both factors, we control for unmeasured maternal characteristics that could confound the observed association. We also examine whether the influence of nonmaternal care on maternal sensitivity varies by mothers' resources, focusing on family income and marital status. The current paper extends prior work by being the first study, to our knowledge, that attempts to control for unmeasured heterogeneity in the association between nonmaternal care and mothers' parenting quality.

PRIOR RESEARCH

There are three positions in the previous research on the association between nonmaternal care and maternal sensitivity: (a) nonmaternal care matters; (b) nonmaternal care does not matter; and (c) nonmaternal care matters only for mothers with fewer resources.

Nonmaternal Care Matters

Several researchers have asserted that the use of nonmaternal care during the first three years of children's lives is related to poorer quality of mothers' parenting. The dominant theory undergirding this view is attachment theory (Ainsworth, 1989; Bowlby, 1969). Attachment theory posits that time spent away from their children may place constraints on mothers' ability to learn their children's subtle cues, which in turn results in a failure to provide sensitive parenting (Belsky, 1999; Belsky & Rovine, 1988). Empirical support for this argument is limited, however. Belsky (1999) and NICHD ECCRN (1999) found that longer hours of nonmaternal care were related to less sensitive parenting. Clark, Hyde, Essex, and Klein (1997) found, however, that the use of nonmaternal care was related to less sensitive parenting only for mothers with depressive symptoms and mothers whose child had a difficult temperament. Other studies found no relationships between maternal employment or child care use and maternal

sensitivity (Booth, Clarke-Stewart, Vandell, McCartney, & Owen, 2002; Sifter, Coulehan, & Fish, 1993). In addition, other studies have found that the use of nonmaternal care was related to *more* sensitive parenting of mothers (Burchinal, Bryant, Lee, & Ramey, 1992; Crockenberg & Litman, 1991; Schwartz, 1983), especially when the quality of care is high (Caruso, 1989; Edwards, Logue, Loehr, & Roth, 1986; Howes & Olenick, 1986).

A stress-resource approach based on social structural and ecological perspectives may offer clues for these contrary findings. The central premise of these perspectives is that parenting occurs in and is influenced by social structures and processes (Bronfenbrenner, 1979; House, 1981). Belsky (1984) argued that these social contexts are major sources of either stress or support that influence parental well-being and functioning. Pearlin's (1989) stress process model posits that stress associated with the parental role leads to deteriorated mental health that can adversely affect the ability to provide sound parenting. The stress-resource approach suggests that, as we will discuss in detail below, nonmaternal care characteristics—type, amount, quality, and stability—are related to mothers' parenting either because they induce more stress or provide mothers with more parenting support.

The types of nonmaternal care commonly used by U.S. parents for young children include father or partner, grandmother or other relatives, family daycare home, daycare center, and in-home nonrelative care (Peyton, Jacobs, O'Brian, & Roy, 2006). Although father care, relative care, and family daycare home may reflect a close-knit support system for mothers, these types of care are more unstable than day care centers, which can be stressful for mothers (Gordon, Kaestner, & Rorenman, 2008; Maume & Mullin, 1993; Scott, London, & Hurst, 2005). For nanny care, qualitative research suggests that the mother-nanny relationship is stressful for

mothers, due to a sense of competition between the mother and the nanny for who is the better “mother” for the child (Macdonald, 2010).

Longer hours of nonmaternal care are typically a reflection of mothers’ greater paid work demands (Glass, 1998). Mothers who are stressed due to their job are more likely to be withdrawn in their interactions with their children (Repetti & Wood, 1997). It is possible that greater stress in juggling paid work and taking care of young children may explain previous findings regarding the link between longer hours of nonmaternal care and mothers’ less sensitive parenting (e.g., Belsky, 1999; NICHD ECCRN, 1999). Alternatively, it is possible that work hours per se may not necessarily result in stress that influences the quality of mothers’ interactions with their children, whereas the negative aspects of the work experience, such as interpersonal conflict, may have such effects (Gassman-Pines, 2011).

Quality of care, especially care providers’ warmth and attentiveness to each child, is the number-one concern that parents have when choosing particular care for their children (Peyton, Jacobs, O’Brian, & Roy, 2006). Whether mothers felt that the quality of nonmaternal care met their child’s needs is related to mothers’ physical and mental health (Goldberg, Greenberger, Hamill, & O’Neil, 1992; Greenberger & O’Neil, 1990; Jackson, 1997). In addition, high quality care delivered by caregivers may serve as a role model for mothers for providing sensitive parenting. Using small samples, studies have found that mothers with children in high-quality day care centers were more likely to show sensitive parenting than mothers with children in low-quality day care centers or stay-at-home mothers (Edwards, Logue, Loehr, & Roth, 1986; Howes & Olenick, 1986). Using the SECCYD, NICHD ECCRN (1999) also found that the quality of care was positively related to maternal sensitivity for a subsample of mothers with children who were in nonmaternal care more than 10 hours per week.

Finally, ethnographic studies have documented that the instability of nonmaternal care creates the daily hassle of finding an alternative arrangement or leads to missing work (Lowe & Weisner, 2004; Scott et al., 2005). Some mothers use multiple arrangements to secure care providers, which increases mothers' difficulty of working around various care providers (Morrissey, 2008; Scott et al., 2005). Other mothers have to change care arrangements because of provider unavailability (Heymann, 2000; Scott et al., 2005). Changing care arrangements requires effort expended in searching out potential providers and building a new relationship with the new care provider. This may lead to mothers' greater stress and less sensitive parenting. In contrast, stable nonmaternal care may represent stable social support for mothers, which facilitates mothers' sensitive engagement with their children.

Nonmaternal Care Does Not Matter

Although the stress-resource approach may appear reasonable, some researchers are skeptical about the influence of nonmaternal care on mothers' parenting quality. The central issue is selectivity. Mothers who use nonmaternal care extensively—i.e., work outside the home—when their children are under age three are different from mothers who do not in a number of ways. These differences in mother characteristics, not the use of nonmaternal care, may be related to differences in maternal sensitivity (Clarke-Stewart, 1989; NICHD ECCRN, 1999). For example, mothers who go back to work full-time soon after childbirth tend to be older, more educated, earn more, have fewer children, and are more committed to paid work (Desai & Waite, 1991; Hynes & Clarkberg, 2005). Although higher education and higher income are related to more sensitive parenting (NICHD ECCRN, 1999), these characteristics as well as greater work-commitment are related to a higher level of work-family conflict (Blair-Loy, 2003; Nomaguchi, 2009) which may ultimately result in less sensitive parenting. Black mothers are

more likely than White mothers to use nonmaternal care (Hofferth, Brayfield, Deich, & Holcomb, 1991), whereas sensitive parenting is more likely to be White mothers' than Black mothers' parenting style (Jackson-Newson, Buchanan, & McDonald, 2008). Mothers who use high quality nonmaternal care are wealthier (NICHD ECCRN, 1997) and may be more child-centered, which may be related to greater parenting sensitivity (Lareau, 2003; NICHD ECCRN, 1999). In short, the amount of nonmaternal care or quality of nonmaternal care may be a reflection of mothers' characteristics, their childrearing orientation and work commitment in particular, and may not be a cause of mothers' less sensitive parenting (Huston & Aronson, 2005; NICHD ECCRN, 1999).

Many of the prior studies mentioned earlier did not control for such characteristics of mothers that might be related to both nonmaternal care characteristics and maternal sensitivity. Studies that used data from the SECCYD, including Huston and Aronson (2005) and NICHD ECCRN (1999), controlled for education and income, but not childrearing orientations and work commitment. Additionally, neither study addressed possible unobserved mother characteristics such as the extent to which they are child-centered. What is needed is research that controls for mothers' background characteristics and orientations toward paid work and childrearing while at the same time eliminating unobserved characteristics that may be influencing both nonmaternal care characteristics and the quality of mothers' parenting.

Nonmaternal Care Matters Only for Mothers with Fewer Resources

Finally, some researchers argue that nonmaternal care may be related to maternal sensitivity only for mothers with disadvantages. The stress-resource approach suggests that the extent to which individuals are vulnerable to stressful circumstances depends on the level of resources available to them that can be used to cope with stress (Pearlin, 1989). Supporting this

view, Belsky, Woodworth, and Crnic (1996) found that long hours of nonmaternal care were related to poorer parenting only among mothers with more demands and fewer resources. The level of demands and resources was measured as a scale based on 10 characteristics such as mothers' personality, child temperament, marital quality, and social support.

Rather than aggregating the level of resources, we examine two types of resources. The first is financial resources. Mothers with more family income may be less likely to be influenced by stress or support associated with nonmaternal care. With the same degree of reliance on nonmaternal care, mothers with more family income may be able to hire outside help for household chores, which may allow them to spend more time with their children in a focused manner. When a regular nonmaternal care arrangement does not work, mothers with higher incomes may be able to hire a substitute more easily. Even when their children's caregivers provide high quality care, mothers with a higher SES are unlikely to emulate their approach, because of social-class differences in childrearing styles (Lareau, 2003; Macdonald, 2010). Thus, modeling the parenting style of high-quality caregivers may only occur among mothers with lower SES.

The second type of resource that may be relevant is marital status. Given that a primary source of social support for U.S. adults is marriage and partnership (McPherson, Smith-Lovin, & Brashears, 2006), not having a partner at home may reflect less social support. Because of their lower level of social support at home, nonmaternal care may be especially salient for single mothers as a source of parenting support and advice (Colletta, 1981). For the same reason, however, single mothers may also be more vulnerable to stress associated with nonmaternal care. Finally, given that cohabiting couples are more likely than married couples to report less support

from their partners (Brown & Booth, 1996), the parenting quality of cohabiting mothers may be more likely to be influenced by nonmaternal care characteristics than that of married mothers.

THE PRESENT STUDY

In the present study we attempt to adjudicate among the three positions discussed above regarding the association between nonmaternal care and maternal sensitivity. Rather than posit conflicting formal hypotheses, we articulate the anticipated findings implied by each position. On the basis of the first view we discussed earlier, we expect that: (a) Longer hours spent by children in nonmaternal care, lower quality of nonmaternal care, and instability of nonmaternal care are related to a lower level of maternal sensitivity. On the basis of the second view, we would anticipate that: (b) Nonmaternal care characteristics are unrelated to maternal sensitivity once both observed and unobserved characteristics of mothers are held constant. On the basis of the third position articulated above, we would expect that: (c) Longer hours spent by children in nonmaternal care, lower quality of nonmaternal care, and instability of nonmaternal care are related to a lower level of maternal sensitivity only for mothers with a lower level of family income and unmarried mothers.

METHOD

Data

The data were drawn from the NICHD Study of Early Child Care and Youth Development (SECCYD). The SECCYD is a longitudinal study of 1,364 children and their families. The study began in 1991 when families of newborns were recruited from 24 hospitals at 10 sites in 9 states (for detailed information about the study design, see NICHD ECCRN, 2005). Of women who met the eligibility criteria for the study, 45% were enrolled. The present study used the information obtained when the child was 1 month (baseline), 6 months (T1), 15 months

(T2), 24 months (T3), and 36 months (T4) of age. Data came from face-to-face interviews, self-administered surveys, and observations in the home, laboratory, and child care settings. Among the 1,364 mothers, 1,234 mothers (90%) remained in the SECCYD by 36 months. Those who dropped out of the sample were more likely to have less than a high school diploma and to be young, non-White, and single. One mother was dropped from the present analysis because of missing data on all variables used in fixed-effects models. The *N* for the analytical sample was 1,233.

Measures

Maternal sensitivity. The indicator of *maternal sensitivity* was a scale based on observations of videotaped mother-child interactions in a semistructured age-appropriate play situation. Trained observers rated mothers' behaviors in several dimensions, such as sensitivity to distress, intrusiveness, detachment, stimulation of cognitive development, and positive or negative rewards for the child. The items and response categories for 36 months were different from those for younger ages, because competent parenting differs by child's age. Thus, following the procedure used by prior research, we created a composite of standardized scores from ratings on three items, including sensitivity to nondistress, intrusiveness (reverse coded), and positive regard for 6, 15, and 24 months; and three items, supportive presence, hostility (reverse coded), and respect for autonomy for 36 months (Huston & Aronson, 2005; NICHD ECCRN, 1999). Chronbach α 's were .75, .71, .74, and .81 in T1, T2, T3, and T4 respectively.

Nonmaternal care characteristics. The present analysis focused on four aspects of nonmaternal care characteristics: Type, amount, quality, and stability. All characteristics were measured at T1, T2, T3, and T4. *Type of care* encompassed six different types, including maternal care only (reference), father or partner, relative in the child's or relative's home, in-

home care by a nonrelative (“nanny”), family day care home (including other types of outside-home care by a nonrelative), and child care center. *Amount of care* was measured by using two types of information: weekly hours of care and weekly hours of employment. The SECCYD asked the number of hours per week children spent in nonmaternal care only when children spent 10 hours or longer in nonmaternal care on a regular basis. Thus, we created a variable indicating the amount of *time apart*, either reported child care hours or reported work hours, whichever was longer. *Quality of care* was measured by observations. Observations of sensitivity, involvement, and stimulation provided by caregivers in nonmaternal care settings were conducted on two half days, using the Observational Record of the Caregiving Environment check list (ORCE; NICHD ECCRN, 1996). The observations consisted of 44-minute cycles, each broken into four 10-minute observation periods. ORCE consisted of three kinds of ratings, including positive caregiving frequencies (i.e., behavioral scores), positive caregiving ratings (i.e., observer evaluations), and overall impressions of caregivers’ behaviors at the end of the observation. Following prior research (NICHD ECCRN, 1999), we used *global child care quality*, which was measured by observers’ rating of their overall impression of child care (1 = *terrible*, 2 = *poor*, 3 = *fair*, 4 = *good*, and 5 = *excellent*). Because very few child care providers were rated as “terrible,” we combined “terrible” with “poor”. Five dummy variables were created, which include not in nonmaternal care, poor, fair, good (reference), and excellent. *Stability of care* was measured with three indicators: *Multiple care arrangements* was a dummy variable indicating whether mothers reported more than one concurrent nonmaternal care arrangement; *missed work* is a dummy variable indicating whether, since the last interview (i.e., during the last 9 to 12 months), mothers or their spouses had missed work due to provider unavailability (e.g., provider

sick, center closed); *changes in arrangements* was a dummy variable indicating whether mothers changed child care arrangements during the past three months because of provider unavailability.

Resources. *Family income* (T1, T2, T3, T4) was a continuous variable that included mothers' and their spouse/partner's annual income from all jobs. *Marital status* (T1, T2, T3, T4) was measured by three dummy variables, including married (reference), cohabitation, and single (including separated, divorced, widowed, and never married).

Controls. The number of children under age 18 in the household (T1, T2, T3, T4) was a time-varying variable, ranging from 1 to 10. Other controls were time-invariant variables that were measured in the baseline interview (except for child temperament which was asked in the six-month interview). Mothers' age at birth ranged from 18 to 46. Mothers' race/ethnicity was tapped by dummy variables including White (reference), Black, Hispanic, and other race. Mothers' education was captured with dummy variables including less than high school, high school diploma, some college, college degree (reference), and advanced degree. Child's gender was a dichotomous variable (1 = *girls*). Birth order was a dichotomous variable (1 = *first child*). Child's difficult temperament was measured as the mean of 55 items ($\alpha = .81$) (e.g., "My baby is fussy on waking up or going to sleep." 1 = *almost never* to 6 = *almost always*). Progressive parenting values was the mean of eight items ($\alpha = .62$) (e.g., "Children should be allowed to disagree with their parents if they feel their own ideas are better." 1 = *strongly disagree* to 5 = *strongly agree*). Work commitment was a sum of six items ($\alpha = .75$) (e.g., "I can't picture having a fully satisfying life without a career." 1 = *strongly disagree* to 6 = *strongly agree*).

Statistical Models

We employ both random- and fixed-effects regression modeling to examine the influence of nonmaternal care characteristics on mothers' parenting sensitivity. A key question in this

study is whether an unobserved characteristic of mothers could be responsible for an observed association between nonmaternal care and maternal sensitivity. A primary advantage of longitudinal data is that they allow the analyst to exercise control over such unmeasured characteristics (Allison, 2009). The first step is to examine whether, once the usual demographic controls are held constant, there is evidence of any such unobserved characteristic at work in the model. This is easily done by pooling the observations from the four different time periods into one dataset and estimating the main model via OLS regression. Serial correlation of errors for the same case across different times is a necessary condition for unobserved heterogeneity (Wooldridge, 2002). Therefore we begin by testing for serially correlated errors, following the procedure outlined in Wooldridge.

Given an unobserved effect, the random-effects regression model includes an extra error term that is assumed to be random and uncorrelated with any model regressors, as well as with the usual regression disturbance. The term represents unmeasured characteristics of cases—in this case, mothers—that would be responsible for the serial correlation. It is assumed that this term is stable over time and has a similarly stable effect on the outcome. The fixed-effects regression model is identical except without the restriction that the additional error is orthogonal to the other regressors. If the influence of model regressors on the outcome is not confounded by unobserved maternal characteristics, then both random-effects and fixed-effects coefficients should be about the same in large samples. But if there is some unobserved characteristic of mothers that is related both to characteristics of nonmaternal care and to mothers' parenting sensitivity, then the effects from the two different approaches will diverge in large samples. In this case, the fixed-effects estimates will be consistent and the random-effects estimates will not. Therefore, a test of the equality of fixed- vs. random-effects coefficients (Allison, 2009) allows

us to evaluate whether the nonmaternal care-maternal sensitivity association is possibly driven by unobserved heterogeneity. Random-effects models were estimated via SAS's PROC MIXED program. Fixed-effects models were estimated via SAS's PROC GLM program, utilizing the ABSORB statement. This accomplishes the "demeaning" of outcome and regressors that effectively removes the unobserved effect from the equation (Wooldridge, 2002).

Missing Data

Most variables had relatively little missing data. For example, at most, four-and-one-half percent of cases were missing on the outcome variable in any given wave. Eight-and-one-half percent of cases were missing data on whether mothers missed work due to child-care exigencies in the first wave. A more marked missing-data problem emerged for nonmaternal child-care quality, with up to 22% of cases missing data on this factor in one or more waves of the study. Rather than employ listwise deletion, which is associated with larger standard errors and reduced power (Johnson & Young, 2011), we instead used multiple imputation to replace the missing values. Following Allison's (2009) recommendation, we replaced missing values on the outcome variable, as well as on the regressors. Five replicates of the dataset were employed to accomplish the procedure.

RESULTS

Sample Characteristics

Descriptive characteristics of the sample are presented in Tables 1 (time-invariant variables) and 2 (time-varying variables). A few attributes are worthy of note. Most mothers are White, with fully 81% falling into this racial group. Child gender is about evenly split between boys and girls. Means for maternal sensitivity were 9.2, 9.4, and 9.4 for 6, 15, and 24 months respectively (range 3 to 12), and 17.2 for 36 months (range 3 to 21). These figures suggest that average

maternal sensitivity is rather high. On average across the four waves from 6 to 36 months, 29.0% used mother care, 12.9% father care, 14.3% relative care, 7.3% nanny care, 19.4% family daycare home, and 17.0% center care. On average across the four waves, distributions of quality of nonmaternal care were 5.9% poor, 18.3% fair, 34.8% good, 12.0% excellent, and 29.0% not applicable due to mother care. For three indicators of stability of nonmaternal care, 21% of mothers used multiple care arrangements, 5.7% of mothers involuntarily changed care arrangements due to unavailability of care providers, and 6.2% missed work due to unavailability of care providers.

[Tables 1 and 2 about here]

Modeling Maternal Sensitivity

We began by testing for serially correlated errors in the primary (i.e., main-effects) regression model. The correlation was .32 and very significant ($p < .001$). This suggests the presence of an unobserved effect in the models. We then estimated both main-effects and interaction models, as shown in Tables 3 and 4, using, alternately, random- vs. fixed-effects specifications. The test recommended by Allison (2009) for assessing equality of effects across the random- and fixed-effects primary models was highly significant ($F = 6.23, p < .001$). This suggests that the unobserved effect is correlated with one or more model regressors and that the fixed-effects results are therefore to be preferred over the random-effects ones. Nevertheless, we discuss both the random- and fixed-effects models, in turn, in each table. This allows us to examine the extent to which results are confounded by unobserved heterogeneity.

Are nonmaternal characteristics related to maternal sensitivity? Table 3 presents the results of regression models predicting the associations between nonmaternal care characteristics and maternal sensitivity in the presence of control variables. Model 1 shows results from the

random-effects model and Model 2 shows results from the fixed-effects model. We consider the random-effects model first. The model (Model 1) shows that the quality of nonmaternal care is related to maternal sensitivity. Mothers receiving poor- instead of good-quality nonmaternal care for their children were significantly less sensitive in their parenting. Maternal sensitivity is greater for those with higher income levels, but lower for cohabitators and single mothers, compared to married mothers. Blacks and other racial groups exhibit lower maternal sensitivity than Whites. Mothers with less education than a college degree show lower maternal sensitivity than their degree-holding counterparts. Mothers with more progressive parenting values and those with lower work commitment are significantly more sensitive. Finally, mothers exhibit greater sensitivity toward girls than boys.

[Table 3 About Here]

These results are, however, somewhat suspect. Random-effects coefficients are biased whenever the unobserved effect in the model is correlated with one or more model regressors, as is the case here. Hence, we re-evaluate the above findings by comparing them to the effects in the fixed-effects model (Model 2). Here we see that the quality of nonmaternal care is not significantly related to maternal sensitivity. Maternal sensitivity is only marginally (at $p < .10$) higher for those with higher income. No other effects in the model attain significance at conventional levels. The time-invariant factors of race through child's difficult temperament in the bottom half of Table 3 are automatically elided from a fixed-effects specification, as the latter only utilizes the within-subjects variation of regressor variables. Nevertheless, all such time-invariant factors are controlled in the equation. In sum, despite the seeming importance of nonmaternal child-care quality that emerges if unobserved confounds are ignored, such a result is not robust to the removal of mothers' unobserved heterogeneity from the model.

The third view regarding the associations between nonmaternal characteristics and quality of mothers' parenting is whether the links would be found only for mothers with fewer resources. Table 4 presents the results of interaction effects between nonmaternal care characteristics and two types of resources—family income and marital status. Models 1 and 2 present the results from random-effects and fixed-effects models, respectively. Once again, we consider the random-effects model first, focusing specifically on the added interaction effects. Four interaction effects are significant. Income appears to condition the effect of nonmaternal-care quality on maternal sensitivity. The effect of excellent vs. only good quality care is: $.384 - .005 \times \text{Income}$. This suggests that the positive effect of excellent quality on maternal sensitivity is diminished by .005 units for each additional thousand dollars of annual family income. Thus, for those making \$78,600, the effect is reduced to zero. The negative effect of poor-quality nonmaternal care is exacerbated by being single; for the latter group, the effect is $-.310 - .889 = -1.199$. Changes in nonmaternal care arrangements appear to have no pronounced effect for married mothers; the coefficient is .08. But it has a significantly more positive effect on maternal sensitivity for cohabiting mothers. This effect is contrary to expectation, as having to make such changes is considered to be stressful. Finally, missing work due to provider unavailability has a significantly more detrimental effect on maternal sensitivity for cohabiting, as opposed to married, mothers.

[Table 4 About here]

Again, an examination of the fixed-effects results provides a check on the robustness of these findings. The interactions involving quality of nonmaternal care and both income and single status are robust: the same substantive findings obtain in the fixed-effects results. However, the other two effects, those involving the conditioning effect of cohabitation, receive

no confirmation in the fixed-effects equation. Instead, the latter specification reveals a marginally significant interaction of singlehood with changes in nonmaternal care arrangements. The interaction suggests that changes in arrangements have a significantly more detrimental effect on maternal sensitivity for singles, compared to marrieds.

Supplemental Analysis

The underlying idea of the stress-resources approach for the link between nonmaternal care and mothers' sensitivity was that longer hours, lower quality, and less stability of nonmaternal care would expose mothers to a greater level of stress. Using the same regression models presented in Tables 3 and 4, we examined whether nonmaternal care characteristics were related to stress and mental health of mothers, focusing on depressive symptoms (data not shown). The results indicate that none of the nonmaternal care characteristics examined here—type, amount, quality, and stability—were related to mothers' depressive symptoms. There were no variations by resource level, except that changing nonmaternal care arrangements was related to increased depression for single mothers only. These results provide an additional indication that the stress-resource approach to the link between nonmaternal care and mothers' sensitivity does not seem to be empirically supported for the most part, albeit there is a modest suggestion of the link for mothers with fewer resources.

DISCUSSION

In the past few decades, there has been a debate over whether nonmaternal care is related to quality of mothers' parenting. Two theoretical perspectives, attachment theory and social structural and ecological theory, contend that nonmaternal care is related to quality of mothers' parenting. Some researchers, however, have been skeptical about whether such a link exists, suspecting the possibility of self-selection bias. That is, mothers who choose a certain

nonmaternal care arrangement are different from mothers who do not in various ways including SES, work commitment, and childrearing orientation. Such maternal characteristics are likely to be related to maternal sensitivity. This paper addressed the self-selection issue by using longitudinal data that allow us to control for observed as well as unobserved maternal characteristics that may be influencing the association between nonmaternal care and mothers' parenting quality.

The analyses in this paper reinforced the importance of considering selection bias. Our test for serially correlated errors was significant, suggesting the presence of an unobserved effect in the models. Comparing results between random-effects and fixed-effects regression models, we found that poorer quality care was related to lower maternal sensitivity in random-effects models, as previously found (NICHD ECCRN, 1999), but we did not find this association in the fixed-effects regression models. A statistical test indicated that fixed-effects regression models would provide more accurate estimates than the random-effects regression results. For other aspects of nonmaternal care, unlike previous findings (Belsky, 1999; NICHD ECCRN, 1999), we found no associations between the amount of nonmaternal care and maternal sensitivity in both random-effects and fixed-effects regression models. Our finding is inconsistent with prior findings, perhaps because we controlled for mothers' characteristics, such as work commitment and parenting values, in the random-effects model that the previous studies did not. More importantly, we used fixed-effects models that eliminate possible unobserved characteristics that may be influencing maternal sensitivity and nonmaternal care characteristics. Finally, we found no associations between type or stability of nonmaternal care and maternal sensitivity, which is consistent with prior research findings. All in all, our findings indicate that nonmaternal care characteristics are not related to quality of mothers' parenting in general.

The third position in the debate argued that the influences of nonmaternal care on mothers' sensitivity may depend on the levels of resources mothers have. Our findings suggest modest support for this argument for only one aspect of nonmaternal care—quality. First, excellent quality of nonmaternal care is related to higher maternal sensitivity for mothers with a lower level of family income. This pattern is consistent with other research, which has shown that high quality nonmaternal care has positive influences on children's math and reading achievement especially for children from low-income households (Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997; Dearng, McCartney, & Taylor, 2009). It is possible that the benefits of high quality nonmaternal care for low-income children's achievement may be realized, in part, through increased sensitivity in mothers' parenting. Second, we found that poor nonmaternal care quality is related to lower maternal sensitivity for single mothers but not for married or cohabiting mothers. This pattern is consistent with stress-process theory (Pearlin, 1989): Those with fewer resources are more vulnerable to stressful experiences because of a lowered ability to cope with stress. Because we found that only two of the many interaction effects tested were significant, however, we would conclude that empirical support for the third position is modest, at best.

Nonetheless, the suggestion that resources condition the influence of the quality of nonmaternal care on mothers' parenting quality may have policy implications. Given that the availability of affordable, stable, high quality nonmaternal care for young children is limited (Heyman, 2000; NICHD ECCRN, 2005), securing a nonmaternal care arrangement that meets their children's needs—quality—and their own needs—practical factors such as costs, location, and schedule—is not an easy task for mothers who have fewer resources. They are more likely than their resourceful counterparts to end up compromising with a care arrangement that is low

quality or inconvenient (Heyman, 2000; Scott, London, & Hurst, 2005). More public efforts to increase the availability of affordable, high quality nonmaternal care for mothers with average or lower incomes are warranted.

We did not find similar interaction effects between the amount of nonmaternal care and resource levels on maternal sensitivity, suggesting that the amount of nonmaternal care is not related to maternal sensitivity even among mothers with fewer resources. Our supplemental analysis showed that the amount of nonmaternal care is not related to mothers' depressive symptoms, regardless of levels of resources. It is possible that the amount of work hours (i.e., nonmaternal care hours) per se may not necessarily result in stress that would affect the quality of parenting. Instead, work conditions and interpersonal relations in the workplace may play a more important role in influencing mothers' sensitivity in parenting (Gassman-Pines, 2011). We recognize that prior research has shown that the amount of nonmaternal care during the first three years is related to adverse child outcomes at age four or in the first grade (NICHD ECCRN, 2003). Although researchers speculate that this link may be explained by poorer quality of mothers' parenting due to the use of nonmaternal care (Belsky, 1999; Clarke-Stewart, 1989), our findings suggest this may not be the case.

Our findings on the interaction effects between the stability of nonmaternal care and resources on maternal sensitivity were less robust. We found that changing nonmaternal care due to the provider's unavailability is related to mothers' lower sensitivity for single mothers at a marginally significant level in the fixed-effects model only. The supplemental analysis indicates that none of our measures of stability of care are related to mothers' reports of depressive symptoms, except that changing nonmaternal care is related to mothers' depression for single mothers. Thus we conclude that stability of nonmaternal care does not seem to be related to

mothers' sensitivity in parenting, with a modest suggestion that it may matter more for single mothers than partnered mothers. Although having multiple care arrangements, changing care arrangements, and missing work due to unavailability of a nonmaternal care provider may produce daily hassles as noted in qualitative studies (e.g., Scott et al., 2005), such daily hassles may not necessarily result in chronic stress that would affect mothers' quality of parenting.

The present analysis has limitations that future research should address. Quality of nonmaternal care was measured on the basis of researchers' evaluations. It is possible that mothers' subjective evaluations of quality of nonmaternal care, which the SECCYD did not ask, may be more important in influencing their parenting than researchers' evaluations (e.g., Greenberger & Neil, 1990). We were unable to examine the manner in which stress or support associated with nonmaternal care is related to maternal sensitivity because of data limitations. The SECCYD did not have information about daily hassles that mothers experienced or mothers' sense of support from their child's care providers. Finally, the SECCYD had a notable advantage in basing measures of the quality of nonmaternal care and maternal sensitivity on observation rather than mothers' self-report. Nevertheless, it was not a representative sample of U.S. mothers. It involved mothers with relatively better financial and social resources. Further work using a national sample is warranted.

In conclusion, past research on the association between nonmaternal care and quality of mothers' parenting ignored the influence of unobserved self-selection. The present analysis suggests that ignoring self-selection obscures our understanding of the associations between nonmaternal care and maternal sensitivity. Controlling for observed and unobserved maternal characteristics that are related both to mothers' choices of nonmaternal care characteristics and to mothers' sensitivity in parenting, nonmaternal care characteristics are not related to maternal

sensitivity. There is some indication that the effects of nonmaternal care quality may be conditioned by levels of resources. Lower quality of nonmaternal care is related to lower maternal sensitivity for mothers with a lower level of family income and single mothers. These results indicate the importance of affordable, high quality care for mothers with fewer resources. Overall, however, nonmaternal care does not seem to have as much influence on quality of mothers' parenting as previously believed.

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Table 1. Background characteristics of the sample ($N = 1,233$)

	Mean or %	SD	% Missing
Age (18 - 46) (M)	28.3	(5.6)	0
Race/ethnicity (%)			
White	80.9		0
Black	12.1		0
Hispanic	4.1		0
Other race	2.9		0
Education (%)			
< high school	9.3		0
High school	20.8		0
Some college	33.1		0
College	21.6		0
Advanced degree	15.2		0
Progressive parenting values (18 – 40) (M)	32.8	(3.5)	0.8
Work commitment (6 – 36) (M)	21.2	(5.9)	0.6
Child's gender (1 = Girls) (%)	48.1		0
First child (%)	44.8		0
Child's difficult temperament (1 - 6) (M)	3.2	(0.4)	1.9

Table 2. Means and Percentage Distributions for Time Variant Variables ($N = 1,233$).

	Child Age (in Months)					% Missing for 6-36 total
	6	15	24	36	6-36 total	
Maternal sensitivity ^a	9.2 (1.8)	9.4 (1.6)	9.4 (1.8)	17.2 (2.8)	11.2 (4.0)	4.5
Standardized maternal sensitivity ^b	-0.008 (2.44)	0.009 (2.38)	-0.006 (2.43)	0.010 (2.56)	0.001 (2.45)	4.5
Nonmaternal care characteristics:						
Type:						
Mother care	35.6%	30.6%	28.4%	21.4%	29.0%	1.6
Father care	12.2%	14.9%	12.4%	12.2%	12.9%	1.6
Relative care	17.6%	14.7%	13.2%	11.7%	14.3%	1.6
Nanny care	7.4%	8.2%	7.3%	6.3%	7.3%	1.6
Family daycare home	18.6%	20.1%	20.7%	18.3%	19.4%	1.6
Center care	8.6%	11.5%	18.0%	30.1%	17.0%	1.6
Time apart ^c	25.2 (20.5)	27.2 (21.0)	28.0 (20.5)	29.4 (20.3)	27.4 (20.6)	1.9
Quality						
Poor	2.9%	4.7%	7.0%	9.3%	5.9%	22.0
Fair	12.8%	18.5%	19.2%	22.9%	18.3%	22.0
Good	35.8%	33.7%	35.3%	34.2%	34.8%	22.0
Excellent	13.0%	12.6%	10.1%	12.2%	12.0%	22.0
Instability						
Multiple care arrangements	16.5%	20.8%	22.5%	26.7%	21.6%	1.6
Involuntary change	4.2%	5.7%	6.1%	6.8%	5.7%	1.9
Missed work due to child care crisis	5.3%	6.8%	6.8%	5.9%	6.2%	8.5
Resources:						
Family income in thousands (2.5 - 402)	49.1 (40.1)	50.1 (41.4)	52.6 (41.8)	53.6 (43.6)	51.3 (41.8)	3.5
Marital Status (%)						
Married	78.8	77.8	77.8	77.2	77.9	3.6
Cohabiting	8.7	8.1	8.4	8.0	8.3	3.6
Single	12.5	14.1	13.8	14.7	13.8	3.6
Control:						
Number of children	1.89 (1.04)	1.92 (1.05)	2.02 (1.06)	2.14 (1.01)	1.99 (1.04)	2.6

^aRanges 3 - 12 for 6, 15, and 24 months; and 3 to 21 for 36 months.

^bMin = -13.1391298; Max = 3.9073257

^cWeekly nonmaternal care hours or work hours, whichever reported or the longest.

Table 3. Regression Models Predicting the Associations Between Maternal Care Characteristics and Maternal Sensitivity (N = 4,932)

	Model 1		Model 2	
	Random Effects		Fixed Effects	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Nonmaternal care characteristics				
Type ^a				
Father care	.004	(.131)	-.091	(.154)
Relative care	.047	(.132)	.108	(.171)
Nanny	.053	(.166)	-.191	(.205)
Family day care home	.070	(.129)	.142	(.160)
Center	.070	(.133)	-.014	(.164)
Amount				
Time apart	-.002	(.002)	.002	(.003)
Quality ^a				
Poor	-.391	(.156)	* -2.89	(.193)
Fair	-.025	(.109)	-.002	(.110)
Excellent	.066	(.125)	.014	(.117)
Reliability				
Multiple arrangements	.126	(.084)	.006	(.108)
Changes in arrangements	-.018	(.130)	.072	(.142)
Missed work due to provider unavailability	-.018	(.132)	-.092	(.159)
Resources				
Family income	.004	(.001)	*** .003	(.002) †
Marital Status ^a				
Cohabiting	-.462	(.149)	** -.323	(.265)
Single	-.342	(.125)	** -.080	(.224)
Controls				
Number of children < 18	-.062	(.047)	-.009	(.084)
Time ^a				
6 months	-.019	(.085)	-.002	(.092)
15 months	.010	(.088)	.011	(.085)
24 months	.002	(.082)	.002	(.086)
Age	.016	(.009)		
Race/ethnicity ^a				
Black	-1.219	(.146)	*** ---	---
Hispanic	-.097	(.204)	---	---
Other race	-.741	(.240)	** ---	---
Education ^a				
Less than high school	-1.880	(.187)	*** ---	---
High school diploma	-1.168	(.137)	*** ---	---

Some college	-.546	(.116)	***	---	---
Advanced degree	.145	(.137)		---	---
Progressive parenting values	.059	(.012)	***	---	---
Work commitment	-.021	(.007)	**	---	---
Girl	.295	(.080)	***	---	---
First child	-.113	(.105)		---	---
Difficult temperament	-.203	(.105)		---	---

Omitted reference categories are: mother care, good quality, married, 36 months, white, college graduate.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4. Interaction Models Predicting Maternal Sensitivity (N = 4,932)

	Model 1		Model 2	
	Random Effects		Fixed Effects	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Nonmaternal care characteristics				
Type ^a				
Father care	-.052	(.135)	-.166	(.156)
Relative care	-.015	(.134)	.034	(.173)
Nanny	.052	(.165)	-.239	(.208)
Family day care home	.004	(.131)	.063	(.162)
Center	.020	(.134)	-.069	(.167)
Amount				
Time apart	.000	(.004)	.007	(.005)
Quality ^a				
Poor	-.310	(.318)	-.174	(.365)
Fair	.068	(.190)	.203	(.213)
Excellent	.384	(.230)	.370	(.214) †
Reliability				
Multiple arrangements	.175	(.162)	.079	(.188)
Changes in arrangements	.080	(.270)	.310	(.291)
Missed work due to provider unavailability	.356	(.273)	.195	(.299)
Resources				
Family income	.007	(.002)	***	.008 (.003) **
Marital Status ^a				
Cohabiting	-.507	(.212)	*	-.221 (.347)
Single	-.206	(.196)		.403 (.309)
Controls				
Number of children < 18	-.061	(.047)		-.009 (.083)
Time ^a				
6 months	-.025	(.085)		-.012 (.096)
15 months	.011	(.088)		.008 (.087)
24 months	-.004	(.082)		-.008 (.090)
Age				
Race/ethnicity ^a				
Black	-1.198	(.147)	***	---
Hispanic	-.112	(.205)		---
Other race	-.748	(.241)	**	---
Education ^a				
Less than high school	-1.854	(.187)	***	---
High school diploma	-1.151	(.137)	***	---
Some college	-.544	(.116)	***	---
Advanced degree	.153	(.137)		---

Progressive parenting values	.059	(.012)	***	---	---
Work commitment	-.019	(.007)	*	---	---
Girl	.292	(.081)	***	---	---
First child	-.101	(.105)		---	---
Difficult temperament	-.203	(.105)		---	---
Care characteristics x income					
Time apart x income	.000	(.000)		.000	(.000)
Poor quality x income	.002	(.004)		.002	(.005)
Fair quality x income	-.001	(.003)		-.003	(.003)
Excellent quality x income	-.005	(.003)	*	-.006	(.003) *
Multiple arrangements x income	-.001	(.002)		-.001	(.002)
Changes in arrangements x income	-.003	(.004)		-.004	(.004)
Missed work x income	-.003	(.003)		-.003	(.003)
Care characteristics x marital status					
Time apart x cohabitation	-.003	(.006)		-.007	(.008)
Time apart x single	.004	(.006)		-.005	(.007)
Poor quality x cohabitation	.107	(.487)		.208	(.596)
Poor quality x single	-.889	(.393)	*	-1.005	(.457) *
Fair quality x cohabitation	.227	(.394)		.205	(.384)
Fair quality x single	-.220	(.305)		-.310	(.306)
Excellent quality x cohabitation	.663	(.430)		.717	(.554)
Excellent quality x single	-.288	(.450)		-.349	(.464)
Multiple arrangements x cohabitation	.016	(.325)		-.175	(.353)
Multiple arrangements x single	-.147	(.284)		-.086	(.328)
Changes in arrangements x cohabitation	.845	(.413)	*	.632	(.437)
Changes in arrangements x single	-.546	(.449)		-.993	(.506) †
Missed work x cohabitation	-1.381	(.642)	*	-.802	(.657)
Missed work x single	-.522	(.439)		-.450	(.494)

Omitted reference categories are: mother care, good quality, married, 36 months, white, college graduate.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.