
MAKING CHILDREN LAUGH: PARENT–CHILD DYADIC SYNCHRONY AND PRESCHOOL ATTACHMENT

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ABSTRACT: The current study examined whether dyadic synchrony of father–child and mother–child interactions in a playful context were associated with attachment organization in preschool children. One hundred seven children (48 boys, $M_{\text{age}} = 46.67$ months, $SD = 8.57$) and their mothers and fathers (counterbalanced order of lab visits) participated in a playful interaction without toys (Laughing Task procedure). Playful interactions were coded based on the degree to which the dyads demonstrated a variety of behavior representing dyadic synchrony and task management. Children's attachment behavior toward fathers and mothers was observed in a modified separation–reunion procedure adapted for the preschool period. Results demonstrate that mothers and fathers are similar in their effort to arouse and engage their child in a playful context, but mothers achieved a greater synchrony with their child. Disorganized attachment to either mother or father is linked with a lack of synchrony in dyadic interaction. Findings are in contrast with prevailing theory, suggesting that despite gender-related differences in parental playful behaviors, dyadic synchrony is equally important in both mother– and father–child relationships for the development of organized social and affectional bonds.

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Bowlby (1969) claimed in his early writings that empirical studies fail to show fathers as influential attachment figures, and rather described them solely as playmates. Indeed, at the time of Bowlby's conceptualizations, this was likely an accurate portrayal of the father's role. However, with the recent dramatic increase of paternal involvement in caregiving-related tasks (Hoffert, Stueve, Pleck, Bianchi, & Sayer, 2002; Pleck, 2010), father's role as an attachment figure is now generally acknowledged, although fathers may not be the primary caregiver and generally do not spend as much time with their child as do mothers (Grossmann, Grossmann,

Kindler, & Zimmermann, 2008; Lamb & Lewis, 2004; Umemura, Jacobvitz, Messina, & Hazen, 2013). Nonetheless, empirical investigation is still needed to determine if there is need for different dynamics or new mechanisms through which to understand father–child relationships or if the same elements considered in mother–child relationships remain appropriate for fathers.

One perspective offered by Paquette (2004a) in his seminal article emphasizes a distinction between parental functions, with fathers as activators and regulators of child arousal and mothers as providers of nurture and comfort. In particular, Paquette (2004a) suggested that fathers play a crucial role in arousing children through behaviors such as surprising and challenging them in physical play, which he refers to as an *activation relationship*. By encouraging children to open up to the outside world (stimulation) while setting the proper limits for their safety (discipline), fathers help children learn to deal with their emotions in a socially acceptable manner, thus fostering the affectional bond needed to develop children's sense of security and self-confidence.

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This perspective emphasizes the biologically driven specificities of mothers (nurturing and deactivating) and fathers (aggressive and activating) in their interaction styles with their children. It is further claimed that an ideal family structure is one in which parents are complementary to each other such that both a safe haven (mother) and a secure base (father) are available to the child (Gaumon & Paquette, 2013; Paquette, 2004a; Paquette & Bigras, 2010). Paquette (2004b) himself admitted that “extreme contrasts” between mothers and fathers are exaggerated to stimulate new lines of research in the scientific community, but justified his choice in light of a possible homogenization and feminization of parental practices in our society. However, perhaps this feminization of parental practices need not be feared. If one accepts Bowlby’s (1969) basic tenet that a child develops trust and security from the comfort and protection provided by a caregiver, one may wonder why these parental behaviors should be viewed exclusively as the mothers’ domain. Rather, we would argue that for a very long time, in most cultures, mothers have been responsible for raising children and thus have developed a stereotypic understanding of what children need to feel secure. With fathers becoming actively involved in parenting (vs. instrumentally involved as breadwinners or a source of support to mothers), it would perhaps not be surprising to find that they also identify the same needs in children and tend to respond in a similar way as do mothers.

Although we recognize the tremendously important contribution of Paquette’s (2004a) theory in stimulating research on fatherhood, we think that basic concepts such as parental sensitivity, dyadic synchrony, and emotional attunement are crucial in fostering a secure attachment to both mothers and fathers. The fact that fathers show some preferences for an activating interaction style does not necessarily mean that they are not also sensitive in the same way that a mother would be in a similar context. In the current study, we observed preschool children’s dyadic interactions with both their father and their mother in the Laughing Task procedure (LT procedure), a playful and activating task, and explored its relation to their attachment security toward each parent.

MOTHERS AS PLAYMATES: A SOURCE OF ACTIVATION AND STIMULATION

Gaumon and Paquette (2013) and Paquette and Bigras (2010) acknowledged that a mother can act as a secure base for child exploration while a father may represent a haven of safety. Nonetheless, these researchers maintained that the complementary nature of paternal and maternal roles is crucial for the child’s development (Gaumon & Paquette, 2013). Such a statement implies that children raised in fatherless families (i.e., one fourth of American families: Burns, 1992) would show deficits due to paternal absence and a resulting lack of complementary parental roles. The notion of social deficits associated with paternal absence is generally accepted as a fact in our society (see Biblarz & Stacey, 2010; Silverstein & Auerbach, 1999). However, recent research comparing heterosexual biparental, homosexual biparental, and single-parent families (single-mother or single-father) almost unanimously have shown

an advantage of a biparental family over a single-parent one, but have failed to show gender-specific differences (for a review, see Biblarz & Stacey, 2010). A longitudinal study comparing the involvement of the parental “partners” (e.g., fathers in heterosexual and co-mother in lesbian families) has found only one difference in the amount of domestic play, at the advantage of co-mothers (Golombok et al., 2003). No differences were found between co-mothers and fathers for imaginative play, constructional play, or rough-and-tumble play in the same study. In brief, it may be true that most partners in biparental families complement the primary caregiver with playful behaviors and stimulation, but there is no evidence that this complementary role is gender-specific as suggested by Gaumon and Paquette (2013).

Research conducted with heterosexual biparental families also has shown great similarities in the ways that mothers and fathers play with their children. In her discussion of past research, Roggman (2004) drew an interesting parallel between the scaffolding role played by mothers in helping their children surpass themselves and getting out of their comfort zone and Paquette’s (2004a) description of fathers encouraging children to take chances in contexts in which they still feel protected. The literature also has suggested that mothers guide their children’s regulation of arousal and emotions through involvement in a variety of games that activate the child, such as peek-a-boo or tickling (Tamis-LeMonda, 2004). Moreover, studies have shown that much of parent–infant play occurs with both fathers and mothers, with similar amounts of affection, object-play, physical-play, and conventional-play interaction with each parent (Goldberg, Clarke-Stewart, Rice, & Dellis, 2002; Laflamme, Pomerleau, & Malcuit, 2002). Last, the majority of novel encounters (e.g., meeting strangers, making new friends, discovering a new park) made by a child happen in the presence of mothers and not fathers (Tamis-LeMonda, 2004). Thus, in contrast to Paquette’s (2004a) claim that fathers play a crucial role in child openness to the outside world and in overcoming their fears, mothers likely take on as much, if not more, of the responsibility to help children socialize and face new challenges on an everyday basis.

Paquette and Bigras (2010) designed a *Risky Situation* (RS) procedure to assess the quality of fathers’ activation with their infants. In this task, children face an increasingly intrusive stranger and are encouraged, but then forbidden, to climb up and down steep stairs. Children are classified within one of three categories: *activated* (confident and prudent in their exploration and obey when the parent sets limits), *underactivated* (engage in little exploration, are passive and anxious, and remain close to the parent), and *overactivated* (reckless and do not obey when the parent sets limits). Parental behaviors also were coded in different categories such as non-care-related responses to the child demands, initiation of interaction, stimulation, supervision, encouragement, discipline, and protection. As part of their validation study, Paquette and Bigras observed three independent samples: one group of mother–child dyads ($n = 21$) and two groups of father–child dyads ($n = 21$; $n = 21$) in the RS. The analysis of these three samples combined revealed no differences in child activation as a function of parent’s gender. Thus, children are neither more optimally activated

when interacting with fathers nor more likely to be underactivated when interacting with mothers, which we would expect according to the activation theory. The authors also reported few differences in the type of discipline and supervision demonstrated by mothers and fathers in the RS while no differences were found for initiation of interaction, stimulation, protection, non-care-related responses, and encouragement. Although the researchers recognized that their comparison of activation scores did not support their expectation that fathers activate children more than do mothers, they reported confidence that future studies may provide such confirmation. However, to the best of our knowledge, no further studies have compared child activation with mothers and fathers in the RS.

In conclusion, although Paquette (2004a) is likely correct in his assertion that fathers prefer interacting with their child through physical play, it does not mean that mothers also are not able to provide similar stimulation and activation when needed. As Roggman (2004) suggested, Paquette's (2004a) theory would gain credibility if the stimulating and comforting dimensions were not seen as exclusive to either mothers or fathers. As parents now have less distinct roles in the family, each parent is likely to play both roles (Grossmann et al., 2008).

FATHERS IN AN ACTIVATING CONTEXT: A SOURCE OF COMFORT AND PROTECTION

If mothers can play and encourage their child to overcome their fears, it also is true that most fathers can respond sensitively and contingently to their children's cues (Black, Dubowitz, & Starr, 1999; Hawkins, Amato, & King, 2006; Johnson & O'Connor, 2002; Lamb, 1976; Schoppe-Sullivan et al., 2006). Given that fathers generally prefer physical play as an interactive mode with their children, paternal sensitivity should most often be displayed in the context of monitored and controlled excitement (for a review, see K.E. Grossman et al., 2008). However, there is a fine line between behaviors that are frightening to a child and those which are humorous in a playful context. The same behavior sometimes may even lead to opposing consequences for the child, depending on the context. In their study on attachment and parenting in father–child and mother–child dyads, Hazen, McFarland, Jacobvitz, and Boyd-Soisson (2010) observed that the majority of fathers (but not mothers) destabilize and frighten their infant during play. However, paternal frightening behavior predicted child emotion dysregulation (at 24 months) only if the father also was insensitive. Indeed, the authors found no difference between children whose fathers were both frightening and sensitive (>40% of the fathers) and those whose fathers were sensitive, but not frightening. Although Hazen et al. interpreted this result as support of the idea that fathers and mothers play different roles, they also concluded that “fathers who engage in frightening interactions but fail to sensitively step in and offer comfort when their infants become distressed may put their infants at risk for becoming emotionally underregulated and easily overwhelmed” (p. 67). Thus, although parents may play different roles, these observations have suggested that sensitivity is still the key factor for attachment security.

Paquette and Bigras (2010) drew a parallel with the Strange Situation Procedure (SSP; Ainsworth, Blehar, Waters, & Wall, 1978), a procedure consisting of a series of separations and reunions widely used to assess parent–infant attachment, in their description of the RS. The authors stated that while the child should reach a balance between exploring and seeking comfort in the SSP, he or she should similarly demonstrate balance between exploring and accepting limits imposed by the parent in the RS. We would like to further propose that in both paradigms, parental features such as sensitivity to child cues, emotional attunement, and synchrony are the key ingredients fostering security in the child. In the SSP, a parent should be sensitive enough to let the child explore when appropriate, but also notice child-distress cues and provide comfort if needed. In the RS, a parent should be emotionally attuned to the child to know when to restrict child exploration and provide comfort. Although Paquette and Bigras (2010) reported a series of parental behaviors such as discipline and encouragement, they did not evaluate behavior related to the quality of the parent–child relationship. Similarly, although the authors reported that the parents were allowed to comfort the child at any time during the procedure, they did not indicate how many parents provided comfort to their child, nor if this was related to the three types of child activation or attachment security. Note that child activation was not associated with child attachment in either the mother or the father sample. Although Paquette and Bigras did not report the association between parental behaviors in the RS and child activation or attachment, they did report a lack of association between self-reported scales of parenting behaviors and child activation. In brief, despite the authors' claim that the absence of association between child activation and attachment supports the orthogonality of their measure, it is puzzling that parental behaviors were not (or only slightly) associated with child behavior assessed in the same procedure.

In brief, if one restricts parental sensitivity to soothing a crying infant, it is quite likely that sensitivity will be considered a mother domain. However, if one conceives of parental sensitivity as awareness to the child's physical and emotional needs, and the ability to respond in a timely and appropriate manner to those needs, then it is not clear from existing empirical findings why fathers should be seen as less sensitive. Although fathers are more likely than are mothers to provoke child distress through challenging play behavior, fathers also are equally capable of identifying accumulating distress in the child and helping the child regulate this arousal in the play context (John, Halliburton, & Humphrey, 2013). Therefore, a landmark of optimal fatherhood may be this interesting display of almost simultaneous activation and sensitivity that may not be as striking in most mothers.

ACTIVATION AND FAILED PROTECTION: PREDICTING ATTACHMENT DISORGANIZATION

In the previous section, we claimed that sensitivity could buffer the negative effect of frightening parental behavior. However, the opposite is true if a parent is insensitive in a hyperarousing context.

Attachment researchers have insisted on the consequences of such failed protection in the development of attachment disorganization (George & Solomon, 2011; Lyons-Ruth, Bronfman, & Parsons, 1999; Madigan, Bakermans-Kranenburg et al., 2006; Solomon & George, 1996). Disorganized attachment is a breakdown in attachment strategy, such that no coherent attachment pattern is evident in reunion with the parent. Instead, the disorganized children exhibit contradictory behavior or fearful reactions during reunion with the parent in the SSP (Main & Solomon, 1990). As disorganized infants and toddlers make the transition into the preschool years, disorganized attachment behavior in infancy often gives way to various forms of controlling behavior toward the parent (Main & Cassidy, 1988; Moss, Cyr, Bureau, Tarabulsy, & Dubois-Comtois, 2005; Wartner, Grossmann, Fremmer-Bombik, & Suess, 1994). It is thought that a caregiver's repeated failure to protect the infant and to respond adequately to their attachment needs when they have been aroused subjects the infant to an extreme state of fear, therefore preventing the child from developing an organized attachment strategy. Indeed, empirical studies have shown an association between observed maternal withdrawal, self-reported maternal helplessness, and child disorganization/controlling behaviors in middle childhood (George & Solomon, 2011; Lyons-Ruth et al., 2013; Solomon & George, 1996). Although the association between failed protection and attachment disorganization in father-child dyads has not been documented, results from the study by Hazen et al. (2010) have suggested that father insensitivity in an arousing play session also should be associated with child attachment disorganization. Paquette and Bigras (2010) also reported that child activation in the RS was associated with attachment disorganization, but not with attachment security, in a combined sample of mother-child and father-child dyads. However, a recent study (Paquette & Dumont, 2013) with a sample of father-child dyads only (overlapping with subsamples from Paquette & Bigras, 2010) failed to replicate these findings.

ASSESSING DYADIC SYNCHRONY IN A PLAYFUL AND ACTIVATING CONTEXT IN THE PRESCHOOL YEARS

The preschool years are a period of major change in children's social capacities. Children become more skilled at participating in collaborative relationships oriented toward common goals referred to by Bowlby (1969/1982) as a "goal-corrected partnerships," which form the basis for secure attachment at later ages. Therefore, it would be particularly useful to assess the concept of dyadic synchrony to describe the quality of the parent-child relationship in the preschool years. This is especially true with respect to fathers, given the major increase in their involvement in childcare during this period (Brown, Mangelsdorf, & Neff, 2012; John et al., 2013). Dyadic synchrony refers to interactions that are well-timed, reciprocal, and mutually rewarding (Smith, 2010). To attain dyadic synchrony, the relational partners should maintain a shared focus of attention, show temporal coordination, and demonstrate contingency (Harrist & Waugh, 2002, p. 559). Synchronous interactions

are thought to be tied to the quality of parent-child interactions which foster secure attachment (Smith, 2010).

At the time of our data collection, the RS had not yet been adapted to the preschool period. Nonetheless, despite the great assets of the RS and its undeniable contribution to the field, our goals were to use a more ecologically valid and less invasive procedure for our research purposes. Indeed, the RS involves climbing ladders and interacting with a stranger while the parent is present, but encouraged not to interact with the child—a situation that is not likely to happen in a child's everyday life. We also were interested in studying the dyads in a playful context, in line with suggestions that fathers' play sensitivity may be a better avenue through which to evaluate their impact on attachment security (Grossmann et al., 2002; van IJzendoorn & de Wolff, 1997). In contrary to traditional settings favoring typical mother-child interactions, a playful context should permit an equal ground for comparison between mothers and fathers. Although the RS provides interesting information about child risk-taking and parental supervision, the procedure was not designed to assess playful behaviors between parents and children. Moreover, coding of the RS is mainly based on child behaviors (i.e., his or her degree of activation), and parental behaviors are generally not taken into account, with the exception of Paquette and Bigras (2010). Therefore, it is unclear whether the current coding of the RS indicates the quality of dyadic interaction in general or parental sensitivity specifically. For these reasons, we instead chose an interactive play task in which parents were instructed to make their child laugh without using toys for a brief period of time.

Although the LT procedure may appear simplistic, it is undoubtedly a useful procedure for both researchers and clinicians interested in assessing parent-child relationships. First, asking parents to make their child laugh generally leads to excitement and high emotional arousal that the adult can easily monitor and foster. Second, parents may become overly intrusive if they are not paying attention to the child's cues in this task (i.e., a child cries and withdraws from interaction). Thus, sensitivity and dyadic synchrony should play a crucial role in preserving the quality of the relationship while still accomplishing the task. Finally, results from at least two studies (Abrams, Rifkin, & Hesse, 2006; Madigan, Moran, & Pederson, 2006) have shown that mothers behave more atypically in a play session without toys. Madigan, Moran, and Pederson (2006) concluded that most mother-infant dyads are likely to find interactions without toys more stressful than are interactions with an attractive set of toys because the toys relieve the mother of the sole burden of interaction. These authors also found that attachment disorganization was significantly related to disruptive patterns of interactions shown in the play sessions without toys, but not in the play session with toys. Therefore, although these studies have been conducted with mother-child dyads only, we thought that it was interesting to use a playful session without toys in our research with both mothers and fathers.

In the current study, we used a set of scales based on a coding system originally developed by Moss, Humber, and Roberge (1996) to assess, within a playful context, the synchrony of

parent–child interactions with their preschool-aged children. Based on the concept of goal-corrected partnerships, Cyr and Moss (2001) and Moss et al. (1996) considered a high cumulative score on this measure to indicate a reciprocal, synchronized, collaborative, and appropriate parent–child interaction. As the original scales assessed various dimensions of mothers' quality of interaction with their preschooler in a snack-time procedure, we modified the existing scales to adapt the instrument to father–child dyads as well as to a playful interaction context. Moreover, Moss, Bureau, Cyr, Mongeau, and St-Laurent (2004) previously showed a linear trend in the association between Preschool Attachment Coding System (PACS; Cassidy, Marving, & the MacArthur Working Group on Attachment, 1992) and the quality of mother–child interactions using this scale, such that secure dyads demonstrated the highest quality, followed by insecure-organized dyads, and finally, disorganized-controlling dyads.

OBJECTIVES AND HYPOTHESES

In the current study, we explored the concurrent associations between attachment and dyadic interaction quality between preschool children and their mothers and their fathers in a playful context without toys. In general, we expected to find similar patterns of association between mother–child and father–child dyads, therefore supporting the idea that despite possible differences in the interactive style across parents, the same dimensions (e.g., sensitivity, emotional synchrony) would foster attachment security with both mothers and fathers.

The first objective was to compare mother–child and father–child dyads' dyadic synchrony in the LT procedure. As a first step toward this objective, an exploration of the factor structure of the various interactive dimensions used to assess the LT procedure was conducted. This analysis is even more important considering that we added scales related to task performance (i.e., parent effort to make the child laugh) to the original instrument by Moss et al. (1996). It was expected that scores related to dyadic synchrony would be similar whether the children interact with mothers or fathers, but that fathers would show greater effort to make their children laugh.

The second and main objective was to explore associations between interactive dimensions and child attachment with both parents. It was expected that synchronous interactions would be associated with a greater likelihood of secure attachment, and less synchronous interactions would be associated with attachment disorganization and control.

METHOD

Participants

One hundred seven father–child and mother–child dyads (48 boys; $M_{\text{age}} = 46.67$ months, $SD = 8.57$) participated in the current study. Participants were recruited through advertisements posted in newspapers or on the radio, and through the research laboratory's website. The participating families were low risk such that only 23.4%

had a gross annual income of less than \$75,000, and the majority of fathers (62.6%) and mothers (75.7%) had a university degree while the remaining parents had either a college or high-school diploma. The sample was comprised of both English- ($n = 89$) and French-speaking ($n = 18$) families.

Procedure

Both father–child and mother–child dyads participated in separate laboratory visits (counterbalanced order), lasting approximately 2 hr, which included dyadic and individual tasks. The dyads first completed the LT procedure, for 2 min, with toys removed from the play area. This task required the parent to do something that would make their child laugh. Next, the parent–child dyad participated in a modified SSP, based on recommendations by Cassidy and colleagues (1992) for assessing attachment patterns in preschool-aged children. This procedure is designed to be moderately stressful for the child, and it proceeded in five stages. First, the parent and child were invited to make themselves comfortable in a room furnished with age-appropriate toys, and magazines for the parent; parents did not receive any particular instruction at this time as to how they should interact with the child. Second, after 5 min of free play, the parent was signaled to leave the room for the first separation, which endured for 5 min, unless the child was exceptionally distressed. Third, the parent returned to the room with the child for a 5-min reunion episode. Fourth, the parent and child were again separated, followed by another 5-min reunion episode (fifth). During both separation episodes, the child was left alone. After each separation, the parent was told to go back to the playroom, but did not receive any specific instructions. All procedures described up to this point were video-recorded. Finally, parents completed a series of questionnaires, including a sociodemographic questionnaire. At the end of the lab visit, parents received monetary compensation while children selected a toy prize in exchange for participation. All procedures and tasks for this study were approved by the institution's Research Ethics Board, and participants were treated in accordance with the national and institutional ethical standards for human experimentation.

Instruments

Playful interactions. Video-recordings of father–child and mother–child playful interactions observed in the LT procedure were evaluated using a modified version of the Parent–Child Interaction Scale for the Preschool and School Periods (Moss et al., 1996). For the current study, seven of the original subscales were coded. The original scale consists of eight subscales reflecting different dimensions of parent–child interactions. The subscales measure: (a) Coordination, (b) Appropriate Roles (originally labeled *Partner Roles*), (c) Sensitivity (originally labeled *Responsivity-Sensitivity*), (d) Synchronized Emotions (originally labeled *Emotional Expression*), and (e) Relaxation (originally labeled *Tension*). Due to their similarities, the original subscales labeled (f) Enjoyment and (g) Mood were combined under a new

TABLE 1. Exploratory Factor Analysis With Varimax Rotation for Parent–Child Playful Interaction Dimensions

Father–Child Playful Interaction	Factor 1 ^a	Factor 2 ^b	Mother–Child Playful Interaction	Factor 1 ^a	Factor 2 ^b
Relaxation	.84	–	Synchronized Emotions	.89	–
Respect of Child’s Rhythm	.82	–	Parental Sensitivity	.84	–
Synchronized Emotions	.75	–	Relaxation	.84	–
Parental Sensitivity	.75	.41	Respect of Child’s Rhythm	.83	–
Appropriate Roles	.62	.49	Appropriate Roles	.74	–
Appropriate Parental Effort	–	.91	Attention Centered on Dyad	–	.92
Attention Centered on Dyad	–	.87	Appropriate Parental Effort	–	.88
Proximity	.43	.75			
Fun	.44	.64			
Eigenvalue	4.96	1.38	Eigenvalue	4.04	1.29
% of Variance	55.07	15.37	% of Variance	57.72	18.46
α	.86	.86	α	.90	.82
<i>M</i>	14.94	11.34	<i>M</i>	15.89	5.83
<i>SD</i>	2.84	2.65	<i>SD</i>	3.06	1.57

^aFactor 1 = Dyadic Synchrony.

^bFactor 2 = Task Management.

subscale labeled *Fun*, which also was modified in accordance to the task’s specificities (i.e., indicators of fun are different when the dyad is explicitly instructed to laugh). The original subscale labeled (h) *Communication* was judged too inclusive and complicated, and thus was not retained in the current study. Although Coordination was coded, it was understood by our team as an overall rating of the quality of the dyadic interaction, and therefore was not retained for the factorial analysis. Four subscales were added to the original scale to better reflect the specificities of the LT procedure. These subscales were: Proximity (i.e., the degree to which partners tolerate physical intimacy in a playful setting), Appropriate Parental Effort (i.e., the effort deployed by the parent to make their child laugh), Parent Follows Child’s Rhythm (i.e., parental intrusiveness in the playful interaction), and Attention Centered on Dyad (i.e., partners focus on each other rather than being distracted by the physical environment; see Table 1 for the list of subscales used in the factor analysis). Each subscale was assigned a score between 1 (*absence of the dimension’s characteristic*) and 4 (*most optimal quality of dyadic interaction*). The original scales have been shown to discriminate the mother–child interactive patterns of 3- to 7-year-old children with different attachment classifications, with the disorganized and controlling children showing the least optimal patterns, and have revealed concurrent and longitudinal links with behavior-problem ratings and school performance (Cyr & Moss, 2001; Moss, Rousseau, Parent, St-Laurent, & Saintonge, 1998; Moss & St-Laurent, 2001; Moss, St-Laurent, Cyr, & Humber, 2000).

Four coders who were blind to other data coded the playful interactions in the current study. Interrater reliabilities for the dimensions (Pearson intraclass correlations: r_{ICC}) were calculated for 45 videos (~20% of the sample) and demonstrated adequate to excellent reliability: Appropriate Roles, $r_{ICC} = .83$, Sensitivity, $r_{ICC} = .86$, Synchronized Emotions, $r_{ICC} = .64$, Relaxation, $r_{ICC} = .68$, Fun, $r_{ICC} = .84$, Proximity, $r_{ICC} = .80$, Appropriate Parental

Effort, $r_{ICC} = .76$, Parent Follows Child’s Rhythm, $r_{ICC} = .80$, Attention Centered on Dyad, $r_{ICC} = .91$, and Coordination, $r_{ICC} = .88$. Any discrepancy between coders were reviewed together to obtain consensus, with particular attention on the Synchronized Emotions and Relaxation subscales.

Parent–child attachment. Attachment behavior during the separation–reunion procedure was classified according to the system of the MacArthur Working Group on Attachment (Cassidy et al., 1992). With the MacArthur coding system, preschoolers are classified as secure, avoidant, ambivalent, controlling-caregiving, controlling-punitive, controlling-mixed, and behaviorally disorganized (originally referred to as “insecure-other;” see O’Connor, Bureau, McCartney, & Lyons-Ruth, 2011). Secure (B) children resume calm and comfortable interactions with their parents upon reunion. Avoidant (A) children maintain polite neutrality toward their parents and limited emotional expressions toward them, even after reunion. Ambivalent (C) children show fussy, helpless, whiny, and/or resistant behavior toward their parents throughout the procedure, and appear unsatisfied by contact with the parent if and when it occurs. Controlling-caregiving children appear overly solicitous and caring for their parents while controlling-punitive children are harshly directive or rudely humiliating toward their parents during the separation–reunion procedure. Controlling-mixed children either vacillate between caregiving and punitive behaviors, or show excessive controlling behaviors that are neither clearly caregiving nor punitive. Last, behaviorally disorganized children do not demonstrate a coherent attachment strategy during reunion and/or display signs of disorganization according to infancy criteria. For the purpose of the current study and following common practice, controlling and behaviorally disorganized behaviors are combined as disorganized/controlling classification (D-cont.).

Two trained and reliable coders who were blind to participants' scores on other study variables coded videos of separation-reunion procedures. Twenty percent of cases ($n = 44$) were double-coded, resulting in 92% agreement ($\kappa = .85$). All discrepancies were resolved by reviewing the videos until a consensus was reached. The breakdown of attachment classifications for the father-child dyads was: Sixty-five (60.7%) children were secure ($n = 38$ girls), 12 (11.2%) children were avoidant ($n = 5$ girls), 12 (11.2%) children were ambivalent ($n = 5$ girls), and 18 (16.8%) children were disorganized/controlling ($n = 11$ girls). The breakdown of attachment classifications for the mother-child dyads was: Sixty-nine (64.5%) children were secure ($n = 35$ girls), 5 (4.7%) children were avoidant ($n = 2$ girls), 11 (10.3%) children were ambivalent ($n = 7$ girls), and 22 (20.6%) children were disorganized/controlling ($n = 15$ girls).

Sociodemographic information. Sociodemographic questionnaires were completed by the parent who participated in the first laboratory visit. These questionnaires obtained diverse information about the family, including the child's age, the family's annual gross income, and the parents' education.

RESULTS

Data-Reduction Analyses

As a first step to analyze the data, two exploratory factor analyses with varimax rotation were conducted to analyze the factor structure of the nine dimensions coded from father-child and mother-child playful interactions observed in the LT procedure (see Table 1). As expected, examination of eigenvalues and scree plot indicated a two-factor solution accounting for 70.44% of variance for father-child interaction dimensions. A similar pattern emerged for mother-child interaction dimensions, with a two-factor solution accounting for 76.18% of variance. For both fathers and mothers, factor loadings were retained based on a cutoff of .50. The dimensions of Fun and Proximity within mother-child interactions yielded factor loadings greater or close to .50 for both factors; thus, these dimensions were eliminated for the mother-interaction factors. The two factors for both father-child and mother-child playful interactions were named *Dyadic Synchrony* and *Task Management*.

Covariate Analyses

Child gender, child age, family gross income, and level of paternal and maternal education were examined as potential covariates. For father-child dyads, no significant correlations were found between the playful interaction factors and potential covariates, $r_s = -.05$ to $.18$, $p_s = .07$ – 1.00 ; similarly, neither factor varied across child gender, Dyadic Synchrony: $t(105) = .77$, $p = .44$; Task Management: $t(105) = -1.03$, $p = .31$. Child age, family gross income, and paternal education did not vary across father-child attachment classifications, $F_s = .94$ – 2.05 , $p_s = .11$ – $.42$. However, maternal

education was related to father-child attachment, $F(3, 103) = 2.78$, $p < .05$, such that children classified as ambivalent with their fathers tended to have mothers with fewer years of education ($M = 15.25$, $SD = 1.96$) than did children classified as avoidant with their fathers ($M = 17.25$, $SD = 2.01$). Finally, child gender did not differ across father-child attachment classifications, $\chi^2(3, N = 107) = 2.31$, $p = .51$.

For mother-child dyads, the Task Management factor and family gross income were significantly correlated, $r = .20$, $p < .05$; no other significant correlations were found, $r_s = -.03$ to $.12$, $p_s = .20$ – 1.00 . Neither interaction factor varied based on child gender, Dyadic Synchrony: $t(105) = -.51$, $p = .61$; Task Management: $t(105) = .18$, $p = .86$. Family gross income and parental education did not differ across mother-child attachment classifications, $F_s = .49$ – 1.97 , $p_s = .12$ – $.69$. However, children classified as disorganized-controlling with their mothers were significantly older ($M = 48.91$ months, $SD = 9.44$) than were children classified as ambivalent with their mothers, $M = 40.73$ months, $SD = 5.69$; $F(3, 103) = 2.74$, $p < .05$. Finally, child gender did not vary by attachment classifications, $\chi^2(3, N = 107) = 2.84$, $p = .42$. Thus, for father-child analyses, maternal education was included as a covariate in subsequent analyses with father-child attachment. For mother-child analyses, family gross income was controlled when conducting analyses with the Task Management factor, and child age was included as a covariate in subsequent analyses with mother-child attachment.

Comparison of Father- and Mother-Child Playful Interaction Factors

The first objective was to compare mother-child and father-child dyads' performance in the LT procedure. To this effect, a paired-samples t test compared scores on the Dyadic Synchrony factors, and a one-way analysis of covariance (ANCOVA) was used for comparison of the Task Management factors. Mothers were rated as higher in Dyadic Synchrony ($M = 15.89$, $SD = 3.06$) than were fathers ($M = 14.93$, $SD = 2.84$); $t(106) = 2.54$, $p = .01$. These results suggest that mothers are in greater synchrony with their child during the playful interaction than are fathers. In the interest of comparing identical Task Management factors, the Fun and Proximity dimensions were eliminated from the father-child interactions factor. Counter to hypothesis, Task Management ratings did not differ between mothers ($M = 5.83$, $SD = 1.60$) and fathers ($M = 5.49$, $SD = 1.57$); $F(1, 105) = 0.02$, $p = .88$. Thus, fathers did not show greater effort than did mothers to make their child laugh.

Attachment to Parents and Playful Interaction Factors

One-way analyses of variance (ANOVAs) or covariance (ANCOVAs) were tested separately for father-child and mother-child interactions to investigate whether the quality of parent-child playful interactions differed across attachment classifications; covariates were included as needed (discussed earlier; for all details, see Table 2). A significant main effect of attachment classification

TABLE 2. Between-Subjects Effects for Attachment-Group Differences in Parent-Child Playful Interactions

	Secure (B) Adjusted M^b (SE) $n = 65$	Avoidant (A) Adjusted M^b (SE) $n = 12$	Ambivalent (C) Adjusted M^b (SE) $n = 12$	Disorganized- Controlling (D-cont) Adjusted M^b (SE) $n = 18$	Between- Subjects Effects (F)	Significant Group Differences ^c
Father-Child Interactions^a						
Dyadic Synchrony	15.52 (.34)	14.77 (.82)	14.45 (.81)	13.24 (.65)	3.35*	D-cont < B**
Task Management	11.64 (.33)	11.15 (.79)	10.66 (.78)	10.83 (.63)	.76	–
Mother-Child Interactions^a						
Dyadic Synchrony	16.44 (.36)	15.25 (1.35)	15.86 (.93)	14.35 (.64)	2.75*	D-cont < B**
Task Management	5.91 (.19)	5.28 (.70)	6.56 (.49)	5.33 (.34)	1.67	–

Note. ^aDyadic Synchrony and Task Management were measured by a modified version of the Parent-Child Interaction Scale for the Preschool and School Periods.

^bMeans were adjusted based on the inclusion of maternal education for father-child analyses, the inclusion of child age for mother-child analyses, and the inclusion of family gross income for mother-child analyses with Factor 2.

^cAs indicated by post hoc Tukey's LSD tests.

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

was found for the Dyadic Synchrony factor for father-child interactions. As expected, post hoc Tukey's lowest significant difference (LSD) tests showed that children classified as secure with their fathers presented a better relationship quality within father-child playful interactions than did children with disorganized-controlling attachment. No differences were found between the other attachment classifications. In contrast, the Task Management factor within father-child dyads did not differ across attachment classifications.

A significant main effect of attachment group also was found with the Dyadic Synchrony factor for mother-child interactions. Tukey's LSD tests indicated that children classified as secure with their mothers presented a better relationship quality within mother-child playful interactions than did children with disorganized-controlling attachment patterns. No differences were found between the other attachment groups. Finally, similar to the findings for father-child interactions, the Task Management factor within mother-child dyads did not differ across attachment classifications.

DISCUSSION

The primary goal of the present study was to explore whether the quality of father-child and mother-child interactions observed in a playful and arousing context are associated with attachment in preschool-aged children. Results of the study demonstrate that both mothers and fathers are equally able to arouse and engage their child in a playful context, and that children's attachment to both their mothers and fathers is associated with dyadic synchrony.

The two-factor solution obtained in the current study differs from the one-factor solution found by Moss and colleagues with the original scales used to code mothers and preschool children in a snack-time procedure (Cyr & Moss, 2001; Dubois-Comtois & Moss, 2004, 2008; Moss et al., 2004, 2005). Note, however, that the scales Moss and colleagues collapsed in their single factor were almost all components of the Dyadic Synchrony factor (i.e., appro-

priate roles, synchronized emotions, sensitivity, and relaxation). The two dimensions included for both mother- and father-child dyads in the Task Management factor were added to the original coding system for the current study to assess the dyad's success in the LT procedure (i.e., parental effort to make the child laugh, attention on the dyad). These additional dimensions are closely tied to the nature of the task and could not have been included in the studies by Moss and colleagues because a snack-time interaction does not involve specific goals for the dyad to attain (Cyr & Moss, 2001; Dubois-Comtois & Moss, 2004, 2008; Moss et al., 2004, 2005). The Fun scale of the original coding system also was modified, as it takes on a very different meaning in the LT procedure, where the goal is to have fun. In this playful context, having fun may be more indicative of a task-related demand than of a spontaneous manifestation of the pleasure of being together while sharing a snack. However, our data suggest that while this is true for fathers, it is only partially true for mothers. Indeed, in the current study, being physically close to each other (proximity) and having fun were associated with paternal effort to make the child laugh, but not to the synchrony of their interaction. Anecdotal evidence from our coding observations suggests that fathers rely on physical play and intrusiveness (e.g., surprising the child with a sudden tickling "assault") to make their child laugh more so than did mothers. In addition, children express a wider variety of emotional states such as surprise and momentary discomfort while also becoming hysterically happy and hyperaroused in interactions with their father as compared to those with their mother. Thus, for some father-child dyads, the effort exerted to make the child laugh may result in a lower respect for the child's rhythm (more intrusiveness), more nervousness in the child (less relaxation), and less synchronized emotions (a child getting hysterical while father stays in control), decreasing the overall ratings for Dyadic Synchrony. In mother-child dyads, results suggest that having fun and being physically close was indicative of both a synchronous interaction and the mother's effort to make child laugh (evident from the dual

factor loadings for these dimensions). Once again, our coding experience suggests that mothers' efforts to entertain their children are generally less intrusive and result from negotiation between partners. For example, whereas a father would surprise a child and chase him or her around the room, a mother would suggest playing a game together, adding structure to the task. This may explain the greater overlap between the way mothers manage the task and ensure dyadic synchrony throughout the interaction. The suggestion that fathers' management of the task was more intrusive and affected synchrony within the dyad also is coherent with results showing higher Dyadic Synchrony scores for mother–child dyads versus father–child dyads.

Concerning the first objective and contrary to hypotheses, results show that mother–child dyads were more synchronous than were father–child dyads, but both parents were similar in their efforts to manage the task (at least when fun and proximity dimensions were ignored). These results are somewhat consistent with Paquette's (2004a) activation theory. Based on his ideas about fathers' and mothers' distinct roles as a secure base and a safe haven, we may have expected that fathers would deploy greater effort to make their child laugh and that mothers would be more attuned to their child's emotional needs, resulting in a greater synchrony. In our study, the activating effort was not more important for fathers but seemed to be slightly more detrimental to the synchrony of the dyad. This also is coherent with previous literature which has suggested that fathers are more likely to destabilize and be more intrusive when they play with their child (Freeman, Newland, & Coyl, 2010; Grossmann et al., 2002; Lewis & Lamb, 2003; Newland & Coyl, 2010), which has been implicated in helping the child to learn to regulate states of hyperarousal (Paquette, 2004a).

The second and main objective of the current investigation was to explore associations between the interactive dimensions in the playful context (LT procedure) and child attachment. Based on past literature that has linked the failure to protect a child in an arousing context to attachment disorganization/control (George & Solomon, 2011; Lyons-Ruth et al., 1999; Madigan, Bakermans-Kranenburg et al., 2006; Solomon & George, 1996), it was expected that an observed lack of dyadic synchrony in an arousing context would be associated with attachment disorganization/control rather than insecurity of attachment in general. This hypothesis was supported for both mother–child and father–child dyads. Moss et al. (2004) also found a similar association between a mother–child lack of synchrony and a disorganized/controlling attachment classification in the preschool years. However, because they observed dyadic synchrony in a snack-time procedure, it is not likely that their results could be interpreted as a failure to protect the child in an arousing context.

Therefore, an alternative explanation to the specific link to disorganization/control found in the current study as well as by Moss et al. (2004) might lie in the nature of attachment disorganization/control as they are coded in the preschool years. Whereas attachment disorganization in infancy is mostly coded based on brief and idiosyncratic behaviors (Main & Hesse, 1990), disorganization in the preschool years is most often manifested as a lack

of global strategy to interact with the parent or a reversal of roles within the dyad (Moss, Bureau, St-Laurent, & Tarabulsky, 2011), both indicative of an extreme lack of coordination and synchrony. Thus, as the conceptualization of the disorganization spectrum in the preschool years and the measure of dyadic synchrony are influenced by the notion of goal-corrected partnership (Bowlby, 1969/1982), it may not be surprising that this association was found both for mother–child and father–child dyads in our sample as well as for mother–child dyads in the study by Moss and colleagues (Moss et al., 2004).

Implications for Research on Fatherhood

Together, our results suggest that fathers' and mothers' synchrony with their child in a playful and arousing context, but not the effort exerted to entertain their child, are associated with attachment organization in the preschool years. Moreover, although we observed less synchrony in father–child dyads as compared to mother–child dyads, results showed that the same dimensions contribute to mother–child and father–child attachment. Therefore, we propose that despite differences in the way mothers and fathers handle physical play with a preschool child, paying attention to child emotional cues, responding in a synchronous fashion, and being sensitive remain major factors fostering attachment organization, regardless of parent gender. Although our results are somewhat contradictory to Paquette's (2004a) theory pointing to the primary role of activation and destabilization of the child in fostering father–child attachment, we do believe that the present findings remain complementary to the results obtained using the RS. Although Paquette and colleagues (Paquette & Bigras, 2010; Paquette & Dumont, 2013) have not found significant associations between child activation when interacting with fathers in the RS and attachment security disorganization, note that they never reported the links between parental behavior in the RS and child attachment. Moreover, neither dyadic synchrony nor parental sensitivity has been formally assessed in the RS. It would be beneficial for future research to code parent–child synchrony in the RS and to explore associated links with the likelihood of being activated, and how these constructs together relate to attachment. Regarding these results, it also appears that our LT procedure represents a promising companion to the RS procedure to obtain a more comprehensive assessment of the father–child relationship. The LT procedure is particularly cost-effective and time-efficient, and could easily be included in both research and clinical assessment protocols.

Limitations and Direction for Future Research

Although this study contributes to our understanding of the parent–child relationships in the preschool period, it is not without limitations. First, this study is somewhat limited by its sample size. Although a sample of 107 biparental families is well within the norms for research involving observational measures of attachment, and is likely excellent for such a study involving fathers

in particular, attachment is not a construct with evenly distributed categories. However, we thought it vital to assess the four distinct attachment groups, as a secure-insecure comparison may likely mask potential significant effects. Nonetheless, a larger sample would have permitted the examination of more complex research questions such as the potential moderating effect of child gender. Future investigation should examine whether dyadic synchrony assessed within our playful context is linked to different outcomes for boys and girls. A second limitation is that the current study used cross-sectional data and concurrent measures of all key variables. Results also should be interpreted with caution, as parents were instructed to make their child laugh, which does not provide information regarding each parents' preferred style of interaction. Indeed, although the current findings demonstrate that mothers are competent in a playful setting and exerted as much effort as did fathers to make their child laugh, we cannot confirm whether mothers would have spontaneously engaged in this style of interaction as often as would fathers in a free-play setting. Another limitation is that the coding instrument we used was originally developed for mothers. This may have inflated the performance of mother-child dyads on the Dyadic Synchrony factor. However, as we were comparing fathers and mothers, an instrument designed specifically for father-child dyads could have biased the results in the reverse way. Although not ideal, we think that using one of the only coding scales validated for the preschool period, which took into account the dyads as a partnership rather than focusing only on child or parent behaviors, was appropriate. Finally, the use of a convenience sample of fathers volunteering for this research limits interpretation of our findings. Recruiting fathers from a more at-risk population, although a very difficult task, would perhaps demonstrate different patterns of results.

In conclusion, we agree with Paquette's (2004a) suggestion that fathers play an important role in preparing the child for the outside world, with a particular emphasis on conquering challenges, taking risks, and regulating emotions. But to do so, we are certain that fathers should first gain their child's confidence and trust, and this crucial and important task is accomplished through sensitivity and emotional synchrony with the child.

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