


Positive Daily Experiences Are Associated with Personality Trait Changes in Middle-aged Mothers

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Abstract: Theory and research have suggested that recurrent daily experiences can affect personality traits. The present study examined the longitudinal relation between individual differences in positive daily experiences and the Big Five personality traits. Data came from Dutch mothers ($N = 483$; M age = 44 years at T1) who completed up to six yearly personality questionnaires and 15 between-year assessment bursts, lasting five consecutive days each. Using multilevel structural equation modelling, we found that individual differences in daily experiences of positive affect and perceived relationship support/affection with partners and children were positively associated with subsequent rank-order changes in all Big Five personality traits. In contrast, we found little evidence that personality traits were associated with rank-order changes in daily experiences, which may be due to the very-high rank-order stability of positive affect and relationship support. Furthermore, positive daily experiences demonstrated incremental validity in predicting rank-order changes in trait agreeableness, emotional stability, and openness, over and above daily negative affect and relationship conflict. The results suggest that positive affective and interpersonal daily experiences contribute to positive personality trait changes in middle adulthood. We discuss these results in the context of contemporary theories of personality trait development. © 2018 European Association of Personality Psychology

Key words: adulthood; daily diary; positive affect; personality development; social relationships

Contemporary dynamic personality theories posit that personality traits can change throughout life as a result of daily experiences (Baumert et al., 2017; Geukes, van Zalk, & Back, 2018; Roberts & Jackson, 2008; Wrzus & Roberts, 2017). In support of this proposition, recent research found that recurrent negative daily experiences were associated with rank-order decreases in emotional stability in adolescence (Borghuis et al., 2018) and adulthood (Wrzus, Luong, Wagner, & Riediger, 2017). However, to the best of our knowledge, no study to date has tested whether these effects generalize to positive experiences. In addition, there is a relative lack of research focused on personality trait development in middle adulthood (Allemand, Gomez, & Jackson, 2010). To investigate the associations between positive daily experiences and change in personality traits, we examined dynamic

transactions between Big Five personality traits (extraversion, agreeableness, conscientiousness, emotional stability, and openness) and daily experiences of positive affect and relationship support/affection with partners and adolescent children in a sample of middle-aged Dutch mothers over a period of five years.


Personality Trait Development in Middle Adulthood

Compared with the burgeoning literature on personality development in adolescence and young adulthood, little research has focused on the period of middle adulthood. The relative sparseness of research on this life stage might reflect findings suggesting that personality traits are rather stable in this period (Costa & McCrae, 1994), which has led researchers to propose that personality traits ‘reach mature form in adulthood; thereafter they are stable in cognitively intact individuals’ (McCrae & Costa, 1999, p. 145). However, more recent longitudinal research has found that personality traits continue to change throughout middle adulthood and even in old age (Bleidorn & Hopwood, in press; Roberts, Walton, & Viechtbauer, 2006).

Most longitudinal studies have examined personality trait development in terms of two types of stability and change, namely, stability and change in the rank ordering of individuals on a trait and in the mean level of a trait. In recent years,

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this research has been complemented by studies on individual differences in change. Rank-order stability refers to the maintenance of individuals' relative standing on a trait dimension within a population over time. Past research has suggested that the rank-order stabilities of personality traits peak in middle adulthood. Nevertheless, even during middle adulthood, individuals continue to show small changes over time in their ranks on trait dimensions (Briley & Tucker-Drob, 2014; Roberts & DelVecchio, 2000; Wortman, Lucas, & Donnellan, 2012).

Mean-level change refers to change in average trait levels of a population over time. Previous research on mean-level change in middle adulthood has found evidence for increases in agreeableness, conscientiousness, and emotional stability and decreases in openness and extraversion during this life stage (Helson, Jones, & Kwan, 2002; Lucas & Donnellan, 2011; Mroczek & Spiro, 2003; Roberts et al., 2006; Schwaba & Bleidorn, 2018; Soto, John, Gosling, & Potter, 2011; Specht, Egloff, & Schmukle, 2011; Srivastava, John, Gosling, & Potter, 2003; Terracciano, McCrae, Brant, & Costa, 2005; Wortman et al., 2012).

Finally, longitudinal studies on individual differences in change have found that, during middle adulthood, individuals differ from each other in the shape of their personality trait trajectories, albeit to a smaller extent than during earlier stages in life (Mroczek & Spiro, 2003; Roberts, Wood, & Caspi, 2008; Schwaba & Bleidorn, 2018). To conclude, although personality traits are relatively stable in middle adulthood, personality trait changes occur during this period. These findings raise questions about the sources and mechanisms of personality change during this hitherto relatively understudied life stage.

Theoretical Perspectives on the Relation between Traits and Daily Experiences

Different theories of personality development have emphasized different pathways to connect personality traits and daily psychological experiences. *Endogenous* personality theories, such as five factor theory (McCrae & Costa, 2008; McCrae & Sutin, 2018), posit that the causal relation between personality traits and psychological experiences is unidirectional. According to this perspective, personality traits are distal causes of daily experiences because traits set in motion various downstream processes (cognitive, behavioural, emotional, and motivational) that, together with environmental influences, produce individual differences in psychological experiences. For example, compared with individuals scoring low on trait agreeableness, highly agreeable individuals may be inclined to act kindly, generously, and cooperatively towards close others and, as a result, may come to experience higher levels of positive affect and relationship support in their daily lives. According to endogenous personality theories, changes in personality traits are exclusively influenced by processes of intrinsic maturation, which includes genetic influences and any other biological process that affects the brain, such as a traumatic brain injury. As such, individual differences in psychological experiences, such as relationship support and positive affect, should have no

influence on individual differences in trait development (McCrae & Sutin, 2018).

In contrast, *dynamic* theories of personality development propose that the causal relation between personality traits and daily psychological experiences is bidirectional: traits and experiences are assumed to influence each other continuously over time (Endler & Parker, 1992; Magnusson, 1990; Roberts et al., 2008). That is, personality traits not only predispose people to certain psychological experiences, but experiences, in turn, can also affect people's personality traits through their influence on momentary or daily thoughts, feelings, and behaviours (i.e. states). As such, contemporary dynamic personality theories emphasize the accumulation of daily experiences and people's short-term responses to daily experiences as key mechanisms of personality trait change throughout life (Fajkowska, 2018; Geukes et al., 2018; Roberts, 2018; Roberts & Jackson, 2008; Wrzus & Roberts, 2017; for an integrative summary, see Baumert et al., 2017). For example, daily experiences of positive affect and relationship support may repeatedly stimulate kind, generous, and cooperative behaviours. According to dynamic perspectives, individual differences in these behaviours/states may in turn lead to differential changes in agreeableness via biological mechanisms (e.g. changes in gene expressions and neuroanatomical structures), associative mechanisms (e.g. implicit learning, reinforcement learning, and habit formation), and/or reflective mechanisms (e.g. conscious memories about one's past states) (Baumert et al., 2017; Roberts, 2018; Wrzus & Roberts, 2017).

Past Research on Dynamic Transactions between Personality Traits and Daily Experiences

A large body of research has shown that Big Five traits are associated with individual differences in affective and interpersonal experiences. Specifically, high levels of emotional stability, agreeableness, conscientiousness, and particularly extraversion have been related to more frequent and higher levels of momentary, daily, and trait levels of positive affect (Ching et al., 2014; Costa & McCrae, 1980; Eid & Diener, 1999; Kuppens, van Mechelen, Nezlek, Dossche, & Timmermans, 2007; Lucas & Baird, 2004; Lucas, Le, & Dyrenforth, 2008; McCrae & Costa, 1991) and higher levels of relationship quality and support (Asendorpf & van Aken, 2003; Branje, van Lieshout, & van Aken, 2004; Lopes, Salovey, & Straus, 2003; Neyer & Lehnart, 2007; Nofle & Shaver, 2006). What processes account for these associations?

Consistent with both endogenous and dynamic perspectives, several lines of past research have suggested that these associations may, at least partly, be driven by downstream effects of personality traits on experiences. Personality traits have been found to prospectively predict important life outcomes and experiences (e.g. Denissen, Luhmann, Chung, & Bleidorn, 2018), including interpersonal experiences, such as relationship formation, support, closeness, and conflict (Asendorpf & van Aken, 2003; Asendorpf & Wilpers, 1998; Mund & Neyer, 2014; Neyer & Asendorpf, 2001; Selfhout et al., 2010; Zimmermann & Neyer, 2013). Findings that (changes in) personality traits are heritable (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; Briley &

Tucker-Drob, 2017; Vukasović & Bratko, 2015) and related to biological variables such as brain structures (DeYoung et al., 2010) and allostatic load (i.e. stress; Stephan, Sutin, Canada, & Terracciano, 2017) are also consistent with the idea that traits predispose individuals to certain experiences.

In contrast to the relatively broad evidence for the predictive power of traits, relatively little is known about the impact of everyday experiences on personality traits. Consistent with endogenous perspectives that psychological experiences are unrelated to changes in personality traits, some studies have found that changes in personality traits were not related to previous relationship experiences (Asendorpf & van Aken, 2003; Asendorpf & Wilpers, 1998; Branje et al., 2004) and not or weakly related to previous major life transitions such as parenthood and divorce (Denissen et al., 2018; van Scheppingen et al., 2016).

However, there is also evidence consistent with the premise of dynamic theories that (daily) psychological experiences can affect personality traits. For example, some evidence has suggested that the experience of social role demands, particularly in the domains of work and the first romantic relationship, lead to personality trait changes (Bleidorn, Hopwood, & Lucas, 2018; Denissen, Ulferts, Lüdtke, Muck, & Gerstorf, 2014). Moreover, some studies have found that personality traits do not only predict changes in relationship experiences, but that relationship experiences also predict subsequent changes in personality traits (for reviews, see Mund, Finn, Hagemeyer, & Neyer, 2016; Wrzus & Neyer, 2016; Wrzus, Zimmermann, Mund, & Neyer, 2016). For example, Mund and Neyer (2014) have found bidirectional longitudinal relations between the Big Five traits and relationship conflict, closeness, insecurity, and contact frequency. Finally, and more directly related to the present research, two recent measurement burst studies have found that daily experiences were associated with subsequent rank-order changes in personality traits (Borghuis et al., 2018; Wrzus et al., 2017). These studies incorporated bursts of momentary/daily assessments of participants' experiences into a multi-wave longitudinal design. Measurement burst designs are particularly well suited for the investigation of dynamic transactions between traits and daily experiences because they link participants' momentary or daily reports of everyday experiences to long-term changes in personality traits. Given these studies' relevance to the present research, we next discuss their designs and results in more detail.

The six-year longitudinal study of Wrzus et al. (2017) contained three assessment bursts during which over 500 participants (aged 14 to 86 years) provided daily reports of their negative affect and hassles (i.e. unpleasant experiences or thoughts). They found that increases in participants' average level of daily negative affect and the extent to which hassles resulted in negative affect (i.e. their short-term hassle reactivity) predicted rank-order decreases in trait emotional stability across two 3-year intervals. They did not find consistent longitudinal effects on any other of the Big Five traits nor did they find evidence for effects of personality traits on

changes in negative affect, hassle occurrence, or hassle reactivity.

Replicating these findings, Borghuis et al. (2018) examined the longitudinal associations between Big Five personality traits (measured yearly) and daily experiences of negative affect and relationship conflict (measured in three bursts of five daily assessments in-between the trait measurements) across five years in a sample of more than 1000 Dutch adolescents. They have found ample evidence that daily experiences of negative affect and interpersonal problems were associated with subsequent rank-order decreases in trait emotional stability, extraversion, agreeableness, and conscientiousness. By contrast, they have found comparatively little evidence that personality traits were also associated with rank-order changes in daily experiences. Moreover, they found that mutually reinforcing, bidirectional longitudinal effects between emotional stability and daily negative affect produced an indirect effect—of initial emotional stability on emotional stability one year later via intervening individual differences in daily negative affect—that partly accounted for the rank-order stability of emotional stability. This finding suggests that individual differences in emotional stability stabilized because adolescents scoring relatively low on emotional stability were more likely to experience negative affect, which further solidified previously existing individual differences in emotional stability. This mediation effect is consistent with the idea that positive feedback loops between states and traits stabilize individual differences (Dingemans & Wolf, 2010; Kandler et al., 2010; Luttbecg & Sih, 2010; Roberts & Caspi, 2003; Sih & Bell, 2008).

To summarize, past evidence has been mixed and mostly indirect with regard to the question how daily psychological experiences are longitudinally related to personality traits. Two recent measurement burst studies have found longitudinal effects of negative daily experiences on rank-order changes in personality traits. These findings raise the question whether and how other daily experiences, such as positive affect and relationship support, are associated with rank-order stability and change in personality traits.

The Roles of Positive versus Negative Daily Experiences in Personality Trait Development

Researchers have discussed two ways in which valence may moderate the links between daily experiences and change in personality traits. First, valence may moderate the direction of effects, with negative experiences (i.e. unpleasant emotional or situational experiences) generally leading to negative personality trait changes and positive experiences generally leading to positive personality changes (e.g. Soto, 2015). Recurrent negative experiences may eventually lead to negative personality trait changes because they tend to trigger negative thoughts, feelings, and behaviours that may be related to, for example, low levels of extraversion (e.g. withdrawal), emotional stability (e.g. anxiousness), and agreeableness (e.g. anger and self-focus). In contrast,

positive experiences tend to elicit positive thoughts, feelings, and behaviours that may be related to high levels of extraversion (e.g. affiliation), agreeableness (e.g. altruism), conscientiousness (e.g. mastery and persistence), emotional stability (e.g. even-temperedness), and openness (e.g. creativity and exploration) (Ching et al., 2014; Isen, 1999; Judge, Simon, Hurst, & Kelley, 2014; Soto, 2015; Wilson, Thompson, & Vazire, 2017). To the degree that states can influence traits (Wrzus & Roberts, 2017), recurrent positive (negative) daily experiences should eventually lead to positive (negative) personality trait changes, as indicated by increases (decreases) in extraversion, agreeableness, conscientiousness, emotional stability, and perhaps also openness to experience (cf. Soto, 2015).

Second, researchers have suggested that valence may moderate the size of effects, with negative experiences having a stronger impact on personality traits than positive experiences (Wrzus & Roberts, 2017). This perspective is based on research showing that negative experiences tend to elicit stronger short-term physiological, affective, cognitive, and behavioural responses and lead to more cognitive reflection than positive experiences (for reviews, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Labianca & Brass, 2006; Taylor, 1991). For example, effects of relationship conflict on stress and rumination may be stronger than the effects of relationship support on altruism and affiliation (Isen, 1999), because negative interpersonal information is generally less ambiguous, less expected, and more consequential for survival and reproduction than positive information (Labianca & Brass, 2006). Consistent with this reasoning, past research has suggested that negative relationship experiences have a larger and more enduring impact on outcomes such as life satisfaction, mood, illness, stress (Labianca & Brass, 2006), and personality traits (Mund & Neyer, 2014) than positive relationship experiences.

To summarize, theory and research have suggested that positively valenced daily psychological experiences (e.g. positive affect and relationship support) may be associated with positive personality trait changes, such as rank-order increases in extraversion and emotional stability, but their impact may be smaller than the impact of negatively valenced daily psychological experiences (e.g. negative affect and relationship conflict). However, to the best of our knowledge, the differential effects of positive versus negative daily experiences on personality traits have not been tested in longitudinal measurement burst data.

The Present Study

We investigated the longitudinal associations between individual differences in personality traits and positive daily experiences in a sample of middle-aged women. Data came from 483 Dutch mothers who participated as part of a broader longitudinal study on the psychosocial development of adolescents.¹ Participating mothers completed

six personality trait measurements (once each year) and 15 assessment bursts (three bursts in-between each yearly trait measurement). During assessment bursts, they reported about the quality of their daily affective and interpersonal experiences. We focused on participants' daily perceived relationship support from their intimate partner as well as from their adolescent child, thereby exploring potential differences between these relationships. These relationships may be differentially related to personality because support may have a different meaning, origin, and occurrence frequency and may trigger different responses in intimate partner relationships compared with parent-child relationships (Branje et al., 2004). In intimate partner relationships, which are typically balanced, dyad members may tend to reciprocate support/affection (Trivers, 1971). Therefore, partner support may be particularly related to agreeableness. In parent-child relationships, which are not equal, support from a child may signal effective parenting practices. Therefore, child support may be particularly related to conscientiousness.

We tested three hypotheses. First, consistent with endogenous and dynamic personality theories, we hypothesized that higher levels of trait extraversion, agreeableness, conscientiousness, and emotional stability are associated with one-year rank-order increases in daily positive affect and relationship support (hypothesis 1). Second, consistent with dynamic perspectives but inconsistent with endogenous perspectives, we hypothesized that higher levels of daily positive affect and relationship support are associated with one-year rank-order increases in extraversion, agreeableness, conscientiousness, and emotional stability (hypothesis 2). Third, based on theory suggesting that a positive state-trait feedback loop stabilizes individual differences (e.g. Dingemans & Wolf, 2010) and preliminary supporting evidence (Borghuis et al., 2018), we hypothesized that bidirectional longitudinal associations between personality traits and daily experiences partly account for the one-year rank-order stabilities of extraversion, agreeableness, conscientiousness, and emotional stability (hypothesis 3).

Given mixed evidence concerning the associations between openness and positive affect (Ching et al., 2014; Eid & Diener, 1999; Kuppens et al., 2007; Leger, Charles, Turiano, & Almeida, 2016) and between openness and relationship quality/support (Branje et al., 2004; Nofle & Shaver, 2006), we adopted an exploratory approach to examining these longitudinal associations. In a follow-up analysis, we also examined exploratory the dynamic transactions between positive daily experiences and personality traits controlled for the effects of daily negative affect and relationship conflict. The goals were to evaluate whether positive daily experiences demonstrated incremental validity in predicting personality change over and above negative experiences and whether the effect magnitudes on personality change differed between positive and negative daily experiences. Finally, because the general shape of long-term personality trait development has been studied relatively little in middle adulthood, we also explored the mean-level development and individual differences in change in the Big Five traits across the entire study period. We uploaded our hypotheses and statistical analysis plan after

¹Participants are the mothers of adolescents whose data were analysed by Borghuis et al. (2018). These authors examined dynamic transactions between negative daily experiences and the Big Five in adolescence. None of the data analysed in the current study have been published elsewhere.

we received the data but before we tested the hypotheses (<https://osf.io/uj2dr/>).

METHOD

Research design and procedures

Data came from the RADAR-Young (Research on Adolescent Development and Relationships—younger cohort) study (van Lier et al., 2011), which is an ongoing prospective cohort-sequential study of Dutch-speaking families in the Netherlands. The RADAR study includes data collected from 497 Dutch target adolescents (who were on average 13 years old at the first assessment wave) and their parents/caregivers, self-nominated best friends, and siblings. In this study, we used data from the target adolescents' *mothers* collected between 2005 and 2010. Target adolescents were recruited from randomly selected elementary schools in the western and central regions of the Netherlands. Participants received written information about the aim of the study, and parents provided informed consent of all participating family members.

Big Five personality traits were measured during yearly home interviews, which took place in February or March. Daily affective and interpersonal experiences were measured during three bursts of online daily assessments, which took place in June, September, and December—that is, in-between the yearly trait measurements. Each between-year assessment burst spanned five consecutive days (from Monday to Friday), adding up to 15 daily assessments per year. Participants with missing data during the assessment bursts were invited to participate in catch-up assessment bursts two weeks later. Assessment weeks always covered the weekdays of a normal school week of the adolescent. At approximately 17.30 hours, participants were invited through email to participate in an online daily diary assessment. Participating families received €100 for each home visit, which lasted approximately 2.5 hours. Participants received an additional €10 for each weekly Internet assessment that they completed. The RADAR study has been approved by the Medical Ethical Testing Committee of the Utrecht University Medical Centre (protocol number 05-159/K; 'RADAR: Research on Adolescent Development and Relationships'). We made openly accessible online the part of the data (<https://osf.io/x7pgq/>) and measures (<https://osf.io/q9jy3/>) that the RADAR management team has granted us access to.

Participants and missing data

After excluding 13 participants who did not provide at least one yearly personality trait report and at least one daily report about positive affect or relationship support, the sample consisted of $N = 483$ mothers. Mean age was 44 years at the first measurement occasion (range: 33–64, $SD = 4.36$). Participants were predominantly native Dutch (94%) and part-time or full-time employed (75%). Most participants lived together with their partner (88%). By design, they had at

least one child who was 13 years old at the first measurement occasion. Based on teacher ratings of children's externalizing behaviour, the RADAR study oversampled adolescents who were at risk of developing delinquent behaviours. Despite this oversampling, participating RADAR families on average had a higher socio-economic status than the general Dutch population, because most were of middle to high socio-economic status (91%). (For more elaborate descriptions of the procedures and participants, see Keijsers et al., 2012; Neumann, van Lier, Frijns, Meeus, & Koot, 2011).

Sixty-seven mothers (14%) participated in the first trait measurement but not in the last trait measurement. Attrition analyses indicated that these dropouts were more agreeable at the first trait measurement than participants who participated in both the first wave and the last wave ($t(89.45) = 2.67, p = .009, d = 0.35$). They did not significantly differ with regard to the other Big Five traits, nor with regard to their average level of positive affect, negative affect, relationship support, and relationship conflict across the first three assessment bursts. The proportion of data that were missing ranged for the Big Five from 0.4% (first measurement) to 14.1% (sixth measurement) and for the assessment bursts from 11.6% (positive affect during the first three bursts) to 45.9% (relationship support from partner during the last three bursts). Almost all participants (98%) had missing data on at least one measure. We handled missing data using MLR estimation (i.e. maximum likelihood estimation with robust standard errors).

Measures

Personality traits

Big Five personality traits were measured using the shortened Dutch version of Goldberg's Big Five questionnaire (Vermulst & Gerris, 2005). Participants received the following instruction: 'In the following list you see words about characteristics of people. Please answer to what extent each of these characteristics apply to you. Try to answer as honestly as possible, even if you dislike it that this characteristic applies to you.' This instruction was followed by 30 adjectives—six per personality dimension—such as 'talkative' (extraversion), 'friendly' (agreeableness), 'systematic' (conscientiousness), 'worried' (emotional stability and reverse coded), and 'creative' (openness). Response categories ranged from 1 (*completely untrue*) to 7 (*completely true*). The range of coefficient alphas (Cronbach, 1951) across the six trait measurements was extraversion (.89–.91), agreeableness (.85–.90), conscientiousness (.90–.91), emotional stability (.84–.88), and openness (.87–.88). We established longitudinal scalar measurement invariance (i.e. consistent item loadings and intercepts) for all Big Five traits across the six measurements ($\Delta CFI_s \leq 0.007$; $\Delta RMSEA_s \leq 0.003$).

Daily positive and negative affect

On each day during the assessment bursts, participants rated their affect level using the happiness, anger, anxiety, and sadness subscales of the Daily Mood Device (Hoeksma et al.,

2000). Mothers were asked in the late afternoon to rate the intensity of their emotional experiences of that particular day ('Please answer below how you feel today') using 9-point Likert scales (e.g. from 1 = *not happy* to 9 = *happy*; from 1 = *not afraid* to 9 = *afraid*). We measured daily positive affect by averaging participants' scores on the adjectives 'happy', 'cheerful', and 'lively'. We measured daily negative affect by averaging scores on 'angry', 'cross', 'short-tempered', 'sad', 'down', 'dreary', 'afraid', 'anxious', and 'worried'. Nested coefficient alpha values (items nested in assessment days nested in participants; Nezlek, 2017) were substantial for positive affect (.94) and negative affect (.88). An analysis of within-person and between-person variance (using the *statsBy* function of the *psych* package in R; Revelle, 2017) indicated that, across all 75 daily assessments structured in long format, 42% of the total variance in positive affect was attributable to stable between-person differences in positive affect (i.e. the ICC1 coefficient was 0.42). The ICC1 coefficient for negative affect was 0.62. When aggregated across the three adjacent assessment bursts that were administered each year, participants differed reliably from each other in their average levels of positive and negative affect (i.e. ICC2 coefficients ranged between 0.91 and 0.97). We established longitudinal scalar measurement invariance for our yearly measure of positive affect across the study period, using the 15 daily reports per year as indicator variables of yearly aggregated levels of positive affect ($\Delta\text{CFIs} \leq 0.003$; $\Delta\text{RMSEAs} \leq 0.001$).

Daily relationship support and conflict

During assessment bursts, mothers also reported the extent to which they experienced relationship support/affection and conflicts with their child and intimate partner, using four items based on the support and negative interaction scales of the Network of Relationships Inventory (Furman & Buhrmester, 1985). We measured relationship support/affection with the questions 'How pleasant was your relationship with your child/partner today' and 'Did your child/partner show that he/she cares about you today?' We measured relationship conflict with the questions 'Did you and your child/partner get on each other's nerves today?' and 'Did you and your child/partner quarrel today?' Response categories ranged from 1 = *not at all* to 7 = *very much*. Nested coefficient alpha values (items nested in assessment days nested in participants) were moderate to substantial for relationship support from child (.47), support from partner (.59), conflict with child (.79), and conflict with partner (.66). ICC1 coefficients, indicating the proportion of variance attributable to between-person differences, were 0.41 for relationship support from child, 0.48 for relationship support from partner, 0.37 for conflict with child, and 0.43 for conflict with partner. Yearly ICC2 coefficients, indicating the reliability of individual differences in average levels across three assessment bursts, ranged from 0.91 to 0.94 for relationship support and ranged from 0.82 to 0.90 for relationship conflict. We established longitudinal scalar measurement invariance for our yearly measure of positive affect across the study period, using the 15 daily reports per year as indicator variables of yearly aggregated levels of relationship support

from partner ($\Delta\text{CFIs} \leq 0.001$; $\Delta\text{RMSEAs} \leq 0.001$) and child ($\Delta\text{CFIs} \leq 0.002$; $\Delta\text{RMSEAs} < 0.001$).

Statistical analyses

First, we estimated the longitudinal relations between individual differences in the Big Five and daily experiences using Mplus version 7 (Muthén & Muthén, 1998–2012), by means of the *MplusAutomation* package (Hallquist & Wiley, 2018) in R. Because we had multilevel data, with up to 15 daily reports varying each year within and between persons,² we used multilevel structural equation modelling (Preacher, Zyphur, & Zhang, 2010) to test our hypotheses. This approach allowed us to estimate the within-person and between-person parameters simultaneously in one model, while taking into account missing data on both levels. We used manifest personality variables in the multilevel structural equation model (SEM) analyses to limit model complexity and ensure model convergence.

We estimated 15 (three daily experience dimensions \times five trait dimensions) statistical models to test our hypotheses. Each model tested all three hypotheses (i.e. personality effects on daily experiences, daily experience effects on personality, and indirect effects between adjacent personality trait measurements via daily experiences) for a specific personality trait–daily experience combination. We tested all hypotheses at the between-persons level.

To test hypotheses 1 and 2, models 1a–3a (Figure 1) estimated bidirectional longitudinal effects between the individual differences in the Big Five and the individual differences in daily levels of positive affect (model 1a), daily levels of support from partner (model 2a), and daily levels of support from child (model 3a). These models contained random intercepts, which decomposed the total variance of daily positive affect/relationship support per year into between-person variance, reflecting individual differences in *average* levels across three measurement bursts, and within-person (residual) variance not accounted for by between-person differences. The 'between' part of the model is similar to the more familiar autoregressive cross-lagged panel model. Specifically, the models estimated whether rank-order differences in Big Five traits were associated with later rank-order differences in daily positive affect/support, controlling for previous rank-order differences in daily positive affect/support one year earlier (and vice versa).

We tested hypothesis 3 that the indirect effects (paths 'a' \times 'b') are statistically significant using the Delta (or Sobel) method (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). A statistically significant, positive indirect effect indicates that dynamic transactions explained part of the temporal consistency in participants' rank-order position on a personality traits dimension.

In models 1b–3b (Figure 2), we tested hypotheses 1–3 again while controlling for the effects of each positive experience's

²We structured the data in a mixed long-wide format, with at most 15 rows per participant. For example, the data column 'BF11MMext' contained for each mother up to 15 rows of time-invariant (between-person) data on the first extraversion measurement; the column 'posaffected5' contained for each participant up to 15 rows of time-varying (within-person) daily positive affect data collected during the last three assessment bursts (i.e. the fifth year).

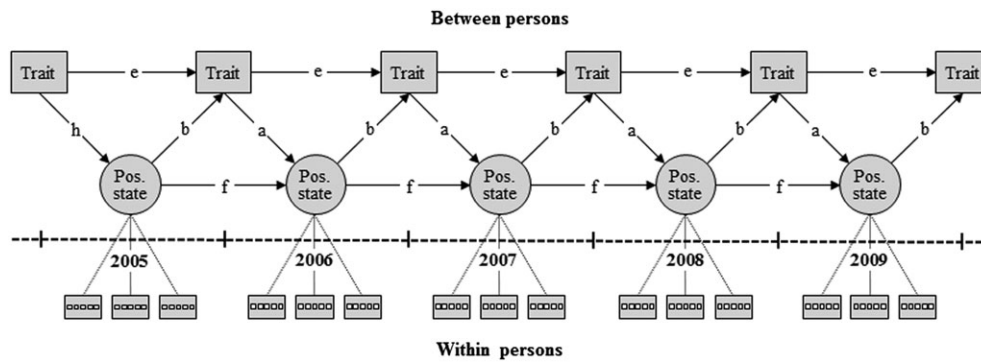


Figure 1. Multilevel structural equation model for estimating bidirectional longitudinal regression effects between yearly measured Big Five personality traits and daily measured positive experiences (Pos. states). Models 1a, 2a, and 3a estimated dynamic transactions with positive affect, relationship support from partners, and relationship support from children, respectively. Each year, we measured daily experiences using three assessment bursts that each lasted five consecutive days. Observed variables are shown in rectangles and latent variables are shown in circles. The latent variables in the ‘between’ part of the model reflect individual differences in average levels of daily positive affect/relationship support, estimated by means of a random intercept. We constrained path coefficients with identical letters to be equal. We omitted (residual) variances and the effects of control variable age to enhance clarity. Path ‘h’ estimated the initial association between personality traits and (unresidualized) between-person differences in daily experiences.

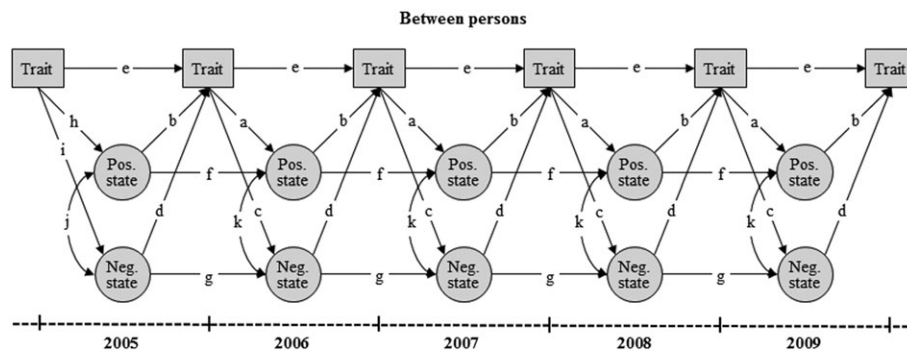


Figure 2. Simplified representation of our multilevel structural equation model for estimating bidirectional longitudinal regression effects between yearly measured Big Five personality traits and daily measured positive experiences controlled for the daily measured negative counterparts of these experiences. We omitted (residual) variances, the effects of control variable age, and the ‘within’ part of the model to enhance clarity. Model 1b included positive and negative affect, model 2b included relationship support and conflict with partners, and model 3b included relationship support and conflict with children. Bidirectional curved arrow indicates that positive and negative experiences were allowed to covary within and between persons. See Figure 1 for more explanation.

negative counterpart. That is, in model 1b, we controlled for negative affect; in model 2b, we controlled for daily conflict with partner; and in model 3b, we controlled for daily conflict with child. In each model, we allowed negative and positive experiences to covary within and between persons.

We accounted for mean-level changes across the study period in personality traits and daily experiences by allowing the regression intercepts to vary across time. We accounted for potentially confounding age effects on individual differences in personality traits and daily experiences by including age as a covariate in all models. We constrained all equivalent regression paths to be equal over time because χ^2 -difference tests for nested models indicated that this did not significantly reduce model fit ($df = 21$; p -values $> .05$). The equality constraints reduced the complexity of our statistical models and ensured that we estimated each hypothesized cross-lagged association only once using data from all assessments. This made the results easier to interpret and increased statistical power.

We used MLR estimation in all models, which estimated model parameters using maximum likelihood and computed standard errors that were robust to non-normality of

observations. We applied a Bonferroni-corrected significance level equal to $\alpha = .05/15 = .0033$ (two sided) because we tested each direct and indirect effect 15 times, once in each of the 15 statistical models. We applied the same significance level of $\alpha = .0033$ in the exploratory analyses that controlled for negative daily experiences. A simplified a priori power analysis using simulation in R suggested that we had sufficient statistical power ($1 - \beta \geq .80$) to detect cross-lagged effects with β 's $\geq .05$.³ The Mplus syntaxes of our multilevel SEMs and the complete results can be found at <https://osf.io/rvp9n/>. The R script that we used to prepare the data, to conduct the latent growth curve model (LGCM) analyses, and to run the Mplus models can be found at <https://osf.io/cdev3/>.

Second, we estimated mean-level and individual-level growth trajectories across the entire study period by means

³We randomly generated 10,000 studies resembling the ‘between’ part of models 1a–3a, with the following population parameters (see Figure 1 for path labels): $\beta_e = .80$; $\beta_f = .90$; $\beta_h = .30$; $\beta_a = .05$; $\beta_b = .05$; $N = 450$; $\alpha = .0033$. The results of these studies indicate that our power was .97 and .83 with respect to path ‘a’ and ‘b’, respectively. The R code of this simulation can be found at <https://osf.io/cdev3/>.

of univariate latent growth curve analyses (Duncan, Duncan, Strycker, Li, & Alpert, 1999) using the *lavaan* (0.5-23.1097) package (Rosseel, 2012) in R (R Core Team, 2017; version

3.4.3). First, we estimated and plotted quadratic growth trajectories on latent Big Five variables (i.e. second-order latent growth curve models). Second, we applied indicator-specific

Table 1. Descriptive statistics

Variable	Year	<i>n</i>	<i>M</i>	<i>SE</i>	<i>SD</i>	Min.	Max.
Extraversion	1	481	5.06	0.05	1.13	1.83	7.00
	2	457	5.17	0.05	1.14	2.00	7.00
	3	451	5.16	0.05	1.12	1.00	7.00
	4	438	5.24	0.05	1.14	1.50	7.00
	5	420	5.27	0.05	1.12	2.00	7.00
	6	415	5.22	0.06	1.13	1.67	7.00
Agreeableness	1	481	5.81	0.03	0.60	3.17	7.00
	2	457	5.85	0.03	0.59	2.67	7.00
	3	451	5.89	0.03	0.57	3.67	7.00
	4	438	5.88	0.03	0.64	1.00	7.00
	5	420	5.93	0.03	0.62	3.50	7.00
	6	415	5.90	0.03	0.62	3.33	7.00
Conscientiousness	1	481	5.11	0.05	1.06	1.67	7.00
	2	457	5.14	0.05	1.05	1.33	7.00
	3	451	5.19	0.05	1.04	1.17	7.00
	4	438	5.22	0.05	1.05	1.83	7.00
	5	420	5.27	0.05	1.00	2.00	7.00
	6	415	5.24	0.05	1.02	2.17	7.00
Emotional stability	1	481	4.51	0.05	1.06	1.33	7.00
	2	457	4.68	0.05	1.08	1.17	7.00
	3	451	4.74	0.05	1.11	1.33	7.00
	4	438	4.79	0.05	1.12	1.67	7.00
	5	420	4.84	0.06	1.13	1.83	7.00
	6	415	4.82	0.06	1.14	1.67	7.00
Openness	1	481	4.72	0.05	1.10	1.83	7.00
	2	457	4.74	0.05	1.07	1.83	7.00
	3	451	4.72	0.05	1.12	1.17	7.00
	4	438	4.73	0.05	1.11	1.83	7.00
	5	420	4.73	0.05	1.12	1.33	7.00
	6	415	4.78	0.05	1.09	1.67	7.00
Positive affect	1	481	20.65	0.17	3.66	9.00	27.00
	2	454	20.52	0.18	3.80	8.67	27.00
	3	434	20.33	0.19	3.95	7.13	27.00
	4	417	20.44	0.19	3.91	8.67	27.00
	5	391	20.25	0.21	4.14	5.82	27.00
Negative affect	1	481	6.01	0.13	2.77	3.00	19.33
	2	454	6.19	0.14	3.02	3.00	21.85
	3	434	6.21	0.15	3.08	3.00	18.48
	4	417	6.11	0.16	3.21	3.00	18.60
	5	391	6.30	0.18	3.51	3.00	19.40
Rel. support partner	1	481	10.84	0.07	1.48	5.00	14.00
	2	453	10.70	0.07	1.52	6.00	14.00
	3	434	10.51	0.08	1.58	4.93	14.00
	4	412	10.55	0.08	1.56	5.18	14.00
	5	391	10.47	0.08	1.66	4.64	14.00
Rel. support child	1	451	10.60	0.08	1.78	2.00	14.00
	2	425	10.64	0.08	1.72	2.87	14.00
	3	404	10.63	0.09	1.72	2.54	14.00
	4	381	10.70	0.09	1.70	3.29	14.00
	5	356	10.65	0.09	1.70	4.20	14.00
Rel. conflict partner	1	481	3.65	0.06	1.42	2.00	9.00
	2	453	3.72	0.07	1.43	2.00	8.67
	3	434	3.80	0.07	1.50	2.00	8.33
	4	412	3.61	0.08	1.53	2.00	10.00
	5	391	3.60	0.08	1.52	2.00	9.00
Rel. conflict child	1	451	3.32	0.06	1.36	2.00	11.00
	2	425	3.45	0.07	1.49	2.00	11.00
	3	404	3.43	0.07	1.49	2.00	10.00
	4	381	3.38	0.07	1.45	2.00	8.62
	5	356	3.35	0.07	1.40	2.00	8.11

Note: *N* = 483. The daily affect and relationship variables were averaged across three assessment bursts that were administered each year.

method factors to the Big Five traits, using the $M - 1$ approach (Geiser & Lockhart, 2012). For each trait, we selected the item with the highest factor loading as reference item. The $M - 1$ approach is more parsimonious and has better psychometric properties than allowing the residuals of the same items to covary over time (Geiser & Lockhart, 2012).

Third, we examined associations between the intercept factors and linear change factors of all study variables. For the Big Five, we re-estimated the second-order latent growth curve models after the removing quadratic slope factors. For the daily experience variables, we estimated linear growth trajectories using five observed variables that reflect participants' daily experiences averaged across the 15 daily observations per year. We correlated the intercept and linear change factors after saving them by means of the 'lavPredict' function of the *lavaan* package.

RESULTS

Descriptive statistics of all study variables are reported in Table 1.

Cross-lagged analysis

Models 1a, 2a, and 3a, which we estimated separately for each Big Five trait, fit the data acceptably (CFIs = 0.88–0.93; RMSEAs = 0.02; SRMR_{within} = 0.02–0.03; SRMR_{between} = 0.07–0.10; Table S1). Table 2 shows the rank-order stabilities (paths 'e' and 'f' in Figure 1), the initial associations between the Big Five traits and the daily experiences (path 'h'), and their cross-lagged associations (paths 'a' and 'b'). Note that the effect sizes of the cross-lagged paths should be interpreted in the light the rank-order stabilities of the two variables in the model and their concurrent association (path 'h'; see also the intercept–intercept correlations of Table 5). Small cross-lagged effects (e.g. $\beta < .10$) are more meaningful if rank-order stabilities and concurrent associations are large than if they are small (Adachi & Willoughby, 2015).

Stability effects

We found high (β 's $\geq .89$) one-year rank-order stabilities for the random intercepts of daily positive affect and relationship support. These stability coefficients exceeded the one-year stabilities of the personality trait measures, which ranged from $\beta = .67$ (agreeableness) to $\beta = .86$ (openness). The high stabilities implied that most of the variance in our measures of personality traits and aggregated daily experiences was accounted for by participants' scores on the same measure one year earlier. Given the relatively small residual variance, we expected cross-lagged associations to be small.

Cross-lagged personality effects on positive daily experiences

We found little evidence for hypothesis 1 that extraversion, agreeableness, conscientiousness, and emotional stability are associated with rank-order increases in positive affect and relationship support. Except for the positive effect of

emotional stability on daily positive affect, none of the predicted associations were statistically significant after Bonferroni correction.

Cross-lagged positive daily experience effects on personality Supporting hypothesis 2, we found that daily experiences of positive affect and relationship support were associated with rank-order increases in extraversion, agreeableness, conscientiousness, and emotional stability. We further found that daily positive affect and relationship support from child were associated with rank-order increases in openness. The strongest cross-lagged associations were the effects of positive affect on emotional stability ($\beta = .14$) and on agreeableness ($\beta = .14$).⁴

Indirect stability effects

We found no support for hypothesis 3 that dynamic transactions between daily experiences and traits account for the one-year rank-order stability of personality traits. Although emotional stability predicted rank-order change in positive affect as well as vice versa, the indirect effect from emotional stability to daily positive affect to subsequent emotional stability was not statistically significant after Bonferroni correction (*indirect effect* = 0.006, *SE* = 0.002, $p = .004 > \alpha = .0033$).

Exploratory analysis: incremental predictive validity of positive and negative daily experiences

Models 1b, 2b, and 3b, in which we controlled for the negative counterpart of each positive daily experience variable, provided an excellent fit to the data (CFIs = 0.97–0.98; RMSEAs = 0.01–0.02; SRMR_{within} = 0.03; SRMR_{between} = 0.05–0.08; Table S2). Table 3 shows that, when we included the measures of positive affect and negative affect in the same model, residualized positive affect (i.e. positive affect controlled for overlap with negative affect)⁵ predicted rank-order increases in agreeableness, conscientiousness, emotional stability, and openness, whereas residualized negative affect (i.e. negative affect controlled for overlap with positive affect) predicted rank-order decreases in extraversion and emotional stability. Furthermore, when we included the measures of relationship support and conflict with partner in the same model, relationship support did not make an independent contribution to the prediction of rank-order changes in personality traits, whereas residualized conflict with partner predicted rank-order decreases in emotional stability. Finally, when we included the measures of relationship support and conflict with child in the same model, residualized

⁴We conducted a sensitivity analysis in which we excluded all data of every third assessment burst to investigate the possibility that the daily experience effects on rank-order change in personality traits were driven by the most recently measured daily experiences, which were assessed a few months before the next trait measurement. The results (Table S3) are very similar to the results of Table 2.

⁵Relatively high residualized positive affect scores indicate that participants reported 'unexpectedly' high levels of positive affect; that is, they reported more positive affect than predicted based on their reported level of negative affect (and their age).

Table 2. Rank-order stabilities of positive daily experiences, initial associations between the Big Five traits and positive daily experiences, and cross-lagged regression effects

Trait	Daily experience	Stability		Initial association Trait ~ Daily exp.				Trait → Rank-order change daily exp.				Daily exp. → Rank-order change trait			
		β	SE	β	<i>b</i>	SE	<i>p</i>	β	<i>b</i>	SE	<i>p</i>	β	<i>b</i>	SE	<i>p</i>
Ext.	Positive affect	.90	.01	.29	.88	.15	<.001	.02	.08	.04	.038	.06	.02	.00	<.001
	Rel. support partner	.91	.01	.21	.29	.07	<.001	.00	.00	.02	.934	.04	.03	.01	<.001
	Rel. support child	.90	.01	.14	.17	.06	.006	.03	.04	.02	.025	.04	.03	.01	<.001
Agr.	Positive affect	.90	.01	.23	1.30	.28	<.001	.03	.20	.07	.007	.14	.02	.00	<.001
	Rel. support partner	.91	.01	.21	.55	.14	<.001	.01	.02	.03	.474	.07	.03	.01	<.001
	Rel. support child	.90	.01	.28	.65	.12	<.001	.02	.06	.03	.083	.10	.04	.01	<.001
Con.	Positive affect	.90	.01	.23	.73	.15	<.001	.01	.04	.04	.290	.06	.02	.00	<.001
	Rel. support partner	.92	.01	.14	.22	.08	.006	-.01	-.02	.02	.323	.04	.02	.01	<.001
	Rel. support child	.90	.01	.19	.24	.06	<.001	.00	.00	.02	.855	.04	.03	.01	<.001
Emo.	Positive affect	.89	.01	.33	1.05	.14	<.001	.04	.16	.05	.002	.14	.04	.00	<.001
	Rel. support partner	.91	.01	.10	.15	.07	.039	.02	.02	.02	.200	.04	.03	.01	.001
	Rel. support child	.90	.01	.19	.24	.06	<.001	.02	.03	.02	.060	.06	.05	.01	<.001
Ope.	Positive affect	.90	.01	.16	.50	.14	.001	.01	.04	.04	.341	.04	.01	.00	<.001
	Rel. support partner	.91	.01	.18	.27	.07	<.001	.00	.00	.02	.885	.02	.02	.01	.015
	Rel. support child	.90	.01	.24	.30	.06	<.001	.03	.04	.02	.035	.04	.03	.01	<.001

Note: Standardized and unstandardized regression coefficients from 15 (i.e. five trait dimensions \times three daily experience dimensions) separate multilevel SEMs (models 1a–3a). The rank-order stabilities of the personality traits (not tabulated) were $\beta = .82$ ($SE = .01$) for extraversion (Ext.); $\beta = .67$ ($SE = .02$) for agreeableness (Agr.); $\beta = .82$ ($SE = .01$) for conscientiousness (Con.); $\beta = .78$ ($SE = .02$) for emotional stability (Emo.); and $\beta = .86$ ($SE = .01$) for openness (Ope.). We controlled all associations for age. $N = 483$. Because we allowed (error) variances to freely vary over time, β 's varied slightly across time lags; therefore, we report average β 's.

Boldface coefficients: $p < .0033$ (significance level after Bonferroni correction).

relationship support predicted increases in agreeableness and openness, whereas residualized conflict with child predicted decreases in emotional stability.

Thus, after accounting for shared variance between positive and negative affect and between relationship support and conflict, positive affect and relationship support re-emerged as significant predictors of rank-order change in personality traits in six of the 14 previously found associations, demonstrating incremental validity in the prediction of rank-order changes in agreeableness, emotional stability, and openness. Residualized negative affect and relationship conflict emerged as predictors of rank-order change in personality traits in four of the 15 estimated associations, predicting rank-order decreases in emotional stability and extraversion. The strongest cross-lagged effects were the effects of residualized positive affect on agreeableness ($\beta = .12$) and of residualized negative affect on emotional stability ($\beta = -.13$). None of the personality effects on rank-order changes in positive or negative daily experiences were statistically significant.

Latent growth curve analysis

All growth models provided an acceptable fit to the data (CFIs = 0.92–0.98; RMSEAs = 0.03–0.06; Table S4). Table 4 shows the results of the growth curve analyses (visualized in Figure 3). The 'mean' estimates of the latent intercepts represent participants' mean personality score at the third personality measurement. The 'mean' estimates of the linear and quadratic slopes represent the mean rate of linear and quadratic personality trait change per year. The

'variance' estimates represent the variance of the individual growth trajectories around the mean growth trajectory.

We found evidence for a linear mean-level increase in conscientiousness, and curvilinear, deaccelerating increases in mean levels of extraversion, agreeableness, and emotional stability across the six yearly measurement occasions. We found no evidence for mean-level change in openness. Figure 3 shows that all mean-level changes were small. We also found evidence for significant individual differences in linear growth trajectories, particularly with respect to emotional stability.

Correlated intercepts and linear growth trajectories

Using univariate latent growth curve analysis, we estimated each participant's linear growth trajectories on all variables. All intercept and linear slope factors had significant variance (p -values $\leq .001$), indicating that mothers differed from each other in their personality and average daily experiences in 2007 and in their linear rates of change in personality traits and daily experiences across the study period. Table 5 shows the correlations among the intercept factors (below the diagonal) and among the linear slope factors (above the diagonal).

We found evidence for small-to-medium-sized positive intercept–intercept correlations between extraversion, agreeableness, conscientiousness, and emotional stability and all three positive affect and relationship support variables. Furthermore, the linear slopes of the Big Five showed small, positive associations with the linear slopes of positive affect and relationship support from child but not with relationship support from partner. Finally, we found evidence for strong

Table 3. Rank-order stabilities of positive and negative daily experiences, initial associations between the Big Five traits and daily experiences, and cross-lagged regression effects

Trait	Daily experience	Stability		Initial association Trait ~ Daily exp.				Trait → Rank-order change daily exp.				Daily exp. → Rank-order change trait			
		β	SE	β	b	SE	p	β	b	SE	p	β	b	SE	p
Ext.	Positive affect	.91	.01	.29	.88	.15	<.001	.02	.07	.04	.093	.03	.01	.00	.022
	Negative affect	.91	.01	-.24	-.54	.10	<.001	-.02	-.06	.03	.054	-.04	-.02	.00	.002
	Rel. support partner	.92	.01	.21	.29	.07	<.001	.00	.00	.02	.846	.02	.01	.01	.098
	Rel. conflict partner	.91	.01	-.19	-.20	.05	<.001	-.02	-.02	.01	.163	-.03	-.02	.01	.026
	Rel. support child	.91	.01	.14	.17	.06	.006	.02	.03	.02	.030	.02	.02	.01	.074
Agr.	Rel. conflict child	.92	.01	-.14	-.15	.05	.005	-.01	-.02	.01	.282	-.03	-.02	.01	.006
	Positive affect	.91	.01	.23	1.29	.28	<.001	.03	.17	.07	.020	.12	.02	.00	<.001
	Negative affect	.91	.01	-.09	-.38	.23	.109	-.02	-.09	.07	.184	-.02	.00	.00	.414
	Rel. support partner	.92	.01	.20	.55	.14	<.001	.01	.02	.03	.617	.04	.01	.01	.135
	Rel. conflict partner	.91	.01	-.16	-.32	.11	.005	-.02	-.05	.03	.108	-.06	-.03	.01	.009
Con.	Rel. support child	.91	.01	.28	.65	.12	<.001	.02	.04	.03	.153	.08	.03	.01	<.001
	Rel. conflict child	.91	.01	-.10	-.21	.11	.058	-.03	-.07	.03	.027	-.05	-.02	.01	.008
	Positive affect	.91	.01	.22	.72	.15	<.001	.01	.03	.04	.408	.04	.01	.00	.003
	Negative affect	.91	.01	-.18	-.45	.12	<.001	.00	-.02	.04	.668	-.03	-.01	.00	.055
	Rel. support partner	.92	.01	.14	.22	.08	.006	-.01	-.02	.02	.222	.02	.02	.01	.079
Emo.	Rel. conflict partner	.91	.01	-.21	-.24	.06	<.001	-.01	-.01	.02	.520	-.03	-.02	.01	.033
	Rel. support child	.91	.01	.19	.24	.06	<.001	.00	.00	.02	.984	.03	.02	.01	.032
	Rel. conflict child	.91	.01	-.18	-.22	.07	.001	-.02	-.03	.02	.066	-.03	-.02	.01	.005
	Positive affect	.90	.01	.33	1.06	.14	<.001	.03	.12	.05	.012	.06	.02	.00	<.001
	Negative affect	.90	.01	-.42	-1.01	.11	<.001	-.03	-.09	.04	.028	-.14	-.05	.01	<.001
Ope.	Rel. support partner	.92	.01	.10	.15	.07	.041	.01	.02	.02	.221	.01	.00	.01	.600
	Rel. conflict partner	.91	.01	-.20	-.22	.06	<.001	-.02	-.02	.02	.110	-.06	-.05	.01	<.001
	Rel. support child	.91	.01	.19	.24	.06	<.001	.02	.03	.02	.084	.02	.02	.01	.134
	Rel. conflict child	.91	.01	-.27	-.32	.06	<.001	-.02	-.03	.02	.063	-.08	-.07	.01	<.001
	Positive affect	.91	.01	.16	.49	.15	.001	.01	.03	.04	.412	.04	.01	.00	.002
Ope.	Negative affect	.91	.01	.00	.01	.11	.956	.00	.01	.03	.829	.01	.00	.00	.385
	Rel. support partner	.92	.01	.18	.26	.07	<.001	.00	.00	.02	.755	.04	.02	.01	.005
	Rel. conflict partner	.91	.01	-.02	-.02	.06	.678	.00	.00	.01	.963	.02	.02	.01	.142
	Rel. support child	.90	.01	.24	.30	.06	<.001	.02	.03	.02	.057	.05	.04	.01	<.001
	Rel. conflict child	.91	.01	-.10	-.11	.05	.041	.00	.00	.02	.742	.01	.01	.01	.308

Note: Standardized and unstandardized regression coefficients from 15 separate multilevel SEMs (i.e. each of the five traits and each of the three pairs of experiences, such as ‘relationship support from partner’ and ‘relationship conflict with partner’, were combined in separate models; models 1b–3b). We controlled all associations for age. $N = 483$. Because we allowed (error) variances to freely vary over time, β 's varied slightly across time lags; therefore, we report average β 's. Boldface coefficients: $p < .0033$ (significance level after Bonferroni correction).

Table 4. Latent growth curve model coefficients ($N = 483$)

Trait	Intercept			Linear change						Quadratic change								
	Mean	Variance		Mean ($\times 100$) ¹			Variance ($\times 100$) ¹			Mean ($\times 100$) ¹			Variance ($\times 100$) ¹					
	Est.	SE	p	Est.	SE	p	Est.	SE	p	Est.	SE	p	Est.	SE	p			
E	5.01*	.06	<.001	1.34*	.10	<.001	5.49*	0.87	<.001	0.99*	.34	.004	-1.03*	.45	.021	0.09	.08	.265
A	5.74*	.03	<.001	0.34*	.03	<.001	3.54*	0.67	<.001	0.65*	.19	.001	-0.64*	.30	.035	-0.03	.04	.488
C	5.22*	.05	<.001	1.13*	.08	<.001	3.58*	0.80	<.001	0.91*	.30	.003	-0.41	.41	.315	0.07	.07	.303
ES	5.20*	.06	<.001	1.47*	.11	<.001	8.03*	1.12	<.001	2.88*	.51	<.001	-1.88*	.50	<.001	0.17	.10	.100
O	3.98*	.07	<.001	2.17*	.16	<.001	1.61	1.11	.146	1.96*	.52	<.001	0.35	.50	.485	0.07	.11	.506

Note: E, extraversion; A, agreeableness; C, conscientiousness; ES, emotional stability; O, openness. We set the intercept at the third personality trait measurement. M age at the first measurement was 44 years ($SD = 4.36$). ¹Because the mean and variance estimates and SE 's of the linear and quadratic change parameters contained many leading zeros, we multiplied them by 100; p -values were not multiplied. * $p < .05$.

intercept–intercept and slope–slope correlations between positive affect and negative affect and between relationship support and relationship conflict. Furthermore, the intercepts of positive affect and support were substantially negatively correlated with negative affect and relationship support. The strongest correlation was found between the intercepts of positive and negative affect ($r = -.72$).

DISCUSSION

In this study, we examined the dynamic transactions between individual differences in Big Five personality traits and positive daily experiences in a sample of middle-aged mothers. Using five-year measurement burst data and multilevel SEM, we found little evidence for associations between

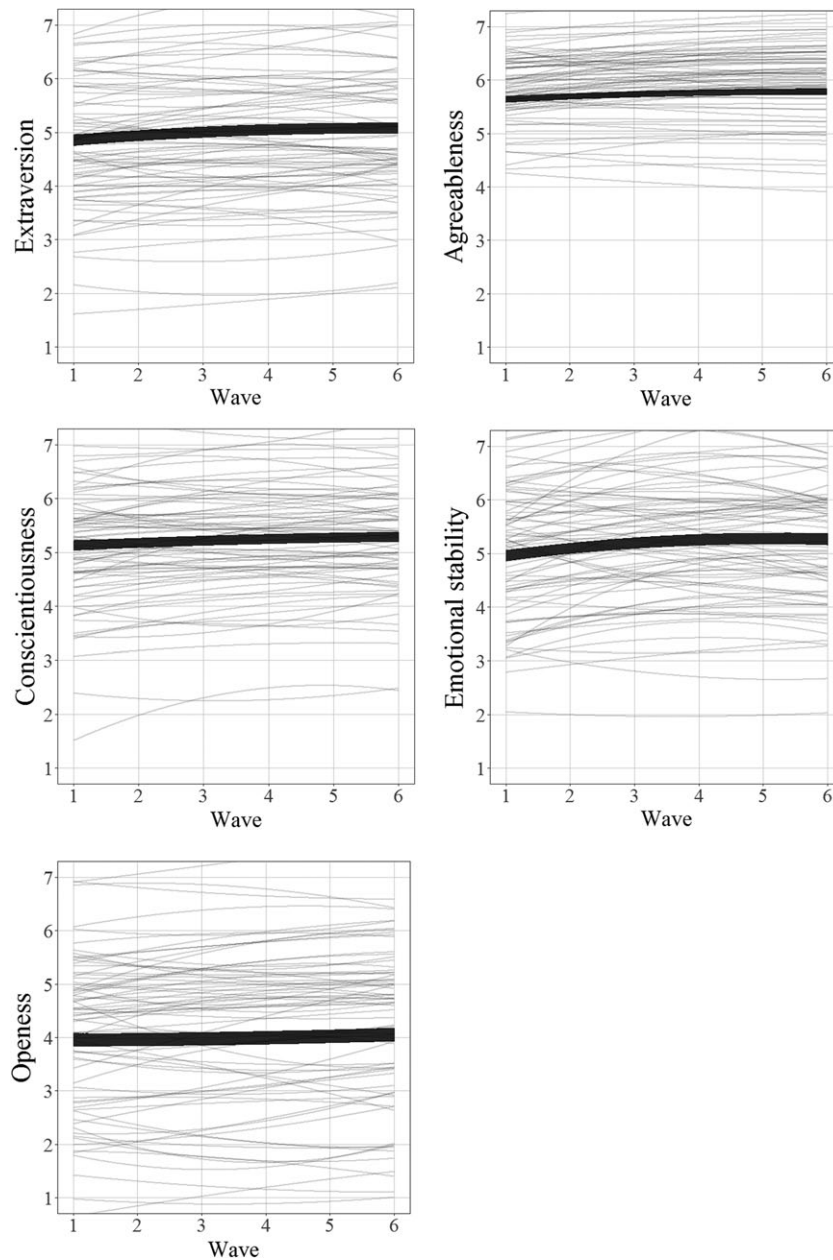


Figure 3. Mean-level and individual-level development in Big Five personality trait levels from the first to sixth yearly personality trait measurements. The upper and lower bounds of the thick black lines represent the 95% parametric bootstrap confidence intervals of the mean-level slope. The individual growth trajectories ($N = 75$) were drawn from a simulated multivariate normal distribution of quadratic trajectories based on the LGCM parameter estimates (Table 2). At the first wave, participants were on average 44 years old ($SD = 4.36$) and had at least one 13-year-old child.

personality traits and rank-order changes in positive daily experiences. In contrast, daily experiences of positive affect and perceived relationship support/affection were positively associated with subsequent rank-order changes in all Big Five traits. Furthermore, we found that for some of these associations, positive daily experiences demonstrated incremental validity in predicting rank-order changes in personality traits over and above negative daily experiences. Taking the high rank-order stability of our trait measures into account (Adachi & Willoughby, 2015), the effect sizes of the daily experience effects on subsequent personality traits ranged from small to medium.

Daily experiences were associated with rank-order changes in personality traits

Consistent with our hypotheses, we found that daily positive affect and perceived relationship support were associated with subsequent rank-order increases in extraversion, agreeableness, conscientiousness, emotional stability, and openness. We found similar effects of relationship support from partners and relationship support from children. These results are consistent with dynamic perspectives suggesting that personality is an open system that can be affected and changed by contextual and psychological influences, even in middle

Table 5. Intercept correlations (lower triangle) and linear slope correlations (upper triangle) among study variables

	1. Ext.	2. Agr.	3. Con.	4. Emo.	5. Ope.	6. PA	7. NA	8. Su. p	9. Co. p	10. Su. c	11. Co. c
1. Extraversion	—	.13**	.05	.29***	.13**	.11*	-.14**	.05	.00	.10*	-.08
2. Agreeableness	.30***	—	.34***	.16***	.28***	.19***	-.24***	.06	-.15**	.11*	-.18***
3. Conscientiousness	.02	.22***	—	.03	.27***	.09*	-.12**	.03	-.07	.06	-.06
4. Emotional stab.	.41***	.19***	.05	—	.10*	.19***	-.26***	.03	-.10*	.10*	-.11*
5. Openness	.11*	.24***	-.03	-.01	—	.17***	-.16***	.04	-.04	.11*	-.03
6. Pos. affect	.30***	.33***	.23***	.42***	.08	—	-.64***	.28***	-.22***	.31***	-.20***
7. Neg. affect	-.27***	-.21***	-.19***	-.51***	.06	-.72***	—	-.21***	.35***	-.25***	.29***
8. Supp. partner	.20***	.24***	.12**	.14**	.08	.52***	-.36***	—	-.55***	.36***	-.16***
9. Confl. partner	-.20***	-.18***	-.20***	-.23***	.06	-.51***	.64***	-.59***	—	-.14**	.36***
10. Supp. child	.15***	.28***	.15***	.21***	.16***	.57***	-.38***	.52***	-.35***	—	-.54***
11. Confl. child	-.14**	-.18***	-.20***	-.30***	-.03	-.49***	.60***	-.29***	.65***	-.57***	—

Note: * $p < .05$; ** $p < .01$; *** $p < .001$. Intercepts were set at the third trait measurement or the daily assessments of the third study duration year (2005). We also examined within-person associations. At the within-person level, daily positive affect was positively associated with daily relationship support ($r = .25$ for support from both partner and child) and daily support from partner was positively associated with daily support from child ($r = .24$). We found negative within-person associations between positive and negative affect ($r = -.62$), between relationship support and conflict with partner ($r = -.53$), and between relationship support and conflict with child ($r = -.56$).

adulthood (Baumert et al., 2017; Geukes et al., 2018; Roberts, 2018; Roberts & Jackson, 2008; Wrzus & Roberts, 2017).

In contrast, these results are more difficult to reconcile with the notion that personality traits are immune to the effects of psychological experiences, as asserted by endogenous personality theories (McCrae & Costa, 2008; McCrae & Sutin, 2018). Our results also speak against the view that the difference between ‘happy and unhappy people’ can be almost entirely traced back to individual differences in extraversion and emotional stability (Costa & McCrae, 1980). Rather, the present results are more consistent with the view that people’s personality traits can be, at least partly, traced back to their idiosyncratic accumulation of happy and unhappy everyday experiences (Soto, 2015).

An open question concerns the mechanisms that underlie the observed longitudinal associations between positive experiences and change in personality traits. It has been argued that positive affective and interpersonal experiences may trigger increases in trait-relevant thoughts, feelings, and behaviours, which may over time accumulate and manifest in increased trait levels (Fleeson, 2007; Judge et al., 2014; Roberts & Jackson, 2008; Soto, 2015). In the present study, it may be that on days on which mothers experienced more positive affect and relationship support, they might have also acted more outgoing, friendly, persistently, even-tempered, and creatively than usual (Ching et al., 2014; Huang & Ryan, 2011; Isen, 1999; Wilson et al., 2017), corresponding to higher state levels of extraversion, agreeableness, conscientiousness, emotional stability, and openness, respectively. According to contemporary dynamic personality theories (Baumert et al., 2017; Geukes et al., 2018; Roberts & Jackson, 2008; Wrzus & Roberts, 2017), recurrent enactment of such Big Five-relevant states may gradually lead to changes in Big Five traits by means of biological mechanisms (e.g. changes in gene expressions and neuroanatomical structures), associative mechanisms (e.g. implicit learning, reinforcement learning, and habit formation), and reflective mechanisms (e.g. conscious memories about one’s past states) (Baumert et al., 2017; Roberts, 2018; Wrzus &

Roberts, 2017). Future research is needed to advance our understanding of the mechanisms through which daily psychological experiences may lead to personality trait changes.

Incremental predictive validity of positive daily experiences

Aggregated positive experiences were negatively associated with aggregated negative experiences, indicating that mothers who experienced on average more happiness and relationship support tended to experience on average less anger, sadness, anxiety, and relationship conflict. We tested the incremental validity of negative and positive experiences in predicting rank-order change in personality traits and found evidence for both common and unique effects of positive and negative daily experiences. With regard to common effects, we found that some associations weakened and were no longer statistically significant after entering positive and negative experiences as simultaneous predictors of rank-order change in personality traits. That is, some associations seemed to be driven by joint effects of the absence of negative experiences and the presence of positive experiences.

However, positive and negative daily experiences also showed unique associations with rank-order changes in personality traits. For example, consistent with research showing that people act more cooperatively when experiencing positive affect (Isen, 1999), we found that, after controlling for negative affect, positive affect was still associated with rank-order increases in agreeableness. The unique effects of positive experiences on personality traits are inconsistent with perspectives that emphasize the dominance of negative experiences over positive experiences (Baumeister et al., 2001; Labianca & Brass, 2006; Taylor, 1991; Wrzus & Roberts, 2017). Taken together, our results suggest that the effects of daily experiences on personality traits are partly driven by aspects that are unique to pleasant and unpleasant daily experiences and partly by aspects that are shared between having pleasant experiences and not having unpleasant experiences.

Personality traits were not associated with rank-order changes in daily experiences

The Big Five were positively associated with the daily experiences of positive affect and relationship support during the first assessment bursts. These associations are consistent with both endogenous and dynamic personality theories and with a large body of previous research. However, contrary to our predictions, we found little evidence suggesting that individual differences in personality traits developmentally preceded individual differences in daily experiences. Although this finding seems to conflict with the widely held view that personality traits are distal causes of daily psychological experiences (Allport, 1937; Deary, 2009; Fleeson & Jayawickreme, 2015; McCrae & Costa, 1991; McCrae & Sutin, 2018; Roberts, 2018; Wrzus & Roberts, 2017), we cannot rule out alternative explanations that are consistent with this view. First, our results are consistent with the possibility that, during an earlier developmental phase, a fixed, stable component of personality produced stable individual differences in daily experiences, resulting in a stable correlation between traits and experiences during middle adulthood (Roberts, 2018). Second, the effects of personality traits might have been obscured by environmental constraints. Because of their role as a parent, our participants might have had relatively little flexibility in selecting new situations corresponding to their personality traits. For example, personality traits may play a more important role in the selection and initial development of newly formed relationships (Selfhout et al., 2010) than in the development of highly stable, well-established relationships.

Perhaps counter-intuitively, but consistent with previous research on adolescence (Borghuis et al., 2018), we found that the rank-order stabilities of the random intercepts of the daily experiences were larger than the rank-order stabilities of the personality trait variables. In fact, individual differences in daily positive affect and relationship support experiences were so stable that no significant rank-order changes may have occurred that could be predicted by personality traits. This finding raises conceptual questions related to the meaning of traits and aggregated states. For example, what accounts for the stable between-person differences in daily experiences/states after averaging across a large number of observations? One possible source of variance is personality traits. Whereas mothers' ratings on any particular day might have been largely influenced by external factors, such as their partner's mood, their *average* level across multiple weeks might have been influenced by a (combination of) underlying trait(s), such as dispositional positive affect or optimism. It is also possible that other factors exerted a persistent, stabilizing influence on individual differences in the daily diary ratings, such as stable environmental characteristics (e.g. job or neighbourhood characteristics and partner/child characteristics) and response styles (e.g. acquiescence and desirability response biases).

Furthermore, the lower rank-order stability of the Big Five raises the question to what extent ordinary one-shot personality trait questionnaires contain unintended state variance, which may be caused by temporary effects of

unsystematic recent experiences (Roberts, 2018). For example, feeling nervous before giving a presentation may temporarily bias one's self-perceived trait level of emotional stability downwards. As statistical aggregation cancels out random temporary influences on states (Epstein, 1979), it is possible that one-shot personality trait measures contain more state variance than aggregated daily experience measures. State variance in personality trait measures is undesirable and can be considered noise because unstable characteristics such as states do not have a long-term influence on future experiences and traits, nor can they be influenced by experiences and trait levels in the distant past (Asendorpf & van Aken, 2003; Neyer & Asendorpf, 2001).

Limitations and future directions

This study was not without limitations, which may be addressed in future studies. First, we cannot infer from our correlational design that the longitudinal associations between traits and daily experiences were causal. It is possible that the non-specific effects on the Big Five traits were driven by multiple third variables that exerted trait-specific effects or by a non-specific third factor that influenced multiple traits (e.g. biological maturation and improved self-regulation ability; Hennecke, Bleidorn, Denissen, & Wood, 2014). Relatedly, the assessment bursts were timed in-between the personality measurements. Therefore, we cannot rule out that ongoing personality changes between trait measurements confounded participants' daily reports. Future research should administer the assessment bursts simultaneously with the personality measurements.

Second, our statistical models were designed to investigate developmental processes that occurred between persons; therefore, we cannot draw inferences about within-person processes. To gain a deeper understanding of the longitudinal relations between daily experiences and personality traits, future research may use within-person statistical models (Bainter & Howard, 2016; Berry & Willoughby, 2017; Hamaker, Kuiper, & Grasman, 2015) and experimentally manipulate daily experiences. For example, intervention studies could test whether random assignment of participants to either a control condition or a treatment condition aimed at increasing daily positive affect (e.g. by repeatedly sending unexpected small gifts and complements; Ogedegbe, 2012) and relationship support (e.g. by creating support groups; Stewart, Craig, MacPherson, & Alexander, 2001) is associated with differential changes in personality traits (Sih et al., 2015).

Third, self-report measures are prone to certain biases. As discussed previously, it is possible that our aggregated daily experience measure contained substantial trait variance. To gain a finer-grained and more objective measure of participants' momentary experiences in daily life, future research may also use smartphone sensing methods, experience sampling methods, and informant reports (Harari et al., 2016). Likewise, it is possible that our trait measure contained substantial state variance. Even though our results were robust to excluding data of every third assessment burst, which was administered most recently before each trait measurement

(see footnote 4; Table S3), we cannot completely rule out the possibility that participants temporarily appraised their personality traits differently as a result of past daily experiences, without having truly changed in their personality traits (Roberts, 2018). Future research may elapse more time between assessment bursts and subsequent personality trait measurements by administering assessment bursts simultaneously with the personality measurements. Moreover, future research may use alternative personality measures that are less prone to bias caused by recent experiences, such as behavioural data and informant reports (Eid & Diener, 2006), or by means of aggregating bursts of repeatedly measured personality states, analogous to how we measured daily positive affect and relationship support (Geukes et al., 2018; Roberts, 2018). An advantage of the latter method is that it may reduce state variance to similar extents in both aggregated daily experience variables and trait variables, which allows for a fairer test of their dynamic transactions.

Fourth, we used a rather homogeneous sample of Dutch mothers of at least one adolescent child. It remains an open question whether our results generalize to other populations and other relationship experiences. For instance, it may be that the effects or relationship support are stronger for mothers than for fathers, as women have been found to be interpersonally more sensitive than men (Hall, 1978; Montagne, Kessels, Frigerio, de Haan, & Perrett, 2005).

Conclusions

Four conclusions stand out. First, we found little evidence for Big Five personality trait effects on rank-order changes in daily experiences. Second, individual differences in average levels of daily positive affect and relationship support were highly stable; therefore, no significant rank-order changes might have occurred that could be predicted by personality traits. Third, consistent with contemporary dynamic personality theories but inconsistent with endogenous theories, we found that high levels of daily positive affect and relationship support/affection were related to rank-order increases in extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. Fourth, for some of these associations, positive daily experiences demonstrated incremental validity in predicting rank-order changes in personality traits over and above their statistical overlap with negative daily experiences. Taken together, our results suggest that recurrent daily positive experiences contribute to personality trait changes among middle-aged women.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1 Fit Statistics Models 1a-3a

Table S2 Fit Statistics Models 1b-3b

Table S3 Sensitivity Analysis: Results of Model 1a-3a after Excluding Data from Every Third Assessment Burst

Table S4 Fit Statistics Models Second-Order Latent Growth Curve Models for the Big Five

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