



Trajectories of Change in Parental Self-Esteem and Emotion Regulation from Pregnancy until 4 Years Postpartum

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Abstract

We know a great deal about the immediate impact of becoming a parent, but less on the more long-term impact as parents are adapting to the rapid developmental changes that characterize the early childhood period. This longitudinal study explored how parental self-esteem and emotion regulation develops during pregnancy, infancy, toddlerhood and preschool-age. We used nine waves of data from 550 Dutch fathers and mothers to examine stability and change in self-esteem and emotion regulation from pregnancy until 4 years postpartum, for both first and later pregnancies. Self-esteem and emotion regulation showed the same trajectory of change, with decreases during pregnancy and infancy, and increases during toddlerhood and preschool-age. Fathers had higher mean-levels of self-esteem and emotion regulation than mothers, but child age-related changes were the same for fathers and mothers. First-time parents and second-, third-, or fourth-time parents did not differ in mean-level self-esteem and emotion regulation, nor in age-related change. Over the course of 4 years postpartum, parents slightly increased in self-esteem and emotion regulation. The results suggest that, for the average parent, the birth of a child causes a temporary deviation from the overall trend toward greater self-esteem and emotion regulation. Since both traits are predictive for parental well-being, positive parenting and child development, future research needs to investigate if an intervention should and could ease the transition to parenthood and thereby prevent this decline.

Keywords Self-esteem · Emotion regulation · Childbirth · Parenthood · Multilevel modeling

Highlights

- We explored trajectories of change in parental self-esteem and emotion regulation during pregnancy, infancy, toddlerhood and preschool-age.
- Parental self-esteem and emotion regulation decreased during pregnancy and infancy, but increased during toddlerhood and preschool-age.
- Parents slightly increased in self-esteem and emotion regulation over the course of 4 years postpartum.
- The same trajectories of change were found for both fathers and mothers, and for both first and later pregnancies.
- Future research needs to investigate if an intervention should and could prevent this temporary decline.

The transition to parenthood is considered one of the most impactful life events, which provokes both excitement and

insecurity (Cowan & Cowan, 2000; LeMasters, 1957; Nelson et al., 2014; Nomaguchi & Milkie, 2020). After the birth of a child, parents have to navigate changes in their daily routines, adjust relationships with their partner and others, and cope with the loss of personal and leisure time (Leerkes & Qu, 2019; Cowan & Cowan, 2000). In the following 4 years after childbirth, children undergo a number of rapid developmental transitions that present unique challenges for their parents (i.e., infancy, toddlerhood, preschool-age; Galinsky, 1987; Leerkes & Qu, 2019). How do these developmental changes relate to changes in parental traits? Previous studies on the transition to

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parenthood primarily focused on the period surrounding the birth of the child (e.g., Bleidorn et al., 2016; Van Scheppingen et al., 2018). As a result, we know a great deal about the immediate short term impact of becoming a parent on parental traits, but less on the more long-term impact as they are adapting to the child's developmental changes. Therefore, in the present study, we examined the stability and change in two highly desirable parental traits (i.e., self-esteem and emotion regulation) from pregnancy until 4 years postpartum.

Impact of parenthood on parental self-esteem and emotion regulation may have consequences for the lives of mothers, fathers, and their children. Both self-esteem (i.e., a person's ability to value themselves positively; Erawan, 2010; WHO, 2003) and emotion regulation (i.e., a person's capacity to control one's emotions during stressful situations; Erawan, 2010; WHO, 2003) are predictive for positive outcomes in various domains, such as work, relationships and mental health (Ketner et al., 2018; Koole, 2009; Orth & Robins, 2014; Rutherford et al., 2015). In addition, both traits are tied to supportive parenting behavior and therefore indirectly affect child functioning (Aunola et al., 1999; Shaffer et al., 2018; Small, 1988; Zimmer-Gembeck et al., 2021). Parents who have low self-esteem and difficulties with regulating their emotions, might, for example, struggle more to effectively cope when their child is expressing negative emotions. This in turn may contribute to parenting practices that lead to poorer self-esteem and emotion regulation in their young children, and more internalizing and externalizing problems (Crespo et al., 2017; Finken & Amato, 1993; Zimmer-Gembeck et al., 2021). Thus, investigating how parental self-esteem and emotion regulation develop across the transition to parenthood is necessary to create interventions that allow parents and their children to thrive.

Despite relative stability, a growing body of research shows that traits continue to change throughout the lifespan (Bleidorn et al., 2021). In general, adults show gradual inclines in mean-level self-esteem and emotion regulation during (early) adulthood (Orth & Robins, 2014; Rutherford et al., 2015). However, little is known about when, why and how traits change. Several theoretical frameworks have begun to address this question (see Bleidorn et al., 2021). They all rest on the distinction between latent traits and their manifestations, often referred to as states. The expression of new states, if sufficiently repeated, is thought to transfer into habits, generalize across domains, and eventually lead to lasting trait changes (Bleidorn et al., 2020). In light of the transition to parenthood, for example, parents are expected to regulate their own emotions while caring for their distressed child, or to show confidence while setting boundaries for their child. If parents successfully adjust to the new role demands, these positive behavioral changes might

eventually lead to increases in their dispositional self-esteem and emotion regulation. On the other hand, if parents are not able to successfully adjust to the new role demands, these negative behavioral changes might eventually lead to decreases in their dispositional self-esteem and emotion regulation.

Empirical evidence for the effects of parenthood on trait change is somewhat mixed. A longitudinal study that examined mean-level change in self-esteem in a sample of young adults, found a negative effect of parenthood on self-esteem, especially in mothers (Chen et al., 2016). However, the authors identified an interaction between parenthood status and parental age in predicting self-esteem, suggesting that parents show more age related increases in self-esteem than non-parents. The authors speculated that their findings might reflect a short-term decline in self-esteem caused by the new stressors associated with parenthood, which alleviates after adjusting to the new role demands. However, due to a limited number of assessment waves, this study was not able to test such a nonlinear change pattern. Two studies with multiple measurement occasions before and after childbirth did formally test for nonlinear change. First, a five-wave longitudinal study of newlyweds found linear increases in self-esteem before childbirth, with larger increases for women than men (Bleidorn et al., 2016). After childbirth, mothers showed abrupt declines in self-esteem, but fathers did not. Parents' self-esteem deteriorated gradually in the following 2 years. Second, another five-wave study found that both first- and second-time mothers' showed declines in self-esteem during pregnancy, sharp increases in the 6 months after childbirth, and gradual decreases in the 3 years after childbirth (Van Scheppingen et al., 2018). Mothers who participated twice in the study showed similar levels of self-esteem during their first and later pregnancy, which suggests that having children does not trigger substantial long-term changes in self-esteem. Although the results concerning the period surrounding childbirth are mixed, these previous studies suggest that parenthood can negatively affect parental self-esteem until 2 to 3 years postpartum.

To the best of our knowledge, no previous research has investigated stability and change of emotion regulation across the transition to parenthood. However, some longitudinal studies have investigated a somewhat related personality trait, i.e., emotional stability. Emotionally stable persons can be labeled as calm, not neurotic, not easily upset (John & Srivastava, 1999). In this vein, one could argue that a person who is more emotionally stable, is better in regulating ones emotions. A study with two-wave longitudinal data found no mean-level change in parents' emotional stability over a period of 4 years during the transition to parenthood (Specht et al., 2011). In addition, another two-wave study compared first-time parents to non-parents

over a period of 4 years. Parents did not differ from non-parents on the mean-level increases in emotional stability, suggesting that the transition to parenthood does not result in changes in this trait (Van Scheppingen et al., 2016). However, firm conclusions regarding the stability or change of emotional stability during the transition to parenthood cannot be drawn, since both studies have included only two assessments over relatively long intervals of 4 years. More nuanced longitudinal designs with frequent assessments are necessary to examine the actual shape of the development (Luhmann et al., 2014). A more recent prospective study using data from up to eight measurements across 9 years, found that participants gradually increased in emotional stability in the 5 years before the birth of their child, and then decreased in emotional stability in the 5 years after childbirth (Denissen et al., 2019).

In sum, empirical evidence does not support the idea that parenthood might lead to an immediate increase in parental self-esteem or emotion regulation. Rather, the transition to parenthood and its concomitant challenges may be overwhelming, especially for mothers (Bleidorn et al., 2016). Lacking the resources to adjust to the demands of the new parental role may cause an initial decline in parents' traits (Denissen et al., 2013). Since most research was restricted until 2 or 3 years postpartum, it remains unclear how long this negative effect on parental traits persists. It might take longer than 2 or 3 years to adapt to the new role demands. Therefore, a more long-term perspective is needed to investigate how parental self-esteem and emotion regulation develop during the first 4 years of parenthood. Not only the period surrounding childbirth, but also the developmental changes in the following years present unique challenges for parents. For example, during toddlerhood, the child's increased demands for autonomy and limited language skills can cause aggressive behavior and tantrums (Brownell & Kopp, 2007; Potegal & Davidson, 2003; Leerkes & Qu, 2019), and parents have to learn how to handle these new situations. In order to investigate if the developmental phase of the child is related to trajectories of self-esteem and emotion regulation, we tested two concurring hypotheses in the present study: the trait-consistency hypothesis and the age-driven hypothesis (see Lansford et al., 2021). The trait-consistency hypothesis asserts that, although self-esteem and emotion regulation may show linear change over the years, the age of the child does not serve as a turning point. Alternately, the age-driven hypothesis asserts that the age of the child is related to trajectories of self-esteem and emotion regulation, and serves as a turning point. This may occur if changes in parental traits are driven by environmental factors, such as the developmental phase of the child.

Extending Previous Research

We aimed to contribute to previous research by using nine waves of longitudinal data to test stability and change in self-esteem and emotion regulation from pregnancy until 4 years postpartum. Even though abundant research has examined parental emotion regulation (Rutherford et al., 2015; Zimmer-Gembeck et al., 2021), to date, no longitudinal research was conducted to study the development of emotion regulation from pregnancy until 4 years postpartum. Further, the present study extended previous research on the development of self-esteem during parenthood with regard to three important issues.

First, this study was the first to use up to nine evenly spaced assessment waves, from pregnancy until 4 years postpartum. To adequately study stability and change during and after the transition to parenthood, it is important that the time intervals between the assessment waves are appropriate for the expected rate of change in each phase (Hopwood et al., 2022; Luhmann et al., 2014). Previous research has especially focused on the transition from pregnancy to infancy, with multiple assessments around childbirth and few later assessment waves in the following years. These studies provide specific information about the shape of the change around childbirth, but not about the shape of the change in the years afterwards. A more long-term perspective is important because parents may face unique challenges at different phases of their child's development (Galinsky, 1987; Leerkes & Qu, 2019). By using regularly spaced assessment waves in the 4 years after childbirth, we were able to investigate whether the negative impact of childbirth alleviates after infancy (i.e., 18 months) or toddlerhood (i.e., 36 months). The frequently timed assessments made it possible to provide specific information on when and how changes unfold.

Second, we included both mothers and fathers in our study. While most previous longitudinal research on self-esteem changes during the transition to parenthood have focused on mothers, evidence from related fields suggests that changes in personality traits before and after the transition to parenthood might differ between mothers and fathers (Doss et al., 2009; Van Scheppingen et al., 2018). One study that did investigate the different effects of parenthood on fathers' and mothers' self-esteem trajectories, revealed that mothers showed abrupt declines in self-esteem after childbirth, but fathers did not (Bleidorn et al., 2016). This implies that, on the short-term, mothers might be more affected by the transition to parenthood than fathers. By including both fathers and mothers in the present study, we were able to investigate if the long-term impact of parenthood is different for mothers and fathers.

Third, most previous research focused on the birth of a first child, but we included both parents with a first child

and parents with a second, third, or fourth child in our study. Although parents are not taking on dramatically new family roles during the transition to second-, third- or even fourth-time parenthood, they do face new challenges. For example, they have to help the other child(ren) in the family to adjust to their new role as an older sibling (Kuo et al., 2018). One study that investigated differences in self-esteem trajectories between mothers during the birth of their first child compared to mother during the birth of their second, third or fourth child, found no significant differences (Van Scheppingen et al., 2018). It appears that - for mothers - the transition to parenthood has a normative impact on their self-esteem, regardless of the number of children already in the family. By including both mothers and fathers during both first and later pregnancies, we were the first to investigate if these results can be replicated amongst fathers.

The Present Study

We used nine waves of longitudinal data from 550 first-, second-, third- and fourth-time fathers and mothers who reported on their self-esteem and emotion regulation from pregnancy until 4 years postpartum. Towards a better understanding of the stability and change in parental self-esteem and emotion regulation during the early childhood period, we explored whether a discontinuous growth model accounting for the combined effect of child's age and developmental phase fitted the data better than a linear growth model. By doing so, we tested two concurring hypotheses: the trait-consistency hypothesis (i.e., although self-esteem and emotion regulation may show linear change over the years, the age of the child does not serve as a turning point) and the age-driven hypothesis (the age of the child is related to trajectories of self-esteem and emotion regulation, and serves as a turning point). Shifting the focus from the period surrounding childbirth to the years after childbirth, in the present study we tested whether two particular developmental phases might serve as a turning point: infancy (i.e., 18 months) and toddlerhood (i.e., 36 months). Further, we tested these two hypotheses for consistency between fathers and mothers, and between first-time and second-, third-, or fourth-time parents.

Method

Participants

The present study used nine waves of data. At T1, the participants consisted of 550 parents living in the Netherlands, of which 141 (25.6%) lived in the city of Leiden. More

mothers (79.5%, $n = 437$) than fathers (20.5%, $n = 113$), participated. The average age of the mothers was 32.2 years ($SD = 4.33$), and the average age of the fathers was 35.0 years ($SD = 5.00$). The majority of mothers (97.3%, $n = 425$) and all fathers (100%, $n = 113$) were in a relationship at the time of the first assessment (i.e., either married or living together). The 550 participants consisted of 90 couples and 370 individual parents, which means that for 67.3% of the sample only one member of the couple dyad provided data. Of the mothers and fathers respectively, 39 (8.9%) and 12 (10.6%) were expecting their first child, 174 (39.8%) and 58 (51.3%) had a first child under the age of 12 months, 75 (17.2%) and 11 (9.7%) were expecting their second, third, or fourth child, and 149 (34.1%) and 32 (28.3%) had a second, third, or fourth child under the age of 12 months. In sum, 137 parents (24.9%) were expecting a child and 413 parents (75.1%) had a child under the age of 12 months at T1. Most parents had the Dutch nationality (97.8%, $n = 538$). Some mothers (6.4%, $n = 28$) and fathers (8.0%, $n = 9$) indicated that they had a different nationality and/or ethnicity (in addition to the Dutch). Highest educational levels achieved for mothers and fathers were 0.2% ($n = 1$) and 0.9% ($n = 1$) for elementary school, 5.5% ($n = 24$) and 10.6% ($n = 12$) for secondary school, 17.4% ($n = 76$) and 13.3% ($n = 15$) for vocational education, 39.1% ($n = 171$) and 38.1% ($n = 43$) for higher education, and 38.9% ($n = 170$) and 37.2% ($n = 42$) for university. Table 1 shows the number of participating mothers, fathers and couples at each assessment wave. In the present sample, dropout was relatively high. The dropout rate over the whole study period was 75.5%. More information about the handling of the missing data is provided in the plan of analysis.

Procedure

Data was collected as part of an ongoing, mixed methods, longitudinal study 'Leuker voor Later' (*Fun for future*;

Table 1 Number of participants at each assessment wave for mothers, fathers, couples, and the total sample

Time point	Mothers		Fathers		Couples		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
T1	437	79.5	113	20.5	90	32.7	550	100
T2	325	80.6	78	19.4	63	31.2	403	100
T3	187	87.0	28	13.0	19	17.6	215	100
T4	110	84.6	20	15.4	10	15.4	130	100
T5	208	81.6	47	18.4	39	30.6	255	100
T6	153	76.1	48	23.9	28	27.9	201	100
T7	100	74.6	34	25.4	22	32.8	134	100
T8	120	76.4	37	23.6	15	19.1	157	100
T9	106	78.5	29	21.5	20	29.6	135	100

Gravesteyn, 2015; Lectoraat Ouderschap & Ouderbegeleiding, 2019). This research was done following the ethical, methodological, and privacy standards of the code of conduct for research at universities of applied sciences in The Netherlands (Andriessen et al., 2010). Participants were recruited from January 2015 to September 2016 via various methods: letters to parents of all newborn babies in the city of Leiden; flyers and posters in places for new parents, such as hospitals and childcare centers; requests on social media (e.g. parent groups on Facebook, parent forums); and articles about the study in the media. In the end, most participants were recruited via letters and social media.

The first inclusion criterion was: expecting a child or having a baby younger than 12 months of age (regardless of the age or number of any other children). In addition, participants had to live in the Netherlands. Individuals could either be married, living together, or be single. Participants were excluded when they were not able to read Dutch or were underage (younger than 18 years old).

A preliminary questionnaire consisting of different themes and scales was developed and pilot-tested ($N = 106$). The questionnaire was then revised and shortened, and administered via the digital survey software Easion (Parantion, 2021). After registering, participants received an email with the link to the online questionnaire, information about the aim of the study, and were assured that data would be processed anonymously. Participants had to sign a digital informed consent form, before they could fill out the questionnaire. The questionnaire consisted of 10 themes and filling out the questionnaire took about 20 to 30 minutes. Afterwards, participants were invited to participate in the subsequent wave of data-collection every 6 months. Participant were informed of their rights to leave the study at any time.

Measures

Self-Esteem

Self-esteem was measured using the self-esteem scale of the Life Skills Questionnaire Parents (LSQ-P; Petterson et al., 2016). Participants were asked to rate themselves on 8 items on a 5-point Likert scale, ranging from 0 (“not at all true”) to 5 (“totally true”). An example of an item of the self-esteem scale is: “I feel confident about myself”. An average item score was calculated, with higher scores indicating higher self-esteem. In a previous study, the scale was validated and the reliability of the scale was calculated with Cronbach’s alpha, which turned out to be high ($\alpha = 0.85$; Petterson et al., 2016). In the present sample, the alpha for self-esteem varied across measurement occasions from 0.83 to 0.86.

Emotion Regulation

Emotion regulation was measured using four items of the self-management scale of the same LSQ-P: 1) “In stressful situations, I stay calm”; 2) “When I’m angry, I respond calm”; 3) “Others say I can control my emotions”; 4) “I can find ways to cope with stress”. Participants were asked to rate themselves on each item on a 5-point Likert scale, ranging from 0 (“not at all true”) to 5 (“totally true”). An average item score was calculated, with higher scores indicating higher emotion regulation. The four items have a high face validity (Taherdoost, 2016) and are similar to the items of the Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004), which is a validated and widely used scale with a high reliability ($\alpha = 0.93$). In the present sample, the alpha for emotion regulation varied across measurement occasions from 0.70 to 0.80.

Plan of Analyses

To account for the non-independence of repeated observations over time and in order to make use of all participants’ data (including participants with missing values), multilevel modeling techniques were used. Mixed model analyses were performed using the package GAMLj in Jamovi (Gallucci, 2020). The multilevel approach to longitudinal data analysis provides a lot of flexibility. There is no need to have equally spaced measurements and missing measurement occasions due to attrition or a later study entry (i.e., T1 after giving birth instead of before) can be handled under a missing at random assumption. Moreover, the mixed model enables taking into account the dependency among the measures within the clusters; in this case, the dependency effects in the models are due to the participants’ characteristics only. We considered the number of cases with complete information on both couple dyad members insufficient to properly account for the dependency as a result of two parents per family.

To allow meaningful interpretations of the scores, self-esteem and emotion regulation were rescaled with a linear transformation, to percent of maximum possible (POMP) scores (Cohen et al., 1999). POMP scores were calculated by taking the raw score minus the minimum score, dividing it by the scoring range and multiplying it by 100. This transformation gave the scores a range from 0 (minimum possible score) to 100 (maximum possible score). Prior to the main analysis, differences between dropouts and parents who remained in the study were calculated. Further, the correlations between self-esteem and emotion regulation were calculated, to test whether self-esteem and emotion regulation can be meaningfully interpreted as two different constructs. In order to test the trait-consistency hypothesis, a mixed model was built for both self-esteem and emotion

regulation with the parent (i.e., either the father or the mother) as the cluster variable. For families in which both the mother and father participated, data from both parents were included in the analysis. Participants completed the first questionnaire when they were expecting a child or had a child under the age of 12, resulting in individual variation in child age per measurement wave. Therefore, child age was included as a covariate. Parent gender and pregnancy number (i.e., first pregnancy versus second, third or fourth pregnancy) were included as between-subject factors. The effects of child age, parent gender and pregnancy number were estimated as fixed effects. Furthermore, random intercepts across parents and random slopes of child age across parents were included. These models operationalized the trait-consistency hypothesis because they modeled linear change in self-esteem and emotion regulation over time, but did not include any turning point in these trajectories.

Then, in order to test the age-driven hypothesis, two other estimations were carried out including developmental phase as a factor. In these models, we examined both the end of infancy (i.e., 18 months) and the end of toddlerhood (i.e., 36 months) as turning point in self-esteem and emotion regulation trajectories. We did this by estimating two different linear slopes: one that examined change in self-esteem and emotion regulation before a particular child age, and one that examined change in self-esteem and emotion regulation after a particular child age. First, to test whether the impact of parenthood changes after infancy, pregnancy and infancy were coded as 0 (i.e., -9 to 18 months), and toddlerhood and preschool-age were coded as 1 (i.e., 18 to 50 months). Second, to test whether the impact of parenthood changes after toddlerhood, infancy and toddlerhood were coded as 0 (i.e., -9 to 36 months) and preschool-age as 1 (i.e., 36 to 50 months). The effect of developmental phase was evaluated based on the statistical significance and further investigated by evaluating the difference between the parameter estimates of each phase and the reference phase. Adequate model fit was indicated by the Bayesian Information Criteria (BIC) and Log-Likelihood (LL), where values closer to zero indicate a better fit of the average change trajectory to the data.

Results

Preliminary Analyses

In the present sample, dropout was relatively high. Some participants who dropped out at an assessment wave, rejoined the research at a later assessment wave. Number of completed assessment waves ranged from 1 to 9, with a median of 3. Dropout rates were especially high between T2 and T3 (46.7%, $n = 188$). To investigate the possible effects

of selective attrition, first, we compared participants who remained in the study at T3 ($n = 215$) with drop-outs at T3 ($n = 188$) on 1) initial levels of self-esteem and emotion regulation, and 2) the following demographic variables: age, gender, educational level, and ethnicity. Independent t-tests indicated that parents who dropped out of the study at T3 did not significantly differ from parents who remained in the study at T3 on their initial levels of self-esteem and emotion regulation. Further, there were no significant differences in parent age, educational level or ethnicity. However, a Chi-square test revealed that the group of parents who dropped out of the study at T3 consisted of significantly more fathers (25.4%), $\chi^2(1) = 12.24$, $p < 0.001$, than the group of parents who remained in the study at T3 (13.0%). Second, we compared participants who remained throughout the entire study and had a maximum of 2 missing assessment waves ($n = 101$) with drop-outs ($n = 452$). Independent t-tests indicated that parents who dropped out of the study did not significantly differ from parents who remained throughout the entire study on their initial levels of self-esteem and emotion regulation. Further, there were no significant differences in parent age, educational level or ethnicity. However, a Chi-square test revealed that the group of parents who dropped out of the study consisted of significantly more fathers (28.4%), $\chi^2(1) = 4.35$, $p < 0.037$, than the group of parents who remained throughout the entire study (14.7%).

To test whether self-esteem and emotion regulation can be seen as two different constructs, the correlation between self-esteem and emotion regulation was calculated in each of the four phases (i.e., during pregnancy (-9 to 0 months), infancy (0 to 18 months), toddlerhood (18 to 36 months) and preschool-age (36 to 50 months)). The correlation was small during pregnancy ($r = 0.22$) and medium during infancy ($r = 0.44$), toddlerhood ($r = 0.46$) and preschool-age ($r = 0.41$), indicating that self-esteem and emotion regulation are related, but distinct constructs. The mean scores in self-esteem and emotion regulation during each phase are presented in Table 2.

As described earlier, we compared the trait-consistency hypothesis and the age-driven hypothesis by exploring whether a discontinuous growth model accounting for the combined effect of child's age and developmental phase fitted the data better than a linear growth model. First, we describe our findings for self-esteem, followed by our findings for emotion regulation.

Self-Esteem

In the first model (BIC = 11780, LL = -5864), representing a single growth curve for the whole age period (i.e., the trait-consistency hypothesis), there was a significant main effect of child age, $F(1, 219) = 11.59$, $p < 0.001$. Parameter

Table 2 POMP-scores for self-esteem and emotion regulation across all four phases for fathers, mothers and the total sample

Variable		Pregnancy	Infancy	Toddlerhood	Preschool-age
		<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Self-esteem	Fathers	70.8 (14.2)	72.0 (9.84)	74.8 (11.8)	74.9 (11.4)
	Mothers	69.4 (10.3)	68.5 (12.2)	70.2 (12.7)	70.2 (13.2)
	Total	69.6 (10.8)	69.2 (11.9)	71.2 (12.7)	71.6 (13.1)
Emotion regulation	Fathers	68.8 (16.4)	66.8 (16.1)	70.0 (12.7)	70.2 (11.8)
	Mothers	61.1 (12.7)	62.0 (13.7)	66.9 (13.4)	67.6 (14.6)
	Total	62.3 (13.3)	62.9 (14.2)	67.6 (13.3)	68.3 (13.8)

POMP scores were calculated with a linear transformation [observed score – minimum possible]/[maximum possible – minimum possible] × 100

estimates indicated that parents showed a small increase in self-esteem when their child got older (mean slope in POMP units per month = 0.06). Further, there was a significant main effect of parent gender, $F(1, 352) = 6.84$, $p = 0.009$. Parameter estimates indicated that, around childbirth, fathers' self-esteem levels were on average 3.95 POMP units higher than mothers'. There was no significant interaction between child age and gender. Further, there was no significant main effect of pregnancy number and there were no interactions between pregnancy number and age or gender.

We included developmental phase as a factor in the second and third model (i.e., the age-driven hypothesis). In the second model, linear change was estimated separately during pregnancy and infancy (–9 to 18 months) and during toddlerhood and preschool-age (18 to 50 months). This was done by estimating the intercept centered on childbirth, and two separate slope parameters. The two slopes reflected change during pregnancy and infancy, and change during toddlerhood and preschool-age. Adding these two phases to the model resulted in improved overall model fit (BIC = 11780, LL = –5856). There was a significant interaction between child age and phase, $F(1, 1324) = 4.50$, $p = 0.034$, indicating that the effect of age in the first phase was significantly different than the effect of age in the second phase, $t(1324) = 2.12$, $p = 0.034$. Self-esteem showed a small decline during pregnancy and infancy (mean slope in POMP units per month = –0.07) and a small increase during toddlerhood and preschool-age (mean slope in POMP units per month = 0.04). Further, the variance of the intercept and slopes was significant, reflecting significant individual differences in parents' self-esteem trajectories, $LRT(2) = 34.8$, $p < 0.001$. In the third model, linear change was estimated separately during pregnancy, infancy and toddlerhood (–9 to 36 months) and during preschool-age

(36 to 50 months). This was done by estimating the intercept centered on childbirth, and two separate slope parameters. The two slopes reflected change during pregnancy, infancy, and toddlerhood and change during preschool-age. Adding these slopes to the model did not improve model fit (BIC = 11793, LL = –5863). Further, there was no significant interaction between child age and phase.

Emotion Regulation

In the first model (BIC = 12397, LL = –6173), representing a single growth curve for the whole age period (i.e., the trait-consistency hypothesis), there was a significant main effect of child age, $F(1, 233) = 67.32$, $p < 0.001$. Parameter estimates indicated that parents showed a small increase in emotion regulation when their child got older (mean slope in POMP units per month = 0.16). Further, there was a significant main effect of parent gender $F(1, 342) = 4.68$, $p < 0.031$. Parameter estimates indicated that, around childbirth, fathers' emotion regulation levels were on average 3.71 POMP units higher than mothers'. There was no significant interaction between age and gender. Further, there was no significant main effect of pregnancy number, and there were no interactions between pregnancy number and age or gender.

We included developmental phase as a factor in the second and third model (i.e., the age-driven hypothesis). In the second model, linear change was estimated separately during pregnancy and infancy (–9 to 18 months) and toddlerhood and preschool-age (18 to 50 months). This was done by estimating the intercept centered on childbirth, and two separate slope parameters. The two slopes reflected change during pregnancy and infancy, and change during toddlerhood and preschool-age. Adding these two phases to the model did improve model fit (BIC = 12386, LL = –6159).

There was a significant interaction effect between child age and phase, $F(1, 1316) = 3.89, p = 0.049$, indicating that the effect of age in the first phase was significantly different than the effect of age in the second phase, $t(1306) = 1.97, p = 0.049$. Emotion regulation showed a small decline during pregnancy and infancy (mean slope in POMP units per month = -0.03) and a small increase during toddlerhood and preschool-age (mean slope in POMP units per month = 0.09). Further, the variance of the intercept and slopes was significant, reflecting significant individual differences in parents' self-esteem trajectories, $LRT(2) = 19.1, p < 0.001$. In the third model, linear change was estimated separately during pregnancy, infancy and toddlerhood (-9 to 36 months) and preschool-age (36 to 50 months). This was done by estimating the intercept centered on childbirth, and two separate slope parameters. The two slopes reflected change during pregnancy, infancy, and toddlerhood and change during preschool-age. Adding these two slopes to the model did not improve model fit ($BIC = 12403, LL = -6168$). Further, there was no significant interaction between child age and phase.

Comparing the Trait-Consistency and Age-Driven Hypotheses

Our analysis revealed that trajectories of self-esteem and emotion regulation each supported the age-driven hypothesis, since the discontinuous growth models fitted the data better than the linear growth models. Further, for both traits, a model with an age 18 months turning-point fitted the data better than a model with an age 36 months turning-point (see Figs. 1 and 2 for an illustration of the best-fitting model). The fixed effects parameter estimates and random components of all three models are presented in Tables 3 and 4.

Discussion

The present study investigated stability and change in parental self-esteem and emotion regulation during pregnancy, infancy, toddlerhood and preschool-age. Self-esteem and

emotion regulation levels were examined during these phases using nine waves of longitudinal data. By using multiple measurement waves over a relatively wide time span, we were able to provide a comprehensive picture of the extent and shape of developmental changes in parents' self-esteem and emotion regulation.

Trajectories of Change

Taken together, our results provide support for the age-driven hypothesis, which means that the age of the child is related to trajectories of parental self-esteem and emotion regulation, and may serve as a turning point. Self-esteem and emotion regulation showed the same trajectory of change, with declines during pregnancy and infancy, and increases during toddlerhood and preschool-age. The decrease in self-esteem and emotion regulation during pregnancy and infancy is consistent with previous research, which found gradual decreases in self-esteem until 3 years after childbirth (Bleidorn et al., 2016; Van Scheppingen et al., 2018) and declines in emotional stability until 5 years after childbirth (Denissen et al., 2019). However, parental self-esteem and emotion regulation did not continue to deteriorate during toddlerhood, but started to increase instead. Although previous research indicated that during this period, often referred to as 'the terrible twos', parenting stress peaks and parenting enjoyments bottoms (Fagot & Kavanagh, 1993; Williford et al., 2007), and parents feel insecure about their role as parent as they have to cope with the tantrums of their child (Pettersen et al., 2017), the results of the present study indicate that this challenging phase does not negatively impact parental self-esteem or emotion regulation. It may be that the child's increased autonomy and increasingly more regulated sleeping pattern makes caring for a toddler less exhausting and more rewarding than caring for an infant (Crnic et al., 2005; Richter et al., 2019). Consequently, this alleviates the negative impact on parents' self-esteem and emotion regulation. Self-esteem and emotion regulation showed significant positive correlations during pregnancy, infancy, toddlerhood and preschool-age, and showed the same

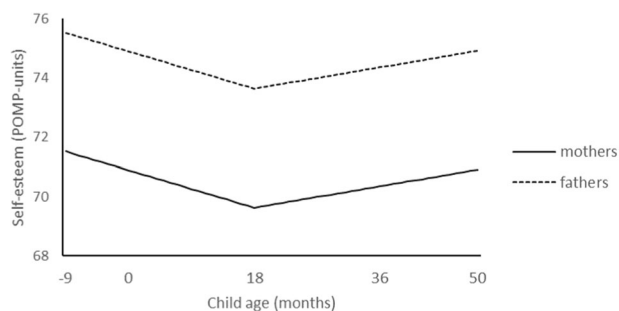


Fig. 1 Estimated change for mothers' and fathers' self-esteem

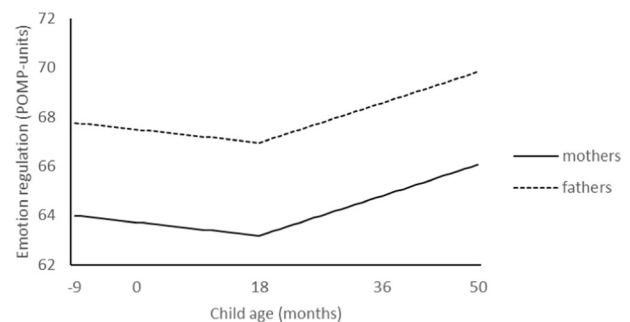


Fig. 2 Estimated change for mothers' and fathers' emotion regulation

Table 3 Fixed effects parameter estimates of Model 1, 2 and 3 for self-esteem and emotion regulation

	Effect	β	SE	95% CI		df	t	p	
				Lower	Upper				
Model 1	SE	(Intercept)	70.04	0.79	68.49	71.60	382	88.17	<0.001***
		Child age	0.06	0.02	0.02	0.09	219	3.40	<0.001***
		Mother - Father	-3.95	1.51	-6.90	-0.99	352	-2.62	0.009**
	ER	(Intercept)	62.58	0.93	60.76	64.40	398	67.54	<0.001***
		Child age	0.16	0.02	0.12	0.20	233	8.20	<0.001***
		Mother - Father	-3.71	1.72	-7.07	-0.35	342	-2.16	0.031*
Model 2	SE	(Intercept)	70.89	0.85	69.24	72.55	475	83.82	<0.001***
		Child age	-0.07	0.04	-0.15	0.01	1336	-1.71	0.088
		Mother - Father	-4.01	1.51	-6.97	-1.05	352	-2.65	0.008**
		T&PA - P&I	0.27	1.03	-1.74	2.29	1330	0.27	0.791
		Child age X T&PA - P&I	0.11	0.05	0.008	0.20	1324	2.12	0.034*
	ER	(Intercept)	63.72	0.99	61.77	65.66	506	64.11	<0.001***
		Child age	-0.03	0.05	-0.13	0.07	1326	-0.61	0.539
		Mother - Father	-3.77	1.72	-7.13	-0.41	342	-2.20	0.029*
		T&PA - P&I	1.73	1.26	-0.74	4.19	1328	1.37	0.170
		Child age X T&PA - P&I	0.12	0.06	0.0008	0.24	1316	1.97	0.049*
Model 3	SE	(Intercept)	67.55	2.71	62.24	72.86	1420	24.96	<0.001***
		Child age	0.12	0.06	-0.004	0.24	1301	1.89	0.059
		Mother - Father	-3.94	1.51	-6.89	-0.98	352	-2.61	0.009**
		PA - P&I&T	-4.83	5.20	-15.03	5.36	1225	-0.93	0.353
		Child age X PA - P&I&T	0.10	0.12	-0.13	0.32	1235	0.83	0.405
	ER	(Intercept)	68.28	1.97	64.43	72.14	1572	34.69	<0.001***
		Child age	0.06	0.07	-0.09	0.21	1303	0.795	0.427
		Mother - Father	-3.70	1.71	-7.06	-0.34	342	-2.16	0.032*
		PA - P&I&T	4.59	3.56	-2.41	11.59	1259	1.29	0.199
		Child age X PA - P&I&T	-0.28	0.15	-0.57	0.008	1270	-1.90	0.057

SE self-esteem, ER emotion regulation, P pregnancy, I infancy, T toddlerhood, PA preschool-age

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

trajectories of change. Indeed, previous research suggests that lower levels of self-esteem are associated with more difficulties in regulating emotions. In fact, negative evaluations of the self may challenge the ability of individuals to regulate their emotions (Velotti et al., 2014; Garofalo et al., 2016). Further, our results indicate that the interrelations between self-esteem and emotion regulation were small during pregnancy, and medium during infancy, toddlerhood, and preschool-age. The higher correlation after childbirth might reflect that some aspects of this transition influenced self-esteem and emotion regulation in a similar way. For instance, both traits are important for successful intrapersonal processes and are related to relationship satisfaction (Bloch et al., 2014; Erol & Orth, 2014; Van Scheppingen, 2018; Vater & Schröder-Abé, 2015). Several studies indicated that, on average, couples decrease in relationship satisfaction after the birth of a child (Doss & Rhoades, 2017; Kluwer, 2010; Mitnick et al., 2009). Future research is needed to test whether this decline in

relationship satisfaction might contribute to the decline in self-esteem and emotion regulation, or vice versa.

Furthermore, the results of the present study showed a positive main-effect of child age, which indicates that parents increased in self-esteem and emotion regulation over the course of 4 years postpartum. Although not consistent with the findings of previous research, which found decreases or no mean-level change in parental self-esteem (Bleidorn et al., 2016; Chen et al., 2016; Van Scheppingen et al., 2018), this eventual increase in parents' self-esteem and emotion regulation is in line with the general observation that personality traits change in the direction of greater maturity (Roberts & Wood, 2006; Bleidorn et al., 2021). In this vein, one could argue that the birth of a child and its concomitant challenges cause a temporary deviation from the overall trend toward personality maturation. In this case, the temporary deviation is not caused by an unexpected or unpredictable event, but by inexperience with the parental role and unexpected challenges these young

Table 4 Random components of Model 1, 2 and 3 for self-esteem and emotion regulation

		Groups		<i>SD</i>	Variance	<i>ICC</i>
Model 1	SE	ID	(Intercept)	10.30	106.06	0.725
			Child age	0.17	0.03	
		Residual	6.35	40.31		
	ER	ID	(Intercept)	12.06	145.39	0.698
			Child age	0.17	0.03	
		Residual	7.93	62.94		
Model 2	SE	ID	(Intercept)	10.30	106.10	0.727
			Child age	0.17	0.03	
		Residual	6.32	39.89		
	ER	ID	(Intercept)	12.14	147.26	0.706
			Child age	0.17	0.03	
		Residual	7.84	61.39		
Model 3	SE	ID	(Intercept)	10.31	106.27	0.725
			Child age	0.17	0.03	
		Residual	6.34	40.25		
	ER	ID	(Intercept)	12.08	145.92	0.701
			Child age	0.17	0.03	
		Residual	7.89	62.20		

SE self-esteem, *ER* emotion regulation

parents face. Preparing young parents for birth and parenthood may help them along this pathway and reduce the negative impact on their self-esteem and emotion regulation. Although empirical evidence concerning parental traits is scarce, preventive interventions have proven to be successful in preparing parents for the challenges of early parenthood in terms of parents' well-being and the quality of romantic relationships (Eira Nunes et al., 2021; Pinquart & Teubert, 2010).

Comparing Fathers and Mothers

On average, fathers had higher mean-level self-esteem and emotion regulation than mothers. This is in line with the findings of a large cross-cultural research, where males consistently reported higher self-esteem than females (Bleidorn, Arslan et al., 2016) and other research, where females report greater difficulties with emotion regulation compared to males (Nolen-Hoeksema, 2012). Further, these gender differences between mothers and fathers are consistent with research on related fields, such as parental well-being, where fathers consistently show higher levels of well-being than mothers (Nelson-Coffey et al., 2019). The gender differences might be due to the higher pressure mothers feel to fulfill their intensive mothering role (Offer, 2016). Fathers tend to spend more time in leisure and play, while mothers tend to spend more time in onerous activities (e.g., basic childcare, housework), which contributes to less

happiness and more fatigue in parenting (Musick et al., 2016). Moreover, after accounting for these differences in parenting activities, mothers shoulder more stress than fathers (Meier et al., 2018). Therefore, it might be that the demands of parenthood impedes mothers' self-esteem and emotion regulation more than fathers'.

Despite these mean-level differences in self-esteem and emotion regulation, child age-related changes were similar for mothers and fathers. Previous research suggested that mothers' may be more sensitive to the impact of childbirth than fathers, due to both physiological changes and gender-specific role expectations (Bleidorn et al., 2016; Van Scheppingen et al., 2016). For example, mothers suffer from higher emotional disturbances after the birth of a child (Asselmann et al., 2020; Don et al., 2014). However, the findings of the present study indicate that mothers and fathers might be equally sensitive to the impact of a child. It may be that not parental gender, but other factors, such as parental age, income, the division of labor, and characteristics of the child influence the effect of parenthood on self-esteem and emotion regulation. In fact, this appears to be the case for the effect of parenthood on relationship satisfaction: not parental gender, but changes in work hours and household work that are associated with becoming a parent, were responsible for changes in relationship satisfaction (Keizer & Schenk, 2012).

Comparing First and Later Pregnancies

First-time parents and second-, third- or fourth-time parents did not differ in their mean-level self-esteem and emotion regulation. Further, age-related changes were nearly identical for first-time parents and second-, third- or fourth-time parents. This is in line with our expectations and previous research on mothers, where no significant difference in self-esteem level and a highly similar change-pattern between first and later pregnancies was found (Van Scheppingen et al., 2018). The results of our study show that this result can be replicated across both mothers and fathers.

In the present study, not only first and later pregnancies, but also mothers and fathers showed the same trajectories of change. Although we found similar change trajectories for different groups of parents, the effect sizes of this study should not be interpreted as a normative effect. We also tested the variability in individuals self-esteem and emotion regulation trajectories. A lack of variance in parents' self-esteem and emotion regulation trajectories would suggest a strong normative influence of parenthood. Contrary, the results of our study indicated there was significant variance in parents' self-esteem and emotion regulation trajectories. This means that the transition to parenthood does not evoke the exact same response in each individual; people differ in how they react to their environment. The degree to which

major life transitions evoke positive versus negative changes in parental self-esteem and emotion regulation can vary from person to person, depending on various protective and risk factors (Luciano & Orth, 2017). For example, previous research has shown significant effects of child characteristics on parent mental health and well-being (Yan et al., 2020). In this vein, we argue that child characteristics could impact trajectories of self-esteem and emotion regulation. Parenting a ‘difficult’ infant, can cause parents to lose control over one’s emotions or negatively evaluate the perceptions they hold for themselves in their new roles, whereas parenting an ‘easy’ infant may lead to more positive outcomes in parents’ traits. Note that, in the present study, the effect sizes averaged across people were small. When the effect sizes are considered in individuals’ environmental context (e.g., controlling for child characteristics), the effect on parental traits may be more profound (Bleidorn et al., 2020).

Strengths, Limitations and Future Directions

The core strength of this study is the high number of measurement occasions over a relatively wide time span, which enabled us to use multilevel modeling techniques to provide a comprehensive picture of the extent and shape of developmental changes in parents’ self-esteem and emotion regulation during pregnancy and the following 4 years postpartum. Two other strengths of this study are the inclusion of both first-time and second-, third-, and fourth-time parents, and the inclusion of both fathers and mothers, while in other research fathers are often ignored (Cabrera et al., 2018). By doing so, this was the first study that distinguished a trajectory of change for both fathers’ and mothers’ self-esteem and emotion regulation from pregnancy to preschool-age, for both first and later pregnancies. Nevertheless, the results of the present study should be considered in the light of some limitations.

First, even though the study started with a sample of 550 parents, there were relatively large dropouts rates. Most parents dropped out of the study between the second and the third assessment wave, which might be caused by the demanding nature of parenthood during early childhood. Preliminary analysis revealed that the group of parents who dropped out of the study did not differ in their dispositional self-esteem and emotion regulation compared to the group of parents who remained in the study. Further, we handled the missing data by using full information maximum likelihood. However, the accuracy of the trajectory estimates might still be compromised due to the dropout towards the end of the study. Therefore, the results of the present study should be interpreted with caution until replicated.

Second, some of the sample’s characteristics and the use of self-report data might limit the generalizability of

the results. The sample is not fully representative of the population of Dutch parents, since it consists of mainly highly educated mothers with a Western background. It remains an open question if similar results can be found in, for example, parents with lower educational levels. Therefore, future research could examine if the change-patterns for self-esteem and emotion regulation can be replicated in a larger group of mothers and fathers from diverse social, economic and cultural backgrounds. Further, in order to examine change in parents’ traits from multiple perspectives, the use of multiple research methods is needed (e.g., self-report, qualitative and observational measures; Bleidorn et al., 2020).

Third, the relatively small amount of participating couples prevented us from performing dyadic analyses. On the one hand, this can be considered problematic, given that the transitions through the various phases of parenthood are dyadic events for most parents, and this leaves the question open how mothers’ changes relate to fathers’ changes. Furthermore, not accounting for the nonindependence between mothers and fathers may have led to biased standard errors of the parameter estimates. This in turn may have had consequences for the accuracy our results, especially for testing differences between fathers and mothers. On the other hand, self-esteem and emotion regulation are not inherently dyadic characteristics like, for example, relationship satisfaction or coparenting. In fact, a previous study indicated that spouses’ self-esteem scores were statistically unrelated (Bleidorn et al., 2016). Still, it would be informative to investigate if this result can be replicated. More actively recruiting fathers in future research would allow researchers to use dyadic analyses to test the change patterns of self-esteem and emotion regulation within and between mothers and fathers (Laurenceau & Bolger, 2012).

Despite these limitations our study expands previous work by applying a more long-term perspective on parental self-esteem and emotion regulation development from pregnancy until 4 years postpartum, while including both fathers and mothers during both first and later pregnancies. Our study demonstrated that, for the average parent, self-esteem and emotion regulation are negatively affected during pregnancy and infancy. Further, due to the frequent measurement occasions in the years after childbirth, we were the first to demonstrate that this negative impact alleviates during toddlerhood and preschool age, and that parents increased in their mean-levels of self-esteem and emotion regulation over the course of 4 years postpartum. Although this finding sheds a more optimistic light on the existing literature concerning the transition to parenthood, it does not mean that the temporary decline in parental self-esteem and emotion regulation should be neglected, since the same trajectories of change were found for both mothers and fathers, during both first and

later pregnancies. As stated previously, parental self-esteem and emotion regulation are important predictors for parental well-being and contribute to positive parenting and better developmental outcomes in children. Therefore, negative psychological adjustment during pregnancy and infancy could have consequences for both the parents and the child. In order to allow parents and their children to thrive, future research needs to investigate if an intervention should and could ease the transition to parenthood and thereby prevent this decline.

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval This research was done following the ethical, methodological, and privacy standards of the code of conduct for research at universities of applied sciences in The Netherlands. Participant completed informed consent prior to participation and were informed of their rights to leave the study at any time. Ethical approval was granted by the Central Ethics Research Committee of the University of Applied Sciences Leiden.

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