



Development of personality traits in response to childbirth: A longitudinal dyadic perspective



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ABSTRACT

To investigate the influence of childbirth on personality, the authors conducted a three-wave longitudinal research program (pregnancy, 6 months, and 1 year postpartum) using a multilevel modeling framework on 204 parental couples with parental group (primiparous vs. multiparous parents) as a time-invariant predictor and the partner's development as a time-varying covariate and on childless couples as a control group. Results showed that the father's Extraversion decreases after childbirth. Except for Extraversion, parents' personality is highly stable. Moreover, when facing childbirth, mothers and fathers tend to follow the same developmental trajectory and hence to function in dyad. The discussion underlines the importance of the dyadic perspective to understand the childbirth experience.

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1. Introduction

People who are involved in the raising of children are transformed and follow a different developmental trajectory from childless adults (Palkovitz, Marks, Appleby, & Holmes, 2003). What kind of transformation can parents be expected to undergo? Is childbirth a life event transformative enough to lead to changes in parent's personality traits?

1.1. Childbirth and parental development

Childbirth is considered one of the most significant life events because of its potential to drastically disrupt the individual's life (e.g., Feeney, 2001). "Childbirth" may actually refer to two distinct life events: the initial transition to parenthood and the birth of another child (i.e. subsequent childbirths). Both events imply a change of relational status and the development of new responsibilities, roles, and identities (Galinsky, 1981). The first-time parents change from a dyadic to a triadic perspective, but the multiparous parents develop relations with siblings (Yu & Gamble, 2008). Given these relational differences, developmental trajectory could differ between primiparous and multiparous parents. These two parental groups were therefore included in this study in order to differentiate their experience of parenthood. Moreover, the inclusion of childless couples was required to find out whether

changes in personality traits are unique to couples with children. In sum, the current study tested (a) whether and to what extent the personality is affected by childbirth, which would be a sign of its transformative nature and (b) whether personality development differs between primiparous and multiparous parents, and between these and childless adults.

1.2. Personality development

Personality traits are defined as the relatively enduring patterns of thoughts, feelings, and behaviors that distinguish individuals from one another. Research (McCrae & Costa 1999) has reached near consensus on a five-trait structure of personality (i.e., the 'Big Five'): Neuroticism (withdrawal behavior, anxiety, and detection of threat), Extraversion (intensive pursuit of interpersonal relationships, activities, and joy), Agreeableness (empathic orientation), Openness to experience (intellectual curiosity, imagination, and new cultural experiences) and Conscientiousness (ability to organize, plan, and respect conventions).

Concerning personality development, two contradictory predictions have been proposed. The essentialist perspective argues that personality traits are biologically based "temperaments" that are not susceptible to the influence of environment. Changes are considered as primarily maturational and associated with changes in biological substrates of personality (McCrae & Costa, 2006). In contrast, the contextual perspective emphasizes the importance of life events and role transitions and suggests that personality can be prone to change (Lewis, 2001). Actually, existing longitudinal studies do not support either of these positions. First,

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there was confusion between the origin (genome and environment) and the development (continuity and change) of personality: Continuity of personality was usually associated with the genome and change with the environment. Actually, both genetic and environmental factors work together in creating and developing personality (Krueger & Johnson, 2008). Second, different forms of continuity and change may be independent of one another, making both continuity and change in personality traits unavoidable (Roberts, Wood, & Caspi, 2008).

Different ways of conceptualizing and measuring personality continuity exist (Roberts et al., 2008): (a) structural continuity (i.e. similarity over time in patterns of co-variation among traits), (b) ipsative continuity (i.e., continuity in the configuration of personality variables within a person across time), (c) mean-level continuity (i.e. consistency in the amount of an attribute over time in a sample of individuals), (d) rank-order consistency (i.e., consistency of the rank ordering on trait dimensions in a sample of individuals), and (e) individual differences in change. The last type refers to the gains or losses in absolute levels of a personality trait that each individual experiences over time (Nesselroade, 1991). Particularly, this type of statistical continuity is used to test whether life events, such as childbirth, are associated with changes in personality traits (Roberts & Mroczek, 2008), which is in line with the objectives of the current study. Now, we will examine the mechanisms of personality continuity and change.

1.2.1. The mechanisms of personality continuity

The first mechanism concerns genes–personality–environment transactions (e.g., Krueger & Johnson, 2008). Genetic effects account for almost half of the variation in each of the Big Five domains (Bouchard & Loehlin, 2001) and can determine drive effects on environmental experiences via niche-building processes. Indeed, individuals tend to create, seek out, or end up in environments that are correlated with their personality traits (Caspi, Roberts, & Shiner, 2005). Once people enter trait-correlated environments, those environments may have causal effects of their own, contributing to the continuity of the personality traits. This illustrates the interactive influence of both genes and environment on personality. The second mechanism of continuity refers to identity clarity. With age, people tend to select roles that appear to fit with their dispositions, values, and abilities which provoke a sounder identity. This process of developing and maintaining an identity leads to higher levels of psychological well-being and adjustments, which in turn are related to personality continuity (Donnellan, Conger, & Burzette, 2007).

1.2.2. The mechanisms of personality change

The social investment principle (Roberts, Wood, & Smith, 2005) allows for an explanation of why personality traits can change over time. It states that the investment in social institutions such as parenthood is embodied in social roles (e.g. parent) which lead to increasing expectations and demands turned towards the pertinent actors (e.g., the family and in particular the baby). These expectations may include responsibility to others, confidence, prosocial behaviors, and emotional stability. By responding to role contingencies and watching and listening to significant others, personality traits change (Roberts et al., 2008). For example, personality change may come about by adopting new behaviors through watching the partner (e.g. modeling), or by watching ourselves, do things differently (e.g., the parent can try to stay emotionally stable) in response to new role demands linked to childbirth. Another question remain: Which personality traits would be affected by childbirth? We could hypothesize that the development of such attitudes brings about an increase in Conscientiousness (i.e. responsibility to others) and Agreeableness (i.e.,

prosocial behavior), and a decrease in Extraversion (i.e., focusing on family) and Neuroticism (i.e., developing emotional stability).

1.2.3. The intervening mechanisms

Despite robust shifts in environments, people do not demonstrate dramatic shifts in terms of personality traits (Robins, Fraley, Roberts, & Trzesniewski, 2001). Why do personality traits not change more? Actually, the influence of continuity mechanisms outweighs the impact of change mechanisms (Roberts et al., 2008). Individuals tend more to assimilate the new environmental information by seeing it as validating than to accommodate themselves to the new environment. Some mechanisms intervene between changes in environments and personality with the result of small change of personality traits: (a) filibustering (i.e., actively avoiding new environments or avoiding making the social and emotional investment that would result in change), (b) identity structures (i.e., localization of the change only to a specific role identity – the parental role – and not one's entire personality), (c) dispositions (i.e., differential susceptibility to environmental contingencies such as susceptibility to partner's personality change), and (d) social-cognitive mechanisms (i.e., cognitive and emotional schemas to protect identity when it is threatened, acting to reconfigure the meaning of experience, not experience itself).

1.3. Gender perspective in personality developmental trajectory

After childbirth, do mother's and father's personality develop differently? After becoming parents, the mother's and the father's roles, attitudes, and goals differ. Couples often fall into more traditional gender roles (Koivunen, Rothaupt, & Wolfram, 2009). For example, men pursue more instrumental goals whereas women are more interested in nurturing the child (Salmela-Aro, Nurmi, Saisto, & Halmesmäki, 2000). These gender differences could be explained by the different social and biological expectations regarding gender roles. Women's greater biological role in childbearing (pregnancy, childbirth, and lactation), coupled with cultural expectations about motherhood place them in a different parenting role from men, who make a smaller biological contribution but still face marked cultural expectations about fatherhood, such as acting as the breadwinner (Eagly & Wood, 1999). Consequently, although the father's role is essential, greater change in mothers' personality was expected due to the biological and social expectations about their roles.

1.4. Childbirth: a parental dyadic life experience

Far from an individual life experience, childbirth affects the couple as a unit. One of the defining features of a couple is interdependence, i.e. the idea that one partner's behaviors and experiences could influence the outcomes of the other partner and vice versa (Atkins, 2005). The mother's and father's experiences are interdependent, so one individual cannot be fully understood outside the context of the couple (Cox & Paley, 1997). Thus, mothers and fathers would affect each other, and these effects change over time in response to events such as childbirth (Sameroff, 2009). Therefore, we expected that within a couple mother and father's developmental trajectories would tend to influence each other. To examine this effect, the partner's personality development was included as a covariate of intraindividual change in the parents' models.

1.5. Current study and hypotheses

Several objectives were considered in the current three-wave longitudinal study (pregnancy, 6 months, and 1 year postpartum)

based on both mothers' and fathers' as well as childless adults' self-reported measures on personality traits. The first objective was to test intra-individual change in personality around childbirth. Because personality traits do not change to a great extent (Roberts et al., 2008), a slight to moderate change was expected. According to the social investment principle, we hypothesized an increase in Conscientiousness and Agreeableness and a decrease in Extraversion and Neuroticism. Compared with the parents, we expected childless couples' personality not to fluctuate. In addition, gender-related differences were also considered: Greater change in mother's personality was expected. The second objective was, in the absence of literature on this topic, to explore the influence of the group affiliation (multiparous vs. primiparous parents). The last objective consisted in testing the dyadic hypothesis: A positive association between the mother's and the father's personality development within the couple was expected, in contrast with the childless couples.

2. Method

2.1. Sample and procedure

The hypotheses generated were tested among parents and childless adults. Participants were recruited with the assistance of gynaecologists. At each wave of data collection, they 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 the Commission for the Protection of Private Life. With regard to the parents, data were collected from a large sample of 204 French-speaking parental heterosexual cohabiting couples ($n = 143$ primiparous, $n = 61$ multiparous), which corresponds to 408 parents ($n = 204$ mothers and $n = 204$ fathers). The primiparous parents were aged from 18 to 45 years old ($M = 28.61$, $SD = 4.21$ for the overall sample; $M = 27.47$, $SD = 3.46$ and $M = 29.76$, $SD = 4.58$, respectively for mothers and fathers) and the multiparous parents were aged from 22 to 43 years old ($M = 31.93$, $SD = 4.07$ for the overall sample; $M = 30.56$, $SD = 3.53$ and $M = 33.26$, $SD = 4.14$, for mothers and fathers respectively).

Data were collected in a longitudinal program study at three distinct points of parenthood: pregnancy (T1; $M = 23.67$ pregnancy weeks, $SD = 8.49$), 6 months postpartum (T2; $M = 25.03$ weeks, $SD = 4.81$), and 1 year postpartum (T3; $M = 12.76$ months, $SD = 1.66$). Both at T1 and T2, depression was assessed by means of the Beck Depression Inventory Short Form Items (BDI-13; Beck, Steer, & Garbin, 1988). No parents showed depression, which can be explained by the normativity of the sample and the time length between both measures.

With regard to the control group, data were collected from a large sample of 215 French-speaking childless cohabiting adults ($n = 125$ women and $n = 90$ men; 64 complete couples) aged from 19 to 52 years old ($M = 26.24$, $SD = 5.62$ for the overall sample; $M = 25.21$, $SD = 4.79$ and $M = 27.73$, $SD = 6.40$, for women and men respectively). Two waves of data were collected with a 6-month interval.

At the last wave of data collection, a stressful life events measure (Sutin, Costa, Wethington, & Eaton, 2010) led us to exclude couples who had incurred a relative's death, marital conflicts, divorce/breakup of a romantic relationship, loss of a job, and/or diagnosis of a serious illness in a close relative or in oneself within the last year (parents) or the last 6 months (childless adults). The participants had to assess the emotional impact of the events that they had experienced on a 5-point Likert-type scale (1 = *not at all affected* and 5 = *absolutely affected*).

2.2. Measures

2.2.1. Sociodemographic variables

Parents were asked for gender, date of birth, details of primiparity, number of weeks of pregnancy (T1), and for the child's age (T2 and T3).

2.2.2. Longitudinal variable: personality (NEO-60)

Personality was assessed by means of a short self-reported version of NEO-PI-R, the NEO-60 (Aluja, García, Rossier, & García, 2005). This questionnaire consists of a measure of the big five (12 items each) with a 5-point Likert-type scale (1 = *Strongly disagree* and 5 = *Strongly agree*). The NEO-60 shows good reliability coefficients, factor structure, and correlations with NEO-PI-R domain scores. Cronbach's alphas (α s) were ranged from .70 to .87. In our sample, the NEO-60 shows good psychometric properties with a five-factor solution explaining 39.44% (T1), 43.03% (T2), and 44.30% (T3) of the variance and α s ranging from .79 to .86 for T1, from .81 to .89 for T2, and from .81 to .88 for T3. Measurement models carried out with SEM software (Arbuckle, 2007) globally provided acceptable fits to the data for mothers [$\chi^2(15) = 12.92$, ns – 27.49, $p < .05$; $\chi^2/df < 1.83$; CFI > 0.99; RMSEA < .06], fathers [$\chi^2(15) = 7.08$, ns – 34.78, $p < .01$; $\chi^2/df < 2.31$; CFI > 0.98; RMSEA = .00–.08], childless women [$\chi^2(5) = 0.86$ –9.51, ns ; $\chi^2/df < 1.90$; CFI > 0.97; RMSEA = .00–.12], and childless men [$\chi^2(5) = 1.53$ –10.07, ns ; $\chi^2/df < 2.01$; CFI > 0.97; RMSEA = .00–.12].

2.3. Analytical strategy

For parents, the main analyses were conducted using a multilevel modeling (MLM) framework with the HLM 6.06 software (Raudenbush, Bryk, Cheong, & Congdon, 2008). This capitalizes on the multilevel structure of the data, providing information about the variability of individuals over time – Level 1 (repeated measures) – as well as between individuals – Level 2 (Raudenbush & Bryk, 2002). Because attrition is common in longitudinal data, MLM estimates are based on all the available data with the assumption that the missing data are random (McCartney, Bub, & Burchinal, 2006). Among the 404 parents, data were fully completed both for T1 and T2. At T3, the drop out only concerned 64 parents who had no systematic socio-demographic differences compared to parents who completed the data collection. The missing data presented little threat to the validity of the study and were therefore considered as missing at random.

Parent personality was treated as the outcome. Group (primiparous vs. multiparous parents) was treated as a time-invariant predictor added in the Level 2 equation (Raudenbush, Brennan, & Barnett, 1995). Time-invariant predictors are those measured only once per individual because they are not likely to change over the course of the study and are considered as predictors of intraindividual change (Hoffman & Stawski, 2009).

Partners experience childbirth at the same moment and are considered as an indistinguishable dyad (i.e., reverse causation; Kashy, Donnellan, Burt, & McGue, 2008). Thus, to avoid endogeneity (Singer & Willett, 2003), partner's development has been introduced as a time-varying covariate in the model. Time-varying covariates are those measured on each occasion and expected to vary across occasions. In longitudinal models, time-varying covariates are composed of two sources of variations, i.e. within- and between-person variations. At Level 1, the time-varying covariate was within-person centered in order to address bias due to unobserved heterogeneity or unmeasured factors that vary across individuals and have a consistent effect over time on the construct of interest (Raudenbush & Bryk, 2002). The

time-varying covariate was also constrained to have fixed effects and contained systematic between-person variations (Raudenbush et al., 1995). Its average level over the three assessment waves was calculated and added as predictor of the slope coefficient at Level 2 in order to examine the pure effect of change in the time-varying covariate over time (as its mean level was controlled; Hoffman & Stawski, 2009). Finally, parents' age was introduced as a control variable.

First, the *unconditional growth models*, in which time is the only predictor, were tested to examine the developmental trajectories of the personality traits and to determine whether there is significant variability between individuals in the slope coefficient which interests us here. Each wave of data was represented by the exact moment of parenthood expressed in months and with the moment of childbirth as intercept. Next, the *conditional models* tested the effect of the predictors on the personality outcomes. MLM allows both time-varying covariate and time-invariant predictor to be included in the models (Raudenbush et al., 1995).

Given that only two waves of data were collected for childless adults' personality, it was impossible and unnecessary to use MLM and preferable to use a repeated measures design with the partner's development as a covariate of linear change.

3. Results

3.1. Preliminary analyses

The means and standard deviations of the outcome variable and the Pearson correlation coefficients examining the stability of the repeated measures over time are presented in Tables 1 and 2 respectively. Normality of the data and homogeneity of variances were checked (Field, 2009).

3.2. Results of the unconditional models with respect to parents

Non-significant slope values indicated that the mothers' and the fathers' personality traits remained stable over time, except for the fathers' Extraversion which decreased by .006 per month (see Tables 3 and 4).

Table 1
Descriptive statistics of personality traits.

	Mothers		Fathers		Childless women		Childless men	
	M	SD	M	SD	M	SD	M	SD
<i>Neuroticism</i>								
T1	2.78	0.69	2.36	0.62	3.06	0.65	2.52	0.63
T2	2.81	0.77	2.44	0.67	2.99	0.75	2.57	0.67
T3	2.78	0.63	2.40	0.69				
<i>Extraversion</i>								
T1	3.75	0.55	3.67	0.59	3.79	0.46	3.71	0.53
T2	3.73	0.64	3.60	0.64	3.76	0.48	3.64	0.53
T3	3.71	0.68	3.52	0.58				
<i>Openness to experience</i>								
T1	3.24	0.64	3.13	0.63	3.45	0.66	3.39	0.67
T2	3.24	0.69	3.13	0.70	3.43	0.62	3.38	0.63
T3	3.17	0.71	3.12	0.67				
<i>Agreeableness</i>								
T1	3.64	0.55	3.35	0.63	3.50	0.49	3.21	0.58
T2	3.69	0.59	3.37	0.68	3.49	0.52	3.22	0.49
T3	3.59	0.63	3.37	0.64				
<i>Conscientiousness</i>								
T1	4.07	0.49	3.93	0.56	3.92	0.52	3.89	0.51
T2	4.11	0.56	3.93	0.63	3.88	0.55	3.82	0.45
T3	4.02	0.61	3.95	0.59				

Note: N = 408 parents and 215 childless adults.

Table 2

Pearson correlation coefficients examining the stability of the repeated measures over time.

	Mothers		Fathers		Childless women	Childless men
	T1	T2	T1	T2	T1	T1
<i>Neuroticism</i>						
T2	.72***	–	.66***	–	.77***	.82***
T3	.61***	.72***	.57***	.66***		
<i>Extraversion</i>						
T2	.73***	–	.75***	–	.73***	.80***
T3	.65***	.78***	.60***	.67***		
<i>Openness to experience</i>						
T2	.75***	–	.76***	–	.83***	.82***
T3	.71***	.78***	.63***	.72***		
<i>Agreeableness</i>						
T2	.68***	–	.70***	–	.67***	.76***
T3	.64***	.66***	.65***	.71***		
<i>Conscientiousness</i>						
T2	.64***	–	.68***	–	.76***	.75***
T3	.52***	.61***	.65***	.57***		

Note: N = 408 parents and 215 childless adults.

*** p < .001.

3.3. Results of the conditional models with respect to parents

The partner's personality development repeatedly acted as a time-varying covariate. There is a reverse causality and a positive association between the mother's personality development and the father's. Variation in the partner's personality across measurements is associated with variation in personality traits. For mothers, for every unit change in the father's level (i.e., every unit deviation from the person-specific mean) per month, there was a change of .19 units of Agreeableness ($p = .001$), of .12 units of Neuroticism ($p = .044$), and of .16 units of Openness ($p = .004$). For fathers, for every unit of change in the mother's level per month, there was a change of .13 units of Agreeableness ($p = .021$), of .09 units of Neuroticism ($p = .049$), and of .12 units of Openness ($p = .009$). Moreover, if the mother's average level of Neuroticism was high, it positively influenced the developmental course of the father's Neuroticism, meaning that for every unit higher of the mother's Neuroticism, .01 ($p = .006$) higher Neuroticism is reported on average. Finally, the group affiliation was not a predictor of linear change (see Table 5).

Parents' age (i.e., control variable) acted as a covariate for the mother's Extraversion development with a negative association ($\beta = -.001$, $p = .018$): The older the mothers were, the more their Extraversion level was low.

3.4. Results of the developmental models with respect to childless adults

As expected, childless adults did not show any personality development between T1 and T2 either for women [$F(1,127) = 2.94$, ns ; $F(1,127) = 2.34$, ns ; $F(1,127) = .15$, ns ; $F(1,127) = .04$, ns ; $F(1,127) = 2.53$, ns , for Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness respectively] or men [$F(1,85) = 1.50$, ns ; $F(1,85) = 3.70$, ns ; $F(1,85) = .13$, ns ; $F(1,85) = .07$, ns ; $F(1,85) = 3.05$, ns , for Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness respectively]. The partner's personality development did not act as a time-varying covariate for either women [$F(1,62) = .40$, ns ; $F(1,62) = .51$, ns ; $F(1,62) = .45$, ns ; $F(1,62) = 1.24$, ns for Extraversion, Openness, Agreeableness, and Conscientiousness respectively] or men [$F(1,64) = .40$, ns ; $F(1,64) = .51$, ns ; $F(1,64) = .45$, ns ; $F(1,64) = 1.21$, ns for Extraversion, Openness, Agreeableness, and Conscientiousness

Table 3

Results of HLM unconditional models: estimates of the intercepts, linear change, and variance in mothers' personality.

		Fixed effects			Random effects variance
		Coefficient	SE	t	
<i>Neuroticism</i>					
Intercept		2.80***	.05	(201)59.36	.41***
Slope		-.00	.00	(201)–.34	.00***
	Deviance	960.38			
	$\tau=$	.31			
<i>Extraversion</i>					
Intercept		3.73***	.04	(201)92.97	.30***
Slope		-.00	.00	(201)–.88	.00***
	Deviance	708.24			
	$\tau=$	.51			
<i>Openness to experience</i>					
Intercept		3.23***	.04	(201)72.79	.37***
Slope		-.00	.00	(201)–.83	.00***
	Deviance	789.06			
	$\tau=$	.33			
<i>Agreeableness</i>					
Intercept		3.66***	.04	(201)99.88	.24***
Slope		.00	.00	(201).46	.00
	Deviance	724.62			
	$\tau=$	.41			
<i>Conscientiousness</i>					
Intercept		4.08***	.04	(201)118.23	.22***
Slope		-.00	.00	(201)–.40	.00**
	Deviance	691.93			
	$\tau=$	.45			

Note: Coefficients are standardized. $N = 300$.** $p < .01$.*** $p < .001$.**Table 4**

Results of HLM unconditional models: estimates of the intercepts, linear change, and variance in father's personality.

		Fixed effects			Random effects variance
		Coefficient	SE	t	
<i>Neuroticism</i>					
Intercept		2.38***	.04	(201)56.32	.32***
Slope		-.00	.00	(201)–.03	.00
	Deviance	812.17			
	$\tau=$	.97			
<i>Extraversion</i>					
Intercept		3.61***	.04	(201)90.52	.30***
Slope		-.01**	.00	(201)–3.04	.00***
	Deviance	684.84			
	$\tau=$	.07			
<i>Openness to experience</i>					
Intercept		3.12***	.04	(201)72.11	.35***
Slope		-.00	.00	(201)–.93	.00***
	Deviance	774.97			
	$\tau=$	.24			
<i>Agreeableness</i>					
Intercept		3.36***	.04	(201)78.90	.34***
Slope		-.00	.00	(201)–.19	.00**
	Deviance	767.12			
	$\tau=$	.10			
<i>Conscientiousness</i>					
Intercept		3.93***	.04	(201)101.98	.27***
Slope		.00	.00	(201).23	.00
	Deviance	683.83			
	$\tau=$	.89			

Note: Coefficients are standardized. $N = 300$.** $p < .01$.*** $p < .001$.

Table 5
Results of HLM conditional models with parental group as a time-invariant predictor and the partner's development as a time-varying covariate of personality intraindividual change.

Fixed effects	Personality Coefficient (SE)				
	Neurotic.	Extravers.	Openness	Agreeabl.	Conscient.
<i>Mothers</i>					
Level 1: The time-varying fluctuations					
Partner's development	.12*(.06)	.11(.05)	.16**(.05)	.19**(.05)	.06(.06)
Level 2: The linear change					
Intercept of the slope	-.00(.00)	.00(.00)	-.00(.00)	.00(.00)	-.00(.00)
Mean partner's	.01(.00)	.00(.00)	-.00(.00)	.00(.00)	.01(.00)
Group	.00(.00)	.00(.00)	.00(.00)	.00(.00)	-.00(.00)
Age	.00(.00)	-.00(.00)	-.00(.00)	-.00(.00)	-.00(.00)
Deviance	919.05	686.07	785.18	686.39	666.98
<i>Fathers</i>					
Level 1: The time-varying fluctuations					
Partner's development	.09*(.05)	.06(.05)	.12**(.05)	.13*(.06)	.05(.06)
Level 2: The linear change					
Intercept of the slope	-.00(.00)	-.01**(.00)	-.00(.00)	-.00(.00)	-.00(.00)
Mean partner's	.01**(.00)	-.00(.00)	-.00(.00)	-.00(.00)	.00(.00)
Group	.00(.00)	-.00(.00)	-.00(.00)	-.00(.00)	.00(.00)
Age	.00(.00)	.00(.00)	.00(.00)	.00(.00)	.00(.00)
Deviance	795.93	671.17	736.24	719.49	684.07

Note: Coefficients are standardized. $N = 300$.

* $p < .05$.

** $p < .01$.

respectively], except for Neuroticism with a negative association [$F(1,62) = 4.66$, $p < .05$; $F(1,64) = 4.59$, $p < .05$ for mothers and fathers respectively].

4. Discussion

The main objective of this study was to examine the impact of childbirth on personality development, with parental group (primiparity vs. multiparity) as predictor and the partner's personality development as covariate of the intraindividual trajectory for mothers and fathers. Their results were compared with those of childless couples.

4.1. Development of personality traits in response to childbirth

A principle finding is that father's Extraversion decreases over time. This result was not found for the childless couples. In line with the "social investment principle", fathers tend to become less extraverted around childbirth which implies less intensive pursuit of interpersonal relationships, activities, and stimulations. Father's activity and sociability levels decrease which allows him to focus on parenting and the new family's needs and responsibilities. This decrease in Extraversion may positively contribute to the family atmosphere (Metsapelto & Pulkkinen, 2005). Concurrently with this result, Gettler, McDade, Agustin, and Kuzawa (2011) have shown that father's testosterone rapidly declines after childbirth, especially among fathers who invest in parental care. This decrease in testosterone allows fathers to focus on family rather than mating. Consequently, we could hypothesize that neuroendocrine and personality architectures cooperate for the well-being of the family and the development of fatherhood.

Now, except for father's Extraversion, the parent's personality tends to be highly stable. The mother's and the father's growth curve was on average flat with an average correlation coefficient of .67 and a coefficient of the intraindividual change of near .00. Our hypothesis was thus confirmed: Despite robust shifts in environments associated with childbirth, parents do not demonstrate dramatic shifts in terms of personality traits (only a slight decrease

in Extraversion). This confirms the existence of mechanisms intervening between changes in environments and changes in personality, resulting in small changes of personality traits.

Do these results mean that childbirth is not a transformative life event? Actually they do not. Previous studies (Palus, 1993) have already shown that although parents feel they are being fundamentally changed, the childbirth did not have an impact at the broad dispositional level of personality factors but rather at the "doing" level of personality; that is, the level where dispositions become contextualized into cognitive-motivational forms, such as values, beliefs, personal goals, attitudes, and various schemata for self, others, and situations (Salmela-Aro et al., 2000), but not at the level of personality traits.

In line with our results, sociologists (LaRossa & Sinha, 2006) introduced the notion of the "social construction of the transition to parenthood" that reappraises developmental stages. After childbirth, people feel they are being personally changed. Indeed, they essentially feel that something in their identity that did not exist before exists now (or vice versa). However, if time is seen as a continuous stream, then the demarcation of time into stages must emerge from mental activity. Consequently, to create a sense of transition, people group one set of "similar" events into one category, another set into a second category, and simultaneously draw a line between the "dissimilar" sets. "Childbirth" would refer to a demarcation of between a before-childbirth and to an after-childbirth. Changes appeared between these two periods, such as sleep patterns and time use. However, these periods may be more alike than unlike at the individual and fundamental level where personality stability originates.

Finally, the primiparous and the multiparous parents' developmental trajectory were compared: No difference was found. Whether it is the first or a subsequent childbirth, there is consistently a change in the familial system and a redefining of the familial roles, but this does not affect personality traits.

4.2. What about gender differences in the personality trajectory?

We expected greater changes in mothers than in fathers. Actually, the only developmental difference we found was in the

father (i.e., a decrease in Extraversion). Apart from this, mothers' and fathers' personalities tend to similarly develop. How can we explain these results? We can imagine an evolution of gender mentality (Perrone, Wright, & Jackson, 2009). Women and men are no longer constrained by the narrow gender role of the woman as nurturing and the man as primary breadwinner. They have been able to define their identities more broadly by incorporating career and family roles, resulting in a similar developmental personality trajectory.

4.3. A dyadic perspective

The dyadic hypothesis was confirmed: The childbirth experience cannot be understood outside the couple. Compared with childless couples, results (i.e., positive coefficient association) showed that within a parental couple, mothers and fathers tend to follow the same personality developmental trajectory. Consequently, we can assume that childbirth leads parents to function in dyad rather than individually: They experience the childbirth together in the same way. Moreover, even if the growth curve was flat, variability around the slope was also observed. This means that on average parents' personality does not change over time but also that some parental couples do experience dyadic personality change.

This hypothesis was confirmed for the majority of the traits, i.e., Agreeableness, Openness to Experience, and Neuroticism. These typically reflect a tendency to be attentive to others' life and experiences. They make people sensitive to external or environmental changes and so to the partner's development (i.e., consecutive to childbirth), which explains this dyadic development. Moreover, Agreeableness makes people empathic and sensitive to others while Openness to experience is characterized by an interest for the emotional aspects of the life event and the new couple's experiences. Neuroticism leads people to behave as sentinels by being sensitive to changes in the social environment (Ein-Dor, Mikulincer, Doron, & Shaver, 2010).

On the other side, the dyadic hypothesis was not confirmed for Extraversion and Conscientiousness. Why not? Conscientiousness is more focused on organization and planning rather than emotional features of the partner and/or the life event. As for Extraversion, we can hypothesize an association between the decline in father's Extraversion and in testosterone, which explains the different developmental trajectories between mother and father.

4.4. Limitations and practical implications

First, we might wonder whether expecting a child, and so planning and imagining the characteristics of the future child and family life, are already a transformative experience. Ideally, we should follow childless adults until the point where they become parents. A second limitation concerns the difference of age between the primiparous parents, the multiparous ones, and the childless adults. According to Davie (2012), a first pregnancy occurs at an average age of 28 years, and multiparity at 31 years, which is very similar to our descriptive data. A third limitation concerns the absence of some predictors of intraindividual change. It could be interesting to include maternity and paternity leave as predictors and conduct international collaborative studies. Finally, we can ask what the results would be from a clinical population. If one parent becomes more and more anxious (i.e. Neuroticism) after childbirth, perhaps we can hypothesize a compensatory effect from the other parent, who would develop less anxiety in order to manage family challenges. Future research should address these limitations.

Two major clinical implications are highlighted in this study. First of all, given the parents' development in dyad, professionals should collaborate with the parental couple, helping prepare them for parenthood, rather than only with the mothers. Secondly, it should be noted that individual differences in change may be important from a practical standpoint. Indeed, modest changes in personality traits, such as the father's decrease in Extraversion, can result in profound consequences for significant life outcomes (e.g., Mroczek & Spiro, 2007).

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