

Who Belongs to Me? Social Relationship and Personality Characteristics in the Transition to Young Adulthood

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Abstract: Not much is known about how social network characteristics change in the transition out of school and what role Big Five personality plays in this context. The aim of this paper was twofold. First, we explored changes in social network and relationship characteristics across the transition out of secondary school. Second, we examined within-person and between-person effects of personality on these social network changes. Results based on a series of multilevel models to a longitudinal sample of 2287 young adults revealed four main findings. First, social networks increased in size, and this increase was mainly due to a larger number of nonkin. Stable social networks during the transition consisted mainly of family ties but were generally characterized by high closeness. Second, extraversion and openness consistently predicted network size, whereas agreeableness predicted network overlap. Third, increases in emotional closeness were found only for kin; closeness was generally lower for unstable relationships. Fourth, changes in emotional closeness were related to personality, particularly neuroticism, agreeableness, and conscientiousness for stable relationships; for unstable relationships, however, closeness was related to extraversion and openness. The article concludes by discussing the role of personality for social relationship development and the active moulding of social networks in young adulthood. Copyright © 2014 European Association of Personality Psychology

Key words: social network development; emerging adulthood; longitudinal multilevel analyses; Big Five personality; between-person and within-person effects

Social relationships represent a major platform of direct person-environment transactions and thus set the stage for examining the development of social relationships and their interdependency with the development of Big Five personality across time (Neyer & Asendorpf, 2001; Pincus & Ansell, 2003).¹ Specifically in life transitions, social networks—and with them, each single relationship—are tied to changes in individual and contextual terms and requirements (Wrzus, Hänel, Wagner, & Neyer, 2013). However, not much is known about the longitudinal change patterns of social relationships, specifically across such a profound transition into young adulthood (Arnett, 2000). At the same time, personality is recognized to affect social relationships and their development (Asendorpf & Wilpers, 1998; Branje, van Lieshout, & van Aken, 2004; Neyer & Asendorpf, 2001; Parker, Lüdtke, Trautwein, & Roberts, 2012). The aim of our study was twofold. First, we explored the structure and development of social network and relationship characteristics across the transition out of high school into young adulthood. To do so, we looked

at network size, network overlap, and emotional closeness of unstable and stable social relationships across time. The second aim focused on the prediction of changes in social networks and fundamental relationship characteristics by Big Five personality of the developing individual itself. Importantly, in this context we differentiate within-person and between-person effects of personality on social relationship change.

To do so, we applied multilevel regression models to an ongoing German longitudinal study (Transformation of the Secondary School System and Academic Careers, TOSCA) of 2287 emerging adults. The specific characteristic of our sample is that we follow up these young adults across the transition from high school to the university or work setting. This transition has been related to substantial changes in personality (Lüdtke, Roberts, Trautwein, & Nagy, 2011). In addition, social relationship changes are particularly likely because this transition relates to leaving school and the related social structures that accompanied individuals for several years. New social contexts (i.e., university and work) may inevitably lead to changes in social networks.

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¹The major focus of this paper is on the patterns and individual differences of changing social network and relationship characteristics. In this analysis, personality is modelled as major predictor of individual differences and not as outcome variable.

Quantitative and qualitative social network characteristics in young adulthood

Within certain biological and contextual boundaries, individuals are active agents of their development, and this may be

Received 18 December 2013

Revised 5 August 2014, Accepted 5 August 2014

particularly true with respect to the formation and shaping of social relationships and social networks (Kahn & Antonucci, 1980; Lang & Heckhausen, 2006; Wrzus *et al.*, 2013). Social relationships are defined by direct, repeated, and dynamic interactions between two people that are accompanied by a mental representation of the relationship as such (Asendorpf & Banse, 2000; Baumeister & Leary, 1995; Hinde, 1979). Ego-centred social networks,² as the general combination or sum of all of the social relationships of one person (e.g., Milardo, 1982), are known to change in structure and quality across time (Doherty & Feeney, 2004; Lang, 2000; Wrzus *et al.*, 2013). Importantly, the examination of social relationships is possible with diverse foci (Feld, Suitor, & Hoegh, 2007). The following study will concentrate on *quantitative* changes, that is changes in the size of ego-centred social networks, in specific subnetworks of kin and nonkin, and the number of stable relationships across the transition, as well as on *qualitative* changes, that is changes in emotional closeness in unstable and stable social relationships, in kin and nonkin ties.

Quantitative changes

In accordance with theoretical outlines of life span dynamics in social networks (Carstensen, 1992, 1995; Kahn & Antonucci, 1980), a recent meta-analysis (Wrzus *et al.*, 2013) emphasized that social networks are a mirror of the individual's motivations and (normative) life decisions. In late adolescence and young adulthood, the endeavour of information acquisition (Carstensen, 1992, 1995) and the experience of normative life events (i.e., first partnership and job entry; Kahn & Antonucci, 1980) relate to steadily increasing social networks up to the age of 25 years. Analyses of specific social subnetworks have indicated a stable number of family relationships from adolescence on, whereas the number of friends and other acquaintances gradually increased and was highest in late adolescence and young adulthood (Hill & Dunbar, 2003; Milardo, Johnson, & Huston, 1983; Neyer & Lang, 2004; Wrzus *et al.*, 2013). Thus, we aim to replicate that larger ego-centred networks in young adulthood are mainly due to an increasing number of nonkin relations.

Over and above the mere size of social networks, it is of interest to determine which ties persist across time and which ties do not (Feld *et al.*, 2007). Both stable and fluctuating relationships constitute important parts of an individual's social network (Granovetter, 1973; Wrzus *et al.*, 2013). Nevertheless, stable ties have been thought to particularly help the individual to learn, grow, and mature, because they partake in numerous life decisions and challenges across a longer time frame (Antonucci, Akiyama, & Takahashi, 2004; Kahn & Antonucci, 1980). But what is the share of stable versus unstable social relationships? Milardo (1982; *cf.*,

also Dunbar & Spoors, 1995; Hill & Dunbar, 2003) summarized several empirical studies stating that the number of significant others is about five individuals. However, empirical research in midlife samples suggests large turnover in social networks across time (Suitor & Keeton, 1997; Wellman, Wong, Tindall, & Nazer, 1997). For example, Wellman and colleagues found that only about 27% of the personal network persisted across 10 years. Importantly, stable ties were more likely to be kin, whereas nonkin relations underwent almost a complete replacement across the same time span. Using a lifespan sample, Fung and colleagues (Fung, Yeung, Li, & Lang, 2009) found an overlap of about 53% across 2 years. And again, kin were more likely to remain in the social network. Extending previous research, we expect that in the transition out of high school kin constitute a major part of the stable social network. However, based on previous findings and theoretical reasoning, we also suggest that friendships and other nonkin are pivotal (Fingerman & Hay, 2002; Wrzus, Wagner, Baumert, Neyer, & Lang, 2011) and represent a substantial share of the stable network.

Qualitative changes

Social relationships are crucial for fulfilling basic human needs such as the striving for intimacy or emotional closeness (Baumeister & Leary, 1995; Deci & Ryan, 2000; Lang, 2001). Specifically, perceptions of and the amount of personal effort put towards developing emotional closeness constitute an essential characteristic of social relationships (Lang, Wagner, Wrzus, & Neyer, 2013; Neyer & Lang, 2003; Neyer, Wrzus, Wagner, & Lang, 2011). Therefore, feelings of emotional closeness are expected to play a crucial role for the existence and stability of social relationships (Lang, 2001; Neyer & Lang, 2004).

A longitudinal study across 4 years indicated that in young adults, average perceptions of emotional closeness remained fairly stable, whereby closeness to kin was even more stable compared to nonkin (Neyer & Lang, 2004). In addition, both longitudinal and cross-sectional evidence have pointed towards higher emotional closeness to biological family as compared to nonkin relationships (Fung *et al.*, 2009; Lang *et al.*, 2013; Neyer & Lang, 2003, 2004). However, also specific nonkin relations such as close friendships are actually able to mimic closeness to kin (i.e., quasi-selected or self-selected kinship; Allen, Blieszner, & Roberto, 2011; Carstensen, 1992; Wrzus, Wagner, & Neyer, 2012). Looking at only stable relationships across 10 years, Feld and colleagues (2007) found an increase in perceived closeness for those people who remained in social networks, and again, the majority of these relationships were kin. Such results emphasize that relationship type, that is kin versus nonkin, is an important indicator of closeness perceptions (Carstensen, 1992). Extending previous findings, we expect generally higher closeness to kin than nonkin also in the transition to young adulthood.

In sum, over and above the mere size of social networks across the transition out of high school, the amount of stable relationships and changes in emotional closeness in unstable and stable, kin and nonkin ties are in the focus of the current paper. This part of qualitative change will additionally

²Importantly, the current study does not address or analyse social groups, sometimes also called *complete* social networks, as the entire social system or all existing ties between a certain group of individuals. Social group members can have but do not have to have a social relationship (Asendorpf & Banse, 2000). Our design should rather be regarded as a 'one with many' design (Kenny *et al.*, 2006). However, to avoid lengthy descriptions, we will use the term social network and by that we mean ego-centred social networks.

control for two important relationship variables known to relate to differences in emotional closeness: conflict perceptions (Fingerman, Hay, & Birditt, 2004; Fung et al., 2009) and contact frequency (Asendorpf & Wilpers, 1998; Neyer & Lang, 2003; Wellman et al., 1997).

Effects of personality on social network and relationship characteristics

Personality, as a relatively enduring behavioural determinant, has been associated with changes in network size and relationship qualities (Asendorpf & Wilpers, 1998; Lang & Heckhausen, 2006; Lehnart & Neyer, 2006; Parker et al., 2012) as well as with the maintenance of relationships (Caspi & Bem, 1990). There are several theoretical frameworks that illustrate the Big Five trait domains, the approach to personality most often used in this context, to map nicely on two higher-order factors. The first higher-order factor is called alpha (Paulhus & John, 1998), plasticity (DeYoung, 2006), or agency (Bakan, 1966) referring to motives of dominance and achievement, as well as the flexibility in behavioural and cognitive domains. The second factor is called gamma (Paulhus & John, 1998), stability (DeYoung, 2006), or communion (Bakan, 1966), referring to motives of nurturance and close relationships, as well as the maintenance in emotional, social, and motivational domains. These two broad motivations are expected to reflect the basic nature of interpersonal relationships that are specified in more agentic or communal goals and manifest in specific behaviours (Pincus & Ansell, 2013). For example, extraverts are known to have a motivation for interpersonal contact (King & Broyles, 1997). This motivation manifests in a higher likelihood to talk to others (Mehl, Gosling, & Pennebaker, 2006) and a higher popularity in their peer group (Paunonen, 2003). We suggest that personality traits related to the first factor, including openness and extraversion, might be more important for flexibility in social contexts, for changes in social network characteristics, and in the context of less-stable relationships. In contrast, the traits related to the second factor, that is agreeableness and conscientiousness (and sometimes neuroticism), should be prominent in the context of relationship maintenance, stability, and emotional closeness.

From a methodological perspective, one downside of most existing studies is the use of aggregated data. Addressing interindividual differences in social network and relationship characteristics, researchers aggregate either across the entire network or within specific relationship types (e.g., Mund & Neyer, 2014; Neyer & Lehnart, 2007; Parker et al., 2012). Despite the fact that this procedure provides valid information about the relationship status of one individual (Asendorpf & van Aken, 1994), there are at least three drawbacks. First, aggregation collapses and thus reduces available relationship information across quite diverse relationship types (e.g., different family members, close and not so close friends). Second, aggregated means are often based on entirely different relationship partners across time (Feld et al., 2007; Wellman et al., 1997). Third, by aggregating the data, it is impossible to consider specific patterns of within-relationship development and to clearly distinguish between the effects

of between-person and within-person associations in social relationship and personality characteristics on such development. Between-person associations refer to how individual differences in personality relate to individual differences in social networks. For example, a person with higher extraversion might in general report larger social networks than a person with lower extraversion. In contrast, within-person associations refer to how individual and time-specific changes in extraversion relate to variability in social network size. In this context, it would be possible that a time-specific increase of extraversion within the individual is actually unrelated to changes in social network size.

Why is this differentiation of within-person and between-person associations so important? Based on knowledge from health and developmental psychology, within-person and between-person associations are in several cases not the same and sometimes even contradictory (Sliwinski, Hoffman, & Hofer, 2010; Thorvaldsson et al., 2012). Furthermore, we know from previous studies that people differ substantially in their within-person trends of change (cf., Mroczek, Spiro, Almeida, & Pafford, 2006). Previous research concentrated on between-person effects of personality on social relationship characteristics (Asendorpf & Wilpers, 1998). The current study extends previous studies by associating not only between-person effects but also within-person changes with social relationship characteristics. Importantly, these two types of associations represent unrelated, independent effects (Snijders & Bosker, 2011).

Between-person effects and social network characteristics

Previous research based on aggregated data is informative regarding between-person effects of personality. With respect to quantitative social network characteristics, two longitudinal studies with college freshman showed that higher levels of extraversion relate to larger peer networks (Asendorpf & Wilpers, 1998; Selfhout et al., 2010). Extraverted individuals tend to be more socially active and less shy. This tendency has been shown to induce positive affect within social situations specifically in extraverts (Denissen & Penke, 2008; Fleeson, Malanos, & Achille, 2002). Thus, extraverts may be more likely to actively look out for frequent social interactions, leading to larger social networks. This assumption maps nicely with the idea of the agentic/plasticity factor.

Associations with relationship stability are lesser known. A sequence of studies on romantic partnerships indicated that higher conscientiousness related to better relationship maintenance, but only in men (Baker & McNulty, 2011). These results map nicely with the theoretical idea of the stability/communal factor of personality (Paulhus & John, 1998). Furthermore, partnership research suggested that higher openness relates to lower relationship stability (Karney & Bradbury, 1995). That is, tendencies towards high interest in new contexts and people possibly lead to less stability with individual relationship partners. Again, such results go along with openness as a trait of the flexibility factor (DeYoung, 2006).

With respect to relationship quality, a very recent longitudinal study found that higher levels of extraversion (or certain subfacets of extraversion) were related to subsequent higher

emotional closeness to friends, the romantic partner, and kin (Mund & Neyer, 2014). Similarly, Parker and colleagues (2012), also using a two-wave longitudinal study and aggregated networks, reported that individuals with higher antecedent extraversion reported subsequent higher emotional closeness. Thus again, the sociable part of extraversion might be in play regarding relationship quality. With respect to further personality traits, we draw some expectations from research on parent-child and spousal relationships (Denissen, van Aken, & Dubas, 2009; Karney & Bradbury, 1995; Neyer & Voigt, 2004; Prinzie, Stams, Dekovic, Reijntjes, & Belsky, 2009; Robins, Caspi, & Moffitt, 2000). In these contexts, consistently negative effects of neuroticism have been found on relationship quality or emotional closeness. In contrast, effects of agreeableness and conscientiousness are less consistent but indicate positive associations to relationship quality. These results map at least partly with the theoretical idea of the two basic motivations. Extraverts appear to feel closer across relationship types, whereas agreeable and conscientious individuals appear to feel closer specifically to stable relationship partners such as kin and romantic partner.

Within-person effects and social network characteristics

Within-person effects represent the individual variability around a person's average level of personality. Such patterns of individual variability have been shown to be meaningful (Mroczek *et al.*, 2006) and possibly also carry important information with respect to social relationships. Since there is no previous study on these effects, we need to explore whether well-established between-person associations translate to the within-person level. From the theoretical perspective of the two higher-order factors, within-person increases in agentic or communal traits could manifest in similar manners as between-person differences. For example, agreeableness has been suggested as an important trait when being selected as friend (Selfhout *et al.*, 2010). Thus, to become more agreeable across the transition into young adulthood could also relate to larger networks. Plus, in line with the stability/communal factor increasing agreeableness and conscientiousness may also facilitate relationship maintenance. At the same time, despite a within-person increase in agreeableness the individual could still be regarded as rather quarrelsome in the between-person perspective. Thus, within-person change can but by no means has to mimic between-person effects.

With respect to relationship quality, within-person changes in emotional closeness have been mainly linked to relationship variables, and no previous study that we know of included personality when considering within-person effects. Thus, we explore the role of all Big Five personality traits in this context. We suggest that within-person dynamics that illustrate a maturation of personality are related to positive changes in emotional closeness. Based on the idea of the communal/stability factor, having more kind and pleasant interactions, and becoming more dutiful and careful but also an increase of emotional stability should relate to emotionally closer relationships, specifically in the context of stable ties.

The present study

The aim of the current study was twofold. First, we examined how social networks and social relationship characteristics develop in the transition out of secondary school into the university or work setting. We hypothesized that on the quantitative side, social networks increase across the transition. However, this increase should be mainly due to a larger number of nonkin relations to friends and acquaintances. Concentrating on stable relationships, we expect kin relations to hold the larger ratio, whereas stable nonkin ties should be fewer in number. Expectations on the qualitative side are that closeness is generally higher to kin compared to nonkin. Changes in perceived closeness may be rather small across time. But we expected an increase in the average perception of emotional closeness for stable network partners because they serve as a constant in the challenging transition out of school.

The second research aim was to address interindividual differences in social relationship characteristics. Importantly, we investigated between-person and within-person effects of personality. With respect to between-person effects, extraversion is expected to positively correlate with both quantitative and qualitative characteristics of social networks. In addition, agreeableness may be profitable and openness detrimental in relationship maintenance. Finally, individuals with lower neuroticism, and higher agreeableness and conscientiousness, may report generally higher emotional closeness to social network partners. With respect to within-person effects, analyses are highly exploratory. Translating from the between-level increases in sociability and agreeableness across the transition should also relate to larger networks. Similarly, decreases in neuroticism, and increases in agreeableness and conscientiousness, should be particularly profitable for the maintenance of and closeness in social relationships.

To test these hypotheses, we applied multilevel models to longitudinal ego-centred social network data of emerging adults who were transitioning out of secondary school and into young adulthood. The current paper differs from previous research (e.g., Neyer & Asendorpf, 2001; Parker *et al.*, 2012) in several ways: (a) Beyond the general network structure, we identified and examined relationship (in)stability across the transition out of secondary school and beyond; (b) we used unaggregated data regarding the quality of relationships applying multilevel modelling techniques to estimate developmental associations within each single relationship across all those identified as well as within stable relationships; (c) thereby, we were the first study that was able to differentiate within-person and between-person effects of personality characteristics on social relationship characteristics; and (d) this differential picture of stability and change, of within-person and between-person effects, may engender a new integrative view on the interplay of social relationship and personality development.

METHOD

Procedure

The current study was based on a sample from an ongoing German longitudinal study (Transformation of the Secondary

School System and Academic Careers; TOSCA). The major focus of TOSCA was on educational and psychological conditions, adaptations, and outcomes during the transition from school to work or university. The study began in 2002 and is now hosted by the University of Tübingen (see Trautwein, Neumann, Nagy, Lüdtke, & Maaz, 2010). Participants were recruited from 149 randomly selected upper secondary schools (99% participation rate for schools) from a single German state; these schools are representative of the German 'Gymnasium' school type. Students in schools were also randomly selected and participated at a satisfactory rate of 80%.

The first assessment of TOSCA (T1), taking place between February and May 2002, was conducted in the school setting where two trained interviewers introduced the project and handed out questionnaires. For the second assessment, 2 years after graduation (T2; February to May 2004) as well as the third wave of data assessment (T3; February to May 2006), extensive questionnaires were sent to the participants' homes. Participants were paid €10 to €15 (about \$12 to \$18) each time they participated. To be able to analyse change in social relationships, the current paper was based on a sample of only those participants who participated at least twice in the TOSCA study.

Participants

The sample of participants with at least two waves of participation consisted of 2287 (mean age = 19.50, $SD = 0.64$; 64% female) participants with an average participation rate of $M = 2.75$ ($SD = 0.4$) waves. For attrition analyses, we compared students who participated in two or more waves with those students who participated only once. Students who continued their participation were slightly younger ($M = 19.69$ versus $M = 19.50$, $d = 0.23$), were more likely to be female, $\chi^2(1) = 136.43$, $p < .001$, and were more likely to live in a traditional family setting, $\chi^2(1) = 7.79$, $p < .01$. In addition, continuers were slightly more open ($M = 2.73$ versus $M = 2.78$, $d = 0.11$), agreeable ($M = 2.88$ versus $M = 2.94$, $d = 0.17$), and conscientious ($M = 2.86$ versus $M = 2.92$, $d = 0.13$), but were similar to those students who dropped out of the study early in mean levels of neuroticism ($d = 0.06$) and extraversion ($d = 0.05$) at T1. Thus, the few existing differences between groups were small in effect size and appear indicative of only modest selectivity effects.

In some parts of our analyses, we specified our sample and analysed only social relationship dynamics of stable social relationships. Relationships were considered *stable* if they were listed at all three waves of the study, thus constituting the constant core of an individual's social network. Participants who were included in these analyses had participated in all three waves and had named at least one of their social network partners repeatedly in all three waves. These 1510 participants were on average 19.48 ($SD = 0.61$) years old, and 70% of them were female. Selectivity analyses comparing this subsample ($n = 1510$) to those individuals of the previous sample who were not included in this subsample ($n = 777$) illustrated that at the first assessment, students in the subsample were more likely to be female, $\chi^2(1) = 21.52$, $p < .001$, but otherwise were similar in age ($d = 0.08$) and

in their likelihood to live in a traditional family setting, $\chi^2(1) = 0.84$, $p = .39$. In addition, the two groups were similar in their mean levels of neuroticism ($d = 0.09$), extraversion ($d = 0.08$), agreeableness ($d = 0.07$), and conscientiousness ($d = 0.11$), but individuals in the subsample were slightly less open ($M = 2.77$ versus $M = 2.82$, $d = 0.14$) at T1. Again, we are inclined to conclude that the very few existing differences between groups were small in effect size and appear indicative of only modest selectivity effects.

Measures

Social network questionnaire

The assessment of social networks was adapted from the social network inventory (Asendorpf & Wilpers, 1998; Neyer & Asendorpf, 2001) and is based on a grid list for which people are asked to name up to 25 social relationship partners. The social network consisted of significant people with whom participants had contact within the last 3 months. To increase the number of named relationships, a cued recall strategy was used, administering a list with primer categories (partner, ex-partner, parent, sibling, grandparents, other relative, friend, and acquaintance). With respect to all social network partners, participants were asked to provide information about their initials (first letter of first and last names), age, and gender. Afterwards, participants rated each social network partner on a number of five-point Likert scales with respect to perceived emotional closeness (1 = *very far* to 5 = *very close*), perceived conflict frequency (1 = *never* to 5 = *nearly every time we meet*), as well as contact frequency (1 = *less than once a month* to 5 = *daily*).

To analyse within-relationship change in ongoing relationships, social network partners were matched across measurement points. The matching procedure was based on three characteristics of the relationship partner: (a) initials (first letter of prename and surname), (b) gender, and (c) relationship type. That is, we combined the three single data files that contained all social network partners from T1, T2, and T3 using these three variables. Relationships were assigned only when all three variables were identical across the three measurement occasions. Across time, some of the relationships changed their type, such as from romantic partner to friend or from friend to acquaintance. To identify these relationships, a team of trained student assistants and the first author reviewed all such combinations (i.e., less than 1%). Generally, decisions about whether the relationship partner was the same as at the previous assessment were handled conservatively; that is, when identities could not be clearly matched across time points, these cases were considered as different and thus, unstable relationships. The matching procedure was conducted using SPSS 19.0.

Big Five personality

Big Five personality traits were measured using the German version of the NEO-FFI personality inventory (Costa & McCrae, 1992). Neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness were all rated with 12 items on a four-point response scale from 1 (*applies not at all*) to 4 (*applies totally*). Extensive previous

work has shown the reliability, validity, and comparability of the German NEO-FFI inventory (Borkenau & Ostendorf, 1991; Lüdtke, Trautwein, Nagy, & Köller, 2004). Across all three waves, alpha reliabilities were satisfactory (Neuroticism: α 's between .81 to .89; extraversion: α 's between .77 to .81; openness to experience: α 's between .73 to .74; agreeableness: α 's between .73 to .76; and conscientiousness: α 's between .83 to .85). Descriptive statistics of personality and relationship control variables are reported in the Appendix (Table A1).

At the first assessment, participants reported demographic information on age, gender, and their family situation (traditional: living with two biological parents versus nontraditional: living in a different setting).

Statistical analyses

To model associations between social relationship characteristics and personality across time, we fit a series

$$\text{CLOS}_{tri} = (\beta_0 + b_{0i} + b_{0ri}) + \beta_1(\text{STABLE}_{ri}) + (\beta_2 + b_{2i})(\text{TIME}_{tri}) + \beta_3(\text{TIME}_{tri} \times \text{STABLE}_{ri}) + \beta_4(\text{EXTRA-within}_{i}) + \beta_5(\text{EXTRA-between}_{i}) + \varepsilon_{tri}$$

of hierarchical linear models (Raudenbush & Bryk, 2002; Snijders & Bosker, 2011). Data analyses were divided into three steps: First, descriptive statistics of social network structure and network overlap were calculated.

Second, a series of models addressed quantitative network characteristics across time and the effect of personality on these characteristics. A first set of two-level multilevel models examined the change of social network size across time. Models included the time variable (coded 0, 1, 2)³ to estimate mean network size at T1 as well as change across time points. Personality was included as a time-varying covariate that was centred within persons, that is represents within-person deviations. To differentiate among within-person and between-person effects of personality, we additionally included the person-centred mean of each respective personality trait in all models (Hoffman & Stawski, 2009; Raudenbush & Bryk, 2002; Thorvaldsson *et al.*, 2012). Thus, the linear slope of the within-person-centred personality variable represents the main effect of within-person personality after accounting for between-person differences in that trait. This slope reflects the within-person association between personality and network size (i.e., the extent to which change in network size within one person is related to linear change in personality within that same person across time). The between-person personality variable, by contrast, directly reflects between-person associations of personality and network size (i.e., the extent of interindividual differences in the average association between network size of one person and the average personality of this person). A set of exploratory multiple regression models in this context

predicted network overlap either between T1/T2 or between T2/T3 by personality at the previous measurement point (i.e., T1 and T2, respectively). Since this is not a multilevel structure, no differentiation of within-person and between-person effects is possible.

In the third step, Big Five personality traits were used as predictors of relationship quality. These analyses were conducted in a three-level model with measurement points (Level 1) nested in social relationships (Level 2) nested in individuals (Level 3). This data structure allowed us to work with unaggregated social network data and, thus, to predict change of emotional closeness within each social relationship. Relationship characteristics of perceived closeness were presented in multilevel models. In a first set of models, all named social relationships were included and relationship stability (0 = unstable, 1 = stable) was differentiated. The final model of this series (including extraversion as example trait) was specified as follows (see Long, 2012):

where person i 's (Level 3) perceived emotional closeness to social network partner r (Level 2) at time t (Level 1), CLOS_{tri} , is modelled as a function of, first, an intercept, β_0 , estimating the average emotional closeness of individuals with all other covariates given a value of zero (i.e., closeness at T1 for unstable relations with an average within-person variation in extraversion and an average between-person extraversion); second, the slope of relationship stability, $\beta_1(\text{STABLE}_{ri})$, in this context, estimating the average deviation from the intercept (i.e., emotional closeness to unstable relations); third, an average linear slope of time in the study, $\beta_2(\text{TIME}_{tri})$, in this context, indicating the change of emotional closeness across measurement points of unstable relations only; fourth, the interaction of time and the stability dummy, $\beta_3(\text{TIME}_{tri} \times \text{STABLE}_{ri})$, in this context, indicating the average deviation from the linear time slope from stable compared to unstable relations; fifth, the linear slope of within-person extraversion, $\beta_4(\text{EXTRA-within}_{i})$, reflecting the within-person association between personality and emotional closeness; and sixth, the linear slope of between-person extraversion, $\beta_5(\text{EXTRA-between}_{i})$, directly reflecting between-person associations of personality and emotional closeness. With respect to random effects, the intercept was allowed to vary across individuals, b_{0i} , and across relationships, b_{0ri} . In addition, the time slope was allowed to vary across individuals, b_{2i} , and the model included a residual error term at Level 1, ε_{tri} . In all models, the dummy-coded stability variable was left uncentred (see Long, 2012).

The same type of model was conducted with only the subset of stable social relationships. In this context, a variable of relationship type (0 = nonkin, 1 = family) differentiated between kin and nonkin relations. The remaining model parameters remained unchanged. With respect to all models in the third step, we included conflict and contact frequency as control variables. We also tested for main effects as well

³Because this study's participants are from a single age cohort, the time variable is approximately identical to mean-centred age.

as all possible interactions. However, the Results section will discuss only statistically significant interaction effects at the $p < .01$ level. All models were fit to the data using R, version 2.13.1, for multilevel models using the package 'lme4' (Bates, Maechler, & Bolker, 2012).

RESULTS

The Results section is divided into three parts. The first part reports descriptive statistics of quantitative and qualitative social network characteristics across the time of the study. The second part of the Results section concentrates on the prediction of interindividual differences in quantitative social network characteristics, using the entire sample. Finally, the third part focuses on the prediction of interindividual differences in qualitative social relationship characteristics with (a) a differentiation of stable and unstable relationships based on the entire sample and (b) a differentiation of kin and nonkin relationships based on the subsample of only stable social relationships that were listed at all three time points. In the last two parts, we were able to test within-person and between-person effects of personality across time. Furthermore, readers should keep in mind that the entire study consists of three measurement points of social networks, spanning 4 years. However, the major transition out of high school is taking place between T1 and T2.

Quantitative and qualitative network characteristics in the transition into young adulthood

Quantitative network characteristics

All in all, the 2287 participants generated a total of 42,161 social relationships across the three waves, whereby the frequency of their inclusion varied. That is, 27,746 (65.8%) were named only once in the social network, 8992 (21.3%)

were named twice, and 5423 (12.9%) of all relationships were included three times in the social network of a participant.

The upper part of Table 1 summarizes the descriptive statistics for social network size across the three measurement occasions. As expected, the average size of social networks increased across time. At the first assessment, students generated an average of eight to nine relationships. On the other hand, the size then remained stable with about 11 social ties at T2 and T3. With respect to specific subnetworks, the results illustrated that the overall social network increase was basically due to a larger number of nonkin, whose average number increased from about five at T1 up to seven at T2 and T3. The number of family ties increased to a much smaller extent across time.

The middle part of Table 1 addresses social relationships that were repeatedly included in social networks. Network overlap (or stability) was similar across consecutive assessment points. Between T1 and T2, an average of four (range 0 to 16) social network partners was included again. This number increased only slightly between T2 and T3 ($M = 5.46$, range 0 to 16). Relationship-specific analyses illustrated that the average number of family ties repeatedly included in the social network fluctuated between two to three across all waves. Interestingly, the average number of repeatedly named nonkin increased from 1.83 to 2.62 and was thus similar to the number of overlapping kin between T2 and T3. Thus, numbers of overlapping social network partners indicate a larger portion of stable family ties in the beginning, but number of stable nonkin relations increased across this transition.

Qualitative network characteristics

Looking at the entire sample, the first section in the lower part of Table 1 indicates that emotional closeness was relatively stable throughout the study. Furthermore, emotional closeness perceptions were higher to stable relationships

Table 1. Descriptive statistics of quantitative and qualitative social network characteristics across time (importantly, quantitative descriptives are calculated on the individual level, whereas qualitative descriptives are based on the relationship level)

	T1			T2			T3		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
<i>Network size</i>									
Entire sample	2261	8.56	4.38	2146	10.85	5.47	1805	10.70	5.47
# of kin	2261	3.52	2.02	2146	3.87	2.24	1805	3.90	2.35
# of nonkin	2261	5.04	3.41	2146	6.97	4.39	1805	6.80	4.33
<i>Network overlap</i>									
Entire sample		/		2065	4.52	2.35	1667	5.46	3.12
Kin		/		2065	2.63	1.62	1667	2.84	1.82
Nonkin		/		2065	1.89	1.48	1667	2.62	2.09
<i>Emotional closeness</i>									
Entire sample	19,246	3.85	0.99	23,166	3.84	0.96	19,209	3.84	0.97
Stable	5393	4.22	0.84	5402	4.30	0.81	5405	4.26	0.84
Unstable	13,853	3.71	1.00	17,764	3.70	0.96	13,804	3.67	0.96
<i>Only stable</i>									
Kin	3623	4.27	0.85	3630	4.36	0.81	3625	4.36	0.81
Nonkin	1770	4.12	0.82	1772	4.18	0.80	1780	4.05	0.87

Note: The range of the entire network is from 1 to 25 in all three waves, whereas the number of specific relationships ranges from 0 (such as no kin in social network at T1) to 24 (number of nonkin at T2). Network overlap ranges from 0 (no overlapping relationship) to 16, and 17 overlapping relationships for T1 to T2, and T2 to T3, respectively. / = there is no network overlap available for the first measurement point.

Table 2. Prediction of social network size change by Big Five personality

	Network size		Number of kin		Number of nonkin	
	Estimate	SE	Estimate	SE	Estimate	SE
<i>Fixed effects</i>						
Intercept	9.07*	0.10	3.62*	0.04	5.45*	0.08
Time	0.99*	0.07	0.15*	0.03	0.83*	0.06
<i>Within-person</i>						
Neuroticism	-0.34	0.24	-0.13	0.10	-0.22	0.19
Extraversion	0.99*	0.30	-0.06	0.13	1.06*	0.24
Openness	1.46*	0.28	0.35*	0.12	1.12*	0.23
Agreeableness	0.71	0.31	0.14	0.13	0.56	0.25
Conscientiousness	-0.13	0.27	0.20	0.11	-0.33	0.21
<i>Between-person</i>						
Neuroticism	0.27	0.22	0.10	0.10	0.16	0.17
Extraversion	1.08*	0.25	0.06	0.11	1.00*	0.20
Openness	0.81*	0.21	0.04	0.09	0.77*	0.16
Agreeableness	0.99*	0.27	0.53*	0.12	0.48*	0.21
Conscientiousness	0.09	0.22	0.22*	0.10	-0.14	0.17
<i>Random effects</i>						
Intercept	Var	SD	Var	SD	Var	Var
Time	5.78	2.40	1.70	1.30	3.40	1.84
Residual	0.82	0.90	0.23	0.48	0.55	0.74
Model fit	14.64	3.83	2.43	1.56	9.43	3.07
AIC	36,613.2		26,070.9		33,826.0	

Note: The models are two-level models with 6172 observations on level 1 and 2284 individuals on level 2.

* $p < .01$.

(i.e., listed at all three time points) compared to unstable relationships (i.e., listed at one or two time points only). And this was true with respect to the entire time span of the study.

In the very last part of our analyses, we focus on this subsample of only stable social network partners, because they have been suggested to represent an important social context of an individual's development (Feld et al., 2007; Kahn & Antonucci, 1980; Milardo, 1982). Stable social relationships are defined as accompanying the individual across the entire phase of the study (i.e., listed at all three time points). In all, $N = 1510$ individuals listed a total of 5423 social relationships at all three waves of the study; an average of 3.59 ($SD = 1.95$) social network partners. Of these, 15% ($n = 229$) of the participants included only one relationship in their social network across all three time points, about 57% of participants ($n = 854$) included between two to four social network partners, and 28% ($n = 427$) of participants included five or more social network partners (maximum: 13 relationships) at all three waves. Differentiating these social relationships by relationship type, family relations constituted about two thirds ($n = 3,640$; 67%) of the stable social network, and the remaining one third ($n = 1783$; 33%) consisted of nonkin relationships with friends and acquaintances. Looking at emotional closeness characteristics, as expected, perceived emotional closeness was higher in stable kin compared to stable nonkin relationships.

Interindividual differences in quantitative social network characteristics: Within-person and between-person dynamics of Big Five personality

Looking at change in social network size as well as number of kin and nonkin across time, we first analysed a set of

empty models. Results of the two-level structure models showed intraclass correlations of .38, .44, and .36 for network size, number of kin, and number of nonkin, respectively. That is, about 38%, 44%, and 36% of the total variation, respectively, was located between persons, whereas the remaining 62%, 56%, and 64% illustrated within-person variability across time. Thus, at both levels, substantial variation was observed.

Table 2 represents results of the final multilevel models including the time variable (coded 0, 1, 2) as well as within-person and between-person personality effects. It appears that social network size substantially increases across time. Furthermore, within-person personality effects illustrated two substantial effects. After accounting for between-person differences in the respective trait, a within-person increase in extraversion and openness was linked to an increase in social network size. By contrast, between-person associations showed three substantial effects. As expected, more extraverted, more open, and more agreeable individuals reported having larger social networks. Thus, agreeableness serves as between-person predictor but not as within-person predictor of social network size. Relationship-specific analyses of kin networks suggest a small increase across time and an inconsistent picture of within-person and between-person effects. Within-person, an increase in openness across time related to an increase in number of kin. However, between-person those individuals that were more agreeable and more conscientious tended to name more kin in their social networks overall. With respect to nonkin ties, result patterns were similar to those of the general network. Within-person increases of extraversion and openness were linked to an increase in number of nonkin. Between-person,

being higher in extraversion, openness, and agreeableness related to larger nonkin networks.

As exploratory analyses, we conducted a series of multiple regression analyses predicting network overlap at T1/T2 and T2/T3 by personality. Across all six performed analyses, only one personality trait proved to have stable positive associations with the number of overlapping relationships. More agreeable individuals tended to name their social network partners more repeatedly (β 's between 0.12 and 0.39, all p 's < .01; cf., Table A2). That is true for the overall network, as well as for kin and nonkin relationships. More conscientious individuals additionally reported more overlap in kin and less overlap in nonkin ties. But this effect was only substantial between T1/T2.

Interindividual differences in change in emotional closeness: Within-person and between-person dynamics of Big Five personality

Emotional closeness in all relationships

Using the entire sample, the first set of three-level models predicts within-relationship change of emotional closeness by relationship stability as well as within-person and between-person personality across time. The three-level structure allows for the differentiation of three variance components: variability between persons (Level 3), between relationships (Level 2), and between measurement points (Level 1). An empty model of emotional closeness indicated that 11% of the variability was located between persons, whereas 47% of the variability captured variation between relationships; and finally, about 42% of the variability was due to differences/change across

waves. Thus, at all three levels, a substantial amount of variability existed, warranting further analyses.

Table 3 presents the final models of these analyses. As a general pattern across all models, we found the expected higher closeness to stable compared to unstable relationships (β 's between 0.67 and 0.68, all p 's < .01). In addition, emotional closeness appeared to be fairly stable across time, except for the model including openness. There we found a slight increase of emotional closeness across time.

Looking at effects of within-person and between-person personality, a consistent picture was found with respect to the three personality traits of neuroticism, extraversion, and openness. Within-person decreases in neuroticism and increases in extraversion and openness related to a relationship-specific increase in emotional closeness. Furthermore, less neurotic, more extraverted, and more open individuals also tended to feel closer in their social relationships in general. All effects were consistent across time as well as across stable and unstable relationships. Agreeableness and conscientiousness illustrated no main within-person effects and only agreeableness showed a between-person effect. More agreeable individuals tended to feel emotionally closer to their social network partners. For both traits, we found interaction effects supplementing the main effects. Within-person increases in agreeableness and conscientiousness related to higher emotional closeness only to stable social relationship partners. This two-way interaction was, however, qualified by a three-way interaction, suggesting a decrease of this positive association across time. To further probe these time-varying associations, we modified the multilevel model so that time was modelled as a categorical variable (Reyes, Foshee, Bauer, & Ennett, 2011). That is, rather than treating time as a continuous

Table 3. Unstandardized estimates of multilevel models predicting perceived emotional closeness in all named social relationships across time including relationship stability as a time-invariant covariate and Big Five personality (within-person = deviation from individual mean and between-person = individual mean) as time-varying covariate

	DV: Emotional closeness									
	Neuroticism		Extraversion		Openness		Agreeableness		Conscientiousness	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
<i>Fixed effects</i>										
Intercept	3.68*	0.01	3.67*	0.01	3.67*	0.01	3.68*	0.01	3.68*	0.01
Stable (1 = yes)	0.68*	0.01	0.68*	0.01	0.67*	0.01	0.67*	0.01	0.68*	0.01
Time	0.00	0.01	0.01	0.01	0.02*	0.01	-0.00	0.01	0.01	0.01
Stable × Time							0.01	0.01	0.01	0.01
Personality <i>within-person</i>	-0.08*	0.02	0.09*	0.02	0.16*	0.02	0.08	0.05	-0.01	0.04
Personality <i>between-person</i>	-0.12*	0.02	0.27*	0.03	0.14*	0.03	0.20*	0.03	0.05	0.02
Stable × P <i>within-person</i>							0.17*	0.07	0.20*	0.05
Time × P <i>within-person</i>							0.02	0.03	0.02	0.03
Time × Stable × P <i>within-person</i>							-0.18*	0.06	-0.14*	0.05
<i>Random effects</i>										
Intercept b_{0i}	0.15	0.39	0.14	0.38	0.15	0.38	0.15	0.38	0.15	0.39
Time slope b_{2i}	0.04	0.20	0.04	0.20	0.04	0.20	0.04	0.20	0.04	0.20
Intercept b_{0ir}	0.38	0.62	0.38	0.62	0.38	0.62	0.38	0.62	0.38	0.62
Residual ϵ_{tri}	0.37	0.61	0.37	0.61	0.37	0.61	0.37	0.61	0.37	0.61
<i>Model fit</i>										
AIC	155,503		155,635		155,490		155,484		155,625	

Note: Including control variables of conflict frequency and contact frequency into the final models did not change the result patterns.

* $p < .01$.

variable in the interaction, we estimated the association between the respective personality trait for each group (in stable and unstable) and each of the three measurement waves (at T1, T2, and T3). These models produced separate parameters for the effect of personality on emotional closeness in stable and unstable relationships at each time point and are depicted in Figure 1. As shown, emerging adults who reported elevated levels of agreeableness (a) or conscientiousness (b) also tended to report more highly elevated levels of emotional closeness in stable social relationships than one would expect given their overall level of emotional closeness. However, this was true only with respect to the first measurement occasion and not with respect to unstable social relationships.

Covarying all final models for perceived conflict and contact frequency did not change the pattern of results. As expected, lower conflict and higher contact frequency related to higher emotional closeness.

Emotional closeness in stable relationships

The final set of three-level models is based on only the stable social relationships that were listed at all three measurements points ($n = 5,423$ generated by $N = 1510$ participants). As a first step, we analysed an empty model on perceived emotional closeness in stable relationships. Results indicated that 16% of the variability was located between persons, whereas 30% of the variability captured variation between relationships; and finally about 54% of the variability was due to differences/change across waves. Again, a substantial amount of variability existed at all three levels, warranting further analyses. We conducted a series of multilevel models that predicted perceived emotional closeness by relationship type (family versus nonkin), time,⁴ as well as within-person and between-person personality. Table 4 summarizes the final models. Three important and generally hypothesized findings across all models are as follows. First, at T1 family ties were generally reported as being closer than relationships with nonkin. Second, perceived emotional closeness in nonkin relationships decreased during the transition into young adulthood. Third, the preference for kin, in contrast, increased in the same time frame (interaction effect Time \times Kin).

The between-person effects for emotional closeness in stable relationships were significant for four out of the five personality traits. That is, less neurotic but more agreeable, more conscientious, and more extraverted individuals tended to feel emotionally closer to their stable social network partners. Similar to previous studies, openness to experiences was unrelated to emotional closeness (Parker *et al.*, 2012). In contrast, only neuroticism, agreeableness, and conscientiousness illustrated substantial within-person associations with emotional closeness. After accounting for between-person differences in the respective trait, a within-person decrease in neuroticism and increase in agreeableness as well

as conscientiousness was linked to an increase in emotional closeness within stable relationships. With respect to these three personality traits, both between-person and within-person effects pointed in the same direction. By contrast, within-person dynamics of extraversion were unrelated to within-person dynamics of emotional closeness in both family and nonkin ties. Similar to the between-person effects, no substantial within-person associations were found between emotional closeness and changes in openness.

Again, within-person results of main effects were supplemented by a number of interesting two-way interaction effects. With respect to agreeableness and conscientiousness, a negative interaction effect with time qualified the respective positive main effects, suggesting that the associations between emotional closeness and both agreeableness and conscientiousness decreased across the time period used in the study. This effect was unrelated to kinship status. Thus, these interactions generalize the found three-way interactions of the models with the entire sample to kin and nonkin ties.⁵ Finally, a substantial positive interaction between within-person openness and relationship type indicated that increases in openness were related to higher levels of emotional closeness to family but not to nonkin. Thus, it appears that in certain relationship contexts, openness is related to within-person relationship dynamics. Again, adding conflict and contact frequency as covariates to this model, they did not change the pattern of results of our main findings with only one exception: the found small decrease of emotional closeness for nonkin across time was not substantial anymore. Perceptions of conflict were negatively and of contact frequency were positively related to changes in perceptions of emotional closeness. These effects indicate that stable social relationships with increasing conflict and decreasing contact frequency were reported as becoming less emotionally close across time.

DISCUSSION

The aim of the current study was to examine social network and relationship characteristics across the transition out of secondary school and beyond, as well as to predict interindividual differences in change by within-person and between-person dynamics of Big Five personality development. Analyses with three waves of the TOSCA sample revealed a set of four main findings. First, social networks showed to generally increase across time, and this increase was mainly due to a larger number of relationships with nonkin. Overlapping social relationships were mainly kin in the beginning, whereas the share of nonkin increased across time. Second, predicting interindividual differences in network size, only extraversion and openness indicated substantial within-person effects, whereas agreeableness

⁴The time slope does not vary randomly across relationship types but only across individuals. Probably due to the limited number of Level-1 units ($M = 3.59$, $SD = 1.95$), models with random slopes in all levels appeared to be relatively demanding as indicated by a very large number of iterations. Thus, we decided to estimate the less complex versions of the models (see Snijders & Bosker, 2011).

⁵Producing estimates in the same way as for Figure 1, results illustrate again that elevated levels of agreeableness and conscientiousness tended to relate to more highly elevated levels of emotional closeness in stable social relationships than one would expect given their overall level of emotional closeness. Again, this was true only with respect to the first measurement occasion and not for the second and third waves of assessment.

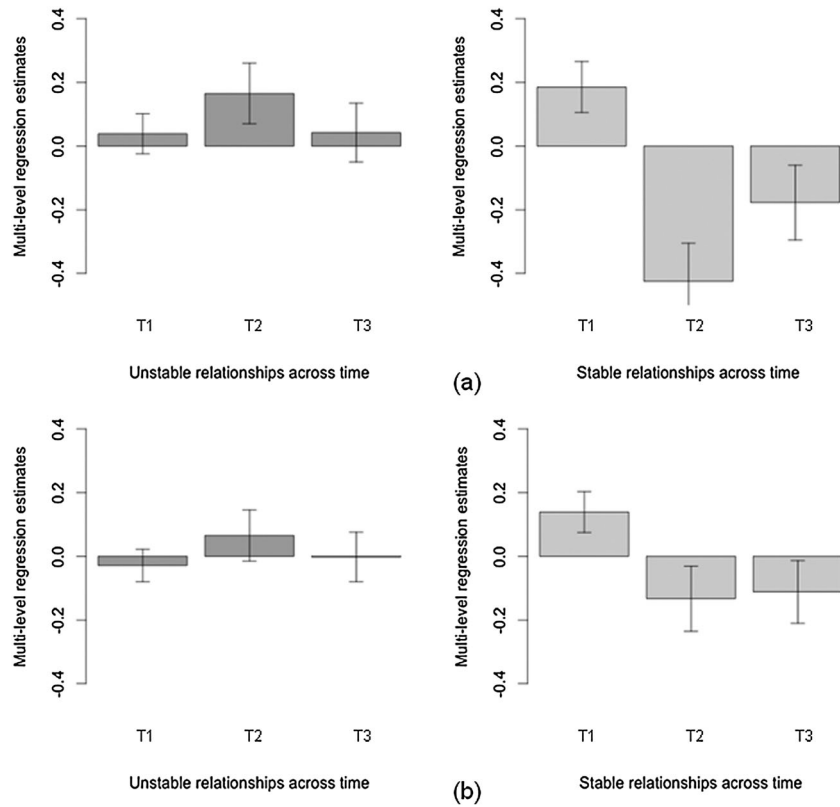


Figure 1. Regression coefficients and standard errors for the effects of within-person (a) agreeableness and (b) conscientiousness on perceived emotional closeness in unstable and stable relationships in the transition to young adulthood. Personality is time varying and centred within persons.

Table 4. Unstandardized estimates of multilevel models predicting perceived emotional closeness in stable relationships across time including relationship type as a time-invariant covariate and Big Five personality (within-person = deviation from individual mean and between-person = individual mean) as time-varying covariates

	DV: Emotional closeness in stable relationships									
	Neuroticism		Extraversion		Openness		Agreeableness		Conscientiousness	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
<i>Fixed effects</i>										
Intercept	4.18*	0.02	4.17*	0.02	4.17*	0.02	4.18*	0.02	4.19*	0.02
Kin (1 = yes)	0.11*	0.02	0.12*	0.02	0.11*	0.02	0.11*	0.02	0.11*	0.02
Time	-0.05*	0.01	-0.04*	0.01	-0.04*	0.01	-0.04*	0.01	-0.05*	0.01
Time × Kin	0.09*	0.01	0.09*	0.01	0.10*	0.01	0.09*	0.01	0.09*	0.01
Personality <i>within-person</i>	-0.12*	0.02	0.05	0.03	0.02	0.03	0.23*	0.05	0.18*	0.04
Personality <i>between-person</i>	-0.10*	0.03	0.25*	0.03	0.02	0.04	0.21*	0.04	0.13*	0.03
Time × Personality <i>within-person</i>							-0.17*	0.05	-0.12*	0.04
Kin × Personality <i>within-person</i>					0.11*	0.03				
<i>Random effects</i>										
Intercept b_{0i}	Var	SD	Var	SD	Var	SD	Var	SD	Var	SD
Intercept b_{0i}	0.15	0.38	0.14	0.38	0.15	0.38	0.15	0.38	0.15	0.39
Time slope b_{2i}	0.05	0.23	0.05	0.23	0.06	0.23	0.05	0.23	0.06	0.23
Intercept b_{0ir}	0.22	0.47	0.22	0.47	0.22	0.47	0.22	0.47	0.22	0.47
Residual ϵ_{iri}	0.32	0.56	0.32	0.57	0.32	0.57	0.32	0.56	0.32	0.57
<i>Model fit</i>										
AIC	35,628		35,683		35,654		35,640		35,667	

Note: Including control variables of conflict frequency and contact frequency into the final models did not change the result patterns. * $p < .01$.

was the only consistent predictor of network overlap. Third, emotional closeness was found to be relatively stable across time and stable relationships showed to be

consistently closer compared to unstable relationships. With a focus on only stable relationships, family ties were found to be consistently closer and this emotional

closeness increased across time, whereas closeness to stable nonkin relationships decreased. Fourth, the consideration of between-person and within-person effects of personality showed consistent negative effects of neuroticism and specific associations with respect to the remaining traits. In our discussion, we highlight social relationship dynamics across transitions and emphasize differential pathways of the relationship-personality transaction.

Quantitative and qualitative social network characteristics in the transition to young adulthood

We found that social networks increased across the transition from secondary school into university or other work settings but remained fairly stable thereafter. On average, emerging adults named about two social relationships more at the second and third assessment occasions compared to the first one. Such results are in line with previous empirical research that has shown that social networks increase in size on average until age 25 (Wrzus *et al.*, 2013). It appears that as young adults move through new or additional social spaces and roles, they accumulate more contacts. Our data additionally showed that as expected, the increase in network size was primarily due to a larger number of nonkin relationships. Thus, including diverse people such as friends or acquaintances in social networks may be most likely to set the stage for the successful transition into young adulthood and beyond. At the same time, the number of family members in the social networks of young adults remained relatively stable. Thus, despite a decrease in contact frequency (Parker *et al.*, 2012) and an increase in the independence of young adults from their parents (Arnett, 2000), family relationships remain important parts of the ego-centred social network along this transition. Again, such results are in line with previous theoretical and empirical work that has emphasized the pivotal role of kin relationships throughout the life span (Carstensen, 1992, 1995; Curry, Roberts, & Dunbar, 2013; Kahn & Antonucci, 1980; Neyer & Lang, 2003).

Concentrating on overlapping, stable relationships, similar to Milardo (1992), we found an average of about five relationships to remain a constant part of the social network. In line with previous research (Fung *et al.*, 2009; Wellman *et al.*, 1997), overlapping relationships comprised mainly kin between the first two assessments. Thus, leaving school appears to have a strong impact on the composition of the social network such that very few nonkin ties survive the transition into emerging adulthood. However, the amount of overlapping nonkin relationships increased across time and was very similar to the number of kin relationships between the second and third assessments. Such findings emphasize the importance of stable nonkin relationships in young adulthood (Feld *et al.*, 2007; Wrzus *et al.*, 2011).

Looking at qualitative characteristics, both the descriptive statistics as well as multilevel models confirm previous studies (Neyer & Lang, 2004) that suggest a relative stability in average perceived emotional closeness. At the same time, our models allowed for within-relationship considerations of

change in emotional closeness and illustrated three interesting findings. First, differentiating stable and changing social network partners uncovered the expected finding of higher emotional closeness to stable social network partners. And this distinction was shown to be stable across time. Despite the importance of more distant social network partners who come and go (Granovetter, 1973), stable ties appear to fulfil a distinct role in satisfying the need for emotional closeness (Baumeister & Leary, 1995; Deci & Ryan, 2000). Second, our findings replicate earlier reports that within stable ties emotional closeness was substantially higher to kin as compared to nonkin in young adulthood. Finally, our results confirmed an increase of emotional closeness for stable relationships. However, we qualified the finding by Feld and colleagues (2007) illustrating that this increase was only true for stable kin. That is, participants felt that family relationships were closer than nonkin ties at the first assessment, and this difference even increased across time. These results add further empirical support to the process of kinship preference (Lang *et al.*, 2013; Neyer & Lang, 2003; Neyer *et al.*, 2011). In addition, they accentuate the ongoing importance of kin ties in young adulthood (Antonucci *et al.*, 2004; Carstensen, 1992). Literally, cutting or at least loosening family ties (*i.e.*, moving out, decreasing contact, and making autonomous decisions regarding work and life settings) does not imply that relationships to parents, siblings, and grandparents become less important. Three aspects of the period of life we studied might be essential to consider in this context: First, young adults, particularly in their first years of higher education, often remain financially dependent on their parents. Such a dependency might also trigger relationship dynamics that we were unable to detect in this study. However, Wrzus and colleagues (Wrzus *et al.*, 2011) illustrated that based on unique relationship perceptions, young adults and their parents actually perceived their relationships to be quite reciprocal regarding both support and money allocation. Nevertheless, existing perceptions of financial dependence may be linked to perceptions of obligation and thus relational consequences (Fingerman *et al.*, 2014). Second, because emerging adulthood is expected to be a life phase marked by a great deal of exploration and experimentation (Arnett, 2000, 2007), the existence of a 'secure base' (Feeney, 2004) could become particularly important and even support the successful completion of the transition. It might be the case that stable family ties provide this base in young adults. Third, the increase of emotional closeness could also be addressed by socioemotional selectivity theory (Carstensen, 1992, 1995) that would suggest an increased salience of significant relationships in a time of uncertainty or change as in the case of relocation to college or the confrontation with new role expectations (*i.e.*, job environment).

Interindividual differences in quantitative social network characteristics: Within-person and between-person dynamics of Big Five personality

Previous research that has included social network and personality characteristics has focused to a large extent on

between-person effects. Using the multilevel context and being able to actually follow the same social relationship across several years, we distinguished between effects of between-person and within-person variability in personality variables. With respect to social network size, our findings indicate that within-person and between-person variability show similar influences and thus comparable patterns with respect to some but not all personality characteristics.

In detail, we were able to confirm previous findings on the profitable role of extraversion and openness in social network size. Between-person effects suggested that on average higher extraversion and higher openness related to larger networks. We extended these findings showing two interesting aspects: First, within-person increases of extraversion and openness also related to an increase in social network size. Thus, it is not only your relative standing compared to other individuals but also your individual development towards greater openness and extraversion that is related to an increase in social network size across the transition into young adulthood. Second, the differentiation between kin and nonkin ties illustrated such consistent effects of extraversion and openness only for nonkin. Thus, to become more socially active and less shy, as well as more curious with respect to new people and places obviously, increases the likelihood of meeting new people outside your family circle and thereby incorporating new friends and acquaintances into your network. Such results map nicely with Carstensen's (1992, 1995) idea of an increased need for information acquisition in young adults as well as the idea of a higher order factor of agency or plasticity (Bakan, 1966; Paulhus & John, 1998) that may be particularly important for flexibility and active navigation in the (new) social world. Thus, personality development on this factor could be regarded as setting the stage for the successful navigation into new social contexts during the post high school period.

We found some additional inconsistent yet interesting results regarding within-person versus between-person effects. First, being a more agreeable individual related to generally larger social networks. However, becoming more agreeable (i.e., within-person change) was unrelated to social network change. In line with the higher-order factor differentiation, we found that agreeableness, as a trait of stability and high communal tendencies (Bakan, 1966; DeYoung, 2006; Paulhus & John, 1998), may relate to generally larger networks, but the within-person development to become a more agreeable individual does not lead to larger social networks. Furthermore, agreeableness was the solely consistent predictor of larger overlap with respect to the entire social network, as well as with kin and nonkin relationships. Relationship stability across time in both relationship types was more likely for more agreeable individuals. Such results reinforce the idea that more agreeable individuals were more likely to be selected as friends (Selfhout et al., 2010). Concomitantly, being selected may increase the likelihood for relationship stability. Further research that includes social network and personality perceptions of both relationship partners is needed to verify such findings (cf., Limitations section).

Interindividual differences in change in emotional closeness: Within-person and between-person dynamics of Big Five personality

Using the three-level context to follow change in emotional closeness in the same social relationship across several years, again we are able to distinguish between effects of between-person and within-person variability in personality. In addition, we applied these kinds of analyses to the entire social network and only to stable social relationships that persist across time. Thus, we were able to examine these two types of personality effects in different relationship contexts. Looking at all named relationships, within-person decreases in neuroticism and increases in extraversion and openness were related to higher emotional closeness. However, between-person effects were found for these three traits as well as for agreeableness. Concentrating only on stable social relationships, within-person decreases in neuroticism and in this case increases in agreeableness and conscientiousness were linked to higher emotional closeness, whereas extraversion and openness were now unrelated to changes in emotional closeness across time. Between-person associations were found with respect to four personality characteristics. In this context of stable social relationships, only openness to experience was unrelated to emotional closeness between persons.

On a more detailed level, the transition out of school and beyond has been shown to be related to a number of different types of personality changes (Bleidorn, 2012; Lüdtke et al., 2011; Roberts, Caspi, & Moffitt, 2001). As young adults mature, they tend to become more emotionally stable, agreeable, and conscientious, and these same three personality traits together appear particularly potent for the maintenance of emotionally close relationships. By contrast, increases in extraversion and openness appear to be more important for the increase of social networks, and thus for the initiation of social relationships, but less so for the maintenance of already existing close ties. This result pattern again supports the idea of the two motivational tendencies to manifest in different interpersonal relations (Bakan, 1966; DeYoung, 2006; Paulhus & John, 1998).

For example, conscientious individuals are described as adhering to social norms or being able to control impulses (John & Srivastava, 1999). For relationship maintenance, these are qualities that ease interactions and may also increase trust and confidence across time because relationship partners are seldom confronted with unexpected behaviours or emotional outbursts. In addition, low conscientiousness, or more specifically low social responsibility, has been related to negative relationship outcomes such as shorter marriages (Roberts & Bogg, 2004). Thus, with respect to the role of conscientiousness in stable social relationships, we suggest that the same behaviours and processes may establish within-person and between-person effects. By contrast, fluctuating or weak ties might not immediately benefit from such behavioural tendencies, and thus, conscientiousness does not affect relationship quality in these ties.

Interestingly, conscientiousness and agreeableness both became less important for emotional closeness to stable relationship partners across time. We can only speculate about possible reasons for these patterns. One option might be that

the decrease in the frequency of contact with family (Parker *et al.*, 2012) also reduces the need to actually behave in such ways. A second reason could be that the development of a more mature personality also decreases the need to behave agreeably and conscientiously in general (i.e., because with maturity one may develop less conflictual relationships).

Importantly, we found that the within-person and between-person dynamics of extraversion differed across our two models. That is, we were able to repeatedly replicate previous findings that more extraverted individuals have closer relationships compared to less extraverted individuals (Asendorpf & Wilpers, 1998). However, we did not find a significant within-person association between changes in extraversion and emotional closeness in stable social relationships. Thus, whether or not people are able to intensify or maintain emotional closeness within an enduring relationship appears to be unrelated to changes in extraversion. Again, looking at specific facets, extraverted individuals are described as sociable, assertive, and energetic (John & Srivastava, 1999). Such motivational characteristics (Paulhus & John, 1998) may result in more social participation and more initial social contacts (Lucas, Le, & Dyrenforth, 2008), as well as larger social networks (Asendorpf & Wilpers, 1998), but an increase in extraversion does not seem to automatically relate to an increase in emotional closeness within already established relationships.

Interestingly, we did find quite differential results for openness to experience. Within all social relationships, openness was consistently related positively to emotional closeness. In a specific focus on stable relationships, we did not find a main effect of openness to experience on emotional closeness with respect to within-person and between-person associations. However, in this context, a substantial within-person interaction with relationship type indicated that young adults with increases in openness to experience simultaneously reported increases in feelings of emotional closeness to their family compared to nonkin. Based on behaviours that are related to increasing openness, such individuals may be more curious with respect to new experiences and environments (John & Srivastava, 1999) and thus engage with diverse new social network partners. At the same time, they appear to invest into their stable and trusted family network. Such results may fit with the idea of young adulthood as a time of both, information acquisition and increase of the nonkin network (Carstensen, 1992, 1995), as well as a remaining dependency on the stable kin network (Fingerman *et al.*, 2014).

Finally, neuroticism was the most influential trait affecting emotional closeness. Being highly neurotic and becoming more neurotic relate to lower average closeness and to decreases in within-relationship perceptions of closeness. Such results extend previous findings from parent–child and partnership research (Denissen *et al.*, 2009; Karney & Bradbury, 1995; Neyer & Voigt, 2004; Prinzie *et al.*, 2009; Robins *et al.*, 2000) suggesting that negative effects of neuroticism generalize across stable and unstable relationships as well as kin and nonkin ties. This might be particularly interesting in combination with the finding that neuroticism is unrelated to network size and network overlap. It is not the case that neurotic individuals have

fewer social relationships; however, they appear to feel less emotionally close to these existing ties.

What can we actually learn from such differential considerations of between-person and within-person effects on a conceptual level? Our findings add to the scientific personality–social relationship literature, which indicates that personality dynamics are not always consistent between and within individuals. In addition, personality development within the individual was shown to influence changes in relationship quality within specific relationships, in both stable and fluctuating ties. We suggest that differences in within-person and between-person associations of closeness and personality may arise because a different suite of behaviours and thoughts is important for initiating versus maintaining social relationships as well as for interaction with kin and nonkin ties. Generally, our results map nicely on the idea of the existence of a higher-order personality factor of stability or communion as an indicator of socialization and continuation, as well as a factor of plasticity as an indicator of flexibility, openness to novelty and agency (DeYoung, 2006; Digman, 1997; Paulhus & John, 1998). Particularly, within-person dynamics of personality affecting emotional closeness in stable relationships were consistently driven by neuroticism, agreeableness, and conscientiousness—the three traits included in the communal or stability factor. By contrast, extraversion and openness appeared as main drivers of social network increases, reflecting main characteristics of the agency or plasticity factor.

Limitations and outlook

Despite the strengths of having a longitudinal design involving social networks and being able to follow the same relationship partners in a large sample across time, we have to consider a number of limitations of our study. First, one recent emphasis in relationship research has been to distinguish different (variance) ratios of social relationships such that relationship perceptions are divided into actor, partner, and unique effects (Back *et al.*, 2011; Kenny, 1996). We were not able to conduct such analyses because we did not collect information from the social network partners in our study. Despite the lack of opinions of other informants, our study followed the same relationships across time and assessed personality as a time-varying covariate. This enabled us to distinguish between-person and within-person effects of personality, an endeavour most previous research on social network and personality transactions has not achieved. In addition, our personality traits were only based on self-report data, which is known to represent only a certain perspective of an individual's personality and thus possibly affect associations with relationship characteristics (Schaffhuser, Allemand, & Martin, 2014). Second, our results illustrated that the number of stable social relationships across waves constituted less than half of the networks of young adults. Simultaneously, social networks increased in size across time, highlighting the large amount of fluctuation in social network partners. In this regard, we were unable to address reasons for this fluctuation or whether the break-up of a relationship was self-selected or came about for other reasons. This information would clearly

enhance our understanding of how people shape their social contexts and what role personality characteristics play in this endeavour. Third, we cannot rule out that the difference of participation in school (for T1) versus at home (for T2 and T3) did affect this pattern of results. However, in all three instances, the participation was based on the same questionnaires. The fact that the majority of change is taking place between T1 and T2 is, in our theoretical understanding, related to the developmental transition out of school as a major life changer in emerging adulthood (cf., Lüdtke et al., 2011). Fourth, as with most longitudinal studies, we are unable to rule out possible selectivity effects that may affect our results. Our selectivity analyses, however, did not indicate even small effects in personality differences and the only consistent selectivity variable appeared to be gender, with women being more likely to participate at least twice and to name at least one social relationship partner across three occasions. Thus, we concluded that with respect to main variables the found differences are maximally modest. Last but not least, even with a longitudinal design, causal inferences are complicated by unobserved variables (Foster, 2010), which may affect social networks and the development of emotional closeness and personality above and beyond the variables analysed here. In addition, young adulthood has been shown to be a time that is characterized by the confluence of several developmental tasks (Arnett, 2000). That is, associations could be affected by other constructs or developmental challenges. By modelling both the within-person and between-person effects of personality on social relationship development in a longitudinal data set, we made an attempt to address this developmental complexity.

What is the major task for future research? With our macrolongitudinal study, we were able to illustrate functional similarities and differences of personality traits on the within-person and between-person level. However, specific processes by which (changes in) extraversion or agreeableness actually drive (the change of) social networks and relationship quality need to be better understood. Future research should address these (microlevel) processes that possibly drive such interrelated change dynamics across time. We propose two major routes for future research. On the one hand, personality and thus behavioural changes may derive in part from biogenetic characteristics (Sen, Burmeister, & Ghosh, 2004) that affect our social interactions and thus social relationships as a whole. Thus, the exploration and inclusion of certain biomarkers may lead to further insights into underlying processes. On the other hand, based on the idea of a sociogenomic personality model (Roberts & Jackson, 2008), we suggest supplementing macrolongitudinal studies by microlongitudinal data. Understanding more fine-grained associations between personality and social interactions will be helpful in disentangling these processes (cf., Hutteman, Nestler, Wagner, Egloff, & Back, in press). Thus, future studies might want to incorporate more fine-grained measures of affective, perceptual, and cognitive processes (Back et al., 2011). Possibly, daily or situation/person-specific changes in a person's response, communication, or evaluation behaviours could drive such general developmental patterns.

CONCLUSIONS

In sum, transitioning out of school and into university or work settings brings a substantial shift to the social contexts of young adults and also to their social networks. In line with theoretical outlines and previous research, we found that social networks become larger across time, mostly due to an increase in the number of friends and acquaintances. Feelings of emotional closeness and changes thereof were related to within-person changes in neuroticism, extraversion, and openness in unstable ties, but to neuroticism, agreeableness, and conscientiousness in stable ties. Regarding between-person associations across all named relationships, similar patterns were found, that is higher emotional closeness related to being less neurotic, more extraverted and more open, and additionally to being more agreeable. Looking at between-person effects in only stable relationships, patterns were again similar to the within-person effects, but also showed for extraversion. Young adults appear to be well prepared to shape and mould their social contexts according to the new opportunities they encounter, despite contextual and general life challenges associated with this transition (Arnett, 2000, 2007). Personality characteristics appear to play a significant role in this developmental interplay. Both within-person and between-person associations show some similarities, specifically with respect to the constant negative effect of high neuroticism, but also substantial differences particularly with respect to agreeableness and extraversion.

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APPENDIX

Table A1. Descriptive statistics of time-varying social relationship control variables as well as personality in the transition to young adulthood

	T1		T2		T3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Relationship control variables						
Conflict	2.26	1.01	2.06	0.94	2.00	0.92
Stable	2.48	0.94	2.37	0.90	2.25	0.88
Unstable	2.17	1.02	1.97	0.94	1.90	0.91
Contact	3.73	1.46	3.01	1.58	2.90	1.55
Stable	4.28	1.18	3.46	1.47	3.08	1.56
Unstable	3.51	1.50	2.87	1.58	2.83	1.54
Personality						
Neuroticism	2.30	0.45	2.17	0.50	2.14	0.53
Extraversion	2.87	0.40	2.90	0.41	2.92	0.42
Openness	2.80	0.44	2.87	0.44	2.88	0.43
Agreeableness	2.96	0.34	3.05	0.34	3.11	0.36
Conscientiousness	2.92	0.44	3.06	0.43	3.13	0.43

Note: Conflict: 1 (*never*) to 5 (*nearly every time we meet*); Contact: 0 (*less than once a month*) to 5 (*daily*); Personality: 1 (*applies not at all*) to 4 (*applies totally*).

Table A2. Prediction of network overlap for T1/T2 and T2/T3 by Big Five personality at the previous measurement point in multiple regression models

	Network overlap		Overlap of kin		Overlap of nonkin	
	<i>Estimate</i>	<i>SE</i>	<i>Estimate</i>	<i>SE</i>	<i>Estimate</i>	<i>SE</i>
<i>Overlap T1/T2</i>						
Intercept	4.52*	0.05	2.63*	0.04	1.89*	0.03
Personality at T1						
Neuroticism	0.08	0.06	0.05	0.04	0.03	0.04
Extraversion	0.05	0.06	-0.01	0.04	0.06	0.04
Openness	0.12	0.05	0.04	0.04	0.08	0.03
Agreeableness	0.24*	0.05	0.12*	0.04	0.12*	0.03
Conscientiousness	0.03	0.05	0.12*	0.04	-0.09*	0.03
<i>R</i> ²	.015		.012		.015	
<i>Overlap T2/T3</i>						
Intercept	5.47*	0.08	2.84*	0.04	2.62*	0.05
Personality T2						
Neuroticism	-0.02	0.09	0.01	0.05	-0.03	0.06
Extraversion	0.08	0.09	-0.05	0.05	0.12	0.06
Openness	0.06	0.08	-0.01	0.05	0.06	0.05
Agreeableness	0.39*	0.08	0.21*	0.05	0.19*	0.05
Conscientiousness	0.02	0.08	0.09	0.05	-0.07	0.05
<i>R</i> ²	.019		.016		.016	

Note: Personality was *z*-standardized before being included in the model.

**p* < .01