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Treating Personality-Relationship Transactions With Respect: Narrow Facets, Advanced Models, and Extended Time Frames

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Contrary to premises of dynamic transactionism, most studies investigating personality-relationship transaction only found personality effects on relationships but failed to find effects of relationship experiences on personality development. The current study reconsiders this issue in 3 ways. First, alongside the broad Big Five characteristics (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness), specific personality facets were considered to make comparisons with relationships more symmetric. Second, a recent extension of latent change modeling was applied allowing for a theoretically more appropriate model that compensates for the shortcomings of traditionally used cross-lagged panel or growth curve models. Third, personality-relationship transaction was studied from young adulthood to midlife using a 15-year longitudinal study with 654 German adults. Results showed patterns of personality-relationship transaction with the romantic partner, friends, kin, and other interaction partners. Specifically, the development of Neuroticism, Agreeableness, and Conscientiousness and their facets was closely interacting with partner and friend relationships, underlining the importance of these relationships for personality maturation during the adult years. We conclude that relationship effects have often been underestimated in previous studies. They are not bound to specific developmental periods, such as emerging adulthood, but their detection depends on the modeling approach and the analysis level (broad dimensions vs. facets). Relationship effects are most likely to occur in relationships that reflect self-selected life styles and circumstances.

Keywords: personality development, dynamic transactionism, personality-relationship transaction, latent change, Big Five facets

The paradigm of dynamic transactionism (e.g., Magnusson, 1990) states that an individual's personality and an individual's environment are likewise agentic and codevelop through dynamic, continuous, and reciprocal processes of transaction. This means that on the one hand an individual's environment is influenced by his or her personality and on the other hand the environment itself exerts influences on personality.

This idea is all the more appealing since recent meta-analyses (Roberts, Walton, & Viechtbauer, 2006) and several large-scale studies (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; Lucas & Donnellan, 2009; Lüdtke, Roberts, Trautwein, & Nagy, 2011; Roberts, Caspi, & Moffitt, 2001; Specht, Egloff, & Schmukle, 2011) have shown that mean-levels of Neuroticism, Agreeableness, and Conscientiousness change over time. Additionally, certain life events were found to function as moderators of change (Jokela, Kivimäki, Elovainio, & Keltikangas-Järvinen, 2009; Lüdtke et al., 2011; Specht et al., 2011; Zimmermann & Neyer, 2013). Interestingly, some of these life events are instantaneously reflected in changes in an individual's social environments (Neyer, Mund, Zimmermann, & Wrzus, 2013). For instance, while some events are accompanied by increases in social networks (gaining new colleagues or fellow students), others are accompanied by relationship losses (death of a spouse, divorce; Wrzus, Hänel, Wagner, & Neyer, 2013). At the same time, it was also shown that the likelihood of the occurrence of some of these life events is in turn influenced by personality characteristics (Jokela et al., 2009; Lüdtke et al., 2011; Specht et al., 2011). These findings suggest that the most important part of an individual's environment is social as manifested in his or her relationships with other people. It is thus reasonable to concentrate not only on individuals when examining patterns of personality development, but additionally on their interaction partners (Caspi, 2000; Reis, Collins, & Berscheid, 2000).

Although it was previously claimed that relationship experiences are particular driving forces of personality development (Lang, Reschke, & Neyer, 2006; Lehnart & Neyer, 2006; Lehnart, Neyer, & Eccles, 2010; Neyer & Lehnart, 2007; Sturaro, Denissen, van Aken, & Asendorpf, 2008), most studies explicitly building on the ideas of dynamic transactionism failed to find the expected effects of relationship experiences on personality dimensions. In the current article, we seize the idea formulated by Neyer and Asendorpf (2001) that comparisons between personality and relationship variables are unfair, and we address this issue by incorporating not only the broad Big Five dimensions but also their

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more specific facets (e.g., facets of Neuroticism such as Negative Affect and Self-Reproach). Second, we take the assumptions of dynamic transactionism seriously by applying a recent extension of latent change modeling that allows for a theoretically more appropriate model and compensates for the shortcomings of traditionally used cross-lagged panel or growth curve models. Third, we examine patterns of personality-relationship transactions not only in emerging adulthood (Arnett, 2000) but up to the midlife transition. By briefly reviewing previous research on personality-relationship transaction in the next section, we describe each of these points in more detail and explain why their consideration is necessary.

The Study of Personality-Relationship Transactions

First, previous research on personality-relationship transactions consistently found effects of personality on changes in relationship experiences to be stronger and more frequent than effects of relationship experiences on changes in personality (Asendorpf & van Aken, 2003; Asendorpf & Wilpers, 1998; Branje, van Lieshout, & van Aken, 2004; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Parker, Lüdtke, Trautwein, & Roberts, 2012; Scollon & Diener, 2006). As an approach to explain the superiority of personality effects, Neyer and Asendorpf (2001) claimed comparisons between personality dimensions and relationship variables to be unfair. This is not only due to the fact that personality as assessed based on the five-factor theory (FFT) is highly stable across time and therefore more likely to influence less stable relationship variables. Additionally, personality dimensions are rather broad and describe general behavioral tendencies (John, Naumann, & Soto, 2008; McCrae & Costa, 2008), while measures of relationship experiences are usually more specific. Even though the aggregation of experiences over meaningful relationship categories (e.g., friends, kin) removes some error variance, the reliability of measures of relationship aspects falls far below the reliability of personality inventories (Epstein, 1983). In other words, there is a misfit between personality and relationship variables regarding the level of abstraction, which can lead to an underestimation of relationship effects (see also Wittmann, 1988).

The consideration of surface characteristics, or of the finer-grained facets of the Big Five are two viable ways to circumvent the tendency to discount relationship effects. Surface characteristics such as self-worth or loneliness are less stable than the broad Big Five dimensions and highly susceptible to environmental influences, as demonstrated by Asendorpf and van Aken (2003). In contrast, to our knowledge no study has yet examined how the multiple facets of the Big Five dynamically interact with relationship experiences. As opposed to the surface characteristics, facets are part of an individual's basic tendencies (McCrae & Costa, 2008) but are narrower in scope than the broad dimensions. Thus, the facets of the Big Five might be more symmetric to and consequently better comparable to measures of relationship aspects. Many studies have demonstrated the usefulness of considering the Big Five's facets in different research areas (Ashton, 1998; Bleidorn et al., 2009; O'Connor & Paunonen, 2007; Paunonen & Ashton, 2001; Rhodes & Courneya, 2003; Rhodes, Courneya, & Jones, 2002; Soto & John, 2012; Weiss & Costa, 2005). With regard to personality-relationship transactions, the failure to detect relationship effects on the broad Big Five factors might be due to the fact that relationship experiences rather work as narrow mechanisms (Soto & John, 2012) and exert influence only on specific facets.

Second, there are also methodological issues that could have led to an underestimation of relationship effects in previous research. Although the frequently used cross-lagged panel models and latent growth curves both are sophisticated tools, they do not allow changes in one domain (personality or relationships) to predict subsequent changes in the respective other domain. Such prediction, however, is an implicit assumption of dynamic transactionism (Magnusson, 1990), which states that the way one domain develops is influenced by and subsequently influences the development of the other domain. Cross-lagged panel models indeed predict changes, but when examining more than two waves of measurement, these changes are not used as predictors of subsequent changes further on (Little, Bovaird, & Siegers, 2006; McArdle, 2009). In bivariate growth curves, changes in one domain (slopes) are predicted by previous levels of the other domain. Since there is usually only one parameter indicating change, it is not possible to assess whether these changes influence later changes, irrespective of the number of measurement occasions. Thus, to capture the full dynamic between personality characteristics and relationship experiences, a modeling approach is needed that simultaneously takes into account effects of previous levels on later changes and the effects of prior changes on subsequent changes. Such a model is outlined in the method section.

A third limitation of previous research is the constrained age range for which data exist. Most studies on personality-relationship transactions have focused on adolescence (Asendorpf & van Aken, 2003; Branje et al., 2004) and emerging adulthood (Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001; Parker et al., 2012; Robins, Caspi, & Moffitt, 2002; Sturaro et al., 2008). Only few studies have assessed the pattern of transactions beyond emerging adulthood (i.e., the age of 30 years; Neyer & Lehnart, 2007; Scollon & Diener, 2006). Given that some authors conceptualize young adulthood as the time between 18 and about 40 years (Helson, Soto, & Cate, 2006; Lachman, 2004), a gap in research concerning personality-relationship transaction in the second part of young adulthood up to the midlife transition is evident.

The Study of Social Relationships

A challenge in the field of personality-relationship transaction is the proper conceptualization of networks or relationships that have the potential to influence personality development. According to Neyer, Wrzus, Wagner, and Lang (2011), three important types of relationships can be differentiated: relationships with a romantic partner, kin, and nonkin. Because of friends' prominent role during young adulthood (Hartup & Stevens, 1997), it seems reasonable to further subdivide the nonkin category into friends and other nonkin. Based on previous research (Hartup & Stevens, 1997; Lehnart et al., 2010; Robins et al., 2002; Sturaro et al., 2008), we expected relationships with a romantic partner and friends to be most important for personality development in young adulthood, because these relationship types more than any other reflect individual life styles and circumstances that people actively choose and that in turn influence them.

Relationships With a Romantic Partner

The relationship with a romantic partner is probably the most intimate relationship possible, at least in Western societies. It is characterized by higher amounts of both emotional closeness and reciprocity (Neyer et al., 2011), compared to other relationship types. Previous research has shown, on the one hand, that an enduring intimate relationship has effects on personality development (Lehnart & Neyer, 2006; Lehnart et al., 2010; Neyer & Asendorpf, 2001; Robins et al., 2002). Changing or shortly lasting romantic relationships, on the other hand, seem to be mainly influenced by personality characteristics (Lehnart & Neyer, 2006). Personality effects also operate in long-term relationships with regard to relationship satisfaction and stability (Karney & Bradbury, 1995; Robins, Caspi, & Moffitt, 2000). Given this pattern of previous findings, we expected both personality and relationship effects to occur in this relationship type.

Relationships With Friends

Friends play an important role as socialization agents in adolescence and remain crucial sources of support and well-being throughout the entire life span (Collins & van Dulmen, 2006; Furman & Buhrmester, 1992; Hartup & Stevens, 1997). Although the absolute number of friends steadily declines throughout adulthood (Wrzus et al., 2013), close and important, and thus influential, friends may be retained (Carstensen, 1995). Prior studies found personality characteristics to play an important role during the rise and early stages of friendships (Asendorpf & Wilpers, 1998; Parker et al., 2012; Selfhout et al., 2010). Additionally, we assume that friendships will also retroact and influence further personality development, since they require mutual adaptation. This interaction of selection and socialization should translate in a more reciprocal pattern of personality-relationship transaction in the specific context of friendship.

Relationships With Kin

Relationships with kin as aggregated in the current study comprise relationships with (step-)parents, siblings, grandparents, children, and other kin. The network of kin can be thought of as a rather closed system. Accordingly, a recent meta-analysis by Wrzus et al. (2013) demonstrated the size of this network to be remarkably stable across the life span. The relationships within this network are determined by genetic kinship and are only seldom ended deliberately. Kin relationships become increasingly important with age, and subjective closeness toward kin is usually higher than closeness toward friends, particularly in older adults (Carstensen, 1995; Neyer & Lang, 2003).

During young adulthood, relationships with kin undergo heavy transformations and renegotiation (Aquilino, 2006). While kin relationships are influential during childhood and adolescence, they might be less influential during young adulthood, when the key task is to establish an autonomous and independent lifestyle (Arnett, 2000). Shaping relationships with kin might thus be primarily subject to one's personality. Accordingly, we primarily anticipated personality effects to occur.

Relationships With Others

This subnetwork includes colleagues, neighbors, fellow club members, and other persons. These relationships are characterized by their relative looseness and lesser emotional closeness (Granovetter, 1973; Neyer et al., 2011). This does not mean, however, that such relationships are unimportant. The particular strength of these weak ties is the provision of nonredundant information (Granovetter, 1973) and also support (Thomése, van Tilburg, & Knipscheer, 2003). If complemented by relationships with kin and friends, relationships with others have been shown to be beneficial for an individual's health (Cohen, 2004). Since relationships with neighbors, colleagues, and fellow club members are neither as voluntary as friend relationships nor as determined as kin relationships and thus barely require mutual adaptations, we expected neither personality nor relationship effects to occur.

Present Study

The present study pursued the goal to treat personality-relationship transactions with respect by circumventing the problems of prior research outlined above. As already explained, we expected reciprocal transactions especially with regard to partner and friend relationships, while kin relationships were expected to be mainly characterized by personality effects. We expected neither personality nor relationship effects in the network of others.

Rather than aiming at single effects of one variable on the other, our comprehensive approach focused on the overall pattern of transactions. Accordingly, we developed the expectations detailed below concerning the types of effects included in our model.

First, cross-lagged effects predict changes in one domain by previous states, or levels, of the other domain (Little et al., 2006). Effects of personality on changes in relationship experiences can be distinguished from effects of relationship experiences on personality change. Since most of the previous research on personality-relationship transaction found personality effects to be stronger and more frequent than relationship effects, we anticipated a similar pattern for the Big Five factors. In contrast, dynamic transactions between personality and the social environment should be more pronounced with regard to the personality facets. Concerning them, we expected a pattern of approximate parity between personality and relationship effects in partner and friend relationships. With regard to personality effects, we expected most of them to involve Neuroticism, as this was the characteristic consistently found to influence relationship experiences independent of interaction partners (Asendorpf & van Aken, 2003; Asendorpf & Wilpers, 1998; Karney & Bradbury, 1995; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Parker et al., 2012; Robins et al., 2002). Concerning the other dimensions, we expected a scattered pattern since previous research found them not to generalize over several relationship types (e.g., Neyer & Asendorpf, 2001; Parker et al., 2012).

With regard to relationship effects, we expected Neuroticism, Agreeableness, Conscientiousness, and their respective facets to be affected, since the strongest mean-level and differential changes during young adulthood were found for these characteristics (Roberts et al., 2006; Roberts & Wood, 2006; Roberts, Wood, & Caspi, 2008). Thus, they should be particularly susceptible to the influences of narrowly acting developmental mechanisms (Soto & John, 2012), which we assume relationship experiences to be.

Likewise, changes in these characteristics should retroact on relationships.

Second, with change-change effects, changes in either personality characteristics or relationship experiences are predicted by previous changes in the other domain. Hence, they capture dynamic aspects of individual development and better mirror the assumptions of dynamic transactionism (Magnusson, 1990). The development of a more mature personality should facilitate the establishment of satisfying, intimate, and close relationships (Reis et al., 2000; Roberts & Wood, 2006). Accordingly, we hypothesized that changes in Neuroticism, Agreeableness, and Conscientiousness would predict later changes in the relationship domain. Likewise, changes in voluntary and close relationships with a romantic partner and friends were expected to influence further personality change.

Method

Participants

At the first measurement occasion in 1995, 661 participants from a representative sample of young German adults were assessed (for a detailed description, see Neyer, 1999; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007). At the following measurement occasions in 1999 and 2003, respondents who already participated at the previous wave were asked to participate again ($N_{1999} = 489$, $N_{2003} = 339$). The last occasion took place in 2010. Unlike the occasions in 1999 and 2003, all participants from the very first occasion in 1995 were sought out. This last measurement occasion was completed by 271 persons.

In the current analyses, we only considered data from the measurement occasions 1995, 2003, and 2010 (referred to as T1, T2, and T3, respectively further on). Participants were only excluded if they provided inconsistent data concerning sex or indicated implausible age during the course of the study. The final sample consisted of $N = 654$ participants (54.28% female). The mean age of the final sample was 24.39 ($SD = 3.69$) in 1995, 32.55 ($SD = 4.47$) in 2003, and 40.2 ($SD = 4.31$) in 2010, respectively. Missing data were treated by the full information maximum likelihood procedure (FIML; Enders, 2010), as implemented in Mplus (Muthén & Muthén, 1998–2012).

Measures

Personality. The German version of the NEO Five-Factor Inventory (NEO-FFI; Borkenau & Ostendorf, 1993) was used to assess the personality dimensions Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. Unlike the other four dimensions, Openness was assessed for the first time in 1999. In order to be able to incorporate all traits of the FFT, we extrapolated T1-Openness by the existing data of the wave conducted in 1999, which was not part of all other analyses.[1] This extrapolated measure closely resembled meta-analytic findings concerning rank-order stability ($r_{tt} = .57$; Roberts & DelVecchio, 2000) and, trivially, mean-level change ($SMD = 0.00$; Roberts et al., 2006) over 4 years.

Coefficient α for Neuroticism ($\alpha_{T1} = .80$, $\alpha_{T2} = .84$, $\alpha_{T3} = .85$), Extraversion ($\alpha_{T1} = .75$, $\alpha_{T2} = .80$, and $\alpha_{T3} = .81$), Openness ($\alpha_{T2} = .73$ and $\alpha_{T3} = .73$), Agreeableness ($\alpha_{T1} = .71$, $\alpha_{T2} = .66$, and $\alpha_{T3} = .68$), and Conscientiousness ($\alpha_{T1} = .80$, $\alpha_{T2} = .80$, and $\alpha_{T3} = .76$) were satisfactory at T1, T2, and T3, respectively.

According to Saucier (1998) and Chapman (2007), the broad dimensions measured with the 60 items of the NEO-FFI can be split up into several facets consisting of three to eight items each. Neuroticism includes the facets Negative Affect and Self-Reproach, Extraversion includes Positive Affect, Sociability, and Activity, Openness includes Aesthetic Interests, Intellectual Interests, and Unconventionality, Agreeableness includes Nonantagonism and Prosociality, and Conscientiousness includes Orderliness, Goal-Striving, and Dependability. We did not calculate facet scores for Openness, as data for T1 were missing, and we refrained from extrapolating data on item-level. Although the facets of the NEO-FFI are rarely used, they proved to be replicable, reliable, and valid (Chapman, 2007; Murray, Rawlings, Allen, & Trinder, 2003). Substantive research also demonstrated their incremental validity above and beyond the broader characteristics (e.g., Rhodes & Courneya, 2003; Rhodes et al., 2002).

In the present study, Coefficient α for the Big Five's facets ranged from .55 to .76 at T1, from .51 to .78 at T2, and from .49 to .81 at T3. These values do not differ statistically significant from those reported by Saucier (1998).

Social relationships. Social relationships were assessed with an ego-centered network approach (Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001). At every measurement occasion, the participants were asked to note up to 35 persons of different categories who have played a major (either positive or negative) role in their lives and with whom they have had contact with at least once during the last 3 months. To facilitate recall, they were provided with a list with 12 categories of interaction partners (e.g., romantic partner, friend, parent, sibling, kin, colleague). Additionally, they were asked to rate each individual relationship concerning conflict frequency (1 = *never* to 5 = *almost always*), contact frequency (0 = *less than once a month* to 5 = *every day*), subjective closeness toward the interaction partner (1 = *very distant* to 5 = *very close*), feelings of insecurity in presence of the interaction partner (1 = *never* to 5 = *always*), and the overall importance of the respective relationship (1 = *better to end the relationship* to 5 = *ending would be a great strain for me*).

In the current article, we focused on the characteristics of different aggregated subnetworks (Feld, Suitor, & Gartner Hoegh, 2007). This procedure allowed us to assess reciprocal transactions between a participant's personality and a typical (average) member of the respective subnetwork, thereby canceling out unrepresentative interaction patterns (Epstein, 1983). Specifically, we included all persons labeled as friends in the friend-network, (step-)parents, grandparents, siblings, children, and other kin in the kin-network, and colleagues, neighbors, fellow club members, and other interaction partners in the network of others. Alongside these three networks, we additionally considered the relationship with a romantic partner, for which no aggregation was applied.

Although the measures of the five different relationship aspects were single-items, previous research demonstrated their satisfying

[1] This was accomplished in two steps. First, we ran a simple confirmatory factor analysis for Openness measured in 1999 and saved the resulting estimated latent factor scores. Second, we added a random error term with $M = 0$ and variance equivalent to the error variance of 1999-Openness to these estimated Openness scores.

retest-reliability over several months (Asendorpf & Wilpers, 1998). As a further proof of reliability, we calculated two coefficients of intraclass correlation (ICC), as proposed by Lüdtke and Trautwein (2007). The ICC(1) is a measure of homogeneity of the ratings and indicates the amount of variance that is due to interindividual differences (variance between persons). The ICC(2) is an indicator of reliability of the aggregated ratings (Hox, 2002). As can be seen in Table 1, most variance of the relationship ratings lies within raters—ICC(1). The reliability of the aggregated measures was comparable to the facet's α-coefficients. ICC(2) ranged from .45 to .80 with insecurity being the most reliable. Mean reliabilities over all networks amounted .57 for conflict, .62 for contact, .62 for closeness, .74 for insecurity, and .65 for importance, respectively. The calculation of the ICCs was not possible for the relationships with the romantic partner, since there was only one partner per participant at maximum.

Analysis Model

The data were analyzed with an extension of bivariate latent change models as shown in Figure 1. The model consists of three parts: (a) two latent change models (one for personality, one for relationship aspects), (b) a cross-lagged panel model, and (c) an extension formalized by Grimm, An, McArdle, Zonderman, and Resnick (2012).

Latent change models. The blocks labeled A1 and A2 in Figure 1 depict the two latent change models, which are the cornerstone of the analyses. The indicators for the latent personality constructs were parcels consisting of four items each. They were allocated to the parcels according to their order in the questionnaire.

The models for personality change (Figure 1, A1) were constrained to be strongly invariant over time by setting the factor loadings and parcel's intercepts equal. For Extraversion and Agreeableness, we only achieved partial strong invariance and set the factor loading of the third parcel at T1 free. Interpretation of all coefficients is, however, warranted (Byrne, Shavelson, & Muthén, 1989). The change scores were modeled in a way that they assess change from occasion to occasion. That is, there is one change variable capturing the changes from T1 to T2 and one change variable capturing change from T2 to T3. These variables represent the differences in the true scores between two adjacent measurement occasions and thus reflect true change (McArdle, 2009). A negative value on a change variable indicates decreases and a positive value increases in a variable between two measurement occasions. The more negative or positive the value, the more pronounced the decrease or increase, respectively. To account for method effects, we additionally included indicator-specific factors (IS in Figure 1), which are more parsimonious and have better psychometric as well as theoretical properties than the widely used correlated uniquenesses (Geiser & Lockhart, 2012).

The same modeling approach was applied to the personality facets, with the exception that the three to eight items making up a facet were used as indicators instead of parcels (Saucier, 1998).

The models for relationship change (Figure 1, A2) were built in a similar vein but with only one item per relationship aspect as indicator. Hence, this part of the model was saturated.

The β-paths examine whether changes in one domain are predicted by previous levels of the same domain (Grimm et al., 2012). While a negative β-weight indicates that those with higher values at a given time point decrease up to the following measurement occasion, positive β-weights denote a tendency to increase in the same variable when it was previously high. This path is comparable to the intercept-slope correlation of growth curves. In the context of the current article, these paths are not of primary interest and are not reported.

Cross-lagged panel model. The combination of the two latent change models leads to a cross-lagged panel model (Figure 1, B), in which changes in one domain are predicted by previous levels of the other domain. Unlike other studies, we modeled changes directly. This enables a straightforward interpretation of the effects and the change-variables to be used later on. Nevertheless, all elements of otherwise specified cross-lagged panel models can be found as well: an initial correlation between both domains (ρ_{IC}), correlated changes (ρ_{CC2} and ρ_{CC3}), the cross-lagged paths predicting relationship change by previous levels of personality ($\gamma_{P1\rightarrow R2}$ and $\gamma_{P2\rightarrow R3}$) and those predicting personality change by previous levels of relationship variables ($\gamma_{R1\rightarrow P2}$ and $\gamma_{R2\rightarrow P3}$). Note that all γ-paths can be interpreted as one variable predicting increases/decreases in the other.

Change-change extension. The extension of these models formalized by Grimm et al. (2012) allows the simultaneous estimation of cross-lagged panel models and the inclusion of changes in one domain as predictors of subsequent changes in the other domain (see Figure 1, C). As in the cross-lagged panel models, there is a personality effect (increases/decreases in personality from T1 to T2 predict subsequent increases/decreases in relation-

Table 1
Homogeneity and Reliability of Relationship Variables in the Three Subnetworks

	Homogeneity			Reliability		
Aspect	T1	T2	T3	T1	T2	T3
			Friend			
Conflict	.24	.22	.19	.63	.60	.56
Contact	.31	.23	.20	.70	.62	.58
Closeness	.22	.16	.22	.61	.51	.59
Insecurity	.37	.43	.40	.76	.80	.78
Importance	.32	.18	.29	.71	.54	.69
			All kin			
Conflict	.20	.16	.13	.57	.51	.45
Contact	.30	.18	.18	.70	.54	.54
Closeness	.32	.22	.21	.72	.61	.59
Insecurity	.37	.35	.32	.76	.75	.72
Importance	.28	.16	.21	.69	.51	.60
			Others			
Conflict	.24	.24	.23	.60	.60	.58
Contact	.32	.16	.32	.69	.47	.69
Closeness	.30	.23	.32	.67	.58	.69
Insecurity	.37	.31	.28	.73	.68	.65
Importance	.36	.24	.38	.73	.60	.75

Note. Homogeneity was calculated via the intraclass correlation (ICC(1)), reliability with the ICC(2). See Hox (2002) for details on formulae. Homogeneity and Reliability were not calculated for the romantic partner.

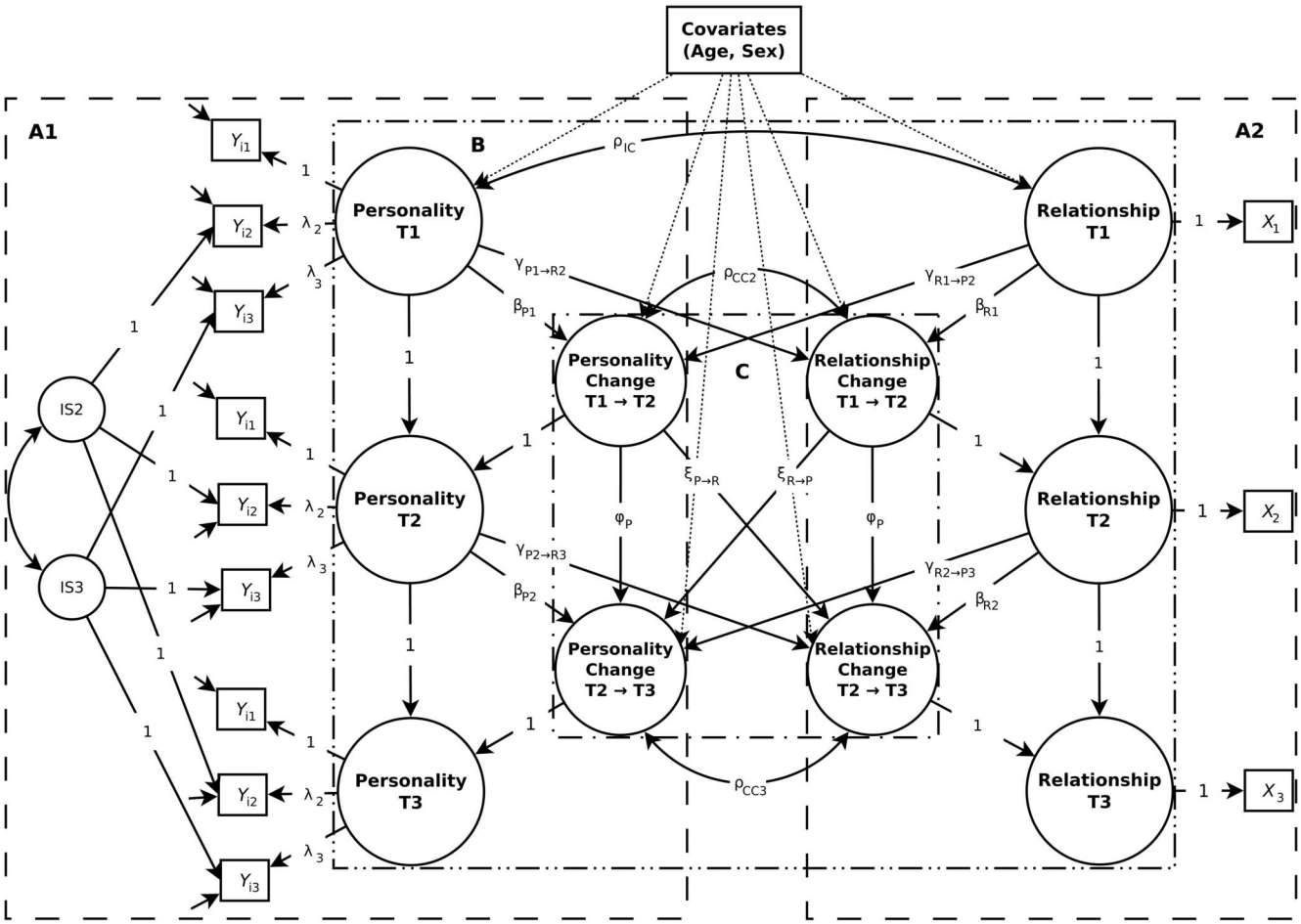

Figure 1. Extended latent change model. A1 is the latent change model for the personality dimensions with item parcels as indicators and indicator-specific factors (IS) to account for method effects. A2 is the latent change model for the relationship aspects. B represents a cross-lagged panel model in which changes in one domain are predicted by previous levels of the other domain. C represents a recent extension of these models, which allow changes in one domain to predict subsequent changes in the other domain. Path labeling according to Grimm, An, McArdle, Zonderman, and Resnick (2012).

ship aspect from T2 to T3; $\xi_{P\rightarrow R}$) and a relationship effect (increases/decreases in relationship experience from T1 to T2 predict subsequent increases/decreases in personality from T2 to T3; $\xi_{R\rightarrow P}$).

It is important to note that cross-lagged and change-change effects can have different signs even when the same variables are involved. Cross-lagged effects address rather static components (a certain level at a certain point in time predicts subsequent changes), whereas change-change effects capture the dynamic aspects of the transaction (changes in one domain predict subsequent changes in the other domain). For example, a positive association between the level of Neuroticism and later changes in conflict frequency (cross-lagged effect) would indicate an increase (decrease) in conflict frequency when Neuroticism is high (low). The change-change effect for the same variables could be negative, indicating that differential increases (decreases) in conflict frequency predict subsequent differential decreases (increases) in Neuroticism.

The α-coefficients assess how changes in one domain influence later changes in the same domain (Grimm et al., 2012) but is not considered in the current article.

In total, we ran 300 models. One hundred models assessed the transactions between the five broad personality dimensions and five relationship aspects in four subnetworks; the remaining 200 did so for the 10 facets of the Big Five. To account for the increased probability of committing type I errors, we followed the procedures of previous studies by only considering effects with a *p* below .01 and a standardized regression coefficient $\geq |.10|$ (e.g., Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001; Parker et al., 2012; Sturaro et al., 2008).

Supplementary Analyses

Alongside the complex models, we also ran conventional cross-lagged panel and latent growth curve models. First, these additional analyses allowed us to examine whether the extended models indeed are superior to the traditional ones. Second, this

procedure allowed us to test whether those effects, that are contained in both the conventional and in the extended models, can be reproduced across methods.

Since each of the complex models also contains a cross-lagged model, we expected all correlations and cross-lagged paths to be reproducible across both methods. In contrast, cross-lagged effects and correlated changes from the latent growth curves convey information about the average effect across the entire study period and are thus not comparable to those derived from the extended models. Accordingly, we expected only the initial correlations to be reproducible between growth curves and the extended models. Neither cross-lagged panel nor latent growth curve models accommodate change-change effects, which thus cannot be reproduced.

All models were calculated using the MLR estimator and controlled for sex and age of the participants. They were built, run, and evaluated with R (R Core Team, 2013) and Mplus (Muthén & Muthén, 1998–2012). When referring to standardized mean differences in the results section, we always used the single-group pretest-posttest effect size (Morris & DeShon, 2002).

Results

Preliminary Analyses

Attrition analyses. Because the dropout rate in the study was rather high, we assessed whether continuers and dropouts differed in important characteristics and, hence, whether the assumption of a random missingness mechanism (MAR; see Enders, 2010), as required by FIML, was met.

Those who dropped out at any point of the 15 years did not differ from those who continued concerning sex ($\chi^2 = 1.64$, $df = 1$, $p = .20$), age ($d = 0.04$), or (manifest) personality scores (ds between −0.08 and 0.12; all confidence intervals include 0). Additionally, no variables above and beyond the reported ones correlated with missingness.

Univariate models. Descriptive information about means, standard deviations, rank-order stability and standardized mean differences are displayed in Table 2 for the latent personality and in Table 3 for the relationship variables, respectively.

On a descriptive basis, the previous findings on personality and relationship change were replicated. Regarding the former, Table 2 shows that there are medium-sized mean-level changes over the 15 years for Neuroticism, Agreeableness, and Conscientiousness while almost no mean-level change occurred for Extraversion and Openness. With two exceptions (Positive Affect and Goal-Striving), the facets by and large changed according to their superordinate dimension. As in previous research, mean-level changes were more pronounced in the early phase of young adulthood (Lüdtke et al., 2011; Neyer & Lehnart, 2007; Roberts et al., 2006; Specht et al., 2011). Rank-order stability was consistently high and comparable to those reported by other authors (Lüdtke et al., 2011; Roberts & DelVecchio, 2000; Specht et al., 2011). Stability was lower for the 15-year interval, as compared to the two shorter intervals, and was highest between T2 and T3 (Fraley & Roberts, 2005; Roberts & DelVecchio, 2000). It is noteworthy that the facets were in most cases at least as stable as the broad characteristics (see Table 2).

With an average rank-order consistency of $r_{12} = .27$, $r_{23} = .19$, and $r_{13} = .13$ across all relationship categories, the relationship variables were less stable than the personality dimensions ($r_{12} = .62$, $r_{23} = .77$, and $r_{13} = .57$) or their facets ($r_{12} = .59$, $r_{23} = .74$, and $r_{13} = .54$), respectively. Thus, compared to personality characteristics, they were subject to stronger differential development.

The subnetworks differed considerably in terms of mean-level changes (see Table 3). While conflict frequency increased in the network of friends from T1 to T3, it decreased in the network of kin and was essentially stable with regard to the romantic partner and in the network of others. Similar differing patterns were also found for the other relationship variables. Unlike for personality, there is no particular time for changes to occur, resulting in highly dynamic trajectories over the complete time span with dramatic ups followed by rapid downs (e.g., contact with the partner,[2] friends and kin, importance of others). With regard to the five different relationship aspects, we found that conflict frequency was rather low in each subnetwork, even below the midpoint of the scale. Contact was most frequent with the romantic partner, followed by others, kin, and friends. The participants felt closest to their partner, followed by kin, friends, and the others. Insecurity was most marked in the presence of others but comparable in the remaining relationship types. The romantic partner was the most important interaction partner, followed by kin, friends, and others.

Model fit of the complex model. Averaged over all 100 models for the Big Five factors, the χ^2-to-df ratio amounted to 1.46 ($SD = 0.18$). We used this index in favor of the simple χ^2-test statistic because of the latter's tendency to faster reject models when sample size or number of observed variables is large (Moshagen, 2012; Schermelleh-Engel, Moosbrugger, & Müller, 2003). Other common fit indices also suggested a very good fit of the models to the data (Schermelleh-Engel et al., 2003). Overall, root-mean-square error of approximation (RMSEA) amounted to .03 ($SD = .01$), standardized root-mean-square residual (SRMR) amounted to .05 ($SD = .01$), and the average comparative fix index (CFI) amounted to .98 ($SD = .01$).

The additional 200 models for the personality facets showed an acceptable fit, too (Schermelleh-Engel et al., 2003). The average χ^2-to-df ratio was 1.6 ($SD = 0.25$), average RMSEA was .03 ($SD = .01$), average SRMR was .06 ($SD = .01$) and the average CFI amounted to .94 ($SD = .03$).

Complex Model

Cross-lagged effects. These effects straightforwardly examined whether changes in one domain were predicted by previous levels of the other domain (Grimm et al., 2012).

Personality effects. As displayed in Table 4, significant personality effects occurred in each of the four relationship types. Most effects were found in the network of friends and the least in the relationship with the romantic partner and others. For the broad dimensions, there were six effects from personality on later changes in relationships. Half of them predicted changes in the relationship domain by T1-level (T1→T2) and the other half by T2-level (T2→T3). Personality effects on the facet-level were more frequent. There were 13 personality effects (five from T1 to T2 and eight from T2 to T3). Some facets yielded effects that were

[2] Some large effects are due to the rather normative character of the respective relationship and the resulting constrained variance, e.g., concerning contact frequency with partner.

Table 2
Descriptive Statistics of the Latent Personality Variables

Dimension	*M*			*SD*			Standardized mean difference			Stability		
	T1	T2	T3	T1	T2	T3	T1→T2	T2→T3	T1→T3	r_{12}	r_{23}	r_{13}
Neuroticism	2.73	2.59	2.55	0.50	0.52	0.55	−0.28	−0.07	−0.36	**.58**	**.76**	**.56**
Negative Affect	2.98	2.80	2.78	0.41	0.46	0.46	−0.44	−0.04	−0.48	**.43**	**.62**	**.41**
Self-Reproach	2.49	2.35	2.29	0.63	0.65	0.67	−0.23	−0.08	−0.31	**.53**	**.80**	**.55**
Extraversion	3.73	3.70	3.63	0.59	0.59	0.62	−0.06	−0.12	−0.18	**.64**	**.80**	**.57**
Positive Affect	3.71	3.77	3.71	0.62	0.63	0.67	0.10	−0.09	0.01	**.56**	**.82**	**.57**
Sociability	3.33	3.26	3.14	0.78	0.87	0.81	−0.09	−0.13	−0.24	**.66**	**.79**	**.60**
Activity	2.91	2.84	2.75	0.86	0.89	0.88	−0.08	−0.10	−0.18	**.67**	**.81**	**.56**
Openness	3.29	3.30	3.28	0.59	0.50	0.53	0.02	−0.04	−0.02	**.56**	**.82**	**.50**
Agreeableness	3.98	4.08	4.15	0.44	0.38	0.39	0.24	0.18	0.40	**.63**	**.72**	**.64**
Nonantagonism	3.96	4.07	4.15	0.51	0.42	0.47	0.21	0.17	0.35	**.47**	**.65**	**.47**
Prosociality	4.03	4.21	4.34	0.61	0.50	0.49	0.30	0.25	0.50	**.61**	**.67**	**.56**
Conscientiousness	3.75	3.95	4.01	0.53	0.49	0.43	0.37	0.13	0.49	**.69**	**.77**	**.59**
Orderliness	3.65	3.86	4.01	0.69	0.62	0.58	0.31	0.23	0.52	**.76**	**.79**	**.61**
Goal-Striving	3.30	3.59	3.50	0.80	0.77	0.72	0.35	−0.12	0.24	**.62**	**.80**	**.55**
Dependability	4.28	4.48	4.54	0.40	0.32	0.31	0.51	0.20	0.67	**.68**	**.75**	**.52**

Note. Boldface correlations are significant at $p < .05$.

not present for the broad dimensions (e.g., Activity and insecurity in relationship with a romantic partner, Sociability and contact in the friend-network, effects of Activity and Dependability in the network of kin), underlining the notion that they contain more information than the broad characteristics alone. As expected, Neuroticism and its facets Negative Affect and Self-Reproach were the most influential predictors of changes in relationship experiences. They generalized over the three subnetworks and

Table 3
Descriptive Statistics of the Relationship Variables

Aspect	*M*			*SD*			Standardized mean difference			Stability		
	T1	T2	T3	T1	T2	T3	T1→T2	T2→T3	T1→T3	r_{12}	r_{23}	r_{13}
Romantic Partner												
Size	0.68	0.81	0.81	0.47	0.39	0.39	0.29	−0.02	0.27	**.28**	−.10	**.16**
Conflict	2.49	2.41	2.44	0.78	0.74	0.84	−0.10	0.04	−0.06	**.26**	**.21**	**.27**
Contact	4.64	4.86	4.40	0.78	0.47	1.23	0.28	−0.96	−0.30	.12	−.01	.06
Closeness	4.77	4.79	4.69	0.58	0.54	0.68	0.04	−0.20	−0.14	**.27**	**.20**	.09
Insecurity	1.46	1.44	1.49	0.68	0.63	0.78	−0.04	0.08	0.04	**.35**	**.25**	**.18**
Importance	4.79	4.78	4.75	0.60	0.62	0.75	−0.01	−0.05	−0.06	.11	−.04	−.03
Friends												
Size	4.69	4.97	4.53	4.20	4.19	4.02	0.07	−0.11	−0.04	**.29**	.01	.07
Conflict	1.84	1.71	2.05	0.55	0.51	0.66	−0.24	0.66	0.37	**.26**	.10	.05
Contact	2.55	2.09	2.66	1.06	1.01	1.22	−0.44	0.57	0.10	**.19**	**.25**	**.22**
Closeness	3.56	3.62	3.65	0.56	0.52	0.73	0.11	0.06	0.16	**.32**	.08	.09
Insecurity	1.56	1.54	1.62	0.59	0.56	0.69	−0.03	0.13	0.09	**.43**	**.34**	**.29**
Importance	3.81	3.87	3.91	0.72	0.61	0.81	0.07	0.07	0.13	**.34**	**.33**	.14
All kin												
Size	5.24	3.34	2.76	3.34	4.23	4.12	−0.57	−0.14	−0.74	**.21**	**.28**	**.09**
Conflict	2.34	2.19	2.15	0.64	0.56	0.54	−0.23	−0.08	−0.30	**.27**	**.26**	**.15**
Contact	2.96	2.55	2.97	1.22	1.08	1.02	−0.34	0.39	0.01	**.27**	**.20**	−.01
Closeness	4.04	4.01	4.00	0.70	0.66	0.66	−0.04	−0.02	−0.07	**.31**	**.17**	**.17**
Insecurity	1.53	1.51	1.53	0.63	0.58	0.57	−0.03	0.04	0.01	**.28**	**.34**	**.26**
Importance	4.49	4.41	4.30	0.62	0.53	0.59	−0.12	−0.21	−0.30	**.31**	**.30**	.14
Others												
Size	3.55	4.56	5.23	3.95	4.23	4.99	0.26	0.16	0.43	**.36**	−.07	−.06
Conflict	1.98	1.98	1.93	0.71	0.73	0.67	−0.00	−0.07	−0.07	**.24**	**.35**	.08
Contact	3.57	3.45	2.52	1.05	1.04	1.41	−0.11	−0.89	−1.00	**.22**	.03	.09
Closeness	2.87	2.84	3.46	0.66	0.59	0.80	−0.04	1.04	0.89	**.24**	.13	.14
Insecurity	1.76	1.78	1.57	0.76	0.68	0.64	0.02	−0.30	−0.25	**.27**	**.24**	.15
Importance	2.92	2.88	3.74	0.79	0.69	0.91	−0.05	1.25	1.04	**.31**	**.28**	.10

Note. Boldface correlations are significant at $p < .05$.

Table 4
Cross-Lagged Personality Effects

Personality	Relationship aspect	Time	γ	95% CI
		Romantic partner		
Activity (E)	contact	T2→T3	−.23	[−.38,−.08]
	insecurity	T2→T3	.21	[.06, .36]
		Friends		
Neuroticism	insecurity	T2→T3	.43	[.23, .63]
Negative Affect (N)	insecurity	T2→T3	.43	[.22, .64]
Self-Reproach (N)	insecurity	T2→T3	.40	[.18, .61]
Extraversion	closeness	T1→T2	.13	[.04, .23]
Sociability (E)	contact	T1→T2	.16	[.05, .26]
	closeness	T1→T2	.18	[.08, .29]
Conscientiousness	insecurity	T1→T2	−.15	[−.26,−.05]
Goal-Striving (C)	insecurity	T1→T2	−.14	[−.25,−.04]
	insecurity	T2→T3	−.20	[−.35,−.05]
		All kin		
Neuroticism	insecurity	T2→T3	.27	[.14, .40]
Negative Affect (N)	insecurity	T2→T3	.32	[.16, .49]
Self-Reproach (N)	insecurity	T2→T3	.23	[.07, .39]
Activity (E)	closeness	T1→T2	.15	[.05, .26]
	importance	T1→T2	.16	[.07, .25]
Dependability (C)	insecurity	T2→T3	−.21	[−.35,−.07]
		Others		
Neuroticism	insecurity	T1→T2	.14	[.04, .25]
Openness	contact	T2→T3	−.28	[−.44,−.11]

Note. CI = confidence interval of parameter estimate. For the facets, their superordinate Big Five dimension is given in parentheses: N = Neuroticism; E = Extraversion; C = Conscientiousness. Table shows standardized regression weights with a $p < .01$ and a size $\geq |.10|$. The column titled Time indicates in which time interval the effect occurred.

were strongest in size. More specifically, lower (higher) values of Neuroticism consistently predicted subsequent decreases (increases) in feelings of insecurity in presence of friends, kin, and others.

The effects of Extraversion and Conscientiousness were rather scattered and occurred only in one particular network. For example, increases (decreases) in contact frequency and decreases (increases) in closeness toward the romantic partner were predicted by higher (lower) levels of Activity, a facet of Extraversion.

In the network of friends, higher (lower) levels of Extraversion and its facet Sociability were predictive of increases (decreases) in closeness and the latter uniquely of increases (decreases) in contact frequency. Higher (lower) levels of Conscientiousness and its facet Goal-Striving predicted subsequent decreases (increases) in feelings of insecurity.

In the network of kin, increases (decreases) in closeness and importance were predicted by previously higher (lower) levels of Activity, a facet of Extraversion. Higher (lower) values of Dependability, a facet of Conscientiousness, predicted subsequent increases (decreases) in feelings of insecurity.

Finally, in the network of others, higher (lower) amounts of Openness predicted subsequent increases (decreases) in contact frequency. Surprisingly, no effects were found for Agreeableness at all.

Relationship effects. While only four statistically significant relationship effects occurred with regard to the broad dimensions (see Table 5), there were 12 on the facet-level (seven from T1 to T2 and five from T2 to T3). This indicates that relationship effects had been underestimated in previous research due to the exclusive reliance on the broad Big Five dimensions.

In the relationship with a romantic partner, for example, only Neuroticism and Agreeableness were influenced by the relationship variables with regard to the broad characteristics. On the facet level, Extraversion and Conscientiousness came into play as well via their facets Activity, Sociability (both Extraversion), and Dependability (Conscientiousness; see Table 5). As expected, relationship effects most frequently occurred in the network of friends and in the relationship with a romantic partner. Unexpectedly, the network of others evinced also relationship effects, which affected facets of Extraversion and Conscientiousness.

Concretely, higher (lower) levels of conflict predicted subsequent decreases (increases) in Neuroticism (romantic partner, friends) and its facets Negative Affect (friends) and Self-Reproach (friends), and Sociability (romantic partner). Higher (lower) levels of closeness were predictive of decreases (increases) in Agreeableness and its facet Nonantagonism (romantic partner), Self- Reproach (friends), and Sociability (others). More (less) feelings of insecurity predicted decreases (increases) in Dependability (romantic partner), Negative Affect (friends), and Agreeableness (kin). Finally, higher (lower) levels of importance predicted decreases (increases) of Sociability and Dependability in the network of others.

Initial correlations and correlated changes. The model contained three types of correlations. The initial correlation (ρ_{IC})

Table 5
Cross-Lagged Relationship Effects

Personality	Relationship aspect	Time	γ	95% CI
		Romantic partner		
Neuroticism	conflict	T2→T3	−.36	[−.53,−.19]
Activity (E)	contact	T1→T2	.28	[.10, .46]
Sociability (E)	conflict	T2→T3	−.32	[−.56,−.08]
Agreeableness	closeness	T2→T3	−.42	[−.66,−.18]
Nonantagonism (A)	closeness	T2→T3	−.47	[−.78,−.16]
Dependability (C)	insecurity	T1→T2	−.21	[−.36,−.06]
		Friends		
Neuroticism	conflict	T2→T3	−.36	[−.53,−.19]
Negative Affect (N)	conflict	T2→T3	−.42	[−.66,−.19]
	insecurity	T1→T2	.19	[.06, .32]
Self-Reproach (N)	conflict	T2→T3	−.29	[−.49,−.09]
	closeness	T2→T3	−.26	[−.45,−.08]
		All kin		
Agreeableness	insecurity	T1→T2	−.23	[−.37,−.09]
		Others		
Sociability (E)	closeness	T1→T2	−.30	[−.48,−.12]
	importance	T1→T2	−.25	[−.42,−.09]
Dependability (C)	importance	T1→T2	−.21	[−.36,−.06]

Note. CI = confidence interval of parameter estimate. For the facets, their superordinate Big Five dimension is given in parentheses: N = Neuroticism; E = Extraversion; A = Agreeableness; C = Conscientiousness. Table shows standardized regression weights with a $p < .01$ and a size $\geq |.10|$. The column titled Time indicates in which time interval the effect occurred.

between personality and the relationship variables indicate whether a fit between personality, and the environment had been established before the study even began. The correlated changes (ρ_{CC2} and ρ_{CC3}) indicate whether changes in one domain are cross-sectionally associated with changes in the other domain. All correlations for the broad dimensions are displayed in Table 6. The respective results for the facets (not displayed) are virtually identical with regard to the initial correlations but evinced more correlated changes. In summary, as predicted by the paradigm of dynamic transactionism, most of the variables from either domain were related. Contrary to our expectations, the correlations in the network of others were by no means weaker, but they were rarer.

Change-change effects. Overall, the pattern of effects supported our expectations, since primarily Neuroticism, Agreeableness, and Conscientiousness were involved. Changes were dynamically linked only in relationships with a romantic partner and the network of friends (see Table 7).

Concerning the relationship with a romantic partner, increases (decreases) in Self-Reproach between T1 and T2 predicted subsequent increases (decreases) in the importance of the partner relationship. Furthermore, the more Agreeableness and Prosociality increased (decreased) between T1 and T2, the more decreased (increased) feelings of insecurity and increased (decreased) closeness and importance.

In the network of friends, increases (decreases) in Agreeableness and its facets predicted subsequent decreases (increases) in contact and conflict frequency.

With regard to the relationship effects, increases (decreases) in importance of the romantic relationship predicted subsequent decreases (increases) of Sociability and increases (decreases) in closeness and conflict frequency predicted subsequent increases (decreases) in Agreeableness and Conscientiousness, respectively. In the network of friends, increases (decreases) in conflict frequency between T1 and T2 were predictive of subsequent increases (decreases) in Neuroticism and Goal-Striving.

In sum, the pattern of relationship and change-change effects confirmed our expectations. Relationship effects were most frequent in the relationships with a partner and friends and predominantly affected the personality characteristics that were previously shown to change most during young adulthood: Neuroticism, Agreeableness, and Conscientiousness.

Results of Supplementary Analyses

As expected, the cross-lagged panel models perfectly reproduced all cross-lagged effects and correlations from the extended models with exactly the same parameter estimates but slightly lower standard errors. The latent growth curves reproduced 87.6% of the initial correlations from the complex models.

Table 6
Initial Correlations and Correlated Changes for the Broad Dimensions

Aspect	N			E			O			A			C		
	ρ_{IC}	ρ_{CC2}	ρ_{CC3}	ρ_{IC}	ρ_{CC2}	ρ_{CC3}	ρ_{IC}	ρ_{CC2}	ρ_{CC3}	ρ_{IC}	ρ_{CC2}	ρ_{CC3}	ρ_{IC}	ρ_{CC2}	ρ_{CC3}
Romantic partner															
Conflict	**.21**	**.25**	−.04	−.14	.02	−.15	**.16**	−.14	−.10	**−.21**	−.10	−.16	**−.18**	−.15	.07
Contact	.11	.05	−.05	−.06	.00	−.01	−.00	−.02	−.01	.00	.08	.03	.04	.04	.12
Closeness	**−.17**	**−.29**	−.18	.07	−.01	−.01	−.05	.01	−.05	**.20**	.02	.06	**.19**	.11	−.06
Insecurity	**.37**	**.32**	**.24**	**−.22**	−.02	−.23	−.06	.05	−.14	**−.20**	.08	.03	−.14	−.12	−.01
Importance	−.05	−.03	−.12	−.04	−.01	.03	.01	−.01	−.04	.12	−.01	.04	.13	.07	−.07
Friends															
Conflict	**.13**	.09	−.02	−.08	.01	−.01	−.00	−.06	.15	**−.18**	−.08	−.01	−.09	−.00	.02
Contact	−.02	−.06	.10	.05	.01	**.26**	.01	−.14	.12	−.03	.06	.16	−.06	−.02	.00
Closeness	−.11	−.09	−.06	**.21**	.06	**.24**	.08	.05	−.05	**.15**	.09	.05	.05	.02	.02
Insecurity	**.37**	**.33**	.11	**−.23**	−.15	−.08	−.03	−.07	.02	**−.15**	−.06	−.14	**−.20**	−.12	−.11
Importance	−.08	.01	.07	**.16**	−.03	.14	.02	−.06	−.12	**.15**	.02	−.01	.04	.05	.02
All kin															
Conflict	**.22**	.09	−.07	−.09	.03	.17	.05	.04	.06	**−.25**	−.13	−.19	**−.18**	−.07	−.04
Contact	.02	.02	.11	−.00	−.01	.10	−.10	−.12	.00	−.06	.12	−.10	.04	.02	−.14
Closeness	−.05	.02	−.20	**.19**	.07	.14	−.09	−.11	.24	.07	.11	.20	**.13**	−.04	.10
Insecurity	**.37**	**.34**	.16	**−.18**	**−.18**	−.02	.05	−.04	−.07	−.09	−.18	−.20	**−.12**	−.14	−.10
Importance	−.06	.03	−.05	.11	.04	.19	−.09	−.09	.22	.12	.15	.19	.03	.03	.12
Others															
Conflict	.08	.06	.02	−.02	.09	.00	−.04	.08	.22	−.06	−.05	.04	.00	.10	−.19
Contact	−.01	−.13	.06	.08	.00	**.23**	.01	−.16	.12	.10	.10	.04	.05	**.28**	.01
Closeness	−.10	−.15	−.09	**.22**	.14	−.01	.01	−.04	−.03	−.00	.13	.06	.04	.09	.11
Insecurity	**.34**	**.33**	.10	−.14	−.04	.09	.00	−.06	.05	−.05	−.09	−.16	**−.18**	−.12	−.19
Importance	.01	.03	−.06	**.14**	−.07	−.11	−.09	−.20	−.06	−.03	−.00	.03	.01	.10	.11

Note. N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness; ρ_{IC} = initial correlation between personality and relationship variable; ρ_{CC2} = correlation of changes in personality and relationship aspects between T1 and T2; ρ_{CC3} = correlation of changes in personality and relationship aspects between T2 and T3. Boldface correlations are significant at $p < .01$.

Table 7
Change-Change Effects in Relationships With a Romantic Partner and the Network of Friends

Personality	Relationship aspect	ξ	95% CI
	Romantic partner		
Personality effects			
Self-Reproach (N)	importance	.14	[.04, .25]
Agreeableness	insecurity	−.20	[−.34,−.05]
Prosociality (A)	closeness	.23	[.08, .38]
	importance	.16	[.05, .27]
Relationship effects			
Sociability (E)	importance	−.42	[−.73,−.11]
Agreeableness	closeness	.35	[.10, .60]
Conscientiousness	conflict	.40	[.16, .63]
	Friends		
Personality effects			
Agreeableness	contact	−.27	[−.43,−.11]
Nonantagonism (A)	contact	−.30	[−.47,−.13]
Prosociality (A)	conflict	−.25	[−.44,−.06]
Relationship effects			
Neuroticism	conflict	.24	[.07, .41]
Goal-Striving (C)	conflict	.36	[.10, .63]

Note. CI = confidence interval of parameter estimate. For the facets, their superordinate Big Five dimension is given in parentheses: N = Neuroticism; E = Extraversion; A = Agreeableness; C = Conscientiousness. Table shows standardized regression weights with a $p < .01$ and a size $\geq |.10|$.

The supplementary analyses show that the complex models do not produce artifactual findings. The results obtained from the extended models can be largely reproduced with equivalent traditionally used models, but advance them by incorporating the dynamic aspects of personality-relationship transactions.

Discussion

The aim of the current article was threefold. First, we extended previous research by not only considering the broad Big Five dimensions but additionally their narrower facets. Second, we applied a modeling approach capable of simultaneously taking into account effects from previous levels on later changes and the effects of prior changes on subsequent changes. Third, we extended previous research by examining patterns of personality-relationship transactions from young adulthood up to the midlife transition.

In the following, we first briefly summarize the overall pattern of results. We then discuss specific personality-relationship transactions and end with a brief discussion of limitations and challenges for future research.

Personality and Relationship Development

Univariate latent change models evinced both personality and certain aspects of relationships to change throughout young adulthood and well up to the midlife transition. Beyond the conceptual replication of earlier studies on the development of personality (Specht et al., 2011), this adds new findings on the development of both the personality facets and the personal networks. To our knowledge, no study so far has examined the stability and change of the facets derived by Saucier (1998) over such a long time period. In particular, we found them to be at least as stable as their superordinate characteristics. The mean-level trends observed in the present study might be helpful to deepen the understanding of personality development during the adult years. Consistent with previous research (Bleidorn et al., 2009; Lüdtke et al., 2011; Roberts et al., 2006; Specht et al., 2011), we found Neuroticism, Agreeableness, and Conscientiousness to change with regard to their mean-level. It is Noteworthy that these are also the characteristics for which we found the most transactions, as is discussed later.

The development of personal networks was previously predominantly assessed in young adulthood (Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Parker et al., 2012). The relationship variables evinced a certain stability over a time period as long as 15 years, thereby extending previous findings for shorter time intervals (Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Parker et al., 2012; Robins et al., 2002). To a larger extent, however, they were subject to differential development. Currently, not much is known about changes in relationship variables and their trajectories are not very well understood yet (Neyer et al., 2013; Wrzus et al., 2013). With regard to the hierarchy of relationships, we replicated findings by Neyer and Lang (2003) and Neyer et al. (2011) showing the romantic partner to be the closest and most important relationship, followed by kin and nonkin (friends and others). This suggests that the network approach used in the current study is a valid and useful instrument in studying dynamics between personality and the social environment.

Personality-Relationship Transactions

Overall pattern. Like previous research (Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Parker et al., 2012; Scollon & Diener, 2006), we found personality effects to outnumber relationship effects with regard to the broad characteristics. On the facet-level, however, we found both types of effects equally likely to occur and to be of comparable strength. Among the personality characteristics, Neuroticism and its facets were, as expected, found to be the most potent in predicting changes in relationship experiences. Conversely, effects of relationship experiences on personality change were generally scarce with regard to the broad characteristics, but more frequent on the facet-level. Negative Affect and Self-Reproach were the most susceptible facets. Also in line with previous research (Asendorpf & van Aken, 2003; Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Parker et al., 2012), conflict frequency and, to a lesser degree, feelings of insecurity were the most influential relationship variables. The relationship effects were largely and the change-change effects completely restricted to relationships with a romantic partner and friends. The finding that these effects primarily influenced Neuroticism, Agreeableness, and Conscientiousness underlines the importance of these relationships for differential personality development in young adulthood.

The occurrence of relationship effects over measurement intervals spanning several years is impressive, since other authors (Neyer & Lehnart, 2007) failed to find effects over comparably long time periods. Asendorpf and van Aken (2003) only found

relationship effects for surface characteristics over 5 years. We extended their finding by demonstrating that the core dimensions are also susceptible to environmental influences when they are looked at on facet-level. At the same time, this specifies the notion of Asendorpf and Wilpers (1998) and Neyer and Asendorpf (2001), who proposed that personality has the primacy over relationships because of the former's higher stability. The results of the present study, rather, suggest that the different levels of abstraction and the resulting unfair comparisons (Neyer & Asendorpf, 2001) are the key to the previously demonstrated preponderance of personality effects.

Turning to the change-change effects conveys the more dynamic associations between personality and relationships. The current study demonstrated that changes in either the personality or relationship domain are themselves useful predictors of subsequent changes in the other domain. This applies in particular to those characteristics that were often found to most strongly change across young adulthood and midlife, i.e., Neuroticism, Agreeableness, and Conscientiousness (Roberts et al., 2006). This indicates that an individual's developmental history is important for his or her future development and supports the ideas of dynamic transactionism (Caspi, 2000; Magnusson, 1990; Reis et al., 2000). Put differently, personality-relationship transactions are not empty phrases or buzzwords—they are real and do exist. Furthermore, the finding that the configuration of one's personality can influence several aspects of one's social interactions several years later and vice versa strongly supports the notion that social relationships are part and parcel of personality and its development (Caspi, 2000; Lang et al., 2006; Neyer & Lehnart, 2007).

Relationship-specific findings. We now turn to the more specific effects in the relationship domains with a particular focus on the change-change effects and on bringing them together with the personality and relationship effects. When interpreting the effects, we confine ourselves to one pole of the results (e.g., becoming less neurotic, having more conflicts). It should be borne in mind, however, that the effects can also be interpreted in reverse.

Relationship with a romantic partner. As seen in the relationship with a romantic partner and in the network of friends, more conflicts predicted subsequent decreases in Neuroticism. This might be counterintuitive at first glance but is presumably due to the often-overlooked positive features of interpersonal conflict. Such conflicts offer the opportunity to improve social skills, which might, in turn, help a person to better get along with others (Collins & van Dulmen, 2006; Laursen & Hafen, 2010). As a consequence, it might be easier for relationships to become deeper, more intimate, and closer (Collins & van Dulmen, 2006; Fung, Yeung, Li, & Lang, 2009). However, it has to be kept in mind that conflict frequency was generally low in the present sample. There might be a certain point at which conflicts become dysfunctional and eventually lead to increases in Neuroticism (Ehrlich, Dykas, & Cassidy, 2012).

With regard to the change-change effects, it was found that the romantic partner became more important for participants who previously increased in Self-Reproach, a facet of Neuroticism. People high in Self-Reproach can be described as tense, reactive, ashamed, and prone to feeling inferior, worthless and helpless (Saucier, 1998). Such a person's partner could function as a place of refuge to withdraw to (Lehnart et al., 2010). At the same, such a person might withdraw from others (e.g., Bolger & Zuckerman, 1995; Collins & van Dulmen, 2006; Park & Maner, 2009), as indicated by the finding that the more important the romantic partner became, the more Sociability, a facet of Extraversion, subsequently decreased. Changes in Agreeableness, which is described as being helpful in order to get along with other people, were negatively related to later changes in insecurity in presence of the partner. Changes in the facet Prosociality were positively related to changes in closeness to and importance of the partner. This bundle of findings might represent a feedback cycle: For example, being considerate and courteous generally reduces rejecting behaviors by the partner (e.g., Downey, Freitas, Michaelis, & Khouri, 1998; Snyder & Stukas, 1999), which allows closeness to increase, which again triggers increases in Agreeableness, as indicated by the respective relationship effect. Finally, increases in conflict frequency with the partner were found to predict subsequent increases in Conscientiousness. This might reflect a tendency to adhere to the rules negotiated during the course of the relationship.

In summary, the transactions found in the relationship with a romantic partner underline his or her importance as socialization institution (Collins & van Dulmen, 2006; Neyer & Asendorpf, 2001; Neyer & Lehnart, 2007; Reis et al., 2000). Experiences in an intimate relationship affect the characteristics that change most during young adulthood and are thus important for developing a more mature personality.

Relationships with friends. As with partner-relationship, it was found that higher levels of conflict frequency were predictive of subsequent decreases in Neuroticism and its facets (cross-lagged relationship effect). Furthermore, differential increases in conflicts with friends predicted subsequent increases in both Neuroticism and Goal-Striving (change-change effect). Hence, it seems that a relationship in which conflicts are more frequent all along (and thus predictable and easier to adapt to) are more comfortable and beneficial in terms of personality development than relationships with previously less conflicts developing into confrontational ones (which is hard to predict based on previous experiences and thus harder to adapt to). At the same time, increased conflict frequency could lead one partner to withdraw from the relationship (Laursen & Hafen, 2010) and to focus on his or her goals (which might be achievement-related or related to restoring the former state of the relationship)—although this interpretation is yet speculative and subject to further research. These findings illustrate that cross-lagged and change-change effects capture different aspects of the dynamic transaction between personality and relationships and thus need to be modeled separately.

Further change-change effects in the network of friends indicated that the more agreeable, prosocial, and nonantagonistic the participants became, the more contact frequency with their friends decreased. This finding suggests that personality maturation precedes the normative trajectory of friendship networks, which were shown to decrease in size during adulthood (Wrzus et al., 2013). This interpretation is consistent with one of our present findings showing that, on the one hand, Extraversion, Sociability, and Activity and thus the tendency to have more friends, decreased. On the other hand, the quality of the remaining relationships with friends increased in terms of closeness and importance (cf. Carstensen, 1995).

Relationships with kin. As expected, relationships with kin were primarily determined by personality effects, indicating that they lost their influence as socialization agents (Aquilino, 2006).

Besides the effects of Neuroticism and its facets on changes in insecurity, we found effects from facets of Extraversion and Conscientiousness on closeness, importance, and insecurity. For example, decreases in insecurity were predicted by higher levels of Dependability. Being dependable, i.e., reliable and consistent (Saucier, 1998), might lead to situations with clear role expectations and thus less insecurity. Activity, a facet of Extraversion, predicted changes in closeness toward and importance of kin. Active people are energetic, fast-paced, and action-seeking (Saucier, 1998). Thus, they are inclined to have more contact with all other relationship partners as well. Yet the difference between more and less active people becomes most obvious in this specific setting of kinship relationships.

The only relationship effect found for this network predicted increases in Agreeableness by lower levels of insecurity. Since this effect was not expected, its interpretation is only tentative. Feeling insecure might be associated with insecurity about how to behave appropriately, which might make getting along with kin harder.

Relationships with others. All findings in this relationship category have to be treated cautiously and necessitate replication in future studies. Currently, not much is known about these peripheral networks and their role in personality development.

As in the other relationship types, Neuroticism was found to be associated with increases in insecurity. Furthermore, the more open the participants were, the more contact frequency with others decreased in the subsequent time period, which might reflect the tendency of more open people to seek new experiences instead of settling early (Jokela, 2009; Zimmermann & Neyer, 2013). Relationships with others also feed back into one's personality. The closer one feels toward and the more important other relationship partners are, the more the tendency to surround oneself with many people decreases (i.e., Sociability declines). This effect accompanies the effect found in the friend network indicating that less sociable people tend to be with friends less often and find them less important. Finally, the finding that decreases in dependability are predicted by more important others-relationships might suggest a certain kind of social loafing, as described by Latané, Williams, and Harkins (1979).

Distribution of effects. Most prior studies argued that relationship effects are most likely to occur during emerging adulthood and confine themselves to this period (Parker et al., 2012; Sturaro et al., 2008). The current study demonstrated that relationship effects can always occur and are not bound to specific developmental periods (Reis et al., 2000). Dynamic transactions play a major role during the whole life span, although the specific aspects with which one's personality interacts might change (Magnusson, 1990; Reis et al., 2000). These results also suggest that considering only two measurement occasions or relying on a single change variable might be inappropriate when attempting to understand the dynamic transactions between personality and social relationships and might lead investigators to underestimate the frequency and strength of relationship effects. As our supplementary analyses showed, no such dynamic transactions or correlated changes can be detected by the latent growth curves. This suggests that growth curves are more appropriate for shorter time intervals or in situations in which researchers can assume constant patterns of transaction. In contrast, the cross-lagged panel models can detect all correlated changes and cross-lagged effects that are uncovered by the complex models but lack the change-change effects.

Importance of Personality Facets for Personality-Relationship Transaction

One of the most important findings of the current study is that relationship effects affected the personality facets, which are narrower in scope and more specific than the broad Big Five characteristics (Chapman, 2007; John et al., 2008; McCrae & Costa, 2008; Saucier, 1998) but not less stable than their superordinate dimensions. In fact, there were three times as many relationship effects for the facets as compared to the broad characteristics. The results of our study thus suggest that the detection of relationship effects is not a question of when they are measured (e.g., emerging adulthood vs. midlife), slightly more a question of how they are measured (cross-lagged panel models, growth curves, etc.), and mostly a question of the level of analysis (broad dimensions vs. narrow facets). Is it reasonable to assume that *specific* relationship experiences exert influence on highly aggregated, *broad* characteristics? In light of the current study it seems more plausible to assume that *specific* relationship experiences exert influence on rather *specific* personality facets. The usefulness of facet-level analyses has been shown in other fields of research (e.g., Ashton, 1998; Bleidorn et al., 2009; O'Connor & Paunonen, 2007; Paunonen & Ashton, 2001; Rhodes & Courneya, 2003; Rhodes et al., 2002; Soto & John, 2012; Weiss & Costa, 2005) and should be more routinely used for examining personality-relationship transaction as well.

Another implication of the particular transactions between the facets and the relationship variables, especially insecurity and conflict, is that these relationship variables are candidates for narrowly acting developmental mechanisms (Soto & John, 2012). According to Soto and John (2012), such mechanisms influence only specific aspects of personality, thereby eventually promoting development of the broader characteristics. Roberts et al. (2008) proposed that, among other things, listening to important others, incorporating their feedback, or modeling their behavior could act as mechanisms influencing personality change. This is likewise an illustration of how narrow mechanisms from the social environment could find their way under the skin.

As in previous studies, we found numerous correlated changes although we were most interested in cross-lagged and change-change effects. Correlated changes indicate a shared dynamic between changes in relationship experiences and personality dimensions (Neyer & Lehnart, 2007), suggesting a codevelopment of both domains. This shared dynamic was not captured by the cross-lagged paths that thus underestimated the transactions between both domains. Technically speaking, correlated changes are unexplained variance (Little et al., 2006), and their occurrence might in part be due to some of the limitations to be discussed in the next section.

Limitations

First, the occurrence of the numerous correlated changes signals the presence of more longitudinal effects behind the scenes that

were not yet fully captured. We suppose that this gap is to some degree due to the fact that the cross-lagged effects in the current study had been calculated across all possible individual contexts and did not differentiate between persons who recently underwent a specific life transition and those who did not. For example, we did not distinguish between people who recently entered the labor force, moved to a new location, separated from a partner, or became parents for the first time from those who lived in stable life circumstances without recent transitions. The consideration of such specific contexts might be helpful in detecting more specific patterns that could deepen the understanding of how personality and relationships interact and how the strength of personality and relationship effects varies across situations (Neyer et al., 2013). Research conducted so far indeed indicates that this is a worthwhile endeavor (Asendorpf & Wilpers, 1998; Jokela et al., 2009; Karney & Bradbury, 1995; Lehnart & Neyer, 2006; Lehnart et al., 2010; Neyer & Asendorpf, 2001; Parker et al., 2012; Zimmermann & Neyer, 2013).

Second, the aggregation of interaction partners into several meaningful subnetworks is a flexible and powerful way to explore the transaction between personality and relationships. However, the analysis of specific relationships in addition to the one with a romantic partner could offer even more insights that are more natural and intuitive than assertions about average relationships. This line of action necessitates the participant to make his or her relationship partners identifiable across several measurement occasions. It should be kept in mind, however, that the consideration of subnetworks (e.g., relationship with an average friend) versus particular relationships (e.g., relationship with best friend) tap into different research questions (see Feld et al., 2007).

Third, the current study set out for predictions. Studies aiming at concrete explanations, however, necessitate different designs (Caspi, 2000). If social relationships acted as developmental mechanisms, it would be desirable to explore how they get to work. Explanatory studies have to consider not only identifiable interaction partners but also to collect more information about partner characteristics and to examine particular units of interaction (Back et al., 2011). Such richness of detail would allow for analyzing how different configurations of personality characteristics together determine relationship quality (e.g., see Denissen, van Aken, & Dubas, 2009) and for the detection of specific processes that initiate personality development (e.g., Back, Schmukle, & Egloff, 2011) in the context of social relationships.

Fourth, besides the dimensions of the FFT, other dimensions of individual differences might play a prominent role in shaping relationship experiences, with attachment possibly being the one that most easily comes into mind. Given that a major part of the results in the current study involved Neuroticism, which shows robust associations with attachment anxiety (e.g., Shaver & Brennan, 1992), the question arises whether attachment is a better explanation for the obtained results. However, studies by, for instance, Shaver and Brennan (1992) showed associations between personality and attachment to be far from redundant. Hence, attachment and personality seem to tap different aspects of relationships and to answer different questions, with the former addressing particularly close relationships (e.g., partner, children, parents) while neglecting relationships with less close ones (e.g., friends, others).

Fifth, the large number of models run could have produced some false-positive results and some of the effects need to be replicated. However, our comprehensive approach was concerned with the simultaneous consideration of multiple relationship types and thus remained more focused on identifying patterns of personality-relationship transaction, rather than specific effects. Moreover, effects are necessarily small in the given situation because not only the personalities of both interaction partners but also their interaction history are together making up relationship quality (Asendorpf & Wilpers, 1998; Reis et al., 2000). Consequently, effects in studies of personality-relationship transaction cannot exceed small to moderate size (Asendorpf, 2002; Neyer & Asendorpf, 2001). Nevertheless, small effects can accumulate over time and exert influence on one's life on the long run (Caspi, 2000; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007).

Conclusion

In the current study, we intended to treat personality-relationship transactions with respect. We found that personality effects dominate relationship effects only with regard to the broad dimensions. In contrast, we found numerous effects from relationship experiences on personality changes with regard to the narrower facets. Personality characteristics that were most likely to change during young adulthood evinced particularly strong transactions with experiences in relationships with a romantic partner and with friends. This underlines these relationships' important role as socializing agents in adulthood. In sum, we demonstrated that relationship effects are not bound to a certain developmental period. In order to detect these effects, it is necessary to more thoroughly inspect what lies beyond the Big Five and to take the assumptions of dynamic transactionism seriously.

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