Development of Attachment Orientations in Response to Childbirth:

A Longitudinal Dyadic Perspective.

Sarah Galdiolo & Isabelle Roskam

Abstract

The aim of the current paper was to investigate the influence of childbirth on parents' attachment orientations. A three-wave longitudinal research program (during the second trimester of pregnancy, at 6 months postpartum, and at 1 year postpartum) using the Actor-Partner Interdependence Model with a hierarchical linear modeling was conducted on 150 parental couples (M = 30.38 years old) with parental group (i.e., primiparous/first-time or multiparous/multi-times parents) as a time-invariant predictor and the partner's attachment development as a time-varying covariate. Results showed that parents' attachment orientations were stable. Moreover, the members of a parental couple tended to follow the same attachment developmental trajectory. Variation in the partners' anxiety was positively associated with variation in the parents' anxiety and avoidance, while variation in the partners' avoidance was not associated with variation in the parents' anxiety and avoidance. The discussion underlined the stability of attachment orientations around childbirth and the importance of the dyadic perspective in understanding the childbirth experience, specifically the parents' receptivity to variation in their partners' anxiety levels and the influence of such variation on their own anxiety and avoidance development.

Keywords: attachment development, attachment orientations, childbirth, dyadic perspective

Childbirth is considered the most challenging life event couples face (Feeney, Hohaus, Noller, & Alexander, 2001) and as a moment at which changes in attachment orientations are likely to be observed (Bowlby, 1988). Until now, scholars have focused on the development of attachment orientations during the transition to parenthood from the perspective of individual mothers or fathers. The current study aimed to examine the particular effect of childbirth on primiparous (i.e., first-time) and multiparous (i.e., multiple-time) parents' attachment orientations using a dyadic approach.

Adult Attachment Theory

Over the course of repeated interactions with their first caregivers during childhood, an individual constructs internal working models of attachment which are then internalized as sets of expectations about himself or herself (i.e., whether he or she is or is not worthy of love and care from attachment figures) and significant others (i.e., whether attachment figures were or were not likely to be loving and supportive in important situations). These working models were thought to influence one's perceptions of—and behaviors in—later relationships (Bretherton & Mulholland, 1999). Two orthogonal dimensions referred to adult attachment (Brennan, Clark, & Shaver, 1998): anxiety (i.e., measuring the degree to which individuals worried that their close relatives did not really love them and might be unavailable or unsupportive in stressful situations) and avoidance (i.e., measuring the degree to which individuals desired limited intimacy with, and strived to remain psychologically and emotionally independent from, close relatives). Previous research showed the association between parents' attachment orientations and perceptions of and responses to childbirth. For example, Wilson, Rholes, Simpson, and Tran (2007) found that highly anxious parents felt greater jealousy toward their babies than did less anxious parents. Parents with a high level of avoidance perceived parenting as less satisfying and personally meaningful (Rholes, Simpson,

& Friedman, 2006). However, such studies did not question the development of attachment orientations during childbirth.

Childbirth and Change in Attachment Orientations

The life-event model of change (Davila & Cobb, 2004) assumed that change in attachment occurred in response to emotionally and relationally significant life events, especially events that changed the nature of a relationship or that affected relationship status, such as childbirth. Bowlby (1988) had already argued that childbirth was a moment at which systematic changes in attachment orientations were likely to be witnessed, for three reasons. First, the emotionally and interpersonally taxing nature of having a child ought to make people more receptive to re-evaluating, updating, and perhaps revising their internal working models of attachment. Second, childbirth should revive significant attachment-related memories and issues that, again, tended to make individuals more receptive. Finally, this event exposed parents to many new personal and interpersonal experiences that ought to contradict their current beliefs, expectations, and views of others and self.

Further, the social investment principle (Roberts, Wood, & Smith, 2005) posited that investing oneself in a social institution such as parenthood entails assuming new roles as a parent which leads to increased expectations and demands on the part of others—in this case, of the baby, especially. These expectations might include responsibility to others, confidence, prosocial behaviors, and emotional stability which lead to growth and increased maturity (Demick, 2002). This principle has been applied in studying parents' personality development (Hutteman, Bleidorn, Keresteš, Brković, Butković, & Denissen, 2014). Yet Donnellan, Burt, Levendosky, and Klump (2008) have reported that a substantial majority of the covariance in attachment and personality appeared to be due to shared genetic influences and that the mechanisms underlying personality and attachment development could be similar (i.e.,

person-environment transactions and gene-environment correlations) (Caspi & Shiner, 2006; Scarr & McCartney, 1983). Therefore, the social investment principle may be applied to attachment theory to explain the influence of childbirth on attachment development.

The life-event model of change and the social investment principle assumed that childbirth led parents to experience changes in their attachment orientations in response to the interpersonally and emotionally taxing nature of this event and to accommodate the baby's and the family's demands. The normative nature of childbirth led individuals to develop similar expectations of maturation attendant to childbirth (e.g., expectations of increased responsibility, sensitivity) which would drive parents to develop toward a more well-adapted attachment profile. Hereby, we could assume this maturational process would lead to more security and then to a lesser level of anxious and avoidant attachment after childbirth.

Empirical Study of the Development of Attachment During the Transition to Parenthood

Despite these theoretical considerations, very few empirical studies considered the influence of childbirth on attachment orientations. In a two-wave longitudinal study (i.e., 6 weeks before and 6 months after childbirth), Simpson, Rholes, Campbell, and Wilson (2003) showed that parents who perceived a pre-to-postnatal increase of their partner's support became significantly less anxious across the transition. In another two-wave longitudinal study (i.e., pregnancy and 1 year postpartum), Cobb, Davila, Rothman, Lawrence, and Bradbury (2003) showed that parents who perceived relatives as being supportive during the transition demonstrated increases in self-reported security. Both studies highlighted the developmental nature of attachment orientations during the transition to parenthood. However, some limitations needed to be addressed in the current study. First, the programs were two-wave and longitudinal while it might be relevant to observe developmental

trajectories by examining both short-term and long-term changes by including three waves (i.e., second trimester of pregnancy, 6 months postpartum, and 1 year postpartum). Second, the two previous studies focused on the transition to parenthood. The current study attempted to differentiate two life events: that of the transition to parenthood and of having additional children. Both life events included a change of relational status and the development of new responsibilities, roles, and identities (Delmore-Ko, 2000; Galinsky, 1981). The first-time parents changed from a dyadic (couple) to a triadic (family) perspective, but the multiparous parents developed relationships with siblings (Yu & Gamble, 2008). Primiparous and multiparous parents were therefore included in the current study. The inclusion of childless couples was required to find out whether changes in attachment orientation were unique to couples with children. Finally, previous studies were on changes in perceptions about social support and their influence on attachment orientations during the transition to parenthood. However, such changes of perception could be due to attachment change during the transition to parenthood and did not account for mutual influence between partners. Scholars have focused on an individual perspective (i.e., the effect of the transition to parenthood on women and men, separately) and have neglected the fact that one of the defining features of a couple is interdependence (i.e., one partner's experiences may be related to the other partner's experiences) (Atkins, 2005; Kenny, Kashy, & Cook, 2006; Thibaut & Kelley, 1959). Keizer and Schenk (2012) have already shown that women's and men's relationship satisfaction within couples was similarly affected by childbirth and changed in tandem. Such a dyadic perspective led us to apply developmental measures both to the individual (i.e., the actor's attachment) and to his or her close relational environment (i.e., the partner's attachment) (Sameroff, 2009) and to observe if and to what extent the couple members' experiences were interdependent.

Current Study and Hypotheses

Three hypotheses were considered in the current three-wave longitudinal study (pregnancy, 6 months postpartum, and 1 year postpartum) based both on parents' and childless adults' self-reported measures on the anxiety and avoidance dimensions of attachment. The first objective was to test intra-individual change in attachment orientations around childbirth. Previous studies (Cobb et al., 2003; Simpson et al., 2003) were only two-wave longitudinal and did not compare parents' trajectory to that of childless adults. The current study was the first one to analyze the developmental trajectory of attachment orientations around childbirth with a 3-wave longitudinal program and comparing to that of childless adults. Based on the life-event model of change and the social investment principle, we first hypothesized that parents develop toward a more well-adapted attachment profile, hence toward more security. We expected a decrease of both attachment orientations after childbirth with a larger decrease of avoidance. Under these assumptions, attachment change should occur especially when individuals encounter new relational information incongruent with their working models (Bowlby, 1988). Childbirth would be such an event to disconfirm the avoidant working models (i.e., the need to be psychologically and emotionally independent from close relatives), because it leads to more physical and emotional proximity between the parent and the newborn. In comparison, given the absence of life-event and new social roles (i.e., as controlled in the current study), we expected an absence of attachment change in the childless group.

Second, parental group (i.e., primiparity and multiparity) was added as a predictor of the intra-individual attachment development in order to observe whether primiparous and multiparous parents experienced different patterns of change. Attachment orientations would tend to change during the transition to parenthood (Cobb et al., 2003; Simpson et al., 2003). Consequently, we expected a decrease in avoidance and anxiety for primiparous parents. No study has yet focused on the developmental trajectory of multiparous parents' attachment

orientations. However, having another newborn leads to significant relational changes (according to the life-event model of change) and new family expectancies (social investment principle), which led us to expect a decrease in avoidance and anxiety for multiparous parents, too. So, we hypothesized the same developmental trajectory for both primiparous and multiparous parents.

The last objective consisted in testing the relation between a parent's attachment development and that of his or her partner. Since childbirth is a shared and interdependent experience within the parental couple and attachment orientations are interpersonal constructs, a positive association between one parent's attachment development and that of the other parent was expected. No such association was expected for childless couples. Keizer and Schenk (2012) have previously shown that relationship satisfaction of both members in a couple changed in tandem after becoming parents, and these results were not found for childless couples. This was why we expected greater interdependence for parents and greater influence from one's partner on parents than on childless individuals. An Actor-Partner Interdependence Model (APIM; Campbell & Kashy, 2002; Kashy & Kenny, 2000; Kenny et al., 2006), a data analytic approach designed to deal with dyadic data and to consider statistical dependencies due to stable and time-varying characteristics of the dyad members and of their environment, was used to examine these three hypotheses, namely (a) the intraindividual development of attachment orientations, (b) the influence of the parental group (i.e., primiparity and multiparity) on attachment development, and (c) the mutual influence between partners' attachment development around childbirth.

Method

Sample and Procedure

Data was longitudinally collected from a sample of 150 XXXXX-speaking heterosexual cohabiting parental couples (*n* = 107 primiparous couples, *n* = 45 multiparous couples), corresponding to 302 parents (*n* = 151 mothers and *n* = 151 fathers). The primiparous parents' ages ranged from 18 to 45 years old (M = 28.69, *SD* = 4.02 for the overall sample; *M* = 27.74, *SD* = 3.39 and *M* = 29.68, *SD* = 4.38, for mothers and fathers respectively) and the multiparous parents' ages ranged from 22 to 43 years old (*M* = 32.06, *SD* = 4.13 for the overall sample; *M* = 30.98, *SD* = 3.70 and *M* = 33.02, *SD* = 4.30, for mothers and fathers respectively). The multiparous parents had from 1 to 4 children (M = 2.56, *SD* = 0.52; Age, M = 5.09, *SD* = 1.23). With regard to the control group, data was longitudinally collected from a sample of 64 XXXX-speaking cohabiting childless adult couples (*n* = 64 women and *n* = 64 men) and ages ranged from 19 to 52 years old (*M* = 27.24, *SD* = 6.66 for the overall sample; *M* = 26.48, *SD* = 6.96 and *M* = 27.95, *SD* = 6.35, for women and men respectively). Data were only collected from a sample of heterosexual couples because before the pregnancy or the child's arrival, homosexual future parents go through experiences (e.g., adoption, in vitro fertilization) that can affect their personality traits and attachment dimensions, beyond the childbirth *per se*.

Participants were recruited with the assistance of gynecologists who gave information about our study to their patients verbally and by means of a leaflet. These patients were either the (future) parents in the second trimester of pregnancy or childless women who were present for a routine check-up (and these latter were asked to recruit their partners). Data was first collected on parents and purposefully on childless couples in order to match the couples for age. At each wave of data collection, participants completed a questionnaire on the Internet via Lime Survey or completed a paper version if they lacked access to the Internet. For ethical reasons, this study was registered with and approved by the Commission for the Protection of Privacy.

Three waves of data were collected in a longitudinal research program at three distinct points of parenthood: pregnancy (*M* = 24.47 pregnancy weeks, *SD* =8.39), 6 months postpartum (*M* = 24.52 weeks postpartum, *SD* = 4.75), and 1 year postpartum (*M* = 12.46 months postpartum, *SD* = 1.20). There was no measure between the birth and 6 months postpartum due to the special characteristics of this period. The early months are difficult, especially for primiparous parents and women in particular: Not only must they cope with the demands of pregnancy and childbirth, but they also tend to assume more responsibilities than their partners (Grote, Naylor, & Clark, 2002). With regard to the childless couples, two waves of data were collected with a 6-month interval.

Measures

Sociodemographic variables. Sociodemographic variables were collected during the first wave of data collection: gender, date of birth, details of primiparity and number of weeks of pregnancy.

Longitudinal variable: attachment (ECR-R). During the three (parents) or two (childless adults) waves of data collection, adult attachment was assessed by means of the "Experiences in Close Relationships Questionnaire – Revised" (ECR-R, Brennan et al., 1998; Fraley, Waller, & Brennan, 2000). Self-report measure of attachment style was used to ensure feasibility of a longitudinal data collection in a large sample size focused on attachment with close relatives. This questionnaire consisted of two subscales (18 items each): anxiety (e.g., I worry about being abandoned) and avoidance (e.g., I prefer not to show a partner how I feel deep down). A 5-point Likert-type scale (1 = *completely disagree* and 5 = *completely agree*) was provided. The ECR-R has been used in many studies since 1998 and has been found to be highly reliable and to have high construct and predictive validity (Shaver & Mikulincer, 2002; Sibley & Liu, 2004). Latent variable analyses showed that longitudinal measures of both the

anxiety and avoidance subscales were remarkably stable over a 6-week assessment period (86% shared variance over time), which suggested that the ECR-R provided stability estimates of trait attachment that were largely free from measurement error over short periods of time (Sibley & Liu, 2004). Finally, Cronbach's alphas were initially .91 for anxiety and .94 for avoidance (Brennan et al., 1998) and McDonald's omega estimates were .90 for anxiety and avoidance in our sample. Tests for normality and homogeneity of variances were conducted on attachment variables: Avoidance was normally distributed but anxiety was not. Log transformation of parents' anxiety ensured a normal distribution [Time 1, $D(300) = .06$, *ns;* Time 2, $D(300) = .05$, *ns;* Time 3, $D(276) = .06$, *ns*].

Criteria of exclusion. A depression scale and a stressful life events measure were administered in order to identify and exclude from the sample postnatally depressed parents and participants who had experienced disruptive life events. Depression (i.e., Beck Depression Inventory Short Form Items, BDI-13, Beck, Steer, & Garbin, 1988) was assessed during pregnancy and at 6 months postpartum, with a positive difference of more than 2 points between the measures being the criterion of exclusion (i.e., this criterion corresponds to the cut-off for assessing a significant increase in depression). One parental couple was excluded from the sample. At the last wave of data collection, parental and childless couples had to select life events that had emotionally affected them for the last year (a relative's death, marital conflicts, divorce or breakup of a romantic relationship, loss of a job, and diagnosis of a serious illness in a close relative or in oneself) and to assess the emotional impact of the events that couples had experienced (Birditt, Antonucci, & Tighe, 2012; Sutin, Costa, Wethington, & Eaton, 2010) on a 5-point Likert-type scale (1 = *not at all affected* and 5 = *absolutely affected*) (i.e., criteria of exclusion: a mean of at least 3 points across all 5 events, that was a cut-off assessing a significant increase in the emotional impact of the experienced events). Only one multiparous couple was thus excluded.

Analytical Strategy

To examine the developmental course of parental couples' attachment during childbirth through repeated measures, the main analyses used the APIM (Campbell & Kashy, 2002; Kashy & Kenny, 2000; Kenny et al., 2006), a data analytic approach designed to deal with dyadic data. Because our study focused on the development of parental couples rather than on mothers vs. fathers, the dyad members have been considered as indistinguishable and, consequently, the terms "actor" and "partner" have been used in the results section to refer to both members of the couple. A two-level hierarchical linear modeling (HLM 7.00; Raudenbush, Bryk, Cheong, & Congdon, 2008) have been used: The level 2 data referred to couple variables while the level 1 data referred to all variables that did not include couple information. Three types of predictor variables were included: between-dyads variables, within-dyads variables, and mixed variables (Kenny et al., 1996). A between-dyads variable is one for which scores were the same for both members of the couple, but differed from couple to couple (primiparity and multiparity). In contrast, a within-dyads variable is something which was a difference within the couple but a similarity between couples (gender). A mixed predictor variable is one for which there was variation both within the couple and between couples, indexed here by the partner's attachment development and the age (i.e., a control variable). The partners' attachment development has been introduced as a time-varying covariate in the model. Because time-varying covariates were composed of two sources of variation, they were actually two variables instead of one (Hoffman & Stawski, 2009). These two sources of variation were likely to have differential effects on the outcome – a between-person effect and a within-person effect, respectively. The time-varying covariate was within-person-centered in order to address bias due to unobserved heterogeneity or unmeasured factors that varied across individuals and had a consistent effect over time on the construct of interest (Raudenbush & Bryk, 2002). The between-person effect concerned the effect on

attachment dimensions of stable individual differences between partners (Raudenbush, Brennan, & Barnett, 1995). To obtain the between-partner effect, the average level of each partner's anxiety or avoidance scores over the three assessment waves was calculated and added as a predictor. This procedure was used to examine the pure effect of change in the time-varying covariate over time (as its mean level was controlled for; Hoffman & Stawski, 2009). In brief, the following analyses were made: (a) analyses of the missing data, (b) preliminary analyses (i.e., means, standard deviations, and Pearson correlations), (c) APIM analyses (i.e., attachment orientations as outcomes, parental group as a between-dyad variable, and partner's attachment as a mixed predictor), and (d) comparison between the developmental trajectories of parents and nonparents.

Results

Missing Data

No attrition occurred between T1 (i.e., pregnancy) and T2 (i.e., 6 months postpartum), yet there was attrition of 25 parents (8.3% of the sample) between T2 and T3 (i.e., 1 year postpartum). Because attrition was common in longitudinal data, HLM estimates were based on all the available data with the assumption that the missing data were random (McCartney, Bub, & Burchinal, 2006). Statistical comparisons between parents who dropped out and parents who completed the three waves revealed no systematic significant differences in either socio-demographic variables or the time-invariant variable under investigation [$t(1, 298) = -1.12$, $p = .27$, Cohen's $d = -0.13$ for primiparity/multiparity; $t(1, 298) = -1.71$, $p = .10$, Cohen's $d = -0.20$ for education level; $t(1, 298) = -1.44$, $p = .16$, Cohen's $d = -0.17$ for incomes)].

Preliminary Analyses

The means and standard deviations of the outcome variables and the Pearson correlation coefficients examining (a) the stability of the repeated measures over time and (b) the relationships between the outcome variables within waves were presented in Tables 1 and 2.

[Insert Tables 1 and 2 about here]

APIM Results

The APIM results for parents were presented in Table 3 and concerned (a) the intraindividual development of attachment orientations over time (i.e., slope value), (b) the influence of the parental group (i.e., primiparity and multiparity) as a between-dyads variable, and (c) the association between the actor's attachment orientations development and that of his or her partner. For our purpose, the time variable was expressed in the metric of years. The exact difference of time between waves for each participant was respected, making it possible to observe any changes in attachment between these three waves of measurement. The APIM model tested the following equation (where t = time, i = individuals, and j = couples):

Level 1: $Actors'\ anxiety\ or\ avoidance = \pi_{0ij} + \pi_{1ij}(Time)_{tij} + \varepsilon_{tij}$

Level 2: $\pi_{0ij} = \beta_{00j} + \beta_{01}(Gender)_i + r_{0i}$

$\pi_{1ij} = \beta_{10j} + \beta_{11}(Gender)_i + r_{1i}$

Level 3: $\beta_{00j} = \gamma_{000} + U_{00j}$

$\beta_{01} = \gamma_{010}$

$\beta_{10j} = \gamma_{100} + \gamma_{101}(Parental\ group) + \gamma_{102}(Partner's\ level\ of\ anxiety\ /\ avoidance) + \gamma_{103}(Age) + U_{10j}$

$\beta_{11} = \gamma_{110}$

First, non-significant slope values indicated that anxiety (β = -0.02, *SE* = 0.03, *p* = .43) and avoidance (β = -0.02, *SE* = 0.03, *p* = .39) remained stable over time around childbirth. Second, the results showed an effect of 0.06 (*p* = .02) of the parental group (i.e., as coded in -

1 = *multiparous* and 1 = *primiparous*), especially a decrease of avoidance in the multiparous group only. Finally, there was a positive association between one actor's anxiety development and that of his or her partner. For every unit of change in the partner's anxiety level (i.e., every unit deviation from the person-specific mean) per year, there was a change of 0.19 units in the actor's anxiety (p = .00). There was also a positive association between the avoidance development of the actor in a couple and his or her partner's anxiety development. For every unit of change in their partners' anxiety level (i.e., every unit deviation from the person-specific mean) per year, there was a change of 0.05 units in the actor's avoidance (p = .01). However, no association was found between (a) an actor's avoidance development and that of his or her partner (β = -0.05, SE = 0.07, p = .43), and (b) an actor's anxiety development and his or her partner's avoidance development (β = 0.03, SE = 0.02, p = .15). Consequently, variation in the partners' levels of anxiety influenced the actors' anxiety and avoidance development around childbirth. This influence was stronger from the partners' anxiety to the actors' anxiety than from the partners' anxiety to the actors' avoidance. Finally, no interaction with gender (β = -0.01, SE = 0.01, p = .21 and .24 for anxiety and avoidance respectively) and age (β = -0.00, SE = 0.00, p = .21 and .80 for anxiety and avoidance respectively) were found.

[Insert Table 3 about here]

We also analyzed the developmental trajectory of anxiety and avoidance for childless couples. Because only two waves of data were collected for childless adults, it was impossible to use HLM. As expected, childless adults did not show any attachment development between Time 1 and Time 2 [F(1, 124) = .86, p = .57 and F(1, 124) = .00, p = .66, for anxiety and avoidance respectively]. When their partners' attachment development was included as a covariate of intraindividual change in the model, there was still no apparent effect [F(1, 124) = 2.14, p = .92 and F(1, 124) = .01, p = .81, for anxiety and avoidance respectively].

Comparison between the Developmental Trajectories of Parents and Nonparents

The comparison between the developmental trajectories of parental and childless couples led us to (a) analyze a potential selection effect by comparing differences between both groups on the baseline (i.e., Time 1) and (b) compare both developmental trajectories by using a stratification on the propensity scores. First, F-test showed a significant difference on the baseline between parents and childless adults, $F(523) = 2.97$, $p = 0.00$, Cohen's $d = 0.26$ and $F(523) = 3.09$, $p = .00$, Cohen's $d = 0.27$ for anxiety and avoidance respectively (see Table 1 for descriptive statistics), with childless adults displaying a greater score on anxiety and avoidance than parents. Significant differences were also found on the baseline between primiparous parents, multiparous parents, and childless adults, $F(523) = 4.42$, $p = .04$, Cohen's $d = 0.39$ and $F(523) = 5.54$, $p = .00$, Cohen's $d = 0.48$ for anxiety and avoidance respectively. Post-hoc tests underlined a significant difference between primiparous parents and childless adults ($p = .04$ and $p = .00$, for anxiety and avoidance respectively), with childless adults showing a greater score on anxiety and avoidance than primiparous parents.

Later, the developmental trajectories of parents and nonparents were compared using the two (first) waves of data with a repeated measures design and stratification on the propensity scores. The propensity score was a conditional probability that expressed how likely a participant was to be assigned to one or the other group (e.g., parents vs. nonparents groups) given certain observed baseline characteristics and was used to reduce or eliminate the effects of confounding (Thoemmes & Kim, 2011). In the current study, the propensity score was built on a set of covariates collected during Time 1, especially age, level of education, and personality traits. Subjects were then stratified into three equal-size subsets based on previously defined thresholds of the estimated propensity score (Austin, 2011). In the current study, no difference appeared between parents' and non-parents' trajectories in the three subsets for anxiety [$F(1, 170) = 1.75$, $p = .19$, Cohen's $d = 0.27$; $F(1, 170) = 2.85$, $p =$

.09, Cohen's d = 0.44; $F(1, 171) = 0.21$, p = .65, Cohen's d = 0.03] and avoidance [F(1, 170) = 0.34, p = .56, Cohen's d = 0.05; F(1, 170) = 0.26, p = .61, Cohen's d = 0.04; F(1, 171) = 0.09, p = .76, Cohen's d = 0.01] respectively.

Discussion

The main objective of this study was to examine the developmental course of parents' attachment during childbirth, with parental group (primiparity vs. multiparity) as predictor and the partner's attachment development as covariate of the intraindividual trajectory for parents. Their results were compared with those of childless couples (which included no life event).

Development of Attachment Orientations Around Childbirth

Despite robust shifts in environment associated with childbirth, parents did not demonstrate dramatic shifts in terms of attachment development. Even though parents coped with new family demands and challenges, their attachment orientations tended to remain stable. The parents' growth curve was on average flat. The average correlation coefficient examining the stability of the repeated measures was around .63 while the coefficient of the intraindividual change was near .00. Moreover, parents' and nonparents' attachment trajectories did not differ from each other.

Our first hypothesis about parents' anxiety and avoidance change has not been supported by our results, which contradicted those of Simpson et al. (2003), whose study was two-wave (i.e., 6 weeks prepartum and 6 months postpartum). In their conclusion, those authors wondered whether the attachment changes represented relatively permanent and stable shifts in attachment orientations versus more transient, stress-induced shifts. Researchers then recommended increasing the number of waves across longer periods around childbirth to test the permanence or change more precisely. We conducted a larger life-span

study (i.e. the second trimester of pregnancy, 6 months postpartum, and 1 year postpartum) and found an absence of anxiety and avoidance change. Consequently, we might wonder whether attachment changes observed between 6 weeks prepartum and 6 months postpartum were transient. This period of transition is particularly intense with many changes (e.g., delivery, breast feeding, parental leave, crèche, resumption of work, etc.). We may suppose that such life changes could lead to transient attachment changes and that from 6 months postpartum, there would have a return to a family balance and so, as we could hypothesize, a return to the attachment baseline.

Due to the descriptive nature of our paper, we could not define the exact processes underlying the stability of attachment orientations around childbirth. However, we could propose three possible explanations. The first one involved a selection effect (Luhmann, Orth, Specht, Kandler, & Lucas, 2014; Roberts, Wood, & Caspi, 2008): People who experienced specific events could differ systematically from people who did not, because of stable between-person differences (e.g., personality or attachment factors). Various constructs of personality have already been found to be associated with reproductive behavior and the probability of having children. For example, a high level of self-esteem and low levels of shyness and aggressiveness were found to be associated with low negative expectations about parenthood, which were associated with intentions to become a parent (Hutteman, Bleidorn, Penke, & Denissen, 2013). Attachment orientations have also been found to be linked with the desire for children. Rholes, Simpson, Blakely, Lanigran, and Allen (1997) observed that avoidant individuals reported less desire to become parents and anticipated more difficulties related to children than less avoidant people. Such differences in attachment and personality might influence how likely and how often individuals encountered opportunities for having children. Our results showed significant differences at the baseline (i.e., Time 1) between parents and nonparents: Childless adults had higher scores on anxiety and avoidance than

primiparous parents. By extension, our results could be interpreted in light of the selection effect and hypothesized that people with lower scores on anxiety and avoidance could undergo the transition to parenthood more often than people with higher scores on both dimensions. Such a hypothesis should be more intensively tested in a future research.

Second, another hypothetical explanation referred to anticipatory changes, that are the possibility that attachment changes occurred before the event itself (Luhmann et al., 2014). (Future) parents could have anticipated the event: They had at least nine months to prepare for childbirth and even longer if the event was planned, which would explain the absence of attachment change in our study. As such, new social roles and expectations (i.e. as understood by the social investment principle) could have been developing already during pregnancy. For example, a greater level of emotional stability may have been observed during this period because parents were taking care that the pregnancy and the conditions of their fetus were untroubled. Moreover, we may suppose that interpersonal and emotional aspects (i.e., as mentioned in the life-event model of change) could be already present during pregnancy such as the development of prenatal coparenting (Van Egeren, 2004), that is, preparation for childbirth involving one's partner and whole family.

The third explanation would have to do with the interpretative system of attachment orientations (Laurenceau, Rivera, Schaffer, & Pietromonaco, 2004). The attachment literature affirmed that individuals' working models of attachment acted as interpretive filters that guided how individuals construed and interpreted their own as well as their partner's actions and experiences. This interpretive process might affect the way that parents interpreted the event that they experienced (i.e., childbirth) and their new familial relations and guided the parents' attachment behaviors. For example, Rholes et al. (2006) showed an influence of parents' attachment orientations on parent-child relationships and on the perception of parenting. Avoidant parents experienced greater stress after childbirth and perceived parenting

as less satisfying and personally meaningful. This interpretive filter could tend to reinforce initial attachment patterns, and so to contribute to attachment stability.

Primiparous and Multiparous Parents' Developmental Trajectories

The primiparous and the multiparous parents' developmental trajectories were compared. While there was not any difference for anxiety, our results showed a difference in avoidance development: Multiparous parents' avoidance decreased after childbirth. Very few studies focused on the comparison between the primiparous and the multiparous parents' development. One possible explanation of such results could be that multiparity was characterized by a significant increase of the number of family relationships (i.e., between each parent and each child and between the children). Parents thus experienced more contact with others and were exposed to many new interpersonal experiences that could, as mentioned by Bowlby (1988), contradict their current beliefs, expectations, and views of others and self, which could *in fine* lead to a decrease in avoidance.

A Dyadic Perspective

The dyadic perspective hypothesis was supported by our results. Results (i.e., positive coefficients association) showed that the members of a parental couple tended to follow the same attachment developmental trajectory. These results were not found for the childless couples. Consequently, we could assume that childbirth led parents to function in dyad rather than individually. Moreover, even if the growth curve was flat, variability around the slope was also observed. This meant that on average parents' attachment did not change over time but also that some parental couples did experience attachment change. Our dyadic results on attachment change were similar of those found on relationship satisfaction (Keizer & Schenk, 2012).

Our results showed that the variation of the partners' anxiety was positively associated to variation of the actor's anxiety and avoidance. This association was particularly strong between partners' and actors' anxiety. On the contrary, the variation in the partners' avoidance was not associated with variation in the actor's anxiety and avoidance. Two hypothetical explanations could be explored. Firstly, childbirth could be a life-event that makes parents more receptive and sensitive to their partner's anxiety. Certainly, childbirth requires shared responsibilities between parents. Parents could be more vigilant to their partners' physical and psychological proximity, availability, and responsiveness, which typically involve the anxious dimension of attachment (Fraley & Shaver, 2000). Secondly, the risk of a vicious cycle was possible. If a partner's anxiety increased, there could also be an increase in the actor's anxiety and avoidance. Yet an anxiously attached individual has considerable needs of intimacy and fears being abandoned. An avoidant response from a partner could not be adequate for such needs. Our results could be one explanation of the dyadic decrease of relationship satisfaction.

Limitations and Research Highlights

From a developmental point of view, it would be interesting to conduct a larger life-span study by including very short-term (e.g., 1 month postpartum) and long-term (e.g., 3 years postpartum) perspectives and multiple waves of data and to have the same number of waves of data for parental and childless couples. This would allow us to observe (a) non-linear attachment development, (b) temporary variations of attachment (i.e., prototype model, Fraley, Vicary, Brumbaugh, & Roisman, 2011), and (c) the potential reversibility of change (e.g., Luhmann, et al., 2014). A second limitation concerned mental representations during pregnancy and anticipatory changes. Before childbirth, parents tended to plan for and imagine their future child (Galinsky, 1981). Therefore, we may suppose that attachment change could appear during pregnancy. Ideally, we should follow childless adults until the point where they

become parents. A third limitation concerned the absence of certain predictors of intraindividual change. It could be interesting to include maternity and paternity leave as a predictor. International collaborative studies could be conducted, given the difference of the length of leave between countries. A fourth limitation involved to the inclusion of the between- and within-person sources of variation for the time-varying covariate (i.e., the partner's attachment development). This procedure was in fact used to examine the pure effect of change in the time-varying covariate over time (as its mean level was controlled for; Hoffman & Stawski, 2009). This is the reason why the between-partner effect has not been interpreted *per se*. Finally, our study was realized in a normative population. It could be interesting to conduct our study in a clinical population to observe their attachment development around childbirth. Future research should address these limitations. This fundamental study offered the first evidence for answering the question of attachment development in parents dealing with childbirth and needed replication.

In sum, our results highlighted five important observations. First, parents' attachment orientations tended to remain stable over time. Second, a selection effect for this life event was possible. Third, the multiparous parents' avoidance decreased over time. Finally, the members of a parental couple tended to follow the same attachment developmental trajectory.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

Atkins, D. C. (2005). Using multilevel models to analyze couple and family treatment data: Basic and advanced issues. *Journal of Family Psychology, 19*(1), 98-110. doi: 10.1037/0893-3200.19.1.98

Austin, P. C. (2011). Comparing paired vs non-paired statistical methods of analyses when making inferences about absolute risk reductions in propensity-score matched samples. *Statistics in Medicine, 30,* 1292 – 1301.

Beck, A. T., Steer, R., & Garbin, M. (1988). Psychometric properties of the Beck depression inventory: 25 years of research. *Clinical Psychology Review, 8*(1), 77 – 100. doi: 10.1016/0272-7358

Birditt, K. S., Antonucci, T. C., & Tighe, L. (2012). Enacted support during stressful life events in middle and older adulthood: An examination of the interpersonal context. *Psychology and Aging, 27*(3), 728 – 741. doi: 10.1037/a0026967

Bowlby, J. (1988). *A secure base.* New York: Basic Books.

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46 – 76). New York: Guilford Press.

Bretherton, I., & Munholland, K. A. (1999). Internal working models in attachment relationships: A construct revisited. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment theory and research* (pp. 89 – 111). New York: Guilford Press.

Campbell, L., & Kashy, D. A. (2002). Estimating actor, partner, and interaction effects for dyadic data using PROC MIXED and HLM: A user-friendly guide. *Personal Relationships, 9*(3), 327-342. doi: 10.1111/1475-6811.00023

Caspi, A., & Shiner, R. L. (2006). Personality development. In W. Damon, R. M. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (pp. 300 - 365). New York: John Wiley.

Cobb, R. J., Davila, J., Rothman, A., Lawrence, E., & Bradbury, T. N. (2003). *Changes in marital satisfaction and attachment security over the transition to parenthood.* Manuscript submitted for publication.

Cox, M. J., & Paley, B. (1997). Families as systems. *Annual Review of Psychology, 48*(1), 243 – 267. doi: 10.1146/annurev.psych.48.1.243

Davila, J., & Cobb, R. J. (2004). Predictors of change in attachment security during adulthood. In W. S. Rholes & J. A. Simpson (Eds.), *Adult attachment: Theory, research and clinical implications* (pp. 133 – 156). New York: Guilford Press.

Delmore-Ko, P. M. (2000). *Developing a parental identity: Expectations about parenthood and descriptions of self as parent* (Unpublished Doctoral dissertation). University of Waterloo, Ontario, Canada.

Demick, J. (2002). Stages of parental development. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol. 3: Being and becoming a parent* (pp. 389-413). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Donnellan, B. M., Burt, A. S., Levendosky, A. A., & Klump, K. L. (2008). Genes, Personality, and Attachment in Adults: A Multivariate Behavioral Genetic Analysis. *Personality and Social Psychology Bulletin*, *34*(1), 3 - 16.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175 - 191.

Feeney, J. A., Hohaus, L., Noller, P., & Alexander, R. P. (2001). *Becoming parents: Exploring the bonds between mothers, fathers, and their infants.* New York, NY: Cambridge University Press.

Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology, 4*(2), 132-154. doi: 10.1037/1089-2680.4.2.132

Fraley, R. C., Vicary, A. M., Brumbaugh, C. C., & Roisman, G. I. (2011). Patterns of stability in adult attachment: An empirical test of two models of continuity and change. *Journal of Personality and Social Psychology, 101*(5), 974 – 992. doi: 10.1037/a0024150

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology, 78*(2), 350 – 365. doi: 10.1037//0022-3514.78.2.350

Galinsky, E. (1981). *Between generations: The six stages of parenthood.* New York: Times books.

Grote, N. K., Naylor, K. E., & Clark, M. S. (2002). Perceiving the division of family work to be unfair: Do social comparisons, enjoyment, and competence matter? *Journal of Family Psychology, 16*(4), 510-522. doi: 10.1037/0893-3200.16.4.510

Hoffman, L., & Stawski, R. S. (2009). Persons as contexts: Evaluating between-person and within-person effects in longitudinal analysis. *Research in Human Development, 6*(2), 97 – 120. doi: 10.1080/15427600902911189

Hutteman, R., Bleidorn, W., Keresteš, G., Brković, I., Butković, A., & Denissen, J. J. A. (2014). Reciprocal associations between parenting challenges and parents' personality development in young and middle adulthood. *European Journal of Personality, 28*(2), 168-179. doi: 10.1002/per.1932

Hutteman, R., Bleidorn, W., Penke, L., & Denissen, J. J. A. (2013). It takes two: A longitudinal dyadic study on predictors of fertility outcomes. *Journal of Personality, 81*(5), 487-498. doi: 10.1111/jopy.12006

Kashy, D. A., & Kenny, D. A. (2000). The analysis of data from dyads and groups. In H. T. Reis & C. M. Judd, *Handbook of research methods in social and personality psychology* (pp. 451-477). New York, NY: Cambridge University Press.

Keizer, R., & Schenk, N. (2012). Becoming a parent and relationship satisfaction: A longitudinal dyadic perspective. *Journal of Marriage and Family, 74*(4), 759-773.

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York, NY, US: Guilford Press, New York, NY.

Laurenceau, J. -P., Rivera, L. M., Schaffer, A. R., & Pietromonaco, P. R. (2004). Intimacy as an interpersonal process: Current status and future directions. In D. J. Debra & A. Aron (Eds.), *Handbook of closeness and intimacy* (pp. 61 – 78). Mahwah, New Jersey: Lawrence Erlbaum.

Luhmann, M., Orth, U., Specht, J., Kandler, C., & Lucas, R. E. (2014). Studying changes in life circumstances and personality: It's about time. *European Journal of Personality, 28*(3), 256-266. doi: 10.1002/per.1951

McCartney, K., Bub, K. L., & Burchinal, M. (2006). Best practices in quantitative methods for developmentalists: VI. selection, detection, and reflection. *Monographs of the Society for Research in Child Development, 71*(3), 105-126.

Raudenbush,S. W., Brennan, R. T., & Barnett, R. C. (1995). A multivariate hierarchical model for studying psychological change within married couples. *Journal of Family Psychology, 9*, 161 – 174. doi: 10.1037/0893-3200.9.2.161

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. (2008). *HLM 6.06: Hierarchical Linear and Non-linear Modeling.* Lincolnwood, IL: Scientific Software International.

Rholes, W. S., Simpson, J. A., Blakely, B. S., Lanigan, L., &Allen, E. A. (1997). Adult attachment styles, the desire to have children, and working models of parenthood. *Journal of Personality, 65*, 357-385.

Rholes, W. S., Simpson, J. A., & Friedman, M. (2006). Avoidant attachment and the experience of parenting. *Personality and Social Psychology Bulletin, 32*(3), 275-285. doi: 10.1177/0146167205280910

Roberts, B. W., Wood, D., & Caspi, A. (2008). The development of personality traits in adulthood. In P. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed.) (pp. 375-398). New York, NY: Guilford Press.

Roberts, B. W., Wood, D., & Smith, J. L. (2005). Evaluating five factor theory and social investment perspectives on personality trait development. *Journal of Research in Personality, 39*(1), 166-184. doi: 10.1016/j.jrp.2004.08.002

Sameroff, A. J. (2009). *The transactional model of development: How children and contexts shape each other.* Washington, DC: American Psychological Association.

Scarr, S., & McCartney, K. (1983). How People Make Their Own Environments: A Theory of Genotype → Environment Effects. *Child Development, 54*(2), 424 - 435.

Shaver, P. R., & Mikulincer, M. (2002). Attachment-related psychodynamics. *Attachment and human development, 4,* 133 – 161. doi: 10.1080/14616730210154171

Sibley, C. G., & Liu, J. H. (2004). Short-term temporal stability and factor structure of the revised experiences in close relationships (ECR-R) measure of adult attachment. *Personality and Individual Differences, 36,* 969 – 975. doi: 10.1016/S0191-8869(03)00165-X

Simpson, J. A., Rholes, W. S., Campbell, L., & Wilson, C. L. (2003). Changes in attachment orientations across the transition to parenthood. *Journal of Experimental Social Psychology, 39,* 317 – 331. doi: 10.1016/S0022-1031(03)00030-1

Sutin, A. R., Costa, P. T., Wethington, E., & Eaton, W. (2010). Turning points and lessons learned: Stressful life events and personality trait development across middle adulthood. *Psychology and Aging, 25*(3), 524 – 533. doi: 10.1037/a0018751

Thibaut, S. W., & Kelley, H. H. (1959). *The social psychology of groups.* New York: Wiley.

Thoemmes, F. J., & Kim, E. S. (2011). A systematic review of propensity score methods in the social sciences. *Multivariate Behavioral Research, 46*(1), 90-118. doi: 10.1080/00273171.2011.540475

Van Egeren, L. A. (2004). The development of the coparenting relationship over the transition to parenthood. *Infant Mental Health Journal, 25*(5), 453 - 477. doi:10.1002/imhj.20019

Wilson, C. L., Rholes, W. S., Simpson, J. A., & Tran, S. (2007). Labor, delivery, and early parenthood: An attachment theory perspective. *Personality and Social Psychology Bulletin, 33*(4), 505 – 518. doi: 10.1177/0146167206296952

Yu, J. J., & Gamble, W. C. (2008). Pathways of influence: Marital relationships and their association with parenting styles and sibling relationship quality. *Journal of Child and Family Studies, 17*(6), 757-778. doi: 10.1007/s10826-008-9188-z