Mother-Child Dyadic Synchrony in European American and African American Families during Early Adolescence

Relations with Self-Esteem and Prosocial Behavior

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Mother-child relationships characterized by dyadic synchrony, a mutually responsive and interconnected interaction style, have been consistently linked to children's psychosocial adjustment in early childhood, but it is unclear whether such interaction patterns remain conducive to positive outcomes in early adolescence. The aim of the present investigation was to examine mother-child synchrony and its link to early adolescents' self-esteem and prosocial behavior. Data were collected from 268 early adolescents and their mothers from both European American and African American families. Four components of dyadic synchrony were assessed during a structured mother-child interaction session. In addition, assessments of early adolescents' self-esteem and prosocial behavior were conducted approximately one year later. Results indicated that mother-child shared positive affect and conversational equality were highly intercorrelated

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This investigation was part of a larger longitudinal research project, supported by a grant to Carol MacKinnon-Lewis from the William T. Grant Foundation, examining family and school factors that influence early adolescents' adjustment during the transition to middle school. The present study focused on a specific characteristic of mother-adolescent interaction, namely dyadic synchrony, as it relates to two specific domains of adjustment, self-esteem and prosocial behavior. We extend our appreciation to Allison Allmon, Kelly Barrow, Angela Walker, and all of the graduate and undergraduate research assistants who worked on this study.

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components of dyadic synchrony. Moreover, early adolescents from dyads with high levels of dyadic synchrony and conversational equality had higher self-esteem. Early adolescents from dyads with high levels of shared positive affect were more prosocial with peers. Although the patterns of association were similar for African American and European American preadolescents, ethnicity did interact with certain components of synchrony in predicting early adolescents' self-esteem and prosocial behavior.

Over the past decade growing empirical evidence has emerged in support of theoretical arguments that parent-child interaction is best conceptualized as a bidirectional process (see Kuczynski, 2003, for review). Much of this evidence is based on research that examines the dyadic quality of parent-child interaction based on measures that capture the systemic wholeness and co-constructed nature of the parent-child relationship as opposed to the individual characteristics of either parent or child (Collins & Laursen, 2005; Maccoby, 1992). One such measure that has received increasing research attention is parent-child dyadic synchrony, defined as a mutually responsive and reciprocal orientation between parent and child that includes elements of mutual focus, a balance of give and take, shared affect, and behavioral reciprocity (Harrist & Waugh, 2002). Synchrony is a complex emergent process that reflects the degree to which interacting partners adapt to one another's behavior in order to maintain a coherent and mutually rewarding interpersonal exchange (Barber, Bolitho, & Bertrand, 2001; Kirsh, Crnic, & Greenberg, 1995). Synchrony therefore provides a unique view of the nature of parent-child relationships that is different from the perspective obtained from more global constructs, such as authoritative parenting, as well as constructs that focus on the behavior of one individual in the relationship, such as warmth or responsiveness. Consistent with this argument, evidence indicates that dyadic synchrony has unique linkages to children's adjustment outside the family relative to parenting behaviors or child characteristics (Harrist, Pettit, Dodge, & Bates, 2004; Lindsey, Mize, & Pettit, 1997). Despite empirical support for the utility of dyadic synchrony as a construct that captures the bidirectional quality of the parent-child relationship (Crandell, Fitzgerald, & Whipple, 1997; Criss, Shaw, & Ingoldsby, 2003; Isabella & Belsky, 1991), a number of questions remain concerning the manifestation of dyadic synchrony between parent and child.

Because the majority of research on dyadic synchrony (and related concepts) has focused on mother-child interaction during early childhood (see Harrist & Waugh, 2002, for a review) and to a lesser extent middle childhood (Criss et al., 2003; Deater-Deckard, Atzaba-Poria, & Pike, 2004), it remains unclear whether mother-child synchrony continues to be of developmental significance when children enter into adolescence. Theo-

retical support for the continued importance of dyadic synchrony comes from Youniss and Smollar's (1985) description of early adolescence as a time of transition in which interactions between parents and child change from hierarchical and unilateral relationships toward more horizontal and reciprocal relationships. In a similar vein, stage-environment fit models of adolescent adjustment (e.g., Chu & Powers 1995; Eccles et al., 1993) propose that synchronicity of adolescent-parent interactions and expectations is a key factor in promoting positive outcomes during the transition to adolescence. To date, however, the empirical support for this proposition is limited. Gross and McCallum (2006) found that adolescent girls' self-reported impression of synchrony in their relationship with their mother was associated with girls' having a higher self-esteem and grade point average. In addition, Barber, Bolitho, and Bertrand (2001) found that parent-adolescent synchrony, operationalized as concordance between parent and adolescent self-reported perceptions of the family environment and adolescent emotional well-being, was linked to adolescents' psychological adjustment and lower levels of conduct disorder. Given the methodological limitations associated with the assessment of synchrony using self-report instruments in these studies and also given the general lacuna in knowledge concerning parent-child synchrony in the adolescent years, additional research is needed to examine the manifestation and developmental consequences of mother-child dyadic synchrony during adolescence.

Another major question concerning dyadic synchrony is whether it manifests itself in similar ways across different ethnic groups. Evidence suggests that unique environmental and sociocultural experiences encountered by families from different ethnic backgrounds account for variations in mothers' parenting style. For instance, neighborhood quality and experiences with racial discrimination have been linked to differences in the child-rearing practices of African American and European American mothers (Deater-Deckard, Dodge, Bates, & Pettit, 1996; Lamborn, Dornbusch, & Steinberg, 1996). Likewise, higher rates of poverty among African American families compared to European American families have been associated with greater parental distress among African American mothers (McLoyd, 1990). In turn, parental distress is linked with low levels of maternal warmth and increased emotional distance and punitiveness on the part of mothers (Kotchick, Dorsey, & Heller, 2005). However, even when factors such as environmental stress and economic status are controlled, differences emerge between European American and African American mothers' child-rearing style, most notably in the use of more frequent physical punishment by African American mothers (Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000). African American mothers also have been

found to display lower emotional support to their children (McLoyd & Smith, 2002) and to be more strict and intrusive than European American mothers (Bradley, Corwyn, McAdoo, & Garcia Coll, 2001; Ispa et al., 2003). These differences have been attributed to variations in child-rearing beliefs, with African American mothers being more likely than European American mothers to view such child-rearing practices as being best for children (Ispa et al., 2003; Pinderhughes et al., 2000). Consequently, it may be that the cultural beliefs held by families of color shape bidirectional processes between mother and child, such as dyadic synchrony, in ways that are unique from such processes in European American families. However, as with most research on mother-child relationships, the study of mother-child synchrony has been confined predominately to white middle-class families. The present study focuses on examining mother-child synchrony in both European American and African American families.

A third question involved in the study of dyadic synchrony centers on the optimal approach or measure used to assess mother-child synchrony. More specifically, it is unclear whether dyadic synchrony is best conceptualized as a global relationship characteristic that encompasses several conditions and properties (Criss et al., 2003) or if it is more optimally represented by the coordination of multiple component processes (Deater-Deckard & Petrill, 2004). Empirical evidence from various literatures suggests that synchronous mother-child interactions may emerge within, and be dependent upon, a constellation of relational variables (Barber et al., 2001; Kochanska, Forman, Aksan, & Dunbar, 2005). Other evidence, however, suggests that the specific elements that have been theorized to constitute dyadic synchrony may be distinguished from one another in terms of their contribution to children's adjustment (Isabella & Belsky, 1991; Lindsey & Mize, 2000). Moreover, lack of consistency across studies in the operational definition of dyadic synchrony, with various authors using one or more constructs designed to tap elements of shared affect, joint attention, or verbal turn-taking (e.g., Criss et al., 2003; Harrist et al., 1994; Lindsey et al., 1997), makes it difficult to interpret the exact process that accounts for connections between dyadic synchrony and children's adjustment. To date there has been no careful evaluation of the operationalized definition of dyadic synchrony. Efforts to understand the links between dyadic synchrony and children's adjustment would benefit from research that systematically examines its constituent components.

The coordination of emotional expressions between mother and child represents one component of dyadic synchrony that has received considerable empirical attention. Evidence suggests that emotional synchrony—investigated under various labels such as shared affect, mutual affect, and emotional reciprocity—is linked to children's relationship competence

(Kochanksa & Askan, 1995). The study of emotional synchrony is complicated by the fact that emotions can have a positive or negative valence, and specifying the valence of emotions exchanged between parent and child has implications for children's adjustment. For example, research suggests that parent-child negative emotional reciprocity has particular significance for children's social competence relative to parent-child positive emotional reciprocity (Boyum & Parke, 1995; Carson & Parke, 1996). Although both positive and negative emotional synchrony are, strictly speaking, indices of a synchronous parent-child relationship (Harrist & Waugh, 2002), understanding their occurrence and patterning will aid in specifying the role that parent-child synchrony has in children's adjustment.

Behavioral reciprocity, characterized by a relative balance in the exchange of behaviors between parent and child, has also been identified as an important component of dyadic synchrony during early childhood. Behavioral indicators such as shared eye contact, coordinated body movements, and facial expressions have been linked to children's socioemotional adjustment in infancy (Raver, 1996). Evidence suggests that as children get older and advance in their use of language, manifestations of behavioral reciprocity may shift to focus more on vocal exchanges. For example, Black and Logan (1995) found that in middle childhood a pattern of conversational reciprocity between parent and child was linked to children's social competence with peers. It seems reasonable to speculate that this aspect of dyadic synchrony may continue, and possibly increase, as children enter into adolescence and are able to sustain more adultlike conversational patterns. Moreover, balance of participation between parent and adolescent in interactive episodes may be particularly salient during the transition to adolescence as youths attempt to individuate from their parents and establish their own identity. To date, however, to the best of our knowledge no study has examined conversational reciprocity in mother-child dyads during early adolescence.

In order to establish whether the multiple components of mother-child synchrony form the structure of a unified dyadic construct or represent distinct dimensions of relationship quality, it is necessary to examine their relative association to early adolescents' psychosocial development. Empirical study of connections between the family and children's socioemotional adjustment has focused extensively on negative dimensions such as externalizing behaviors (Crick, 1996; Deater-Deckard et al., 1996). Within this body of literature there is evidence that mother-child dyadic synchrony contributes to lower levels of peer aggression and reduces children's risk for rejection by peers (Deater-Deckard et al., 2004; Lindsey & Mize, 2000). However, recent calls have been made for researchers to investigate positive domains of adjustment that may be linked to children's family relationships (Eisenberg & Ota Wang, 2003; Krevins & Gibbs, 1996). In keeping with this

recommendation, the present study focuses on two indices of positive adjustment that have received particular attention in regard to their connection to parent-child dyadic synchrony, namely children's self-esteem and prosocial behavior. Specifically, researchers have postulated that a synchronous, mutually responsive parent-adolescent relationship enhances children's sense of personal competence, or self-worth (Barber et al., 2001; Chu & Powers, 1995). Consistent with this view, Gross and McCallum (2006) found that daughters who perceived their relationship with their mother as being highly synchronous had higher levels of self-esteem. Researchers also have posited that a synchronous mother-child relationship promotes cooperative views of others (Crandell, Fitzgerald, & Whipple, 1997; Mize & Pettit, 1997), enhances perspective-taking skills (Barber et al., 2001), and contributes to nonselfish choices that lead to higher levels of prosocial behavior (Kochanska et al., 2005; Raver, 1996). Indirect evidence in support of this argument comes from empirical links between synchrony and children's social competence with peers (Pettit, & Harrist, 1993), social skills (Criss et al., 2003), and positive relationships with peers (Lindsey, Mize, & Pettit, 1997). To date, however, no study has directly examined connections between mother-child dyadic synchrony and adolescents' prosocial behavior. Given the limited empirical study into the theoretically proposed links among synchrony, children's self-esteem, and prosocial behavior, the present study focused on these two areas of early adolescents' positive socioemotional adjustment.

It is important to note that the proposed theoretical connections among synchrony, self-esteem, and prosocial behavior can operate in either direction. That is, biological characteristics or experiences in the child's environment may promote children's self-esteem and prosocial behavior. In turn, children who have a high self-esteem and who are prosocial with peers may be better at establishing a synchronous pattern of interaction with their mother. This possibility is just as likely as the proposal that mother-child dyadic synchrony promotes self-esteem and prosocial behavior in early adolescence. The cross-sectional nature of the current study prohibits us from being able to address this issue of directionality; however, it does represent an initial step in examining the proposed connections.

Like the majority of existing research on dyadic synchrony, the present study focuses on synchrony in the mother-child relationship and does not examine father-child dyadic synchrony. Consequently, questions concerning the effect of parent gender on dyadic synchrony are not addressed in the study. However, several researchers suggest that child gender may account for variations in the manifestation of synchrony as well as differences in connections between synchrony and children's adjustment (Criss et al., 2003; Garcia-Sellers & Church, 2000; Harrist & Waugh, 2002; Lindsey &

Mize, 2000). Evidence to support this claim is equivocal at best, with some evidence suggesting that mother-son dyads are better able to achieve synchrony than mother-daughter dyads (Weinberg, Tronick, Cohn, & Olson, 1999) and other research indicating that mother-daughter dyads are characterized by higher levels of synchrony than mother-son dyads (Hofer, 1987; Weinraub & Frankel, 1977). The majority of research reports no differences between mother-son and mother-daughter dyads on measures of synchrony. Because of variations in operational definitions of synchrony across studies, it is possible that patterns of differences based on child gender may depend on the particular behavioral dimension of synchrony that is assessed. Given the contradictory evidence and limited number of studies that have investigated different components of synchrony, it is worthwhile to explore child gender differences in manifestations of synchronous behavior.

The primary objective of this study was to examine the structure of mother-child dyadic synchrony during early adolescence by assessing multiple components of synchronous behavior. Four measures of dyadic synchrony were selected: (a) a global measure of synchrony tapping the degree of coordinated and contingent behavioral and verbal exchanges between mother and child; (b) a microanalytic measure of shared positive affect, tapping the moment-by-moment expression of contingent positive emotion by parent and child; (c) a microanalytic measure of shared negative affect, tapping the moment-by-moment expression of contingent negative emotion by parent and child; and (d) a global measure of conversational equality, tapping the extent to which parent and child participated in conversational turn-taking. It was expected that all measures of dyadic synchrony would be intercorrelated. A second aim was to explore the link between mother-child dyadic synchrony and early adolescents' developmental adjustment in two domains: (a) self-esteem and (b) prosocial behavior. The relative contributions of different components of dyadic synchrony to adolescent adjustment were examined to identify whether specific aspects of synchrony differentially related to specific aspects of adolescent adjustment. Finally, the role of ethnicity in the manifestation of dyadic synchrony and connections between synchrony and early adolescent developmental adjustment was explored.

Method

Participants

The early adolescents and mothers participating in this study were part of a larger longitudinal research project that examined children's adjustment as they transitioned through middle school (Frabutt, Walker, & MacKinnon-Lewis, 2002; MacKinnon-Lewis, Lindsey, Frabutt, & McCarroll, 2005). Two

cohorts of children from those attending 13 public schools in a metropolitan southeastern city (population = 197,733) were recruited for the study. Cohort 1 (C1) was recruited in the summer of 1997, and Cohort 2 (C2) was recruited in the summer of 1998 before the children began attending the sixth grade. During the recruitment period, each public school assisted by providing rosters and demographic information about all children enrolled in the fifth grade. Graduate students telephoned the families to briefly explain the purpose of the study. After obtaining verbal consent from mothers who were interested in the study, the students proceeded with the screening procedure. All families who were African American or European American and with a child who was living with both biological parents and entering middle school in the fall were invited to participate in the study. An effort was made to recruit a sample of families that equally represented boys and girls from both ethnic groups. The subject inclusion criteria involving ethnicity and family structure were established in order to limit the number of contextual factors that might confound analyses of the data.

Of the total number of families contacted during the screening procedure, 300 (72%) gave their consent for participation in the study and visited the laboratory for the first waves of data collection. However, during the second and third wave of data collection, 32 families did not participate in the study either because they refused to participate (11), had scheduling conflicts (14), or had relocated (7). The final sample thus consisted of 268 families, which included 119 African American families and 149 Caucasian families. All children (130 girls and 138 boys) in the study were transitioning into middle school and ranged from 11 to 13 years old (M = 12.34). All the mothers in the study were married, and the length of marriage ranged from 15 to 27 years (M = 18 years). With respect to education, 14% of the mothers had less than a high school education, 31% had a high school diploma, and 28% had completed an associate's or bachelor's degree. All families in this study were from middle-class socioeconomic backgrounds, with the total family income ranging from $12,000 to $88,000 (M = $55,000) and the annual monthly per capita income ranging from $1,362 to $12,432 (M = $6,532).

Procedure

Before data collection, graduate and undergraduate research assistants participated in a 35-hour training session that explained the purpose of the study, outlined the research measures and the interview protocol, and trained them to conduct interviews with mothers and children in a laboratory setting. Each interviewer was given a detailed training packet that

included information regarding the presentation and introduction of each measure included in the study. As part of the training process, new interviewers were required to assist more experienced interviewers during data collection with at least three families and then assumed full responsibility for a family interview under the observation of the project director. The interviewers were periodically observed to ensure quality control and were given feedback based on the criteria on an interview checklist.

The families participated in three waves of data collection. The data that are the focus of the present study come from the first and third waves, during the summer before the children entered the sixth grade (Wave 1) and the summer following matriculation out of sixth grade (Wave 3). Information collected during the second wave focused on children's school experiences, which are not relevant to the current study and will not be described further.

The families were greeted on their arrival to the laboratory. Each mother consented to her own as well as her child's participation in the study, and separate consent was obtained from the adolescent. Both mother and child were provided with a written description of the study, which was discussed with them and subsequently signed. In order to ensure that all questions were answered correctly and that the laboratory visits progressed in a timely manner, the researcher escorted the mothers to a separate room where they completed the questionnaires on their own. Then the researcher returned to the room where the child was seated and began interviewing the child using the questionnaires. Throughout the interview, mothers and children were reminded that they could refuse to respond to any questions that made them uncomfortable and that all their responses would be kept confidential. Mother and child separately provided information pertaining to family demographics, parenting, and child psychosocial competence. In Wave 1, the mother-child dyad also participated in a 20-minute videotaped interaction session that was designed to obtain information regarding mother-child behavior and the quality of the mother-child relationship. During the task, mother-child dyads were left alone. The laboratory visit lasted approximately three hours. For their participation the families were compensated $35 in Wave 1 and $55 in Wave 3.

Measures

Family demographic information. Family History Inventory (MacKinnon-Lewis, Lamb, Arbuckle, Baradaran, & Volling, 1992) was completed by mothers at Wave 1 to provide information concerning demographic characteristics of the family. Mother and father education was measured according to the highest grade completed and included nine levels that ranged

from 1 (grade school) through 9 (Ph.D., Ed.D., and M.D.). Family income was identified from a list of 10 items identifying income ranges in increments of $10,000, from 1 ($0 to $9,999) through 10 ($90,000+).

Observations

Each mother-child dyad participated in a 20-minute videotaped interaction task, which was taped from behind a one-way mirror. During the interaction task the mother-child dyad discussed a variety of parent-child relationship topics developed by Conger and his colleagues (Conger et al., 1993; Conger, Patterson, & Ge, 1995). Fourteen cards were given to the mother-child dyads, each with one to three questions regarding specific topics on family life such as parenting approaches, school performance, household chores, and important family events. Initially, the topics focus on more mundane issues (e.g., first card "What do I do with my mother when we spend time together?"), and slowly, as the session advances, the issues become more intense (e.g., "What do my parents usually do when I get into trouble for something?"). Detailed instructions were provided to the mother-child dyads regarding the use of the cards. They were informed that one person should read the card aloud and then both were required to respond to the question and discuss their responses with one another. Some cards were to be read by the mother and some were to be read by the adolescent, as indicated on the card with the word "mom" or "child" (e.g., Card 4, read by the child, "What are some rules or things my Mom expects me to do or not do? Which of these are fair and which are unfair?"; Card 12, read by the mother, "If each of us could change anything about our family, what would we like to change? Why? Do we agree or disagree about this?"). The mother-child dyads were told to discuss the cards in consecutive order. To ensure that all the instructions were accurately understood, the mother-child dyad was encouraged to begin the session with a practice card while the researcher was present in the room. After completing the practice session and providing additional instruction as needed, the researcher left the room so that the mother and child could complete the session on their own. The researcher reentered the room to end the session when 20 minutes had elapsed, regardless of the number of cards the mother-child dyad had completed.

Subsequently, videotapes were coded for multiple components of dyadic synchrony using a detailed rating system. Three independent teams of 8 coders (total of 24 coders) used a different rating scale to code all of the videotapes. Prior to coding the videotapes, coders participated in 20 hours of training that included reviewing the coding manual, passing written tests about the coding instructions, reviewing practice tapes with the primary investigator who iden-

tified exemplars of behaviors from each scale, and independently coding practice tapes until they achieved 80% agreement with the primary investigator. Once reliability was achieved, coders were randomly assigned tapes to code. To assess reliability during ongoing coding, approximately 20% of the tapes (N = 54) were assigned randomly to a primary coder (whose ratings were used in the analysis) and a reliability coder. The coders independently rated their assigned tapes and were blind as to which tapes had been assigned for reliability purposes. Reliability between the primary and reliability coders was calculated using intraclass correlations (ICC).

Mother-child synchrony. Videorecords of the mother-child interaction session were coded at 30-second intervals using a 5-point dyadic rating of the extent to which parent and child were engaged in mutually focused, reciprocal, and responsive exchanges (Mize & Pettit, 1997). Codes were assigned every 30-second interval with high ratings indicating that parent and child shared the same focus of attention, mirrored partner's affect, and were responsive to partner's cues. Low ratings were assigned when parent and child did not share a common focus, frequently changed topics abruptly, or one or both partners were unresponsive for many interaction sequences. Correlations revealed a high level of agreement between coders (ICC[50] = .74, $p < .001$; percent agreement = 83%). A mother-adolescent synchrony score was created for each dyad by averaging the ratings received across all intervals.

Mother-child conversational equality. The observational measure of mother-adolescent conversational equality, developed for the present study, was based on other measures in the literature (Conger et al., 1995; Deater-Deckard & Petrill, 2004). It focused on the dyadic quality of communication in the mother-child relationship, assessing the extent to which both partners were equal participants in exchanging verbal information. The scale measures the degree to which both partners initiate conversational topics and respond to the conversation of their partner. High scores indicate that there is an equal participation on the part of both parent and child in their conversation together, whereas low scores indicate that one partner maintains conversational dominance. The assessment of conversational equality was designed to focus exclusively on the quality of verbal communication within the mother-child dyad, based on the content of the statements that mother and child made to each other. In this regard it differed conceptually from the assessment of mother-adolescent dyadic synchrony, which tapped a broader range of nonverbal and verbal exchanges and focused more on the quantity of interaction. Conversational equality was rated on a 5-point scale with highly detailed anchor points. Ratings of conversational equality were made for each 30-second interval, based only on observed evidence. Correlations revealed a

high level of agreement between coders (ICC[50] = .81, $p < .001$; percent agreement = 88%). A mother-adolescent conversational equality score was created for each dyad by averaging the ratings received across all intervals.

Mother-child emotional expressiveness. Coders used two 5-point scales to rate both mother and adolescent expression of positive and negative affect (Lindsey & Mize, 2000) during each 30-second interval of interaction. First, a positive affect scale was used to record the occurrence and intensity of positive emotion, with scores ranging from 1 ("no positive affect") to 5 ("intense and sustained positive affect"). Coders looked for behavioral indicators of positive affect, such as smiles, chuckles, or laughter. Second, a negative affect scale was used to record the occurrence and intensity of negative emotion, with scores ranging from 1 ("no negative affect") to 5 ("intense and sustained negative affect"). Coders looked for behavioral indicators of negative affect, such as raised tone of voice, angry facial expressions, facial expressions of sadness, and sarcastic comments. The use of separate scales to code positive and negative affect resulted in the possibility that both positive and negative affect could be coded in the same interval for a subject. Two different coders rated the behavior of mother and adolescent on each tape. Correlations revealed a high level of agreement between coders: ICC(50) = .77, $p < .001$, percent agreement = 80%, and ICC(50) = .81, $p < .001$, percent agreement = 87%, for mother positive affect and negative affect, respectively; ICC(50) = .78, $p < .001$, percent agreement = 82%, and ICC(50) = .75, $p < .001$, percent agreement = 77%, for child positive affect and negative affect, respectively.

Mother-child shared affect. The affect ratings for each partner were subsequently recoded into a dichotomous variable representing the presence or absence of positive or negative affect. Specifically, for both positive and negative affect, a rating of 2 or higher (indicating the presence of affect) was recoded as 1, whereas a rating of 1 (indicating no expression of affect) was recoded as 0. This transformation was performed for each 30-second interval. The recoded positive and negative affect scores were submitted to two sets of sequential analyses in order to examine the pattern of emotional expressiveness between parent and child. Specifically, two Yule's Q scores were generated to identify contingencies in mother-adolescence emotional exchanges (Bakeman, 1991). In Yule's Q analysis, a 2×2 table is used to compare the probability that a particular sequence occurs (antecedent A followed by consequent B) relative to the other events that might occur (e.g., A and not B). The analysis yields a Yule's Q odds-likelihood ratio score representing the likelihood that a particular event or sequence occurred in relation to other events or sequences. Yule's Q scores range from 1, indicating that the event sequence of interest (A followed by

B) was more likely to occur than other sequences, to –1, indicating that the event sequence was less likely to occur. The present data were examined for event sequences reflecting the co-occurrence of positive and negative emotion between mother and adolescent. Consequently, two Yule's Q scores were calculated for each mother-adolescent dyad: (a) mother positive affect accompanied by adolescent positive affect (mother-adolescent shared positive affect) and (b) mother negative affect accompanied by adolescent negative affect (mother-adolescent shared negative affect). The resulting Q scores were used in subsequent analyses.

Early adolescents' adjustment

Self-esteem. The 7-item global self-worth scale from Harter's (1982) Perceived Competence Scale for Children (PCSC) was used to assess adolescent self-esteem. For each item, adolescents were first asked to decide which of two statements describing other children were more like them, and then they were asked to indicate whether the statement is really true or just sort of true for them. Following Harter (1982), responses were scored on a scale ranging from 1 (least competent) to 4 (most competent). Higher scores on this measure indicate a greater sense of self-worth. For this sample, alpha was .75. The PCSC was designed for elementary school children; it has been successfully used with seventh through ninth graders, with acceptable internal consistency among samples (range .73 to .84) and has adequate test-retest reliabilities over three months (Harter, 1982).

Prosocial behavior. Mothers completed the Ratings of Children's Social Behavior Scale (CSBS) (Crick, 1996). The prosocial behavior subscale, which consists of 4 items (α = .84; e.g., "Says supportive things to peers" and "Tries to cheer up peers when sad or upset"), was used in the present report. The response scale for each item ranged from 1 ("this is never true of my child") to 5 ("this is almost always true of my child"). Scores were averaged to form an index of adolescents' prosocial behavior to be used in subsequent analyses. The prosocial behavior subscale of the CSBS has demonstrated adequate internal consistency with a sample of children ranging from third to sixth grades (α = .93) and convergent validity with significant associations to concurrent peer ratings of prosocial behavior (Crick, 1996).

Results

Descriptive statistics for mother-adolescent synchrony and adolescent adjustment variables are presented separately based on ethnicity and gender

Table 1. Descriptive Statistics for Mother-Adolescent Synchrony Variables and Adolescent Adjustment Variables

	Mean	SD	Mean	SD
	African American (*N* = 119)			
	Girls (*N* = 61)		Boys (*N* = 58)	
Mother-adolescent synchrony				
Dyadic synchrony	3.63	.52	3.63	.54
Shared positive affect	.45	.15	.42	.14
Shared negative affect	.14	.08	.14	.07
Conversational equality	5.47	1.17	5.38	1.25
Adolescent adjustment				
Self-esteem	24.37	2.95	25.24	2.26
Prosocial behavior	3.80	.67	3.42	.74
	European American (*N* = 149)			
	Girls (*N* = 69)		Boys (*N* = 80)	
Mother-adolescent synchrony				
Dyadic synchrony	3.65	.48	3.60	.51
Shared positive affect	.47	.13	.38	.12
Shared negative affect	.14	.09	.14	.08
Conversational equality	5.35	1.22	5.48	1.25
Adolescent adjustment				
Self-esteem	25.43	2.12	24.89	2.49
Prosocial behavior	3.68	.54	3.72	.60

in Table 1. Correlation analyses were conducted to examine associations among family demographic characteristics, mother-child interaction, and early adolescent adjustment variables (Table 2). A significant positive association was found between mother education and mother-child dyadic synchrony as well as mother-child conversational equality. This suggests that mothers with more education were more likely to achieve dyadic synchrony and conversational equality with their early adolescents. Mother education also was positively associated with child self-esteem, indicating that early adolescents whose mothers were more educated had higher self-esteem. Based on these correlations, mother education was included as a control variable in subsequent analyses.

Intercorrelations also demonstrated expected patterns of covariation within and between variable domains (see Table 2). In general, the overlap between the measures of mother-child synchrony was moderate and signif-

Table 2. Correlations among and between Family Characteristics, Mother Characteristics, Child Characteristics, and Mother-Child Synchrony Variables

	1	2	3	4	5	6	7	8	9	10
Family characteristics										
1. Family income		.30***	.02	–.05	.06	–.07	.02	.08	.07	.08
2. Mother education			.02	.14*	.15*	.14	–.09	.18**	.13*	.11
Child characteristics										
3. Gender				.01	.03	.23***	.02	–.01	–.05	.11
4. Ethnicity					.02*	.11	–.01	–.05	.18**	–.10
Mother-child synchrony										
5. Dyadic synchrony						.56***	–.31***	.56***	.16*	.24**
6. Shared positive affect							–.39***	.67***	.05	.16*
7. Shared negative affect								–.53***	–.14*	–.28*
8. Conversational equality									.10	.30**
Adolescent adjustment										
9. Self-esteem										.20**
10. Prosocial behavior										

Note. Gender was coded 1 = male, 2 = female. Ethnicity was coded 1 = African American, 2 = European American.

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

icant (rs = –.31 to .67). Negative correlations were accounted for by mother-child shared negative affect being inversely related to other indices of mother-child dyadic synchrony. In addition, early adolescents' self-esteem and prosocial behavior were intercorrelated.

Gender differences were examined in terms of main effects (i.e., bivariate correlations with the dichotomous child gender variable) and in terms of gender-differentiated patterns of relations. The bivariate correlations revealed that mother-daughter dyads achieved higher levels of shared positive affect than mother-son dyads. The pattern of relations between dyadic synchrony variables and adolescents' self-esteem and prosocial behavior were generally similar for boys and girls, with only 1 (out of 10) correlations showing a significant gender difference via a z-test. Mother-child shared positive affect was significantly positively associated with boys' prosocial behavior ($r[136] = .32, p < .001$) but was not significantly related to girls' prosocial behavior ($r[128] = .04$, *ns;* difference via z-test significant at .05).

Ethnic differences also were examined in terms of main effects and in terms of differentiated patterns of relations between African Americans and European Americans. The bivariate correlations indicated that European American children achieved higher levels of dyadic synchrony with their mothers than African American children achieved. European American children also had higher self-esteem than African American children. The pattern of relations among variables was very similar for African Americans and European Americans, with only 3 (out of 10) correlations showing significant differences via a z-test. Dyadic synchrony was significantly associated positively with self-esteem among European American early adolescents ($r[147] = .31, p < .01$) but was not significantly associated with self-esteem among African American early adolescents ($r[117] = –.12$, *ns;* difference via z-test significant at .05). Shared negative affect was significantly associated negatively with prosocial behavior among European American early adolescents ($r[2,147] = –.38, p < .01$) but was not significantly associated with prosocial behavior among African American early adolescents ($r[117] = .04$, *ns;* difference via z-test significant at .05).

Dyadic synchrony as a predictor of early adolescents' self-esteem and prosocial behavior. For the final set of analysis examining the relative contribution of the five indices of mother-child synchrony to self-esteem and prosocial behavior, hierarchical regressions were computed, with ethnicity and child gender as covariates. These analyses also examine interactions between ethnicity and each mother-child dyadic synchrony variable in the prediction of early adolescent adjustment. Because mother education was correlated with two indicators of synchrony (i.e., global dyadic synchrony and conversational equality) and early adolescents' self-esteem in the

bivariate analyses, mother education was entered on the first step of the regression equation in order to control its effects. The four indicators of mother-child synchrony were entered simultaneously on the second step. Interaction terms for ethnicity and each of the parent-child synchrony indicators were entered together in a third step.

The analyses are summarized in Table 3. Early adolescents' self-esteem was predicted by high levels of dyadic synchrony and conversational equality. One significant interaction with ethnicity was found, and these mirrored the bivariate correlations. Ethnicity interacted with dyadic synchrony in the prediction of self-esteem. As noted earlier, mother-child dyadic synchrony was positively associated with European American early adolescents' self-esteem but was unrelated to African Americans' self-esteem.

In the analysis with early adolescents' prosocial behavior, mother-child shared positive affect was positively associated with prosocial behavior, whereas mother-child shared negative affect was negatively associated with prosocial behavior. One significant interaction with ethnicity was found. Ethnicity interacted with shared negative affect in predicting early adolescents' prosocial behavior. Shared negative affect was negatively associated with European American early adolescents' prosocial behavior but was unrelated to African Americans' prosocial behavior.

Discussion

The present study joins a growing body of empirical research that has identified mother-child dyadic synchrony as an interactional quality that captures the bidirectional nature of the parent-child relationship (Criss et al., 2003; Harrist & Waugh, 2002; Mize & Pettit, 1997). Nearly all of the prior research on dyadic synchrony has relied on middle-class European American samples of mothers and children, and most of the research has focused on infants, toddlers, and preschoolers. Consequently, we sought to extend this literature by examining the structure of dyadic synchrony in a sample of mother-child dyads during early adolescence from both European American and African American families. In an effort to investigate the multidimensional nature of dyadic synchrony, and guided by previous work that has conceptualized dyadic synchrony in different ways, we assessed the following components of dyadic synchrony: conversational equality, shared positive affect, shared negative affect, and a global rating of dyadic synchrony.

Consistent with previous work (Criss et al., 2002; Deater-Deckard & O'Connor, 2000), we found moderate covariation among the four components of dyadic synchrony. Moreover, this coherence among the dyadic synchrony components held true in both the European American and African

Table 3. Regression Analysis: Relations of Family Demographic Characteristics, Mother-Child Synchrony Variables, and Interaction Terms between Mother-Child Synchrony Variables and Early Adolescent Ethnicity, to Early Adolescents' Self-Esteem and Prosocial Behavior

	Self-Esteem				Prosocial Behavior			
	ΔR2	*B*	*SE B*	β	ΔR2	*B*	*SE B*	β
Step 1: Family demographics	.02				.01			
Mother education		.22	.15	.09		.04	.02	.09
F for step	F(1, 266) = .40				F(1, 266) = .25			
Step 2: Mother-child synchrony	.04*				.08**			
Dyadic synchrony		1.62	1.48	.20*		.12	.34	.06
Shared positive affect		3.21	2.57	.13		2.42	2.11	.26**
Shared negative affect		–8.73	9.11	–.14		–.51	1.62	–.10
Conversational equality		.84	.76	.23*		.89	.91	.24**
F for step	F(5, 261) = 2.81*				F(5, 261) = 4.72**			
Step 3: Interaction terms	.03*				.04*			
Dyadic synchrony × ethnicity		1.83	.87	.54*		.15	.28	.17
Shared positive affect × ethnicity		1.78	5.91	.11		1.92	6.12	.22
Shared negative affect × ethnicity		–1.86	6.05	.08		–.97	1.08	–.34*
Conversational equality × ethnicity		–1.12	2.29	–.10		.07	.41	.05
F for step	F(9, 257) = 2.52*				F(9, 257) = 2.76			

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

American samples. These findings are particularly noteworthy given that the components of dyadic synchrony were obtained from observations made by independent coders. The results indicate that dyadic synchrony continues to be a salient characteristic of mother-child interaction in the early adolescent years and that synchrony includes multiple components of dyadic interaction that can be measured reliably using brief observations. Moreover, dyadic synchrony appears to manifest in consistent ways across European American and African American mother-child dyads.

Despite the general coherence among the dyadic synchrony components, it is important to note that mother-child shared negative affect was significantly negatively associated with three of the four other indices of dyadic synchrony. Specifically, the more mother and child reciprocated one another's negative emotions, the less likely they were to share positive emotion, to engage in conversational equality, and to achieve dyadic synchrony. Thus, it appears that shared negative affect is a quality of interaction that interferes with mother-child dyadic synchrony. Strictly speaking, although shared negative emotional states reflect a certain level of attuned interaction between mother and child, it appears that the character of this dyadic state is not conducive to responsiveness between mother and child in other domains. This is consistent with the work of Harrist and her colleagues (Harrist et al., 1994), who distinguished between negative synchrony (e.g., reciprocal and focused interactions with a hostile tone) and positive synchrony (e.g., reciprocal and focused interactions with a positive tone) in parent-child dyads among families with preschool-age children. It may be worthwhile to explore other indicators of negative synchrony in mother-child interaction in future research.

A number of theorists have proposed that the emergence of coherent, well-regulated, and mutually rewarding parent-child interactions in adolescence may contribute to children's positive developmental outcomes. Mounting empirical evidence from studies of younger children lend support to this view (e.g., Harrist et al., 1994; Kochanska et al., 2005; Kochanska & Murray, 2000). We attempted to extend this literature by examining connections between the components of dyadic synchrony and early adolescents' self-esteem and prosocial behavior. Positive independent associations were found between ratings of mother-child dyadic synchrony and conversational equality and early adolescents' self-esteem. This result corroborates theoretical proposals that synchronous, mutually responsive parent-adolescent interaction is linked to children's sense of personal competence and self-worth (Chu & Power, 1995). The findings are also consistent with those of Gross and McCallum (2006), who found that synchronous mother-daughter relationships, as measured by adolescent girls' self-reports, was linked to daughters having higher self-esteem. The fact that other indices of mother-child

synchrony were not related to early adolescents' self-esteem suggests that there may be specificity in the links between particular domains of dyadic synchrony and early adolescent adjustment. Conversational equality may be particularly salient to early adolescents' sense of self given their increasing autonomy from parents during this age. However, because ours is the first study to investigate this characteristic of mother-child interaction, additional research is needed to verify the connection.

The study also revealed a significant association between several domains of mother-child dyadic synchrony and early adolescents' prosocial behavior. In particular, children from dyads marked by shared positive affect and conversational equality were more likely than other children to be rated by teachers as engaging in high levels of prosocial behavior with peers. Following the tenants of attachment theory, and consistent with previous research (Crandell et al., 1997; Isabella & Belsky, 1991), it may be that synchronous interaction contributes to a secure mother-child attachment relationship. In turn, securely attached children develop a working model of others as being trustworthy and are more likely to engage in prosocial behavior with peers. An alternative explanation, offered by social learning theory, is that children carry the mutually responsive and socially coordinated behavior patterns learned from synchronous mother-child interactions into their interactions with peers. Support for this proposal comes from evidence that children who engage in prosocial behavior engage in turn-taking with peers and coordinate their behavior with that of their playmates (Black & Logan, 1995). Additional research designed to test these theoretical explanations will help to elucidate the pathways linking mother-child synchrony to children's prosocial behavior.

There were a number of significant differences in the links between dyadic synchrony and early adolescents' adjustment when comparing European American and African American families. Specifically, the global measure of dyadic synchrony was significantly related to high self-esteem for European American, but not African American, early adolescents. In contrast, negative emotional reciprocity was related to low levels of prosocial behavior for European American, but not African American, early adolescents. Although these findings should be interpreted with caution given the limitations of this study and are in need of replication, they do join a growing body of research pointing to differential connections between parent-child interactions and child adjustment on the basis of ethnicity (Brody et al., 1994; Deater-Deckard et al., 1996). It appears that there may be cultural values and norms that result in different meaning being assigned to particular behavior patterns in the family that alter the connections to children's adjustment. For example, it has been suggested that beliefs asso-

ciated with adult-centered child-rearing practices among African American families lead to an authoritarian parenting style (Ispa et al., 2003; Pinderhughes et al., 2000), which typically is associated with poor adjustment for children. However, because this child-rearing approach tends to be normative within the African American culture, the negative consequences of authoritarian parenting for children's adjustment seen among European American samples does not hold true for African American children (Bradley et al., 2001; McLoyd & Smith, 2002). It has also been suggested that contextual factors account for variations in the way that authoritarian parenting affects early adolescents' adjustment across different ethnic groups. For instance, evidence suggests that because African American families are disproportionately affected by poverty and are more likely to live in dangerous neighborhoods, African American parents must rely on authoritarian child-rearing practices in order to protect their children from these dangers (McLoyd, 1990). Because such dangers are very real, authoritarian parenting represents a strategy that promotes children's security and sense of being cared for by parents, leading to more positive adjustment for children living in these neighborhood compared to children from more affluent families (Deater-Deckard et al., 1996; Lamborn et al., 1996). Given the fact that empirical research on mother-child synchrony has been conducted predominately with European American families, additional research is needed to understand the role that ethnicity may play in the manifestation of parent-child dyadic synchrony.

The findings regarding mother-child dyadic synchrony have important theoretical implications for the conceptualization of parent-child relationships as being bidirectional in nature. Dyadic synchrony is a dynamic process whereby both partners contribute to their ongoing interaction. Consequently, it represents an emergent quality of the parent-child relationship rather than a particular characteristic or style attributable to one partner. As such, the study of dyadic synchrony moves beyond a focus on parent effects or child effects to embrace a family systems view of the parent-child relationship as being more than the sum of it constituent parts. An underlying assumption of this perspective is that dyadic synchrony may provide more accurate information about relationship functioning than do characteristics of one or both participants. Moreover, a view of both parent and adolescent cocreating their relationship together may be more accurate and useful than simply reversing a unidirectional perspective to capture the influence that children exert on parents' behavior. However, the correlational and concurrent nature of the present data prevents conclusions regarding the direction of effect in connections between mother-child dyadic synchrony and early adolescents' self-esteem and prosocial behavior. While high levels of dyadic synchrony may lead to

greater self-esteem and prosocial behavior, it is equally possible that other factors contribute to improvements in early adolescents' self-esteem, which in turn contributes to mother-child dyadic synchrony. In order to test the utility of socialization models based on parent effects, child effects, and relationship effects, additional research is needed that assesses individual characteristics of mother and child together with indices of dyadic synchrony to examine their relative contribution to children's adjustment over time.

In addition, although a basic premise of the current study is that the manifestation of mother-child dyadic synchrony in early adolescence is likely to differ from that of early ages, the lack of developmental data prohibits conclusions regarding this possibility. Nevertheless, when considered in conjunction with findings from other research, the present study does provide room for speculation. Specifically, the similarity between the findings of this study regarding mother-child shared affect and findings of other researchers who have examined similar constructs (Boyum & Parke, 1995; Kochanksa et al., 2005) suggest that mother-child emotional reciprocity, or shared emotion, may be an important component of dyadic synchrony with implications for children's adjustment across developmental periods. In contrast, it seems reasonable to argue that the conversational equality component of dyadic synchrony may vary in salience across development. That is, with the advances in cognitive maturity that accompany the onset of adolescence, children are more likely to participate on an equal footing in conversations with their parent compared to earlier ages. In a similar vein, other components of mother-child dyadic synchrony, not assessed in the current study, may emerge as being salient during the transition the adolescence as parent and child adapt to the adolescent's developing autonomy. Clearly, longitudinal research is needed to untangle the direction of associations between dyadic synchrony and early adolescent adjustment and to examine developmental trends in the manifestation of mother-child dyadic synchrony.

There are other limitations in the present study that also need to be addressed in future research. First, it is important to recognize that dyadic synchrony is multidimensional, and can manifest itself in a wide range of behavioral characteristics. Although supported by empirical evidence, the components of dyadic synchrony examined in this study may not represent the most ideal constellation of indices. Additional research that explores alternative synchrony constructs will help to provide clarity to the behavioral indicators of dyadic synchrony. Second, mother-child synchrony was assessed during a structured laboratory task of limited duration. It will be worthwhile for future research to examine mother-child synchrony in more naturalistic venues as well as across different interactional contexts. In addition, although the present study included both African American and

European American families, it would be important to examine this construct in more heterogeneous samples that include multiple ethnic groups (e.g., Hispanic, Asian American). A fourth limitation is the fact that the study examined only mother-child interaction, and thus the results cannot be generalized to father-child relationships. Given that differences exist between mothers and fathers in patterns of emotional expressiveness (Boyum & Parke, 1995) and verbal communication with children (Black & Logan, 1995), it is likely that the patterns of association between shared emotion and conversational equality observed for mother-child dyads will not be mirrored in father-child dyads. Additional research that examines dyadic synchrony in father-child relationships at multiple developmental periods is needed, given evidence that the quality of father-child interaction has unique consequences for children's adjustment (Carson & Parke, 1996). Finally, the measures used to assess early adolescent self-esteem and prosocial behavior were limited in that they contained a relatively small number of items and were based on self-report and teacher-report instruments, respectively. Until the findings of the current study are replicated by research using multiple methods to assess children's self-esteem and prosocial behavior, they should be weighed cautiously.

Although not without limitations, the results from the present study provide much-needed information on mother-child dyadic synchrony in early adolescence and within two ethnic populations. Results suggest that dyadic synchrony is equally prevalent and related to adjustment in both African American and European American mother-child dyads. When considered with previous findings with preschool-age children (Feldman et al., 1999; Harrist et al., 1994; Mize & Pettit, 1997) and in middle childhood (Criss et al., 2002; Deater-Deckard et al., 2004), the present study suggests that there may be developmental continuity in the importance of dyadic synchrony as a characteristic of mother-child interaction. At the same time, given the associations that were found among the various components of dyadic synchrony, our findings argue for a multidimensional view of mother-child dyadic synchrony during early adolescence. Moreover, variations in the connections between dyadic synchrony and adolescents' adjustment for European American and African American adolescents suggest that there may be cultural differences in the meaning of particular components of dyadic synchrony.

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