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RESEARCH

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Shared parental responsiveness among fathers and mothers with low income and early child outcomes

Joyce Y. Lee[1] | **Shawna J. Lee**[2] | **Kaitlin P. Ward**[3] | **Garrett T. Pace**[4] | **Olivia D. Chang**[2]

[1]College of Social Work, The Ohio State University, Columbus, OH

[2]School of Social Work, University of Michigan, Ann Arbor, MI

[3]School of Social Welfare, University of California-Berkeley, Berkeley, CA

[4]School of Social Work, University of Nevada-Las Vegas, Las Vegas, NV

Correspondence
Joyce Y. Lee, The Ohio State University College of Social Work, 1947 North College Road, Columbus, OH 43210, USA.
Email: lee.10148@osu.edu

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Abstract

Objective: Informed by the family systems theory, the current study aimed to examine whether shared parental responsiveness between fathers and mothers with low income was associated with preschoolers' developmental outcomes.

Background: Both fathers' and mothers' parental responsiveness are key contributors to their young children's development. However, the ways in which fathers and mothers work as a system, as well as the role of shared parental responsiveness in child development, are not well understood, especially among families from low-income contexts.

Method: Participants were from the Building Strong Families project, a racially diverse group of families from socioeconomically disadvantaged backgrounds (N = 1,173). Fathers' and mothers' parental responsiveness were observed during father–child and mother–child interactions using the two-bags task. Preschoolers' child behavior problems, prosocial behaviors, and receptive language served as developmental outcomes of interest. A common fate approach to dyadic analysis was employed to create shared responsiveness and individual residual variance latent variables, which the child outcomes were regressed onto. Moderation analysis by fathers' resident status was conducted.

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Results: Shared responsiveness positively predicted preschoolers' prosocial behaviors (B = 0.33, $p < .001$) and receptive language (B = 14.85, $p < .001$), above and beyond individual residual variance. Fathers' resident status did not moderate any of the examined relationships.
Conclusion: There may be benefits to young children's development when mothers and fathers demonstrate shared responsiveness.
Implications.
Interventions serving families with low income could help strengthen mother–father shared responsiveness to promote child development.

KEYWORDS
Building Strong Families, child development, common fate modeling, family systems theory, shared responsiveness

In the United States, an estimated 7 million families, which correspond to 9% of all families, live in poverty (U.S. Census Bureau, 2020). Families with young children represent one of the largest groups of families living in poverty, with close to 20% of families with any children under 5 years old living in poverty (U.S. Census Bureau, 2020). The adverse effects of poverty on children's development are well documented, including poor physical health, lower school readiness and academic achievement, and more emotional and behavioral problems (Duncan & Brooks-Gunn, 2000; Masrik & Conger, 2017; McLoyd, 1998). Also important to understand, but less examined compared with the negative effects of poverty, are factors contributing to children's resilience in the face of poverty. Emerging research with racially diverse families from socioeconomically disadvantaged backgrounds suggests that fathers' and mothers' shared parenting quality, including shared parental responsiveness, may be beneficial for the development of young children (Brown et al., 2020; Song et al., 2018; Lee et al., 2021). Shared parenting quality refers to the mothers' and fathers' mutual influence and similarity in parenting.

The current study aimed to examine mothers' and fathers' shared parental responsiveness and its association with young children's developmental outcomes, using family systems theory (Cox & Paley, 1997) to inform dyadic analyses. Family systems theory (Cox & Paley, 1997) proposes that individuals in families function via interdependent relationships that are best studied in relation to one another. That is, the functioning of an individual family member is related not only to the individual member, but also to the behaviors between members of the same family system (Galovan et al., 2017). Further, the theory suggests that the whole is greater than the sum of its parts and that a family system cannot be understood simply from the combined characteristics of each member (Cox & Paley, 1997). From a family systems perspective, system behaviors between mothers and fathers that result in unique group-level phenomenon is of interest. One example of such system behaviors is mothers' and fathers' responsive parenting, which are key contributors to their children's development and well-being (Cooke et al., 2022; Pinquart, 2017). Yet the ways in which fathers and mothers work as a system are still understudied. The current study used dyadic analysis to examine whether mothers' and fathers' shared responsiveness—mutual influence and similarity between mothers' and fathers' parental responsiveness toward their children—contribute to their preschoolers' behavior problems, prosocial behaviors, and receptive language, above and beyond the effects of mothers' and fathers' individual residual variance. The observational measure of responsiveness captured fathers' and mothers' sensitivity, cognitive stimulation, positive regard, lack of detachment, and

relationship quality with the child during a parent–child interaction task, among a large and racially diverse sample of parents living with low income.

PARENTAL RESPONSIVENESS AND CHILD DEVELOPMENT

Bornstein et al. (2008) defined parental responsiveness as "the prompt, contingent, and appropriate reactions parents display to their children in the context of everyday exchanges" (p. 867). Warmth is conveyed through parents' verbal and physical expression of affection, comfort, concern, and support to the child. Displays of love and acceptance to the child are thought to be the opposite of parental rejection (e.g., the absence or withdrawal of parental love; Rohner, 2004; Rohner & Britner, 2002). Acceptance and love from parents are universal needs of all children (Rohner et al., 2005). Rohner et al. (2005) proposed that "as much as 26 percent of the variability of children's psychological adjustment can be accounted for by the degree to which children perceive themselves to be accepted or rejected by their major caregivers" (p. 300).

Indeed, a robust research base demonstrates that parental responsiveness contributes to child development across a number of domains. For example, mothers' and fathers' parental responsiveness are both associated with children's—including young children's—better mental health and psychological adjustment, fewer behavioral problems, and more prosocial behaviors (Cooke et al., 2022; Daniel et al., 2016; Deater-Deckard & Panneton, 2017; Khaleque, 2013; Lee et al., 2018; Newton et al., 2014; Pinquart, 2017; Rohner & Britner, 2002; Wang et al., 2013; Ward & Lee, 2020). Children are thought to learn prosocial behaviors through parents' verbal (e.g., expressions of love, reinforcing the child's positive behavior) and physical (e.g., hugging, kissing, giving a hand) behaviors that model prosocial responses, including empathy, sharing, and helping (Hoffman, 2001; Kiang et al., 2004).

Relatedly, there is evidence that the benefits of responsive parenting extend beyond children's behavioral and socioemotional development. Responsive parenting practices in early childhood show direct benefits to children's cognitive development. Parents who support their children's interactions with the world and provide responsive stimulation, whether through play or verbal interactions, help to promote children's attention and language development, which establishes a trajectory for school preparation and academic achievement (Coley et al., 2011; Madigan et al., 2019; Wade et al., 2014). A recent meta-analysis suggested that the benefits of early parental responsiveness to children's cognitive development were especially pronounced for children from socioeconomically disadvantaged backgrounds (Madigan et al., 2019), such as the children in the current study. Furthermore, both mothers' and fathers' parental responsiveness appear to contribute positively to children's cognitive development (Baker, 2017; Coley et al., 2011; McWayne et al., 2013; Rollè et al., 2019; Rothenberg et al., 2020; Ryan et al., 2006).

FATHERS' AND MOTHERS' SHARED PARENTING QUALITY AND CHILD OUTCOMES

One extension of the family systems theory (Cox & Paley, 1997) is the notion of interparental relationship quality "spilling over" to parent–child interactions. Studies have shown that various aspects of the interparental relationship, including conflict resolution and coparenting alliance, often spillover to impact mother–child and father–child interactions and child adjustment (Galovan et al., 2017; Stroud et al., 2015; Sutton et al., 2017; Teubert & Pinquart, 2010; Lee et al., 2020, 2021). That is, a high-quality interparental relationship that is marked by cooperation, harmony, and a shared sense of parenting may have benefits to child well-being (Cummings & Davies, 2010; Galovan et al., 2017; Lee et al., 2020, 2021, 2022). Researchers suggest that shared parenting quality to children is just as important, if not more so, than assessing individual parenting quality given that

shared parenting captures interdependence—the mutual influence and similarity between parents given the influence of a shared variable (Galovan et al., 2017; Gonzalez & Griffin, 2012). Shared parental responsiveness encapsulates the mutual influence and similarity between mothers' and fathers' parental responsiveness because mother–father dyads are rooted in the same family systems in which parental responsiveness is displayed. Importantly, while examining individual parental responsiveness allows for learning about mothers' or fathers' responsiveness in relation to their children's outcomes, it does not permit investigation of how mothers and fathers as dyadic members influence each other's responsiveness and this shared parental responsiveness' association with children's outcomes. What children may be gaining from a family system in which mothers and fathers share similar or mutually agreed-on ways of being sensitive and warm toward their children possibly include more coordination, communication, and concordance between mothers and fathers and less interparental conflict or tension around parenting behaviors, styles, and values.

A number of studies have examined the contributions of fathers and mothers from low-income contexts to their young children's developmental outcomes using a dyadic approach (Lee et al., 2020, 2021). For example, one Building Strong Families (BSF) study aimed at creating a dyadic coparenting alliance latent variable—using both mothers' and fathers' reports—and found associations with higher levels of children's prosocial behaviors as mediated by fathers' and mothers' individual parental responsiveness (Lee et al., 2021). Because the researchers' main focus was to examine how couples' shared coparenting alliance was associated with children's prosocial behaviors, although both fathers' and mothers' parental responsiveness were entered in the same model as mediators, a separate shared responsiveness variable was not created and tested as a predictor of child outcomes.

Building on prior research, the current study applied a common fate modeling (CFM; Ledermann & Kenny, 2012) approach to conducting dyadic analysis to a BSF sample. CFM explores theoretical links about interdependence at the group level (Ledermann & Kenny, 2012) and thus is ideal for testing systems and dyadic relations posited by the family systems theory (Cox & Paley, 1997). Aligned with the family systems theory's focus on group-level phenomenon (e.g., the whole is greater than the sum of its parts), CFM allows for appropriately accounting theoretical assumptions about group-level influence by modeling shared variance or similarity between dyad members on a given variable as a latent dyadic variable (Galovan et al., 2017). Within CFM, commonality or similarity in a shared variable is the main focus no matter the specific level of that variable for each person in a dyad. In the case of the current study, this translates to whether a shared responsiveness latent variable can be constructed or modeled among mother–father dyads from low-income backgrounds, irrespective of mothers' and fathers' individual levels of parental responsiveness and their combinations (e.g., high paternal responsiveness, low maternal responsiveness). This focus on similarity of a shared variable within a dyad supports prior research documenting the importance of going beyond individual-level examination to uncover similar dyadic parenting patterns and their associations with subsequent developmental outcomes (Galovan et al., 2017; Martin et al., 2007; Meteyer & Perry-Jenkins, 2009; Lee et al., 2021). For example, Galovan et al. (2017) constructed a shared interparental conflict resolution latent variable using both mothers' and fathers' reports (individual variances were modeled as residuals) and found that shared interparental conflict when the children were in sixth grade was associated with lower levels of child behavior problems when the children were 15 years old.

FATHERS' PARENTAL RESPONSIVENESS IN RESIDENT AND NONRESIDENT FATHER FAMILIES

Lamb and Pleck's original theory of father involvement (Lamb et al., 1985) delineated three dimensions of father involvement (i.e., engagement, responsibility, accessibility). The original

theory has a general focus on fathers' overall involvement with their children without recognizing the emotional and qualitative aspects of fathering. Building on the original theory, Pleck developed a revised theory of father involvement (Pleck, 2010), highlighting fathers' warmth and responsiveness as central to understanding father involvement. From this perspective, the quality of fathers' engagement with their children (e.g., hostility vs. responsiveness) is a critical dimension of the interaction that relates to how children will benefit from father involvement. Importantly, Pleck's (2010) theory is inclusive of the roles of both resident and nonresident fathers. Even though nonresident fathers spend less time with their children compared with resident fathers (Jones & Mosher, 2013), the benefits of nonresident fathers' involvement can be felt through interactions that are high in warmth and parental responsiveness (Adamsons & Johnson, 2013; Amato & Gilbreth, 1999). That said, researchers have noted that individual and shared parenting practices can differ for resident and nonresident father families (Carlson et al., 2008; Jones & Mosher, 2013).

In the current study, such a distinction may be relevant because when parents do not coreside, they may be less likely to share a common parenting approach and may have fewer opportunities to observe each other and potentially adopt the parenting strategies of the other parent. Relatedly, research suggests that parents who do not live together may be less likely to coparent well (Fagan et al., 2016) and less likely to share similar parenting styles (Teubert & Pinquart, 2010). However, it is equally important to note that prior research comparing family processes involving parental warmth among resident and nonresident father families with low income has demonstrated no differences in findings by fathers' resident status (Lee et al., 2023), suggesting additional research in this area is needed. As such, we examined fathers' resident status as a moderator of the associations primarily between shared parental responsiveness and children's developmental outcomes.

CURRENT STUDY

The current study used a CFM approach to dyadic analysis to examine fathers' and mothers' shared parental responsiveness and its associations with three developmental outcomes (i.e., child behavior problems, prosocial behaviors, and receptive language), above and beyond the effects of mothers' and fathers' individual residual variance. Informed by family systems theory and prior research documenting interparental and shared parenting quality (Cox & Paley, 1997; Cummings & Davies, 2010; Lee et al., 2020, 2021), we primarily hypothesized that fathers' and mothers' shared parental responsiveness would be associated with more positive developmental outcomes for children (i.e., lower levels of child behavior problems, higher levels of prosocial behaviors, and higher levels of receptive language). In other words, we hypothesized that children would primarily benefit from mothers' and fathers' shared parental responsiveness (i.e., mutual influence and similarity between parental responsiveness within the mother–father dyad). We also explored potential differences in these linkages for resident and nonresident father families. We did not have specific hypotheses for this exploratory analysis, given mixed findings of prior research comparing family processes across resident and nonresident families.

Shared parental responsiveness can be appropriately modeled through dyadic analysis, where mothers' and fathers' shared variance of parental responsiveness is captured and used as a predictor of subsequent child outcomes (while parsing out unshared individual variance as error terms; Galovan et al., 2017; Gonzalez & Griffin, 2003; Ledermann & Kenny, 2012). In implementing the CFM, we built a couple-level latent parental responsiveness variable that captured the shared variance of parental responsiveness between fathers and mothers. We also created an individual residual variance latent variable that captured mothers' and fathers' unique variance that remained unexplained. This was important to do to examine the effects of shared

responsiveness at the dyad level on child outcomes above and beyond the effects of the parsed out individual residual variance. This approach is consistent with prior research employing the CFM (Galovan et al., 2017; Iida et al., 2018; Mejía & Gonzalez, 2017; Maroufizadeh et al., 2018). By examining the links between shared responsiveness and children's developmental outcomes, the current study makes an important contribution to the literature on father–mother shared parenting quality and subsequent child well-being, especially among children from socioeconomically disadvantaged backgrounds.

METHODS

The Building Strong Families Project and related procedures

Data came from the BSF project, a federally funded evaluation of a healthy marriage and relationship education program (Moore et al., 2013). The goal of the BSF project was to enhance couples' relationship quality and thus promote healthy child and family outcomes. The project recruited more than 5,000 racially diverse families from socioeconomically disadvantaged backgrounds (i.e., low income and low levels of educational attainment) living in eight U.S. sites between 2005 and 2011. Eligibility criteria to participate in the BSF project included the following: The mother and father (a) had to provide informed consent, (b) needed to be at least 18 years old, (c) were either expecting a baby or had a baby under 3 months old, (d) were unmarried at the time of the focal child's conception, and (e) were romantically involved. Couples were recruited at various locations, including health clinics, hospitals, maternity wards, prenatal clinics, and Special Supplemental Nutrition Program for Women, Infants, and Children clinics. The BSF project randomized participants into treatment and control groups. Those in the treatment group received 30 to 42 hours of group-based relationship skills education in addition to access to family coordinators and referral services. Those in the control group could seek relationship skills education elsewhere but were not provided with BSF services (Moore et al., 2013).

Survey data were collected at three time points: (a) baseline when couples enrolled into the BSF project, (b) at 15 months post-baseline via telephone interviews, and (c) at 36 months post-baseline via telephone interviews. At the 36-month post-baseline time point, direct observations of father–child and mother–child interactions also took place. Further, children's developmental outcomes were only available at the 36-month post-baseline time point. The average ages of children were 44 and 42 months old at the time of father–child interaction assessments and mother–child interaction assessments, respectively. Mathematica Policy Research conducted the impact evaluation of the BSF project and found that BSF's intervention did not have statistically significant effects on key outcomes, including couples' likelihood of marriage, partner relationship quality, coparenting relationship quality, and father involvement (Wood et al., 2014). However, children in the treatment group exhibited a small but significant decrease in behavior problems (Wood et al., 2012, 2014). Therefore, we added the BSF randomization status (i.e., control or treatment group) as a control variable in all our analyses.

Participants

Our analyses involved a subsample of BSF families from the original sample of 5,102 families. To create our shared responsiveness study sample, we first dropped 18 families in which either the BSF mother or father died. Next, because not all BSF families took part in the direct assessments of parent–child interactions at the 36-month post-baseline time point where parental responsiveness was observed, we dropped mothers and fathers missing on parental responsiveness. This involved

dropping 92 cases in which mothers' responsiveness was missing, as well as 3,819 cases in which fathers' responsiveness was missing. This left us with a total sample of 1,173 families. We further divided families into resident and nonresident father families. Families were considered resident father families if fathers (and mothers) indicated that they had been living with their BSF partner all the time since the focal child's birth or across all three time points ($n = 651$). Families were considered nonresident father families if fathers (and mothers) indicated they had not lived with their BSF partner since the child's birth or had reports that were discrepant (i.e., fathers and mothers disagree on resident status; $n = 521$). Because BSF data are deidentified, the institutional review board at University of Michigan deemed the study exempt from its oversight.

Measures

Parental responsiveness

Fathers' and mothers' parental responsiveness were separately observed and video recorded in participants' homes at the 36-month post-baseline period using the two-bags task, a semi-structured task meant to elicit meaningful parent–child interactions (Administration for Children and Families, 2002; Hershey et al., 2013). The two-bags task is a modified version of the three-bags task (NICHD Early Child Care Research Network, 1999) used in the Early Head Start Research and Evaluation Study and the Early Childhood Longitudinal Study—Birth Cohort (Nord et al., 2004; Vogel et al., 2015). The task involved a 10-minute interaction wherein mother–child and father–child dyads were instructed to play with objects found inside the bags in numerical order. The children's book *Good Night, Gorilla* (Rathmann, 1994) was inside the first bag, and a set of toy dishes were inside the second bag. Mother–child interactions took place first and then father-child interactions (Moore et al., 2013).

Eighteen trained Mathematica Policy Research coders watched parent–child interaction videos in a centralized location and used the same rating system as the NICHD Study of Early Child Care Research Network to rate fathers' and mothers' parenting on five dimensions: (a) sensitivity (i.e., ability to perceive and accurately interpret child's behaviors and respond appropriately), (b) positive regard (e.g., demonstration of positive feelings toward child), (c) parent detachment (reverse-coded) (e.g., disengagement with child), (d) cognitive stimulation (e.g., ability to scaffold child's cognitive development), and (e) quality of the parent–child relationship (e.g., parent and child closely connected). The rating system employed a 7-point scale ranging from 1 = *very low* to 7 = *very high* (NICHD Early Child Care Research Network, 1999). The coders achieved 90% interrater reliability. Additional descriptions of the procedures, measures, and validity of the parent–child interactions can be found in the BSF documentation and elsewhere (Guerrero et al., 2021; Hershey et al., 2013; Moore et al., 2013). The five parenting dimensions noted earlier were then combined for each parent to create composite measures, representing fathers' and mothers' parental responsiveness. The measures demonstrated good internal reliability for both parents (fathers: $\alpha = .84$; mothers: $\alpha = .85$).

Child prosocial behaviors

Children's prosocial behaviors were measured via maternal reports at the 36-month post-baseline time point with the Social Interaction Scale of the Preschool and Kindergarten Behavior Scales—Second Edition (PKBS-2; Merrell, 2002). Mothers were asked to rate nine items on how frequently each behavior occurred during the past month on a 4-point scale: 0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*. Example items include "How often did [child] show affection for other children?" "How often did [child] comfort other children who were upset?" and

"How often did [child] invite other children to play?" Items from the PKBS-2 have been adapted for use in other large-scale surveys, including the Early Childhood Longitudinal Survey—Birth Cohort (ECLS-B) and the Universal Preschool Child Outcome Study (Hershey et al., 2013). The measure demonstrated good internal reliability ($\alpha = .75$).

Child behavior problems

Children's behavior problems were measured via maternal reports at the 36-month post-baseline time point using 26 items from the Behavioral Problems Index (BPI; Peterson & Zill, 1986; Zill, 1985). Mothers indicated whether statements about the child's behavior were 0 = *never true*, 1 = *sometimes true*, or 2 = *often true*. Sample items include "[Child] demands a lot of attention," "[Child] has a very strong temper and loses it easily," and "[Child] is unhappy, sad, or depressed." The measure demonstrated good internal reliability ($\alpha = .86$). For child behavior problems and child prosocial behaviors, both of which were assessed at the 36-month post-baseline time point, children were on average 37 months old. More than 90% of surveys at the 36-month post-baseline time point were completed before the child reached 3.5 years of age (Moore et al., 2013).

Child receptive language

Children's receptive language was measured using the Peabody Picture Vocabulary Test Fourth Edition (PPVT-4; Dunn & Dunn, 2007), a norm-referenced instrument for measuring the receptive vocabulary of children. The items broadly sample words that represent 20 content areas (e.g., actions, vegetables, tools) and parts of speech (e.g., nouns, verbs, or attributes) across all levels of difficulty. In BSF, the PPVT-4 was administered to the child by an independent assessor to English-speaking children at the 36 month post-baseline time point. Children were given a series of words ranging from easy to difficult that were accompanied by a picture plate containing multiple drawings. Children were instructed to point to the drawing that best represented each target word. The test typically takes 20 to 30 minutes to complete and concludes when the difficulty level becomes too high for the child. Among young children, higher PPVT scores have been shown to relate to early school readiness (Mashburn & Henry, 2004).

Sociodemographic and other control variables

We controlled for factors that could influence associations between independent and dependent variables. Parents' race and ethnicity were measured at baseline with a series of dummy variables, including whether both parents were Hispanic, non-Hispanic White, non-Hispanic Black, or other (which included interracial couples). Parental education was measured at baseline with dummy variables for whether neither parent, one parent, or both parents had a high school degree. Parental age was measured at baseline in years. Child sex (0 = *female*, 1 = *male*), couples' relationship status at baseline and the 36-month post-baseline time point (0 = *unmarried*, 1 = *married*), and BSF randomization status (0 = *control*, 1 = *treatment*) were specified and included. The number of biological children the mother had with the BSF father before the focal child was born (capped at 5) was also included. Because participants' data were collected from multiple BSF sites (suggesting nonindependence of data), individual dummies for BSF sites in our study sample—Atlanta, Houston, Indiana, and Oklahoma City—were also included as control variables. Fathers' and mothers' depressive symptoms at the 36-month post-baseline time point were measured using the 12-item Center for Epidemiologic Studies Depression Scale

(CES-D; Radloff, 1977; fathers: α = .86, mothers: α = .86). In analyses where fathers' resident status was not tested as a moderator (i.e., initial model before conducting moderation analysis), father resident status (0 = *nonresident*, 1 = *resident*) at the 36-month post-baseline time point was included as a control. The same variable served as a moderator variable in subsequent analyses comparing main results across resident and nonresident father families.

Analysis plan

As part of our preliminary data analysis, we compared the study sample and original or full BSF sample and found that there was a significant difference in mothers' responsiveness such that mothers in the study sample had higher responsiveness scores than those in the original sample, $F(1, 1902) = 22.80$, $p < .001$. There was also a significant difference in preschoolers' receptive language such that children in the study sample exhibited higher PPVT scores than those in the original sample, $F(1, 1376) = 6.18$, $p = .013$. Additional details, including comparisons on key sociodemographic variables, can be found in Supplemental Material 1.

Descriptive analyses were conducted in Stata Version 15.1 (StataCorp, 2017). All other analyses were conducted in Mplus Version 8 (Muthén & Muthén, 2018). Data were screened for outliers and multicollinearity. All variance inflation factors were below 2.3, suggesting no concerns with multicollinearity in the present analyses. There were no missing values on the independent variables, and there were only minimal missing data on child behavior problems (<1% missing) and child prosocial behaviors (<1% missing). Approximately 31% of the cases were missing on child receptive language. To handle missing data, we used full information maximum likelihood estimation, which has been documented as a generally unbiased way to handle missing data in the context of structural equation modeling (SEM) (Kline, 2016). Descriptive analyses were conducted followed by bivariate analyses to examine differences in study variables based on fathers' resident status.

For our main dyadic analyses, we used CFM within a latent variable SEM framework (Gonzalez & Griffin, 2003; Ledermann & Kenny, 2012). Whereas a typical common fate approach involves two latent variables (i.e., a latent independent variable and a latent dependent variable), our analysis involved two latent independent variables (i.e., shared parental responsiveness and individual residual variance) and three observed dependent variables (i.e., child behavior problems, prosocial behaviors, receptive language). Conducting CFM involved first formulating a measurement model that consisted of the latent construct of shared parental responsiveness (i.e., representing shared variance of mothers' and fathers' responsiveness scores) with two observed indicators: fathers' responsiveness and mothers' responsiveness. The factor loadings of these indicators were fixed to 1 to represent equal contributions of both parents. This practice is consistent with recommendations for conducting dyadic analysis and what prior research has done (Gonzalez & Griffin, 2003; Lee et al., 2020, 2021).

Next, to create a latent construct of individual residual variance, the residual variances of fathers' and mothers' responsiveness indicators were estimated and constrained to be equal at 1. This approach is consistent with prior work (Mejía & Gonzalez, 2017) and allowed us to use the individual residual variance latent variable as a predictor of child outcomes. This latent variable represented mothers' and fathers' unique residual variances that were separated out and thus distinct from their shared responsiveness. Separating the individual residual variance from shared responsiveness was important to examine the effects of shared responsiveness on child outcomes, above and beyond the effects of the parsed out individual residual variance.

Afterward, child outcomes were regressed onto the shared responsiveness and individual residual variance latent variables. A significant effect from the shared component would suggest that fathers' and mothers' shared responsiveness predicts child outcomes, even after controlling for their individual residual variance. Three measures of model fit were used,

including comparative fit index (CFI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). CFI values greater than .95, RMSEA values less than .06, and SRMR values less than .08 suggest good model fit (Hu & Bentler, 1999).

Finally, for our moderation analyses, the following two interaction terms were introduced to our models to examine whether the relationships between parental responsiveness and child outcomes were moderated by fathers' resident status: (a) an interaction between fathers' resident status and the shared parental responsiveness latent variable and (b) an interaction between fathers' resident status and the individual residual variance latent variable. The interaction terms were created using the XWITH command in Mplus. Then, to examine whether the model with the interaction coefficients exhibited better fit to the data than the model without the interaction, we compared model fit using a chi-square difference test and by determining which model had lower values of the Akaike information criteria (AIC) and Bayesian information criteria (BIC). A significant chi-square statistic suggests a better model fit for the larger model with more freely estimated parameters (i.e., the moderation model in our case) than the smaller original model (i.e., the non-moderation model). A nonsignificant chi-square statistic suggests that both models fit the data equally well.

RESULTS

Descriptive results

Descriptive statistics and bivariate analysis results by fathers' resident status can be found in Table 1. In the overall sample, the average ages for fathers and mothers were 26 years and 23 years, respectively. More than half the couples identified as non-Hispanic Black (52.27%). Parents had low levels of education, with nearly 52% of families reporting that neither parent or only one parent had a high school degree. Children in nonresident father families exhibited more prosocial behaviors than children in resident father families, $t(1167) = 2.98$, $p < .01$. Also, children in nonresident father families exhibited more behavior problems than children in resident families, $t(1167) = 2.96$, $p < .01$. Mothers and fathers in resident father families were older than those in nonresident father families, mothers: $t(1170) = -3.99$, $p < .001$; fathers: $t(1170) = -4.14$, $p < .001$. Resident father families had more biological children than nonresident father families, $t(1170) = -2.27$, $p = .023$. There were no statistically significant differences between fathers' and mothers' observed responsiveness scores (mothers: $M = 4.64$, $SD = .85$; fathers: $M = 4.58$, $SD = .86$, $t(1172) = 1.90$, $p = .058$).

Dyadic analysis results

The measurement model involving the shared responsiveness and individual residual variance latent variables for the full sample exhibited good fit, CFI = .98, RMSEA = .03, SRMR = .04. The structural model with all three child outcomes—child prosocial behaviors, child behavior problems, and child receptive language —also exhibited good fit, CFI = 1.00, RMSEA = .00, SRMR = .01. As shown in Figure 1, fathers' and mothers' shared parental responsiveness was positively associated with child prosocial behaviors (B = 0.33, $SE = .06$, $p < .001$). However, fathers' and mothers' individual residual variance was not significantly associated with child prosocial behaviors (B = 0.02, $SE = .01$, $p = .277$). Similarly, although fathers' and mothers' shared parental responsiveness was positively associated with child receptive language (B = 14.85, $SE = 2.23$, $p < .001$), fathers' and mothers' individual residual variance was not significantly associated with child receptive language (B = 0.87, $SE = 0.51$, $p = .087$). Neither shared parental responsiveness (B = −0.05, $SE = 0.03$, $p = .088$) nor individual residual

TABLE 1 Descriptive statistics and bivariate analyses of study variables by fathers' resident status

	Total sample ($N = 1,173$)	**Resident father families ($N = 651$)**	**Nonresident father families ($N = 521$)**			
Variable	*M* (*SD*)/*n* (%)	*M* (*SD*)/*n* (%)	*M* (*SD*)/*n* (%)	t/χ^2	*df*	*p*
Mother responsiveness	4.64 (.85)	4.65 (85)	4.63 (.86)	−0.35	1170	.724
Father responsiveness	4.58 (.86)	4.57 (.86)	4.60 (.86)	0.45	1170	.652
Child prosocial behavior	2.39 (.49)	2.36 (.50)	2.44 (.47)	2.98	1167	<.01
Child behavior problems	0.39 (.26)	0.37 (.24)	0.42 (.28)	2.96	1167	<.01
Child receptive language	90.24 (15.33)	90.33 (16.35	90.14 (14.27)	−0.17	809	.863
Mother age	23.20 (4.75)	23.70 (4.93)	22.59 (4.47)	−3.99	1170	<.001
Father age	25.52 (6.17)	26.19 (6.13)	24.69 (6.13)	−4.14	1170	<.001
Mother depressive symptoms	4.51 (5.67)	3.87 (0.21)	5.30 (0.26)	4.28	1161	<.001
Father depressive symptoms	3.86 (5.42)	3.05 (4.54)	4.87 (0.27)	5.75	1157	<.001
Number of biological children	1.35 (.72)	1.39 (.75)	1.30 (.67)	−2.27	1170	.023
Couple married, baseline	94 (8.01)	70 (10.75)	24 (4.61)	14.82	1	<.001
Couple married, 36 months	358 (30.52)	300 (46.08)	58 (11.13)	166.63	1	<.001
Parent race/ethnicity, *n* (%)				117.92	3	<.001
Hispanic	209 (17.91)	179 (27.67)	30 (5.78)			
White	231 (19.79)	144 (22.26)	87 (16.76)			
Black	610 (52.27)	265 (40.96)	344 (66.28)			
Other	117 (10.03)	59 (9.12)	58 (11.18)			
Parent education, *n* (%)				0.99	2	.609
Neither parent high school	180 (15.38)	104 (16.02)	76 (14.62)			
One parent high school	426 (36.41)	229 (35.29)	197 (37.88)			
Two parent high school	564 (48.21)	316 (48.69)	247 (47.50)			
Treatment group, *n* (%)				13.44	1	<.001
Control	571 (48.68)	286 (43.93)	285 (54.70)			
Treatment	602 (51.32)	365 (56.07)	236 (45.30)			

Note. Parental responsiveness range is 1 to 7. Child prosocial behavior range is 0 to 3. Child behavior problem range is 0 to 2. Peabody Picture Vocabulary Test (PPVT) range is 26 to 142. Mother age range is 18 to 41. Father age range is 18 to 57. Number of biological children range is 1 to 5. Mother depressive symptom range is 0 to 36, and father depressive symptom range is 0 to 34. Child cognitive ability analyses were restricted to children with nonmissing PPVT data ($n = 811$). Chi-square tests were conducted for categorical items, and *t* tests were conducted for continuous items.

variance (B = −0.01, $SE = 0.01$, $p = .085$) was significantly associated with child behavior problems.

Concerning sociodemographic control variables, couples' education levels, couples' marital status, and child sex were significant predictors of shared parental responsiveness. Specifically, compared with neither parent having a high school diploma, at least one parent having a high school diploma (B = 0.22, $SE = 0.06$, $p < .001$) and both parents having high school diplomas (B = 0.33, $SE = 0.07$, $p < .001$) were linked with higher levels of shared parental responsiveness. Couples' being married, especially at the 36-month period, was linked with higher levels of shared parental responsiveness (B = 0.13, $SE = 0.05$, $p = .013$). Having a boy was linked with lower levels of shared parental responsiveness (B = −0.10, $SE = 0.14$, $p = .013$).

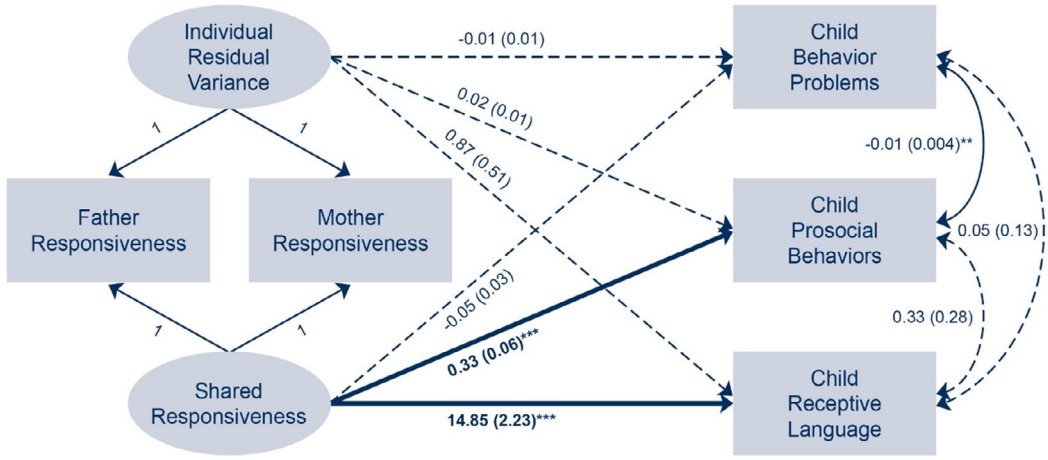

FIGURE 1 Associations between mothers' and fathers' shared responsiveness and individual residual variance predicting child prosocial behaviors, child behavior problems, and child receptive language.
Note. Dotted lines indicate pathways where $p > .05$. Coefficients are unstandardized and standard errors are shown in the parentheses. Model controls for mothers' and fathers' race and ethnicity, education, age, marital status, depressive symptoms, number of biological children parents had together, child sex, fathers' resident status, whether the couples were assigned to the Building Strong Families (BSF) treatment or control group, and BSF program site. Comparative fit index = 1.00, Root mean square error of approximation = .00, standardized root mean square residual = .01. [Color figure can be viewed at wileyonlinelibrary.com]

Moderation analysis results

Fathers' resident status did not moderate any of the relationships tested in our joint model. Specifically, fathers' resident status did not moderate the relationship between shared parental responsiveness and child prosocial behaviors (B = 0.05, $SE = 0.11$, $p = .652$). It also did not moderate the relationship between individual residual variance and child prosocial behaviors (B = 0.02, SE = 0.05, $p = .667$). Similarly, fathers' resident status did not moderate the relationship between shared responsiveness and child behavior problems (B = 0.10, $SE = 0.06$, $p = .066$), as well as individual residual variance and child behavior problems (B = 0.01, $SE = 0.02$, $p = .602$). Fathers' resident status did not moderate the relationship between shared responsiveness and child receptive language (B = 2.71, $SE = 6.06$, $p = .654$), as well as individual residual variance and child receptive language (B = 3.70, SE = 3.17, $p = .243$). When comparing the non-moderation model to the moderation model (in which fathers' resident status was examined as a moderator), the BIC value for the non-moderation model was smaller (BIC = 13543.70) than that of the moderation model (BIC = 13570.043). However, the AIC value for the moderation model was slightly smaller in value (AIC = 13070.925) than that of the non-moderation model (AIC = 13074.530). The chi-square difference test showed no statistical difference between the two models, $\chi^2(6, 1087) = 11.82$, $p = 0.66$, suggesting that the two models fit the data equally well.

DISCUSSION

Family systems theory suggests it is important to examine both fathers and mothers to best understand child development, given that families are made up of interrelated subsystems that directly and indirectly influence each other (Cox & Paley, 1997). Using a large and racially

diverse sample of families with low income, the current study modeled fathers' and mothers' shared parental responsiveness—mutual influence and similarity between parental responsiveness within the mother–father dyad—to better understand their shared influence on their preschoolers' development, above and beyond the effects of mothers' and fathers' individual residual variance. Results partially supported our hypotheses related to shared parental responsiveness and its links to three developmental outcomes. Shared responsiveness did not predict child behavior problems. However, shared parental responsiveness predicted higher levels of both preschoolers' prosocial behaviors and their receptive language, even after accounting for the effects of mothers' and fathers' individual residual variance that is distinct from their shared variance on parental responsiveness. Fathers' resident status did not moderate associations between parental responsiveness and preschoolers' developmental outcomes.

Our results suggest that when fathers and mothers exhibit shared responsiveness, it may provide young children with a sense of stability and predictability (Meteyer & Perry-Jenkins, 2009; Rinaldi & Howe, 2012; Tavassolie et al., 2016) that is more directly linked to their prosocial and language development than behavior problems. We did not find similar findings for mothers' and fathers' individual residual variance. These results suggest that when mothers and fathers are able to engage in shared parental responsiveness, their young children perhaps benefit from a larger family system that is more coordinated, cohesive, and stable. Perhaps parents are able to be on the same page about their parental behaviors and styles. It may also be that by both parents being responsive to their children's needs, they are modeling cooperation and prosocial behaviors for their children to replicate. Our results are consistent with those of prior studies that included both fathers' and mothers' observed parental responsiveness to examine the associations between parental responsiveness and preschoolers' cognitive abilities (Mills-Koonce et al., 2015; Ryan et al., 2006; Ward & Lee, 2020), as well as the broader literature on parental sensitivity, warmth, and child language development (Madigan et al., 2019). Relatedly, prior studies that analyzed fathers' and mothers' behaviors together suggest that combined patterns of parental behaviors are additive (Martin et al., 2007; Meteyer & Perry-Jenkins, 2009; Lee et al., 2021). Overall, our results contribute to the literature by corroborating the notion that not simply individual levels of parental responsiveness but shared levels of responsiveness from fathers and mothers may be important for early child outcomes, especially in the area of young children's prosocial and language development.

One notable finding from the current study, when considered in the context of prior studies (Barnett et al., 2021; Cooke et al., 2022; Lee et al., 2018; Ward & Lee, 2020), is that parental responsiveness did not appear to be linked to child behavior problems. This is both consistent and inconsistent with results from studies that jointly examined fathers' and mothers' warmth (Lee et al., 2018), as well as fathers' and mothers' responsiveness (Barnett et al., 2021; Ward & Lee, 2020), as predictors of preschoolers' behavior problems. For example, in their BSF study, Lee et al. (2018) found that while fathers' reports of warmth (e.g., felt their relationship with child was warm, showed love to child) were for the most part not associated with child behavior problems, mothers' reports of warmth were significantly associated with both fewer internalizing and externalizing child behavior problems. Similarly, others who used observational parental responsiveness data, found that while BSF fathers' parental responsiveness was not associated with child behavior problems, BSF mothers' parental responsiveness was significantly linked with fewer child behavior problems (Barnett et al., 2021; Ward & Lee, 2020). A recent meta-analysis showed across 108 studies a consistent negative pattern between parental sensitivity and child externalizing and internalizing problems, with a stronger effect of parental sensitivity on child internalizing problems, especially for families from low-income contexts (Cooke et al., 2022).

It Is possible that methodological differences, including the current study's use of a common fate–informed approach to dyadic analysis, in which we focused on creating a shared parental responsiveness latent variable from fathers' and mothers' observed parental responsiveness

variables, may have contributed to some of the differences in findings between ours and prior BSF studies (Barnett et al., 2021; Lee et al., 2018; Ward & Lee, 2020; studies used individual parent-level, non-latent warmth or responsiveness variables). Furthermore, it is helpful to consider potential child effects and family selection factors. For example, given that parent–child relationships are bidirectional, it may be that children's behavior problems exert a stronger effect on parents' shared responsiveness than the other way around. Moreover, BSF families volunteered to participate in a relationship-strengthening program, which may have contributed to already high levels of parental responsiveness and low levels of child behavior problems. Lack of variance in some of the key study variables may have contributed to the null finding related to child behavior problems. Moreover, it is possible that the combination of internalizing and externalizing items within the child behavior problems composite may have contributed to the null finding. Additional research is needed with child internalizing and externalizing behavior problems disaggregated.

Our results showing no moderation by fathers' resident status suggest that shared parental responsiveness and its associations with preschoolers' developmental outcomes operate similarly across resident and nonresident father families. This aligns with tenets of Pleck's (2010) revised theory of father involvement and findings from prior research suggesting that fathers' responsiveness may be a dimension that is important for children irrespective of fathers' resident status (Adamsons & Johnson, 2013; Amato & Gilbreth, 1999). Our findings also support those from prior studies that compared family processes involving parental warmth or predictors of father involvement among resident and nonresident father families, with results showing no significant differences in findings by fathers' resident status (Coley & Hernandez, 2006; Lee et al., 2023). That said, we are mindful that our findings are inconsistent with those of others, especially examining pathways between coparenting and father involvement (Altenburger, 2022; Fagan & Palkovitz, 2011; Lee et al., 2020). Because of the generally limited application of family systems theory with nonresident father families (Bocknek, 2020), our study, and its moderation results, makes meaningful contributions to the literature.

It is important to consider that our sample involved only those fathers—both resident and nonresident fathers—who completed the parent–child observations. Resident and nonresident fathers in our sample may be more similar to each other (as evidenced by both groups' availabilities to complete the parent–child observations) than different. For example, compared with those who are unavailable, fathers who are available to complete parent–child observations may be highly involved in their children's lives, irrespective of their resident status. Given prior research documenting differences between resident and nonresident fathers (Carlson et al., 2008; Jones & Mosher, 2013), additional research with a more representative sample is needed to understand the links between shared responsiveness and child outcomes by fathers' resident status.

Observational parental responsiveness of fathers and mothers with low income

Prior research has examined mothers' and fathers' warmth and responsiveness through a variety of measures (e.g., parental warmth survey measures capturing affection and love parents displayed to their children, how often parents comforted their children who were upset or crying) (Harper & Fine, 2006; Zaslow et al., 2002). For example, large-scale research such as the Panel Study of Income Dynamics and the ECLS-B have used survey measures that ask fathers and mothers to report how often they and their child "have warm close times together," how much the father or mother "feels like the child likes the parent and wants to be near the parent," and how often fathers and mothers show warmth or love to the child (Baker, 2017; Harper & Fine, 2006; Lee et al., 2018). One important element of the current study is that we used observational data from the two-bags parent–child interaction task. What this means with regard to

the current study's main finding is that when independent coders objectively scored fathers and mothers on the same task and using the same coding procedures, children tended to have higher prosocial behaviors and receptive language.

Separately, the vast majority of existing studies that used direct assessments similar to the two-bags task to measure parental responsiveness have been conducted with mothers (Brady-Smith et al., 2013; Fuligni et al., 2013; Fuligni & Brooks-Gunn, 2013; O'Neal et al., 2017). There are few studies of this current study's scale (i.e., consisting of more than 1,000 families from low-income contexts) that capture both fathers' and mothers' parental responsiveness with a widely used observational task and coding system (NICHD Early Child Care Research Network, 1999). By leveraging such data, as well as applying a dyadic analysis to capture fathers' and mothers' shared parental responsiveness and their associations with multiple developmental outcomes, the current study makes an important contribution to the literature related to family systems, shared parenting quality, and child development.

Limitations and future research directions

There are a number of limitations to the current study. Although we endeavored to apply the family systems theory in modeling our shared parenting responsiveness variable, additional research is needed to refine and develop the construct further, theoretically and empirically. For example, future research might build on this work to better understand not only "what" is being shared between mothers and fathers but also "how" they come to form mutuality or similarity in their parental responsiveness toward their children (e.g., through joint coordination or goal setting, interactive communication). Because the current study was cross-sectional in design, we cannot make causal claims about the associations between parental responsiveness and child outcomes. This was primarily due to limitations in data availability. Parental responsiveness and child outcomes were only available at the 36-month post-baseline period. Additional research with longitudinal data is needed to see if results replicate across time or to examine reciprocal relations between shared responsiveness and developmental outcomes.

The study sample consisted of parents who volunteered to be part of a relationship education program. Therefore, their initial levels of parental responsiveness may have been higher than other parents with low income who did not select to participate in a relationship education intervention. Relatedly, the sample faced high levels of socioeconomic adversity, and most study participants were people of color. As such, the sample is not representative of the U.S. population. Future research would benefit from using nationally representative data to ensure generalizability of findings.

Additionally, the study relied on mothers' reports of child behavior problems and prosocial behaviors, and these may differ from fathers' reports, which were generally not available in the data. There is a need to use reports from both mothers and fathers, when possible, to reduce single-reporter biases. That said, the child receptive language measure in our study used a BSF staff–administered standardized test, which may be a less subjective outcome. Furthermore, due to limitations of the available data, we could not compare families who participated in the two-bags task to those who were invited to participate but did not do so. The two-bags task was also limited to a 10-minute semi-structured parent–child observational session, which may be insufficient in capturing how parents and children interact with each other in the course of everyday events. All these factors further limit the generalizability of our results.

That said, our findings suggest that future research should consider examining shared parenting quality in relation to child outcomes. Dyadic analysis wherein joint patterns of parenting behaviors are modeled may elucidate findings that can provide more specific implications for families and practitioners serving them. Additionally, using data wherein parenting behavior can be modeled as a latent variable could allow the researchers to examine more complex

patterns across dimensions of parenting behaviors. One approach to doing so would be conducting a more person-centered analytic approach in which groups of couples could be examined on their parental responsiveness scores (e.g., similarly high, similarly low, discordant mother high and father low, discordant mother low and father high) across resident and nonresident father families.

Future research could explore which patterns of fathers' and mothers' behaviors, using a broader set of constructs, are most beneficial to young children. In other words, certain combinations of fathers' and mothers' parenting may be differentially beneficial to children based on children's age, temperament, socioeconomic status, or cultural context. The current study suggests that mothers' and fathers' shared responsiveness is largely beneficial for our sample of preschoolers. However, these associations might look different across racial and ethnic groups, warranting moderation by race and ethnicity in future research to inform the development of culturally responsive interventions for children and families.

Finally, our fathers' resident status variable focused on those fathers who were consistently resident with the mothers and focal children across all three time points (or since the birth of the focal children) and thus was not able to capture any changes in fathers' resident status across time. Future research may consider more nuanced ways of looking at fathers' resident status (e.g., resident at birth but nonresident by 36 months, nonresident at birth but resident by 36 months, and other complex residential patterns) and examine whether moderation by fathers' resident status yields similar or different results from those in this study.

Conclusions and implications

Little is known about shared parental responsiveness and child outcomes among racially diverse families with high levels of socioeconomic disadvantage. Findings from this study suggest that fathers' and mothers' shared parental responsiveness may be an important contributor to children's prosocial behaviors and receptive language, with no differences demonstrated when comparing resident and nonresident father families. Future research should consider how joint patterns of fathers' and mothers' parenting behaviors influence child outcomes across different contexts. A key implication of this study is that helping fathers and mothers with low income communicate about and develop a shared sense of parental responsiveness may be beneficial to their young children's socioemotional and language development. For example, in early parent education programs (including home visiting), this may take the form of encouraging fathers and mothers to be aware of how they and their partners display responsiveness toward their children and work toward aligning their responsiveness behaviors and, more broadly, coordinating their parenting styles to work as a joint team and thus promote their children's healthy development. Our results also suggest that shared parental responsiveness is beneficial for children even after their mothers and fathers are no longer in romantic relationships, as was the case for those in nonresident father families. Parenting programs then could prioritize specific strategies for promoting shared parental responsiveness among mothers and fathers no longer romantically involved to foster the well-being of children growing up in nonresident father families.

ORCID

Joyce Y. Lee https://orcid.org/0000-0003-2805-9277
Shawna J. Lee https://orcid.org/0000-0003-0562-2856

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SUPPORTING INFORMATION

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