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Children's Responses to Mother-Infant and Father-Infant Interaction with a Baby Sibling: Jealousy or Joy?

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Abstract

Firstborn children's reactions to mother-infant and father-infant interaction after a sibling's birth were examined in an investigation of 224 families. Triadic observations of parent-infant-sibling interaction were conducted at 1 month after the birth. Parents reported on children's problem behaviors at 1 and 4 months after the birth, and completed the Attachment Q-sort before the birth. Latent Profile Analysis (LPA) identified four latent classes (behavioral profiles) for mother-infant and father-infant interaction: *regulated-exploration*, *disruptive-dysregulated*, *approach-avoidant*, and *anxious-clingy*. A fifth class, *attention-seeking*, was found with fathers. The regulated-exploration class was the normative pattern (60%), with few children in the disruptive class (2.7%). Approach-avoidant children had more behavior problems at 4 months than any other class with the exception of the disruptive children who were higher on aggression and attention problems. Before the birth, anxious-clingy children had less secure attachments to their fathers than approach avoidant children, but more secure attachments to their mothers. Results underscore individual differences in firstborns' behavioral responses to parent-infant interaction and the importance of a person-centered approach for understanding children's jealousy.

Keywords

birth of a sibling; firstborn adjustment; infant sibling; fathers; jealousy; attachment

The birth of a sibling can be a stressful life event for young children and their parents. Mothers reported that firstborn children's oppositional behavior was frequent 3 weeks after the birth and that children deliberately engaged in naughty, demanding and noncompliant behavior that caused considerable stress for the mothers (Dunn & Kendrick, 1982). Still, firstborn children were interested in their new sibling, were eager to assist in infant care, and responded affectionately to the infant in the days and weeks after the birth (Anderberg, 1988; Dunn & Kendrick, 1982; Marecki, Wooldridge, Dow, Thomspson, Lechner-Hyman, 1985; Gottlieb & Mendelson, 1990). Thus, firstborn children engage in a combination of jealousy and joy at the arrival of their infant sibling. The primary objective of the current study was to examine individual differences in children's behavioral reactions to both mother-infant and father-infant interaction shortly after an infant sibling's birth. Throughout the remainder of this paper, we refer to the firstborns as children and the infants as siblings.

There are good reasons to pay close attention to how children react to parents' interactions with the sibling in the early weeks. First, the initial reactions provide a gauge of the children's acceptance of the new baby and may be a good indicator of how children are adjusting to the transition to siblinghood (TTS). Second, children's initial reactions 3 weeks after birth predicted their responses to mother-sibling interaction at 14 months (Kendrick & Dunn, 1982), with children protesting mother-sibling interaction more if they were demanding and difficult shortly after birth than if they had positively approached and imitated the newborn sibling. Particularly worrisome were children who were initially withdrawn because these children were more likely to develop poor sibling relationships over time (Dunn & Kendrick, 1982).

The Social Emotion of Jealousy

Jealousy is a complex social emotion. Complex because it is not simply a single emotional expression, but rather, a constellation of behaviors and affective responses; and social because it occurs in a very specific interpersonal context---the social triangle involving the jealous individual, a beloved, and a rival (see Volling, Kennedy, & Jackey, 2010). Jealousy represents a *patterned* response of intrapersonal affects, behaviors, and cognitive appraisals that form a jealousy profile. For instance, a child may appraise the infant as a threat to the mother-child relationship, feel anxious, and interfere in mother-infant interaction, or she may appraise her mother as inaccessible, feel sadness, and withdraw from interaction. Jealousy is elicited when the individual appraises the rival relationship between their beloved and another as a threat to their primary relationship with the beloved. When an infant sibling is born, the firstborn is now part of a social triangle that fits the jealousy template. The parent-firstborn attachment relationship is being threatened by the rival relationship developing between parents and the newborn. The increased confrontations between mothers and children, and the deliberately naughty behaviors recorded by Dunn and Kendrick (1982) when mothers interacted with the infant sibling shortly after the birth suggest that children may indeed be caught in a triangle of jealous relations.

A number of investigations have now examined children's behavioral reactions to mothers interacting with a rival in different triadic situations, whether the "rival" was a sibling (Teti & Ablard, 1989; Volling, et al., 2002, 2010), an infant-size doll (Hart, Carrington, Tronick,

& Carroll, 2004; Mize & Jones, 2012) or a same-age peer (Masciuch & Kienapple, 1993), and have found that both social approach behaviors (e.g., watching parent-rival interaction, maintaining proximity, seeking comfort), *and* distress/negative affect (i.e., protesting, disrupting the interaction, and aggression to mother) constituted jealousy responses. As a result, we used a person-centered approach to identify different behavioral patterns of children's approach and distress reactions, in contrast to most variable-centered studies, where each behavior is examined separately.

Another unique aspect of the current work is the inclusion of fathers. Although fathers are considered an important support for children during the transition (Kreppner et al., 1982; Legg et al., 1974), no study has observed children's responses to father-infant interaction directly, although according to Dunn & Kendrick (1982), mothers reported that children were more jealous when fathers interacted with the infant sibling than when mothers did. Children may, therefore, show more distress and disruptive behaviors in response to father-infant interaction than mother-infant interaction so that different profiles might emerge for children when interacting with mothers and fathers.

Attachment Theory and the Threat of a Rival Relationship

Given the centrality of the attachment relationship between children and their beloved parent in the jealousy triangle, we relied on the evolutionary-ethological theory of attachment (Ainsworth, Blehar, Water, & Wall, 1978; Bowlby 1969) as a starting point in our theorizing about individual differences in children's jealousy profiles. By interpreting the *patterns* of infant exploration, distress, and attachment behaviors observed during the separations and reunions of the now classic Strange Situation (SS), individual differences in infants' attachment relationships can be classified as secure or insecure (i.e., avoidant, resistant, disorganized). We argue that not only do physical separations from caregivers as in the SS activate the attachment behavioral system but so, too, does the child's appraisal of the caregiver's accessibility when caring for a newborn sibling. Even Bowlby (1969) acknowledged that for most young children, "the mere sight of mother holding another baby in her arms is enough to elicit strong attachment behavior" (p. 260). It should come as no surprise then to learn that many of the behaviors that researchers have coded during jealousy eliciting situations involving a rival (e.g., clinging, touching, proximity seeking, distress) are also attachment behaviors.

In the current study, we paid particular attention to how children balanced their exploratory play behaviors with their attachment behaviors in the presence of parent-sibling interaction when interpreting the resulting profiles. From an attachment perspective, children who feel confident in their parents' availability and use parents as a secure base should explore freely, even when parents are interacting with the infant sibling. They may monitor the parents' whereabouts or the parents' interactions with the sibling closely, but they should not disrupt interaction. Because children in the current study were observed in the familiar environment of their home in the presence of their parents, we did not expect to see strong attachment behaviors, such as crying or excessive clinging because the parent's presence in this situation should be enough to reduce any anxiety or fear. Volling et al. (2002) also argued that one way to gauge children's abilities to cope successfully with distress in triadic jealousy

situations was to observe the balance between children's abilities to engage in self-focused, exploratory play and their social interest in parent-sibling interaction, with emotionally-regulated children exploring toys and monitoring interaction rather than protesting or physically interfering.

In prior research, Teti & Ablard (1989) reported that insecurely attached infants cried and protested more in response to mothers' interactions with their older sibling, and Hart & Behrens (2013) recently found that insecure-resistant infants stayed in proximity to their mothers longer during a jealousy-inducing doll paradigm than secure or insecure-avoidant infants, and touched mothers more often than insecure-avoidant infants. Further, using maternal and paternal Q-sorts of attachment security, Volling et al. (2002) found that securely attached older siblings were less behaviorally dysregulated (i.e., protests, disruptions, negative to parent and sibling) during triadic interactions with their parents and toddler siblings. If witnessing rival parent-infant interaction sufficiently engages the attachment behavioral system, then individual differences in children's jealousy profiles may reflect their internal working models of their attachment relationship with their parents. Therefore, we hypothesized that children's attachment security before the birth would predict children's jealousy profiles 1 month after the birth.

The current study used a longitudinal design to address three aims: (1) to examine individual differences in children's behavioral profiles in response to mother-infant and father-infant interaction 1 month after birth using latent profile analysis; (2) to examine the concurrent and predictive validity of these profiles by looking at children's problematic behavior 1 and 4 months after the birth; and finally, (3) to determine if prenatal attachment security to mothers and fathers predicted the profiles. Prior research on the transition following the birth of a sibling has described some children as clingy, anxious-withdrawn, or oppositional after the birth (Dunn et al., 1981; Nadelman & Begun, 1982; Trause, 1978), so we hypothesized that at least three different behavioral profiles characterizing children's reactions to parent-sibling interactions would emerge. This study has both confirmatory and exploratory features. Although previous literature and theoretical work leads to predictions of specific patterns of clingy, anxious-withdrawn and oppositional behavior, there is no research on the specific behavioral profiles of children's jealousy responses to mother-infant and father-infant interactions after the birth of a sibling.

Method

Participants

Participants included 241 families consisting of mothers, fathers, and children (*mean age* = 31.12 months, *SD* = 10.12). Families were primarily European American (85.9% of mothers; 86.3% of fathers) with 14.1% of mothers and 13.7% of fathers representing other racial and ethnic minorities. Mothers were 31.6 years and fathers 33.2 years old, on average. Most families earned \$60,000 - \$99,999, and most had a Bachelor's degree or higher (83.9% of mothers, 79.2% of fathers). About 45.6% of the firstborn children (*n* = 110) and 55.1% of the infant siblings (*n* = 124) were boys.

Initially, 241 families provided data at the prenatal visit. Sixteen families dropped out after the prenatal visit for various reasons (e.g., lack of time, could not be contacted, infant hospitalization, parents separated). The remaining 225 families had complete observational data at 1 month. One family was dropped from the analysis because they were an extreme outlier (i.e., a score of 12.65 *SD* on the negativity score for mother-infant interaction). The 224 remaining families had higher education levels for both mothers, $\chi^2(6) = 29.54, p < .001$, and fathers, $\chi^2(7) = 23.91, p = .001$, but did not differ significantly on race/ethnicity, years of marriage, mothers' and fathers' ages, firstborns' age and gender, or family income.

Recruitment—Women pregnant with their second child were recruited from obstetric clinics, advertisements, and flyers posted in local hospitals, child care centers, pediatricians' offices, and child-birth education classes. Interested families were contacted to determine if they met the following criteria: (1) the mother was pregnant with her second child; (2) the infant's biological father was residing in the home; (3) the firstborn was between 1 and 5 years of age at the time of the infant's birth and (4) infants were born full-term, with both children free of developmental and/or physical disabilities. Of the 408 families who fit study criteria, 241 (59.1%) agreed to participate. Families were compensated \$300 for completing all phases of the study.

Design and Procedures

Data were drawn from a longitudinal investigation of changes in children's adjustment and family relationship functioning after the birth of a second child. There were five measurement occasions: prenatal (last trimester of the mother's pregnancy, $M = 33.8$ weeks gestation, $SD = 3.34$ weeks) and 1, 4, 8, and 12 months following the infant's birth (chosen to coincide with a pre- and post-birth transition response, as well as developmental milestones of infant development). The current report focused on home visits of triadic parent-infant-sibling interaction at 1 month, parent reports of children's problem behaviors at 1 and 4 months after the birth and the attachment Q-sorts obtained from mothers and fathers conducted prenatally.

Observations of parent-infant-child triadic interaction (1 month)—During a 10-minute parent-infant interaction (counterbalanced across mothers and fathers), one parent was instructed to play with the infant in a very affectionate manner, while the child was playing nearby with toys. The second parent was present, but was asked not to initiate interaction with the children or be actively involved in parent-infant interaction; they could respond to children if they initiated interaction or if they attempted to leave the observation area. Digital video files were later coded using 15-sec interval sampling using a coding scheme created by Volling et al. (2002). *Attention seeking* included behaviors and vocalizations which intentionally drew the parents' attention away from the infant and toward the child without physically disrupting the parent-infant interaction. These vocalizations (e.g., “Hey mommy, look at this!”) and behaviors (e.g., lifting arms for pick-up) had to be clearly directed toward the parent interacting with the infant and clearly attention-seeking in nature. *Monitors* included watching the parent-infant interaction either closely or at a distance, but making no attempt to actively approach, join, or disrupt the interaction. Children appeared more interested in the parent-infant interaction than in their

own play or activity, or may have simply monitored the interaction by looking up frequently from their own activities. *Joins positively* included approaching physically or vocalizing in a positive way toward the parent or the infant (e.g., offering toys, affectionately touching either parent or baby, or joining in the parent's play with the infant). *Solitary, object-focused play* included intervals in which children were completely focused on toys or other objects in solitary play for 10 to 15 seconds of the interval. Children may have shown interest in the parent-infant interaction with a quick glance, but then returned to playing. *Comfort-seeking* included any physical contact made with the interacting parent that suggested the child wanted contact or comfort, but without disrupting parent-infant interaction (e.g., sitting on the parent's lap; sitting nearby with hand on the parent's leg, leaning on parent). Children's disruptive behaviors were captured by three codes: *negativity toward parent*, *negativity toward sibling* (any physical or verbal action, such as hitting, pushing, pinching, or yelling), and *protests/demands* (any physical or verbal action, such as physically intruding on or disrupting the parent-infant interaction, or demanding the parent's attention). Both negative and protest behaviors occurred infrequently, so a composite of disruptive behavior was created by summing across all three categories and then dividing by 3.

Independent coders ($n = 8$) were trained on a subsample of tapes until inter-observer agreement was 80% or higher. Reliability was calculated on approximately 20% of the sample. Fleiss (1981) considers κ between .40 and .75 to represent fair to good agreement beyond chance; Cohen's Kappa coefficients (κ) ranged from .48 to .77 ($M = .63$) in the current study. κ can lead to an artificially low measure of agreement in the presence of low frequency events such as the negative behaviors in the current report (see Cicchetti and Feinstein, 1990, for a discussion). This low frequency of negative behaviors during observations of children's reactions to mother-sibling interaction, however, is not unique to our study (see Dunn & Kendrick, 1982; Gottlieb & Mendelson, 1990; Volling et al., 2002). Given the centrality of negative affect to an understanding of children's jealousy responses, we decided to maintain these behavioral codes for our analysis and acknowledge that results should be interpreted with caution until subsequent research can replicate these findings.

Children's behavioral adjustment (1 and 4 months)—Mothers and fathers were asked to complete the Achenbach Child Behavior Checklist 1.5 to 5 (CBCL, Achenbach & Rescorla, 2000) at 1 and 4 months. The CBCL (1½-5) is a widely used measure of preschool children's adaptive and maladaptive functioning that included 99 items which yielded 7 subscale scores: *emotional reactivity*, *anxious/depressed*, *somatic complaints*, *withdrawal*, *sleep problems*, *attention problems*, and *aggressive problems*. We chose to use the subscales rather than the broad-band externalizing and internalizing scales because Dunn et al. (1981) argued that no single dimension of distress could adequately capture the range of behaviors that characterized children's adjustment following the birth of a sibling. Further, many of these behaviors have been the focus of studies looking at change in the firstborns' adjustment (e.g., sleep problems, withdrawal, anxiety; see Volling, 2012) and are thus, a basis for comparison.

Attachment to parents (prenatal)—The Attachment Q-sort (AQS, Waters & Deane, 1985) was completed by mothers and fathers at the second prenatal home visit to assess the

security of the mother-firstborn and father-firstborn relationship. The AQS consists of 90 cards, each of which contains a statement about child behavior (e.g., when child returns to mother after playing, he is sometimes fussy for no clear reason). Each of the parents had been left the list of the 90 behaviors two weeks earlier at the first prenatal home visit with instructions to observe their children over the intervening two weeks. A trained research assistant sat with each parent while s/he separately sorted the 90 cards into nine piles (10 cards each) ranging from “least characteristic of your child” to “most characteristic of your child.” Mothers and fathers completed the sorts independently and sorted behavioral items based on how the child interacted with them individually. Attachment security scores were calculated by correlating mothers' and fathers' sorts with a criterion sort representing the hypothetically “most secure” child. Higher scores indicated a closer fit to the criterion sort; correlations were transformed into Fisher's z coefficients.

Advantages of the AQS for the current study are the applicability to a wide age range (12 - 48 months) and the assessment of children's secure-base behavior in the home environment. Several disadvantages of the Q-sort are the inability to distinguish among insecure classifications, and that maternal sorts do not predict children's SS classifications as well as observer sorts (van IJzendoorn, Vereijken, Bakermans-Kranenburg, Riksen-Walraven, 2004). To ensure validity of parental sorts, we followed the procedures recommended by Teti & McGourty (1996): (a) parents had the opportunity to familiarize themselves with the items beforehand; (b) they were blind to the fact we were measuring attachment security; and (c) they completed the sort in the presence of a research assistant who was available to answer questions as needed.

Overview of Data Analysis

Because our first aim was to determine whether there were different behavioral profiles, we conducted latent profile analysis (LPA). LPA is a model-based approach to clustering participants using a set of continuous variables; it is a person-centered analysis. Groups of participants sharing similar response patterns across the variables are called latent classes. Models are fit in steps, starting with a one class model with a subsequent increase in the number of classes until there is no further improvement in the model fit indices. We used the logit implementation of LPA.

The primary research questions were addressed in a three-step modeling framework. In Step 1, conditional Latent Profile Analysis (CLPA) including firstborn age as a predictor of class was conducted to identify distinct behavioral patterns. We included age as a linear predictor of class because of the wide age range of the firstborn children and the fact that attachment behaviors vary by age (e.g., distal versus proximal; Bowlby, 1969). We fixed the classes after the initial CLPA by constraining the means and variances for each class because otherwise class membership can change when additional predictors and outcomes are added to the models (Petras & Masyn, 2010). In Step 2, once the latent classes were identified and described, we used LPA with the distal outcomes framework (Muthén & Muthén, 1998-2010) using the same models as in Step 1 (i.e., constrained to maintain class structure and including age as a predictor of class) to examine class differences in children's problem behaviors at 1 and 4 months to determine concurrent and predictive validity of class

membership. Finally, in Step 3, we conducted CLPA in which the latent classes were predicted by children's prenatal attachment security using multinomial logistic regressions, again using age as a predictor of class and the same constraints for class structure as in Step 1. The implementation of both Step 2 and Step 3 ensured that the posterior probabilities for class membership as estimated in Step 1 were included in the models.

All analyses were conducted in Mplus version 6.1 (Muthén & Muthén, 1998-2010). Throughout our modeling we allowed for missing data on the measured outcomes using Full Information Maximum Likelihood (FIML) estimation. Model comparisons were conducted using a series of fit indices, including the Bayesian Information Criterion (*BIC*; Schwartz, 1978), and the sample size adjusted *BIC* (*SSA BIC*; Sclove, 1987); lower scores represent better fitting models. We also considered the Bootstrapped Likelihood ratio test (BLRT) of model fit, which assesses the fit between two nested models that differ by one class and provides a *p*-value that indicates the better fitting model; *p*-values less than .05 indicate the lower-class solution is the better fit. Entropy, an index indicating the classification of individuals into their respective classes or profiles, was also examined with higher values closer to 1 indicating better classification.

Results

The four-class solution (*BIC* = 7664.05, BLRT (8) = 144.21, $p < .001$, entropy = .90) was considered the best model fit for mother-infant sessions because there was a decrease in the *BIC* values compared to the three-class solution (*BIC* = 7764.97, BLRT (8) = 176.03, $p < .001$, entropy = .91) and because the five- and six-class solutions each resulted in a class with one child. Fit indices indicated that a five-class solution (*BIC* = 7281.93, BLRT (8) = 93.45, $p < .001$, entropy = .98) was a better fit for children's behavioral profiles during father-infant interaction compared to the four-class solution (*BIC* = 7337.40, BLRT (8) = 138.87, $p < .001$, entropy = .98) and the six-class solution (*BIC* = 7328.23, BLRT (8) = 3.003, $p = ns.$).

Children's Behavioral Profiles During Mother-Infant Interaction

The means of children's behaviors for each class and the total sample are presented in Table 1 for mother-infant interaction. The majority of children (Class C1: 60.7%, $n = 136$) engaged in very high levels of exploratory play, combined with moderately high levels of monitoring and approaching (joining positively, comfort-seeking) parent-infant interaction, with some attention-seeking and very little disruptive behavior. We labeled this class as the *regulated-exploration* group because they fit an overall pattern of what we would expect for a child in the familiarity of their home environment, feeling confident in the parents' accessibility, even when caring for an infant sibling.

A second class of children (C2: 30.8%, $n = 69$) displayed a profile with high levels of monitoring and substantially lower levels of exploratory play than C1, combined with moderate amounts of social approaches, attention seeking, and comfort-seeking, as well as a higher incidence of disruptive behavior than C1 children. In interpreting this and subsequent behavioral profiles, we relied on Bowlby's (1969) descriptions of children's attachment and secure base behaviors. For C2 children, the affectionate exchanges of mother-infant interaction appeared to have activated attachment behavior in the form of intense

monitoring, with some attempts to socially approach and seek contact. This contact, however, may not have been sufficient to reduce children's anxiety and the perceived threat of the infant, as their impoverished exploration indicated they were unable to explore freely and confidently in the mother's presence. These children appeared to be socially reticent or quite possibly, socially withdrawn; their social fear and feelings of anxiety may have attenuated their desire to approach so they avoided parent-infant interaction, resulting in an approach-avoidance conflict. Thus, we labeled this second class *approach-avoidant*.

A third, much smaller, class of children (C3: 5.8%, $n = 13$) appeared to be very attuned to the mother-infant interaction because they not only monitored interaction more intently than any other class, but they also made frequent and active attempts to either seek comfort or join the interaction positively, with some physical disruption and protesting of parent-infant interaction. Their extensive attempts to stay close and interact with the parent naturally resulted in very low levels of exploratory play. Strong attachment behaviors appeared to be activated in these children as they maintained close physical contact and proximity to their mothers, but this bodily contact was also mixed with protests and some demanding behavior. They appeared to be intensely interested in the mother-infant interaction and had little interest in exploratory play. Thus, the third profile was labeled *anxious-clingy* because they engaged in high levels of approach behaviors in the form of comfort-seeking and both positive and negative attempts to join parent-infant interaction, with an intense interest in mother-infant interaction that appeared to override their interest in exploration.

The fourth and final class (C4: 2.7%, $n = 6$) was distinguished from all other classes by their high levels of disruptive behavior. This small class of children also monitored interaction closely, made some attempts at attention-seeking and socially approaching mother-infant interaction for comfort. This final class of children was labeled *disruptive-dysregulated*.

Children's Behavioral Profiles during Father-Infant Interaction

Four jealousy classes emerged for father-infant interaction that closely resembled the *regulated-exploration* (54.5%, $n = 122$), *approach-avoidant* (29.5%, $n = 66$), *anxious-clingy* (6.2%, $n = 14$) and *disruptive-dysregulated* (2.7%, $n = 6$) profiles found with mothers (see Table 2). A fifth class (C5: 7.1%, $n = 16$) monitored father-infant interaction closely but stood apart from the others because of the high levels of attention-seeking. Attention-seeking often involved vocalizations to draw the caregiver's attention away from the infant. C5 children combined this attention-seeking with positive social approaches and moderate levels of exploratory play, but were not inclined to protest or disrupt father-infant interaction. We labeled these children as *attention-seeking*, believing these children might be working to maintain the connection with their fathers through a form of distance interaction.

Additional analyses on both mother-infant and father-infant interaction revealed nonsignificant χ^2 tests indicating no association between the classes and counterbalancing (mother or father first), children's gender, or race/ethnicity, nor did univariate ANOVAs reveal any differences across classes with respect to demographic information (i.e., parents' age, education, family income) so these variables were not considered further.

There were similarities in the percentages of children who fell into each of the classes across mother and father sessions. For instance, nearly 30% of children fell into the approach-avoidant classes and only 2.7% of children fell into the disruptive classes for mothers and fathers. A significant χ^2 indicated that classes across mother and father sessions were associated (see Table 3), but children often fell into different classes with mothers and fathers. Although 20 children were approach-avoidant with both mothers and fathers, 37 children were in the regulated-exploration class with mothers and approach-avoidant with fathers, and 30 were approach-avoidant with fathers and in the regulated-exploration class with mothers. Also, none of the 13 anxious-clingy children with mothers were included in the 14 anxious-clingy children with fathers, and none of the 6 disruptive children with mothers were included in the 6 disruptive children with fathers. Finally, 11 of the attention-seeking children with fathers were approach-avoidant with mothers, whereas 5 fell in the regulated-exploration class. Even though the mother and father sessions were contiguous, children's behavioral profiles often differed across mother and father sessions (see also Volling et al., 2002).

Children's Behavioral Profiles and Problem Behaviors at 1 and 4 Months Postpartum

Our second aim was to examine whether the jealousy profiles had concurrent and predictive validity by looking at how the classes differed with respect to children's problem behaviors at 1 and 4 months. Using LPA with a distal-outcomes framework, evidence for class differences can be tested by noting whether there is a significant improvement in model fit from the model in which the mean scores were constrained to be equal across classes and the model in which the scores were allowed to vary. To test which classes differed significantly from one another, the Wald Test, in both omnibus and pair-wise forms, was conducted on all between-group comparisons (see Nylund, Bellmore, Nishina, & Graham, 2007).

There were significant class differences for nearly all problem behaviors for mother classes at 1 and 4 months (see Table 4). In particular, the approach-avoidant children exhibited significantly more of every problem behavior compared to the regulated-exploration children at 1 month, although there were few differences when comparing the anxious-clingy and disruptive children with the regulated-exploration children. By 4 months, however, differences between groups became more apparent, particularly for the small group of disruptive children who were higher on emotional reactivity, somatic complaints, sleep problems, attention problems and aggression than regulated-exploration children. Approach-avoidant children still had significantly higher scores on all CBCL dimensions at 4 months than regulated-exploration children, although disruptive children had the highest scores on attention problems and aggression than any of the other four classes. Anxious-clingy children only differed from the regulated-exploration class in that they had significantly fewer somatic complaints and attention problems.

Because no prior study has included triadic interactions with fathers after the birth of a sibling, we focus here on the significant class differences revealed by the Wald test comparisons when each father-infant class was compared with the large regulated-exploration class (all p 's < .05). Anxious-clingy children were significantly higher on somatic complaints, attention problems, and aggression than regulated-exploration children

at 1 month. Again, more class differences emerged by 4 months, with approach-avoidant children higher on emotionally reactive, anxious-depressed, sleep problems, and aggression than regulated-exploration children. Attention-seeking children had significantly higher anxious-depressed scores than regulated-exploration children, but still had lower scores than the other three groups. Finally, anxious-clingy children were significantly more withdrawn, more aggressive, and had more sleep problems than regulated-exploration children at 4 months.

Attachment Security and Children's Behavioral Profiles

Our final aim was to examine whether children's attachment security prior to the birth could distinguish the different classes. To understand how attachment security contributed to the likelihood of membership in one class versus another, we examined each class in the role of reference group in separate multinomial logistic regressions.

Attachment security to mothers was associated with a lower likelihood of being in the regulated-exploration ($logit = -1.95, SE = 1.05, OR = 0.14, p < .07, 95\% CI [0.02, 1.12]$) and approach-avoidant ($logit = -2.25, SE = 1.22, OR = 0.10, p < .07, 95\% CI [0.01, 1.15]$) than the anxious-clingy class. Attachment security to fathers was associated with a significantly greater likelihood of being in the approach-avoidant ($logit = 2.14, SE = 0.98, OR = 8.51, p < .05, 95\% CI [1.26, 57.67]$) and marginally more likely to be in the regulated-exploration ($logit = 1.87, SE = .97, OR = 6.51, p < .06, 95\% CI [0.97, 43.53]$) than the anxious-clingy class. Though several of these comparisons were only marginally significant, we report them because they provide the first empirical evidence of a link between attachment security and children's jealousy profiles after the birth of a sibling and can be used as a referent for future research and hypothesis testing.

Discussion

Prior research has noted that children's reactions to the arrival of a newborn sibling vary considerably and include both negative (e.g., aggression, attention-seeking, protesting) and positive behaviors (e.g., joining positively, affection). Yet, most studies of children's behavioral reactions in response to parent-rival interaction take a variable-centered, rather than person-centered, approach that does not allow the identification of different behavioral profiles that may capture individual differences in children's jealousy reactions. This is especially important for research on children's jealousy because investigators have argued that it is the combination of social approach and negative affect that constitutes a jealousy profile (e.g., Mize & Jones, 2012). The current study is the only study to date to recruit a large sample of families going through the transition following the birth of a second child that also employed home observations of children's responses to mother-infant and father-infant interaction to examine children's behavioral profiles.

Because the primary attachment relationship between parents and firstborns is one central component of the jealousy triangle, we reasoned that individual differences in children's behavioral responses should be consistent with predictions from attachment theory and reflect children's internal working models of attachment security. Appraising the affectionate interactions between parent and sibling as a threat to their own relationship with the parent

should elicit children's jealousy and activate attachment behaviors. Based on attachment theorizing, children's reactions to parent-infant interaction in the familiar home environment should reflect the balance between children's attachment, exploratory, and fear/wariness behavioral systems, and should also reflect the internal working models of young children's attachment histories with caregivers (Bowlby, 1969). Four classes were uncovered during the mother-infant sessions: regulated-exploration, approach-avoidant, anxious-clingy, and disruptive-dysregulated. The fact that these same four classes emerged in the father-infant sessions suggests to us there is organization in children's behavioral profiles and they can be replicated across caregivers. Yet, the fact that children do not always fall into the same class with mothers and fathers is consistent with several attachment studies reporting that children can have different attachment classifications across mothers and fathers (van IJzendoorn & De Wolff, 1997) and with prior jealousy research where both the interpersonal dynamics of the triadic context and the child's intrapersonal profile give rise to behavioral variation in jealousy-inducing triadic interactions with mothers and fathers (see Volling et al., 2010).

Most children engaged in a pattern of behavior in which they monitored parent-infant interaction closely, sometimes making positive social approaches and joining interaction, but they often sat by quietly, freely exploring nearby toys, and did not engage in disruptive behaviors. We labeled these children as the regulated-exploration group, and because they were the largest class (60%), considered this profile as the normative pattern for children in this study. Many attachment studies in the U.S. report that most children (65%) are securely attached to parents (van IJzendoorn & Sagi-Schwartz, 2008); a finding that is consistent with the normative pattern found here. These "secure" children acted as one would expect in a familiar home setting where parents serve as a secure haven, children are confident of the parents' accessibility, and use them as a secure base from which to explore. Mothers and fathers also reported that these children had fewer problem behaviors than most of the other children in the months following the birth. There was little evidence that these children were disruptive during observations of parent-infant interaction or displayed problematic behaviors.

Actually, only 2.7% of children fell into the disruptive classes in response to both mother-infant and father-infant interactions. Parents were specifically instructed to be very affectionate in their interactions with the infant so as to be sure that the interactions were sufficiently engaging and would attract the children's attention. We expected this affectionate engagement with the infant would elicit more disruptive behavior than might be typical, but this was clearly not the case. Indeed, children's verbal protests and physical aggression were so infrequent that we had to composite across categories in order to have a sufficient number of "negative" behaviors to include in analyses. As noted earlier, this low frequency of negative behaviors directed to parents and infant after the TTS is not unique to our study (e.g., Gottlieb & Mendelson, 1990; Dunn & Kendrick, 1982), making one question whether the transition after the birth of a sibling is a developmental crisis for firstborn children (Colona & Newman, 1983). We should be mindful, however that negative reactions to parent-sibling interaction may change over time as the infant sibling becomes more mobile and sibling confrontations became more frequent at the end of the first year (Legg, Sherrick, & Wadland, 1974; Stewart, 1990).

At the same time, mothers rated disruptive children as having more attention problems and aggression, and as more emotionally reactive by mothers and fathers 4 months after the birth, indicating that these children may be at greater risk for externalizing behavior problems. These children may indeed have difficulties regulating negative emotions and even though they represent a small percentage of this low-risk, community-based sample, parents and family practitioners alike may want to attend closely to these children's disruptive behaviors.

A third group, comprising nearly 30% of children, was labeled approach-avoidant because they monitored parent-infant interaction intensely and were less likely to engage in solitary play or approach parent-infant interaction compared to the regulated-exploration group. They sought little comfort from parents, which may have left them anxious and unable to explore freely. Mothers of approach-avoidant children reported they had higher scores on every problem behavior (e.g., withdrawal, sleep, aggression) considered at 4 months, and fathers also reported these children were significantly more emotionally reactive, anxious/depressed, and had more sleep problems than regulated-exploration children. In short, these children had higher internalizing and externalizing problem behaviors, and we would recommend that family practitioners attend closely to these children. Whereas the protests, aggression, and demanding behavior of the disruptive children may be overt and easy to spot in the early months, the socially reticent behavior and impoverished play of these approach-avoidant children may go unnoticed, or may even be reinforced by hassled parents balancing the care of both a newborn and older sibling (“Be a good boy and go play with your toys while Mommy changes the baby”). Because Dunn & Kendrick (1982) found that it was children's initial withdrawal after the birth, not aggression or anger, that predicted difficult sibling relationship problems nearly a year later, these approach-avoidant children may be most at-risk for developing poor sibling relationships in the months and years ahead. Early identification of these children in the early months after the birth, would allow family practitioners an opportunity to intervene and prevent problematic sibling relationships in the ensuing years.

Only 6% of children were among the anxious-clingy children. These children were distinguished from the other groups by their excessive interest (or preoccupation) with parent-infant interaction, and their keen desire to seek proximity and maintain contact with their parents. They also protested and attempted to intrude on parent-infant interaction on occasion, but not as much as the disruptive children. Anxious-clingy children with mothers were younger than approach-avoidant children, but similar in age to regulated-exploration children. Their strong desire for proximity and contact may be appropriate for their younger age. Kendrick & Dunn (1980) reported that younger firstborns were more likely to be held and to stay close to mothers while they attended to the infant, but these same children were also more likely to be prohibited by and in confrontations with their mothers, particularly during infant feedings. Anxious-clingy children were similar in many respects to the regulated-exploration group, except mothers reported they had *fewer* somatic complaints and attention problems at 4 months. They were not the same anxious-clingy children with fathers, yet fathers reported they were more withdrawn, had more sleep problems and were more aggressive than regulated-exploration children. Anxious-clingy children were less

securely attached to fathers than regulated-exploration and approach-avoidant children, which contrasts with the findings for the anxious-clingy children with mothers who had marginally more secure attachments with their mothers than the approach avoidant and regulated-exploration children. The findings for these children are certainly mixed, and additional research will be needed to disentangle whether the behavior of anxious-clingy children is an age-appropriate means of maintaining contact and felt security for a young child during a time of transitional stress or a clear sign of anxious attachment, and we recommend future research continue to address this issue.

According to earlier maternal reports, children were more jealous when fathers interacted with the infant than mothers (Dunn & Kendrick, 1982), but we did not find support for more disruptive behaviors in response to actual home observations of father-infant interaction, nor did we find markedly different behavioral profiles from those found in the mother-infant sessions. One of the only differences across mothers and fathers was the emergence of a fifth class of attention-seeking children in response to fathers. These children spent a considerable amount of time monitoring father-infant interaction, but were also unique in that they had high levels of both attention seeking and positive approaches to join the interaction, with moderate levels of exploratory play. In line with attachment theory, we believe these children were engaging in distance interaction and signaling in the form of attention-seeking to maintain their emotional connection and communication with their fathers. Fathers reported that attention-seeking children had low scores on all problem behaviors, similar to the large regulated-exploration class, with the exception of anxious/depressed.

One reason this group may have emerged with fathers, and not mothers, is that fathers tend to minimize and punish children's negative emotions (e.g., McElwain, Halberstadt, & Volling, 2007; Nelson, O'Brien, Blandon, Calkins, & Keane, 2009). Fathers may not be as tolerant of their children's physical clinging or visible distress as are mothers, so these children may have learned to seek emotional assurance from a distance. To our knowledge, this is the first study to observe children's behavioral reactions to father-newborn interaction; although Stewart (1990) did observe children's talk to mothers and fathers during naturalistic home observations. The TTS marks an important developmental transition for the mother-firstborn attachment relationship and may be a time when close relationships with alternate caregivers, particularly fathers, play a critical role in children's adjustment after the birth of an infant sibling (Kreppner et al., 1982). More TTS studies that include fathers are needed to clarify this issue.

We used a person-centered approach to identify individual differences in children's jealousy profiles in contrast to a variable-centered approach. We admit that our interpretation of the behavioral profiles in line with individual differences in attachment security and children's internal working models is quite speculative and future replication is necessary, particularly given our contrasting results for mother-child and father-child attachment security using the Attachment Q-sort (AQS). Anxious-clingy children had higher attachment security scores with mothers, but lower attachment security scores with fathers compared to the regulated-exploration and approach-avoidant children. The AQS is not the best means by which to test our predictions because it only provides a continuous attachment security score and does not

distinguish among the different insecure attachment classifications, which may be essential to make sense of the current findings. For instance, contact maintenance and proximity seeking are often displayed by secure and insecure-resistant infants in the strange situation, but insecure-resistant children mix their need for proximity and contact with angry resistance, similar to our anxious-clingy children. The AQS may capture the close proximity and comfort-seeking of our anxious-clingy children, but miss the protests and disruptive behaviors observed in response to mother-infant interaction. Future research would benefit from having information on children's attachment classifications from the Strange Situation in order to understand better how attachment and children's jealousy in response to their infant sibling are related. Despite these inconsistent findings with attachment security to mothers and fathers, attachment processes must certainly play some role in how children respond to parent-infant interaction given the primacy of the parent-child attachment relationship in the jealousy triangle.

Limitations of the Current Study

There are, of course, several limitations to the current research. Because one of the main goals of the study was to consider the role of fathers across the transition, the sample consisted of two-parent, mostly educated, middle-class families of European descent. More studies will need to examine how children from lower socioeconomic, single parent, and other racial and ethnic family backgrounds might adapt to the TTS. Different behavioral profiles might emerge in a sample of families under considerable financial stress or for families from different cultural backgrounds. If the profiles identified here do indeed reflect individual differences in children's internal working models of attachment, however, we would expect similar behavioral profiles across studies, but perhaps a different distribution of children among classes, as is the case for attachment studies across cultures (van IJzendoorn & Sagi-Schwartz, 2008). Second, the current report represents some of the first findings from our longitudinal investigation and only included information on the first three time points (prenatal, 1 and 4 months). Eventually, we will examine the outcomes for these children one, two and even three years after the birth to determine whether children continue to display difficulties or whether these initial differences are short-lived. Third, the continuous AQS scores obtained from parent sorts do not allow one to classify attachment relationships as secure or insecure so it is not the best means by which to link attachment security to the jealousy profiles, and is most likely why we found different predictions across the mother and father classes. Fourth, the sample sizes of some of the classes were relatively small (e.g., 6). We acknowledge the low statistical power involving comparisons between classes, and that the statistical tests involving comparisons of classes with small sizes should be interpreted cautiously until they can be replicated. The frequency of disruptive behavior after the sibling's birth might be higher in a sample of hard to manage preschoolers, as was noted by Campbell (2000). Finally, LPA is a data-driven exploratory analytic procedure that we relied on to uncover person-centered jealousy profiles and these need to be replicated. The present findings, however, can guide future replication efforts and advance empirical and theoretical work on children's jealousy responses to the birth of a sibling.

Normative transitions can be very stressful for many families. In the case of the transition to siblinghood, firstborns, often no more than babies themselves, must adapt to changes in mothers' accessibility once the infant has arrived. The mother-child relationship changes profoundly after the sibling's birth (Volling, 2012), and the disruption of the attachment bond between parent and child can have a powerful impact on children's emotional well-being (Bowlby, 1979). Yet, research examining how representations of children's attachment relationships may explain their behavioral responses to interactions between their parents and their infant sibling is still in its own infancy.

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Table 1
Mean Differences in Firstborns' Behavioral Reactions by Latent Classes for Mother-Infant Interaction

Firstborn Behaviors	Total Sample (224)	Mother-Infant Interaction Classes				Disruptive (6)
		Regulated-Exploration (136)	Approach-Avoidant (69)	Anxious-Clingy (13)		
Disruptive	0.27	0.08 ^a	0.23 ^b	0.71 ^c	3.89 ^d	
Attention seeking	5.10	2.55 ^a	8.60 ^b	10.14 ^b	8.85 ^b	
Monitors	16.23	10.40 ^a	23.27 ^b	32.68 ^c	25.46 ^b	
Joins positively	6.17	2.48 ^a	9.49 ^b	24.64 ^c	8.81 ^b	
Self-focused play	10.54	12.48 ^a	8.37 ^b	4.12 ^b	7.68	
Comfort seeking	2.75	0.83 ^a	3.80 ^b	14.22 ^c	8.13 ^d	
Firstborn age (in months)	32.18	31.60 ^a	34.57 ^b	26.54 ^a	30.17	

Note. N in parentheses. Means designated with different superscripts are significantly different across classes based on post-hoc LSD comparisons ($p < .05$).

Table 2
Mean Differences in Firstborns' Behavioral Reactions by Latent Classes for Father-Infant Interaction

Firstborn Behaviors	Total Sample (224)	Father-Infant Interaction Classes				
		Regulated-Exploration (122)	Approach-Avoidant (66)	Anxious-Clingy (14)	Disruptive (6)	Attention-Seeking (16)
Disruptive	0.34	0.12 ^a	0.24 ^a	0.65 ^b	5.16 ^c	0.27 ^{ab}
Attention seeking	3.20	1.18 ^a	3.44 ^b	5.98 ^d	6.65 ^d	14.00 ^c
Monitors	13.71	6.73 ^a	18.88 ^b	27.84 ^c	28.77 ^c	28.49 ^c
Joins positively	4.60	1.25 ^a	5.32 ^b	18.37 ^d	6.14 ^b	14.65 ^c
Self-focused play	11.56	14.80 ^a	8.19 ^b	7.66 ^b	3.82 ^b	6.40 ^b
Comfort seeking	1.93	0.40 ^a	1.88 ^b	13.20 ^d	0.83 ^{ab}	4.24 ^c
Firstborn age (in months)	32.18	32.66	30.51 ^a	32.47	31.17	35.02 ^b

Note. N in parentheses. Means designated with different superscripts are significantly different across classes based on post-hoc LSD comparisons ($p < .05$)

Table 3
Association between Firstborns' Jealousy Profiles (Classes) for Mother-Infant and Father-Infant Interaction

	Jealousy Profiles for Mother-Infant Interaction				Total	Chi-square
	Regulated-Exploration	Approach-Avoidant	Anxious-Clingy	Disruptive-Dysregulated		
<i>Jealousy Profiles for Father-Infant Interaction</i>						
Regulated-Exploration	83 (74.1)	30 (37.6)	4 (7.1)	5 (3.3)	122	
Approach-Avoidant	37 (40.1)	20 (20.3)	8 (3.8)	1 (1.8)	66	
Attention-Seeking	5 (9.7)	11 (4.9)	0 (0.9)	0 (0.4)	16	
Anxious-Clingy	9 (8.5)	5 (4.3)	0 (0.8)	0 (0.4)	14	
Disruptive-Dysregulated	2 (3.6)	3 (1.8)	1 (0.3)	0 (0.2)	6	
Total	136	69	13	6	224	
Chi-square						25.27*

Note. Numbers in parentheses are the expected frequencies.

* $p < .05$.

Table 4
Mean Differences in Mothers' Reports of Children's Problem Behaviors at 1 and 4 Months Post-Birth by Latent Classes of Firstborns' Reactions to Mother-Infant Interaction

CBCL Outcomes	Mother-Infant Interaction Classes										Wald Test <i>df</i> (3)	<i>p</i>
	Regulated-Exploration		Approach-Avoidant		Anxious-Clingy		Disruptive-Dysregulated					
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>		
<u>One Month</u>												
Emotionally reactive	2.006 ^a	.189	3.128 ^b	.342	1.665 ^a	.380	3.501	1.200	9.924	1.200	9.924	.019
Anxious/depressed	1.196 ^a	.149	2.333 ^b	.274	1.352 ^a	.369	1.503	.617	10.690	.617	10.690	.013
Somatic complaints	1.413 ^a	.157	2.093 ^b	.258	1.202 ^a	.309	1.503	.617	5.735	.617	5.735	.125
Withdrawal	1.054 ^{ac}	.131	1.943 ^b	.215	.755 ^c	.305	1.831 ^{ab}	.435	15.020	.435	15.020	.002
Sleep problems	2.351 ^a	.201	3.925 ^b	.388	2.136 ^a	.486	3.672	1.203	14.080	1.203	14.080	.003
Attention problems	1.878 ^a	.163	2.862 ^b	.270	1.602 ^a	.312	2.833	.928	11.544	.928	11.544	.009
Aggressive behaviors	9.363 ^a	.630	13.080 ^b	.929	9.221	1.754	11.340	2.918	9.215	2.918	9.215	.027
<u>Four Months</u>												
Emotionally reactive	1.786 ^a	.186	3.691 ^b	.475	1.569 ^a	.285	6.665 ^b	1.664	21.138	1.664	21.138	.000
Anxious/depressed	1.173 ^a	.142	2.586 ^b	.343	.729 ^a	.277	3.332	1.661	18.562	1.661	18.562	.000
Somatic complaints	1.204 ^a	.133	2.409 ^c	.299	.447 ^b	.167	3.666 ^c	.727	48.167	.727	48.167	.000
Withdrawal	1.150 ^a	.145	2.257 ^b	.308	.870 ^a	.338	1.667	.270	11.884	.270	11.884	.008
Sleep problems	2.345 ^a	.201	4.562 ^b	.573	2.558 ^a	.580	5.999 ^b	1.421	17.528	1.421	17.528	.001
Attention problems	1.771 ^a	.164	2.919 ^b	.323	1.020 ^c	.320	4.333 ^d	.272	83.521	.272	83.521	.000
Aggressive behaviors	7.726 ^a	.555	11.913 ^b	1.016	7.938 ^a	1.489	20.330 ^c	3.142	23.658	3.142	23.658	.000

Note. Means designated with different superscripts are significantly different based on Wald test comparisons ($p < .05$); means without a superscript are not significantly different from any other class. CBCL = Child Behavior Checklist.