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## Personality-situation transactions from adolescence to old age

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People presumably choose and create their daily environments according to their personality. Prior research shows that, for example, more extraverted people engage more often in social situations, and more conscientious people engage more often in work-related activities compared to less extraverted or less conscientious people, respectively. The current study examined such personality-situation transactions in people's daily life. Based on the assumption that older people know themselves and their personality better than younger people, we investigated whether momentary and proximate personality-situation associations (i.e., changing from one type of situation into another) increase with older age. 378 people aged 14 to 82 years described their Big Five traits and took part in a three weeks experience-sampling phase. Using mobile-phone based assessments in daily life, participants reported on average 55 times on their momentary situation. Multilevel modeling results showed that personality-situation associations varied with the age of participants. Some of the "established" personality-situation associations, such as for extraversion and time spent with friends or conscientiousness and time spent with work activities, were only observed in adolescence and young adulthood. In contrast, other personality-situation associations appeared only in late adulthood, such as for openness and time spent with friends. Yet most personality-situation associations did not vary significantly with people's age. In addition, personality traits predicted maintaining or entering personality-congruent situations. The latter results point to the active role of personality in shaping one's environment. The findings imply that some personality-situation transactions may be largely similarly across the lifespan.

**Keywords:** Big Five; personality-situation transactions; experience sampling in daily life; lifespan development; multilevel modeling

Personality-situation transactions describe how people select, change, create, and construe situations based on their dispositions (Buss, 1987; Funder, 2008; Rauthmann, Sherman, & Funder, 2015). For example, the more extraverted people are, the more they engage in social situations, and the more conscientious people are, the more they engage in work-related activities (e.g., Ickes, Snyder, & Garcia, 1997; Mehl, Gosling, & Pennebaker, 2006). As personality-situation transactions were mainly studied among young adults (Emmons, Diener, & Larsen, 1986; Mehl et al., 2006), it is open whether these findings generalize across the lifespan. Personality traits change across the lifespan (e.g., regarding rank-order stability, Lucas & Donnellan, 2011; Roberts & delVecchio, 2000), and so may personality processes, such as selecting and creating personality-congruent situations. Increasing self-knowledge and selectivity in several life domains with older age (Baltes & Baltes, 1990; Helson, Stewart, & Ostrove, 1995) could lead to stronger personality-situation transactions with older age. We thus aimed to extend previous studies on personality-situation transactions by testing whether transactions change with age and by examining the active role of personality in shaping one's daily environment from one situation to the next. Therefore, we applied a mobile-phone based experience-sampling approach to sample situations pseudo-randomly in people's daily life, and predicted being in, maintaining, and changing to specific situations from people's Big Five personality traits and age.

### **Theoretical Perspectives on Age Differences in Personality-Situation Transactions**

People choose and create their daily environments and situations according to their personality because such environments are compatible with their behavioral dispositions, that is, their personality. Put differently, momentary situations partly covary with people's personality dispositions because situations were (in)directly sought or created, where the existing behavioral dispositions can be (or have been) lived out (Allport, 1961; Buss, 1987; Emmons & Diener, 1986; Ickes et

al., 1997). For example, extraversion broadly describes the tendency to engage in and enjoy social situations (Denissen & Penke, 2008; McCrae & Costa Jr, 2008), therefore people higher in extraversion should actually be more often with other people instead of alone. In addition, when more extraverted people are alone, they should be more inclined to change the situation and next seek being with others. Hence, people are assumed to not only be in specific personality-compatible situations more often, but also people should change from personality-incompatible to compatible situations. That means, both momentary and proximate situations somewhat later should be predictable from personality traits.

Whether situations are maintained or changed may relate even more strongly to one's personality than momentarily being in specific situations because it better captures the active nature of personality to select and create situations (Buss, 1987; Ickes et al., 1997). For people to select situations, variation in situations is necessary to select from (Buss, 1987). The variation of situations can be constrained by people's general life circumstances, for example not being (self-)employed constraints the time that can be spent with work activities and colleagues, and by people's age.

People's constraints and possibilities vary with their age (Baltes, 1987, 1997). With older age, people presumably experience more and more constraints: in cognitive and physical resources as well as in their environment (Baltes, 1987). For example, declining health may constrain the daily situations that people can engage in, such as visiting other people. Increasing constraints should necessitate selectivity (choosing between alternatives), and hence people should become more selective with older age (Baltes, 1987; Baltes & Baltes, 1990; Heckhausen, Wrosch, & Schulz, 2010). Previous findings on increasing selectivity in life goals, daily goals, and social partners as well as less diverse daily activities and situations support the assumption of increasing selectivity with older age (Freund, 2008; Riediger & Freund, 2008). Therefore, we assume that with older age people select such situations more often, which match their

personality better to optimize their use of time and energy. Increased self-knowledge with older age (Helson et al., 1995; Staudinger & Glück, 2011) should allow older people to select situations increasingly according to their personality, which would then lead to greater personality-situation associations with older age.

### **Empirical Evidence on Age Differences in the Associations Between Big Five Personality Traits and Trait-Relevant Situations—Hypotheses of the Present Study**

Although research on personality-situation transactions often aims at measuring situations objectively, the used self-reports can contain different situational information: Cues regarding the situational context (i.e., present persons, locations, and momentary activities), characteristics or subjective perceptions of the situation, and classes or categories describing the entire situation based on available cues and subjective perceptions (Rauthmann, 2015; Rauthmann et al., 2014, 2015a). Here, we conceptualize daily situations as the external context people are in (Wagerman & Funder, 2009; Wood, Tov, & Costello, 2015) and differentiate situations based on persons and activities. This information is less susceptible to differences in interpretation even when assessed via self-reports compared to situation perceptions (Rauthmann, Sherman, Nave, & Funder, 2015; Sherman, Nave, & Funder, 2013). Thus, it is better possible to distinguish situation and personality for addressing personality-situation transactions. In addition, information on persons, locations, and activities has been frequently used to describe people's daily situations (Mehl et al., 2006; Saucier et al., 2007).

We next describe empirical evidence on age differences in personality-situation associations separately for each of the Big Five traits. Generally, knowledge about age differences in person-situation associations is preliminary because previous studies either used age-homogenous samples or reported only age-general patterns of personality-situation associations from their age-heterogeneous samples. We therefore base our

central prediction on the just described theoretical considerations: The associations between traits and momentary or proximate trait-relevant situations should be stronger with older age.

**Neuroticism.** High levels in neuroticism are characterized by more frequent worries as well as greater emotional instability including more frequent and more intense negative affect. Hence, individual differences in neuroticism are difficult to observe because neuroticism focuses strongly on internal states (Funder & Dobroth, 1987; Gosling, John, Craik, & Robins, 1998; Vazire, 2010). Thus, only a few behavioral manifestations of neuroticism were repeatedly observed: The higher young adults scored in neuroticism, the more often they reported negative affect—in general and in reaction to unpleasant events (Suls & Martin, 2005; Suls, Martin, & David, 1998), the more often they judged their social behavior as insecure and anxious (Back, Schmukle, & Egloff, 2009; Funder & Sneed, 1993), and the more often they were observed to be alone (Mehl et al., 2006). Furthermore, higher neuroticism predicted a greater preference for solitude, that is, people higher in neuroticism reported that they generally prefer more strongly to be alone (Nestler, Back, & Egloff, 2011).

Empirical evidence on age differences in effects of neuroticism are available regarding negative affect reactivity to unpleasant events. Among older adults, higher neuroticism more strongly predicted greater negative affect reactivity to daily stress (i.e., increases in negative affect) compared to younger adults (Mroczek & Almeida, 2004). We assume that for other situations relevant to neuroticism, such as being alone more often (Mehl et al., 2006; Nestler et al., 2011), the associations between neuroticism and situations are also stronger with older age.

**Extraversion.** High levels in extraversion are characterized by frequently seeking and enjoying social interactions. Since extraversion is mainly a social trait, it is easily observed in social situations (Gosling et al., 1998; Vazire, 2010). For example, the higher college students scored in extraversion, the more often they were in social situations and

conversations instead of alone (Emmons & Diener, 1986; Mehl et al., 2006), the more others judged their social behavior as talkative, confident, and active (Back et al., 2009; Funder & Sneed, 1993), and the more they reported to engage in social leisure activities instead of aesthetic activities (Barnett, 2006).

Matching results exist for older adults: More extraverted older adults most often lived in social and accessible areas with numerous social and cultural facilities (Carp & Carp, 1980; Murray et al., 2005). In an experimental setting, more extraverted older adults felt better in active, social situations compared to less extraverted older adults, who felt better in less active, non-social situations (Quattrochi-Tubin & Jason, 1983). In sum, we assume that people higher in extraversion more often seek and engage in situations with others. Again, this effect should be more pronounced with older age.

**Openness.** High levels in openness are characterized by enjoying intellectual activities and new experiences in a variety of domains. Consistent with the definition of trait openness, the higher college students scored in openness, the more other people judged their behavior as intellectual (but also hostile, Back et al., 2009; Funder & Sneed, 1993), and the more often they reported to engage in cultural leisure activities (Barnett, 2006; Emmons & Diener, 1986). In a similar vein, people watching TV less often in daily life were rated as more open (Mehl et al., 2006). Furthermore, higher openness predicted a greater preference for solitude, that is, more open people reported that they generally prefer more strongly to be alone, presumably to pursue intellectual activities (Nestler et al., 2011).

The association between openness and cultural/intellectual activities also shows indirectly in late adulthood: More open older adults more often lived in so-called high accessibility areas with numerous social and cultural facilities (Murray et al., 2005), and reported to engage more often in intellectual activities, such as reading and learning about new topics (Hogan, Staff, Bunting, Deary, & Whalley, 2012). In sum, we assume that people higher in openness more often seek

cultural leisure activities. These effects should be more pronounced with older age.

**Agreeableness.** High levels in agreeableness are characterized by being cooperative and avoiding conflicts. Individual differences in agreeableness are not so much related to seeking specific social partners, activities, or places, but to how social interactions are carried out (Denissen & Penke, 2008; Funder & Sneed, 1993). Accordingly, college students higher in agreeableness argued less often in daily life (Mehl et al., 2006; Suls et al., 1998), and others judged their social behavior as more friendly (Back et al., 2009; Funder & Sneed, 1993). Other than this no specific preferences for places, situations, general activities, or leisure activities were observed among young adults (Barnett, 2006; Mehl et al., 2006; Rauthmann et al. 2015b). Thus, in line with previous research and the conceptualization of agreeableness, we assume that individual differences in agreeableness are largely unrelated to the situations people seek out because individual differences will show in the social interaction style (Denissen & Penke, 2008; Suls et al., 1998).

**Conscientiousness.** High levels in conscientiousness are characterized by tenacious goal pursuit and high task orientation. Consistent with the definition of conscientiousness, college students higher in conscientiousness reported and were observed to work more often, and engage less in leisure activities (Barnett, 2006; Emmons et al., 1986; Fleeson, 2007; Mehl et al., 2006), and complete tasks more in time (Back, Schmukle, & Egloff, 2006; Back et al., 2009).

Nothing is known whether the associations between conscientiousness and being more often in work- or task-related situations increases with older age. Here, we can only speculate that the personality-situation associations will also be greater with older age because people should select more the situations that match their personality when they have restricted resources available in older age. In sum, we assume that people higher in conscientiousness more often seek work- and task-related activities and engage less often in leisure activities, and, these

effects should be more pronounced with older age.

### **The Present Study**

The study tests hypotheses on the associations between the Big Five personality traits and the occurrence of trait-relevant situations in daily life. We assume to confirm the personality-situation associations described before (see Table 1 for specific trait-situation associations). Furthermore, we generally assume that personality-situation associations increase with older age because generally people are more selective, for example with regard to goals and social interaction partners, with older age due to more restricted resources (see *Theoretical Perspective*).

We address these hypotheses with an experience sampling study where 378 participants from adolescence to old age reported their momentary situation (main activity and present persons) on average 55 times during three weeks of their daily lives. We employed a random sampling procedure (see *Method* section) to assess people's daily situations with greatest possible variation and in the moment of occurrence. In contrast, retrospective reports, even at the end of the day, might involve reporting biases, such as underestimating frequent situations and overestimating scarce events (Brose, Lindenberger, & Schmiedek, 2013; Sonnenberg, Riediger, Wrzus, & Wagner, 2012). Also, assessments in people's natural environment offer rather ecologically valid assessments, which uniquely contribute to understand how personality manifests in daily life (Reis, 2011; Sherman et al., 2015).

## **Method**

### **Participants**

A professional fieldwork agency (*TNS Infratest*) recruited 378 participants from three different regions (*Munich, Dusseldorf, Berlin*). Participants ranged in age from 14.0 to 86.5 yrs ( $M = 42.5$  yrs,  $SD = 19.0$ ). The sample was approximately stratified by gender (50.3% men) and age group (17% 14–18 yrs, 15% 19–29 yrs, 14% 30–39 yrs, 16% 40–49 yrs, 15% 50–59 yrs, 16% 60–70 yrs, 7% 70–90 yrs).

Twenty-eight percent of those 321 participants who had already finished school held a degree from a (applied) university. The present research is part of an ongoing longitudinal project, but none of the results have been published elsewhere.

### **Procedure**

The study began with an individual instruction session in the participants' homes. During this session, participants received extensive instructions on the experience-sampling period and completed a trial experience-sampling questionnaire on the same mobile phones later used in daily life (Nokia E50 with Java-based customized software). Following the instruction session, participants carried the phone with them at all times during three experience-sampling periods, each lasting three consecutive days. The three experience-sampling periods were separated by intervals of six days and covered a total of three weeks. On each experience-sampling day, six assessments were distributed pseudo-randomly over a 12-hour window, which was chosen by the participants according to their personal waking habits. Two adjacent assessments were scheduled to be at least 15 minutes and at most four hours apart. At each assessment, the phones prompted participants to answer a short questionnaire displayed on the phone. Participants navigated and responded to the questionnaire using the mobile phone's joystick and keypad. If participants did not respond, they were reminded twice by auditory signals, occurring after five and after ten minutes. If there was still no response, the questionnaire closed, thus reducing participants' degree of freedom in determining when to answer the questions. On average, participants completed at least five of the six daily assessments on 90.7% of their assessment days,  $SD = 13.0$ . To obtain a sufficient number of assessments, experience-sampling periods were extended for a day if participants completed fewer than five assessments on a given day. Overall,  $M = 1.21$ ,  $SD = 1.71$ , of these extension days were scheduled per participant. Participants completed an average of 54.9 assessments,  $SD$

= 4.1. After the experience-sampling phase, participants answered questionnaires during a second individual session in their homes and received a reimbursement of approximately \$135 (100€). The Ethics Committee of the Max Planck Institute for Human Development, Berlin, approved the study.

### Measures

**Momentarily present persons and activities in daily life (repeated assessment during the experience-sampling period).** At each assessment, participants reported the persons that were momentarily present as well as the activity participants were momentarily engaged in. From the seven answering options for present persons *nobody*, *partner*, *family*, *friends*, *colleagues/fellow students*, *strangers*, and *other*, we recategorized *partner* and *family* in one category *family*, and excluded 3.3% of all occasions when *other* was chosen. From the seven answering options for activities *work/school/study*, *chores*, *doctor visit/official errand*, *leisure activity*, *conversation/visit*, *watching TV/doing nothing/napping*, and *other*, we recategorized the seldom chosen category *doctor/official errand* with *chores* in one category *chores*, and excluded 11.0% of all occasions when *other* was chosen, which could be meals.

**Personality traits (single session assessment).** The Big Five personality traits were assessed with the 16-item version of the Big Five Inventory (John & Srivastava, 1999; German version: Lang, John, Lüdtke, Schupp, & Wagner, 2011). Participants rated short self-descriptions about their personality on a scale from 1 (*does not apply*) to 7 (*applies totally*), e.g., I am somebody who ... worries often (neuroticism); ... works thoroughly (conscientiousness). The internal consistencies for the five traits were: neuroticism  $\alpha = .61$ , extraversion  $\alpha = .67$ , openness  $\alpha = .67$ , agreeableness  $\alpha = .49$ , conscientiousness  $\alpha = .66$ .

**Control variables.** From the demographic information participants provided during the first individual session, we created two effect-coded variables on participants' family status (1 = married/steady relationship, -1 single/divorced/widowed) and occupational

status (1 = full-time employment, -1 = no full-time employment). Family and occupational status might affect being in family- or work-related situations. Mobil phones automatically recorded the time when participants answered the questionnaire on the phones. With this information, we computed the time between two adjacent beeps to use as a control variable.

### Analytic strategy

First, we specified multiple regression models to test personality and age effects on *momentarily* present persons or pursued activities. The dependent variables in the separate models were the percentage of measurement occasions when being with specific persons (*nobody*, *partner/family*, *friend*, *colleague*, *stranger*) or the percentage of occasions when doing a specific activity (*work*, *chores*, *conversation*, *watching TV*, *leisure activity*). The predictors were age (continuous linear and squared effects), the five personality traits, and the interactions between age and the traits.

Second, we specified logistic multilevel regression models in HLM 6.0 (Raudenbush, Bryk, & Congdon, 2004) to predict the *proximate* situation, that is, being with a specific person or doing a specific activity at the next assessment. We used penalized quasi-likelihood estimation and robust standard errors. Multilevel modeling was used because measurement occasions (Level 1) were nested within persons (Level 2). The dichotomous dependent variables in separate models were the present person or the activity at the *next* measurement occasion within the same day, which were predicted by momentary situation (1=same person or activity during momentary and next situation, 0=different person or activity during momentary and next situation) at the measurement occasion (Level 1). The Level-1 predictor was uncentered because 0 was a meaningful value. The five traits (N = neuroticism, E = extraversion, O = openness, A = agreeableness, C = conscientiousness), age, and the interactions between traits and age were entered as linear predictors on Level 2 (all centered at the sample mean). We first tested all squared age effects and interactions with traits, and then omitted non-significant

effects for reasons of parsimony. Formally, the equations for the full model were<sup>1</sup>:

*Occasion level (level 1)*

Probability of occurrence of situation at next assessment (e.g., being alone) =  $\varphi$

$\log[\varphi/(1-\varphi)]_{ij} = \beta_{0j} + \beta_{1j}$  (momentary situation) +  $r_{ij}$

*Person level (level 2)*

$\beta_{0j} = \gamma_{00} + \gamma_{01}$  (age) +  $\gamma_{02}$  (age<sup>2</sup>) +  $\gamma_{03}$  (N) +  $\gamma_{04}$  (E) +  $\gamma_{05}$  (O) +  $\gamma_{06}$  (A) +  $\gamma_{07}$  (C) +  $\gamma_{08}$  (age×N) +  $\gamma_{09}$  (age×E) +  $\gamma_{010}$  (age×O) +  $\gamma_{011}$  (age×A) +  $\gamma_{012}$  (age×C) +  $\gamma_{013}$  (age<sup>2</sup>×N) +  $\gamma_{014}$  (age<sup>2</sup>×E) +  $\gamma_{015}$  (age<sup>2</sup>×O) +  $\gamma_{016}$  (age<sup>2</sup>×A) +  $\gamma_{017}$  (age<sup>2</sup>×C) +  $u_{0j}$

$\beta_{1j} = \gamma_{10} + \gamma_{11}$  (age) +  $\gamma_{12}$  (age<sup>2</sup>) +  $\gamma_{13}$  (N) +  $\gamma_{14}$  (E) +  $\gamma_{15}$  (O) +  $\gamma_{16}$  (A) +  $\gamma_{17}$  (C) +  $\gamma_{18}$  (age×N) +  $\gamma_{19}$  (age×E) +  $\gamma_{110}$  (age×O) +  $\gamma_{111}$  (age×A) +  $\gamma_{112}$  (age×C) +  $\gamma_{113}$  (age<sup>2</sup>×N) +  $\gamma_{114}$  (age<sup>2</sup>×E) +  $\gamma_{115}$  (age<sup>2</sup>×O) +  $\gamma_{116}$  (age<sup>2</sup>×A) +  $\gamma_{117}$  (age<sup>2</sup>×C) +  $u_{1j}$

The coefficients  $\gamma_{03}$  to  $\gamma_{07}$  and  $\gamma_{13}$  to  $\gamma_{17}$ , respectively, are most relevant to test our hypothesis concerning changing to or maintaining trait-relevant situations, and the coefficients  $\gamma_{08}$  to  $\gamma_{017}$  and  $\gamma_{18}$  to  $\gamma_{117}$  are most relevant to test our hypothesis on age moderations in such personality-situation associations. We report odds ratios and the percentage change in probabilities of being in specific situations in Tables 4 and 5. For example, a positive trait main effect ( $\gamma_{03}$  to  $\gamma_{07}$ ) of 5% indicates that with higher trait values, the probability of changing to a certain situation increases by 5% with every trait-unit increase. A significant age-moderation of this effect of 0.5% indicates, that the trait main effect increases by 0.5% with every year in age. This means, for participants, who were 10 years older than the average, the trait main effect was more pronounced, 10% (5%+10\*0.5%) instead of 5%. Put differently, for a 10-years older than average participant, the probability of changing to a certain situation increases by 10% for every trait-unit increase instead of 5% for the average-age participant. Thus, age-moderation effects may seem small because they are scaled in one-year increases/decreases.

## Results

We first provide descriptive information and information on age differences for the Big Five traits and the daily situations participants were in. Then, we present the results on age effects on momentary personality-situation associations and proximate situation change, i.e., whether traits predicted if participants maintained or changed situations from one to the next assessment. These results are grouped by traits and address different situations. Thus, the presentation of results deviates from the statistical models, which predicted one type of situation by all traits, to enhance clarity of presentation. Table 1 summarizes the results and compares them with the hypothesized effects.

### Descriptive Information and Age Differences for the Big Five Personality Traits and Situations

**Big Five personality traits.** Multiple regression models largely replicated known cross-sectional age differences in the Big Five traits: With older age, extraversion ( $\beta_{\text{age}} = -.17$ ,  $p < .01$ ) and agreeableness ( $\beta_{\text{age}} = -.13$ ,  $p < .01$ ) were less pronounced. Both openness ( $\beta_{\text{age}} = .12$ ,  $p < .01$ ,  $\beta_{\text{age}^2} = -.20$ ,  $p < .01$ ) and conscientiousness ( $\beta_{\text{age}} = .40$ ,  $p < .01$ ,  $\beta_{\text{age}^2} = -.23$ ,  $p < .01$ ) evinced non-linear, inverted U-shaped age effects, where young and middle-aged adults had higher values than adolescents and older adults. There were no significant age effects for neuroticism ( $\beta_{\text{age}} = .03$ ,  $p = .32$ ). We created seven age groups, described in the section *Participants*, and tested the homogeneity of variances of the Big Five traits in these age groups. The variances were homogeneous for all traits ( $ps > .10$ ) except conscientiousness, where a significant Levene test (2.77,  $p = .01$ ) showed that there was more variance among adolescents aged 14-17 years.<sup>2</sup>

**Being with specific persons.** In daily life, on average participants reported most often that family was present or they were alone, when the phone signaled an assessment (Table 2). Friends, colleagues, or strangers were on average present in about ten percent of the measurement occasions. Multiple regression models showed and Figure 1A depicts that



with older age, participants were more often alone, and less often with colleagues. Also, adolescents, young adults, and older adults were more often with family or with friends compared to middle-aged adults (Table 2, Figure 1A). There were no significant age differences in the occurrence of being with strangers.

Levene tests showed that the variances in being with specific persons were unequal (all  $ps < .01$ ) across the seven age groups described in the *Participants* section: In the oldest age groups, variances in being alone or with family were larger, but variances in being with friends or colleagues were smaller compared to the younger age groups. Variance in being around strangers was larger among young and oldest adults compared to the other age groups.

We computed the number of different person categories per day and the average percentage of assessments per day when participants reported different person categories to understand whether certain age groups had more heterogeneous social contacts per day. On average participants reported 2.50 different categories for present persons per day ( $SD = 0.54$ ). With older age, participants reported fewer categories  $r_{age} = -.38, p < .01$ . Participants reported on average on 46% of assessments per day that a different person was present relative to the other assessments that day ( $SD = 10.8$ , range 17% - 85%). With older age, participants reported fewer assessments per day that varied in the present persons,  $r_{age} = -.46, p < .01$ . That means, with older age, participants had more homogeneous days with respect to the persons that were present during the day.

**Doing specific activities.** In daily life, on average participants reported the different activities about equally often (Table 2). Multiple regression analyses confirmed age differences in the reported activities. Young and middle-aged adults reported to pursue work/school activities more often than adolescents and older adults (Table 2, Figure 1B). In contrast, adolescents and older adults reported leisure activities or watching TV more often than middle-aged adults (Table 2, Figure 1B). Finally, with older age participants

reported more often to be engaged in chores or conversations (Table 2, Figure 1B).

Levene tests showed that the variances in engaging in chores, conversations, or watching TV were not significantly unequal (all  $ps > .10$ ) across the seven age groups described in the *Participants* section. Less variance in doing work activities was observed among older adults ( $p < .01$ ), and less variance in leisure activities was observed among young and middle-aged adults ( $p < .01$ ).

Again, to understand whether certain age groups pursued more heterogeneous activities per day, we computed the number of different activity categories per day and the average percentage of assessments per day when participants reported different activity categories. On average, participants reported 2.66 different categories for activities per day ( $SD = 0.48$ ), without a significant age effect therein,  $r_{age} = .06, p = .25$ . Participants reported on average on 49% of assessments per day a different activity relative to the other assessments that day ( $SD = 9.1$ , range 26% - 78%). The heterogeneity of reported activities per day did not vary significantly with participants' age,  $r_{age} = -.08, p = .12$ .

In sum, older participants varied somewhat less in the persons that were present in daily life, but they did not vary less with respect to the pursued activities. In addition, all age groups exhibited sufficient variance in the present persons and momentary activities for further analyses (Table 2). We next present how personality traits, age, and the interactions between traits and age predicted being in and changing to specific situations. Only significant interaction effects between traits and age appear in figures (Figure 2 and 3). The figures communicate the size of effects because they show probabilities of being in specific situations that can range between 0 and 1.

### Neuroticism

**Occurrence of situations.** Participants higher in neuroticism reported to be alone more often, to do chores more often, to watch TV more often, and to do work activities less often (Table 2). These effects remained when controlling for the other traits in multiple

regression models. The association between neuroticism and doing chores was moderated by age (Table 3). Simple slopes analyses (Preacher, Curran, & Bauer, 2006) showed that the positive association was significant for participants older than 38 yrs and more pronounced with older age. Figure 2A depicts the effects: Participants higher in neuroticism reported more often during the experience sampling phase that they did chores, relative to participants lower in neuroticism, and this effect was stronger with older age. This effect is controlled for the age main effect that with older age participants reported more often to be engaged in chores (Table 3).

**Proximate occurrence of situations at the next assessment.** Individual differences in neuroticism significantly predicted the occurrence of being alone, with friends, working, doing chores, doing leisure activities, or watching TV at the next assessment (Table 4 and 5). We next explain these effects.

The positive main effect of neuroticism when predicting being alone at the next assessment (Table 4, top half) denoted that with higher values of neuroticism participants were more likely to remain alone. One scale point increase in neuroticism predicted a 1.7% higher probability of remaining alone.

The significant interaction between neuroticism and age when predicting being with friends at the next assessment when participants were not with friends momentarily indicated age-differential effects of neuroticism (Table 4, bottom half, Figure 3A): With one-year increases in participants age, the main effect of neuroticism (-0.44%) increased by 0.13%. To follow up on the age interaction, we computed simple-slopes analyses (Preacher et al., 2006) that confirmed the significant negative association between neuroticism and changing to being with friends for adolescents/young adults, and the significant positive associations for older adults. With higher values of neuroticism, adolescents younger than 24.6 yrs were less likely to be with friends at the next assessment, when they were not with friends momentarily. In contrast, with higher values of neuroticism, adults older than 66.2 yrs were more likely to be with friends next, when they

were not with friends momentarily (Figure 3A).

The negative main effect of neuroticism when predicting occurrences of working at the next assessment (Table 5, top half) showed that with higher values of neuroticism participants were less likely to maintain work activities. This effect was robust when statistically controlling the work status of participants.

The significant main and interaction effects of neuroticism and age when predicting chores indicated (Table 5, bottom half, Figure 3B): With older age and higher values in neuroticism participants were more likely to do chores next, when they did something else momentarily. This positive association between neuroticism and doing chores was significant for participants older than 41.4 yrs and more pronounced with older age, as confirmed by simple slopes analyses.

The negative main effect of neuroticism when predicting occurrences of leisure activities at the next assessment (Table 5, top half) denoted that with higher values of neuroticism participants were less likely to maintain doing leisure activities.

In contrast, the positive main effect of neuroticism when predicting watching TV at the next assessment (Table 5, top half) showed that with higher values of neuroticism participants were more likely to maintain watching TV.

### **Extraversion**

**Occurrence.** Participants higher in extraversion reported to be less often with family, more often with friends, colleagues, or strangers, and more often to do work activities (Table 2). These effects remained when controlling for the other traits in multiple regression models. The association between extraversion and more often being with friends was moderated by age (Table 3). Simple slopes analyses showed that the positive association was significant for participants younger than 46.4 yrs and more pronounced with younger age. Figure 2B depicts the effects: Participants higher in extraversion reported more often during the experiences sampling that they were with friends, relative

to participants lower in extraversion, yet this effect was only significant for participants younger than 46.4 yrs and stronger with younger age. This effect is controlled for the age main effect that with older age participants reported less often to be with friends (Table 3).

**Proximate occurrence of situations at the next assessment.** Individual differences in extraversion significantly predicted the occurrence of being alone, with friends, with colleagues, with strangers, doing chores, and doing leisure activities (Tables 4 and 5). Next, we describe these effects.

The negative main effect of extraversion when predicting being alone at the next assessment (Table 4, top half) indicated that with higher values of extraversion participants were less likely to remain alone.

The significant interaction between extraversion and age when predicting being with friends at the next assessment when participants were with friends momentarily indicated age-differential effects of extraversion (Table 4, top half). Simple-slopes analyses (Preacher et al., 2006), however, showed that the association would be significant for participants outside of the observed age range of 14 to 86.5 yrs. The significant positive main effect of extraversion when predicting changing to friends at the next assessment (Table 4, bottom half) indicates that with higher values of extraversion participants of all ages were more likely to be with friends next, when they were momentarily not with friends.

The positive main effects of extraversion on being with colleagues or strangers (Table 4, bottom half) showed that in situations when participants were with somebody else, next they were more likely to be with colleagues or strangers, respectively, with higher values in extraversion. The effect on being with colleagues was robust when statistically controlling the work status of participants.

The significant interaction effects of extraversion and age when predicting chores (Table 5, top half, Figure 3C) denoted that in situations when participants did chores, participants older than 67.9 yrs were less likely, to maintain doing chores with higher

values in extraversion (confirmed through simple slopes analyses, Preacher et al., 2006).

The negative main effect of extraversion on engaging in leisure activities at the next assessment (Table 5, top half) indicates that with higher values of extraversion participants were less likely to maintain leisure activities.

## Openness

**Occurrence.** Participants higher in openness reported less often being with family, more often being with strangers, more often doing work activities, and less often watching TV (Table 2). These effects remained significant when controlling for the other traits in multiple regression models. The multiple regression models showed an age-differential association between openness and being with friends (Table 3, Figure 2C). Simple slopes analyses revealed that among participants older than 71.7 yrs higher values in openness were related to more often being with friends. The simple slopes for the lower age range were significant for participants younger than 11.7 yrs, hence outside of the observed age range of 14 to 86.5 yrs.

**Proximate occurrence of situations at the next assessment.** Individual differences in openness significantly predicted being alone, with family, friends, colleagues, doing work, engaging in leisure activities, and watching TV (Table 4 and 5). We next explain these effects.

The positive main effect of openness when predicting being alone at the next assessment (Table 4, top half) indicated that with higher values of openness participants were more likely to remain alone.

The negative main effect of openness on being with family at the next assessment (Table 4, bottom half) showed that in situations when participants were not with family members, they were less likely to be with family members at the next assessment with higher values in openness.

The interaction effects of openness and age in predicting being with friends at the next assessment denoted: In situations when people were with friends, participants older than 55.6 yrs were more likely to be with friends at the next assessment with higher values in

openness (Table 4 Top half, Figure 3D). In situations when people were not with friends, participants older than 46.2 yrs were also more likely to be with friends at the next assessment with higher values in openness (Table 4, bottom half, Figure 3D).

The positive main and interaction effects of openness and age in predicting being with colleagues (Table 4 bottom, Figure 3E) showed that in situations without colleagues, participants older than 38.7 yrs were more likely to be with colleagues next with higher values in openness. This effect was robust when statistically controlling the work status of participants.

The positive main effect of openness on being with strangers at the next assessment (Table 4, bottom half) indicated that in situations when participants were with strangers, they were more likely to remain with strangers, with higher values in openness.

The positive main effect of openness when predicting engaging in leisure activities at the next assessment (Table 5, top half) showed that with higher values of openness participants were more likely to maintain leisure activities.

The main effects of openness on working or watching TV at the next assessment (Table 5, bottom half) showed that compared to situations when participants did something else, with higher values in openness they were more likely to work, but less likely to watch TV next. The effect on work activities was robust when statistically controlling the work status of participants.

### Agreeableness

**Occurrence.** The only significant association between agreeableness and momentarily present persons or current activities was that participants higher in agreeableness reported more often to be with friends (Table 2).

**Proximate occurrence of situations at the next assessment.** Individual differences in agreeableness significantly predicted being with family or watching TV at the next assessment (Table 5)—differently for younger and older participants. The significant interactions between agreeableness and age in

predicting being with colleagues or doing work activities were largely reduced when controlling for the work status of participants.

The significant interaction between agreeableness and age on being with family members at the next assessment (Table 4, bottom half, Figure 3F) showed: In situations when participants were not with family members, only participants younger than 27.6 yrs were more likely to be with family members next with higher values in agreeableness (confirmed through simple slopes analyses, Preacher et al., 2006).

The significant interaction between agreeableness and age when predicting watching TV at the next assessment (Table 5, bottom half, Figure 3G) indicated: When participants did something else, with higher values in agreeableness they were more likely to watch TV next. Simple slopes analyses (Preacher et al., 2006) confirmed that the effect was significant for participants younger than 38.3 yrs and more pronounced with younger age.

### Conscientiousness

**Occurrence.** Participants higher in conscientiousness reported to be less often with friends, more often to do chores, and less often to do leisure activities or watch TV (Table 2). These effects remained significant when controlling for the other traits in multiple regression models. The multiple regression models showed an age-differential association between conscientiousness and working (Table 3, Figure 2D). Simple slopes analyses revealed that only among participants younger than 40.3 yrs, higher values in conscientiousness were related to more often being engaged in work activities, and this effect was more pronounced with younger age. The effect was reduced when statistically controlling the work status of participants.

**Proximate occurrence of situations at the next assessment.** Individual differences in conscientiousness significantly predicted being with friends, being with colleagues, doing work activities, doing chores, engaging in leisure activities, or watching TV (Table 4 and 5). Next, we detail these effects.

The negative main effect of conscientiousness on being with friends at the next assessment (Table 4, bottom half) denoted that in situations when participants were not with friends, participants higher in conscientiousness were less likely to be with friends next.

Conscientiousness and age significantly predicted being with colleagues at the next assessment (Table 4, top and bottom half, Figure 3H). In situations when participants were with colleagues, higher values in conscientiousness predicted remaining with colleagues for participants younger than 32.6 yrs. In situations when participants were not with colleagues, higher values in conscientiousness predicted being with colleagues next, for participants older than 57.0 yrs. The effects were robust when statistically controlling the work status of participants.

The significant interactions between conscientiousness and age in predicting work activities at the next assessment (Table 5) showed two different age patterns, depending on whether participants were momentarily working or not (Figure 3I). In situations, when participants were not working, conscientiousness did not predict working at the next assessment for any of the observed age groups (confirmed by simple slopes analyses to follow up on the significant interaction effect). In contrast, in situations, when they were working, participants younger than 33.5 yrs were more likely to work next with higher values in conscientiousness (confirmed through simple slopes analyses, Preacher et al., 2006). This effect was robust when statistically controlling the work status of participants.

The main effects of conscientiousness on doing chores or watching TV at the next assessment (Table 5, top and bottom half) indicated that participants higher in conscientiousness were more likely to do chores next (irrespective of already doing chores or not); however, they were less likely to watch TV next, when they did something else.

Finally, the significant interactions between conscientiousness and age on engaging in

leisure activities at the next assessment (Table 5, bottom half, Figure 3J) showed that only participants younger than 46.3 yrs were less likely to engage in leisure activities next with higher conscientiousness (when they did something else). This effect was more pronounced with younger age.

### Summary of Results

**Personality-situation transactions.** We confirmed many of our hypotheses how individual differences in the Big Five traits predict being in and changing to trait-relevant situations (see Table 1 for an overview on the hypotheses and results). For example, higher values in neuroticism were related to more often being alone and more often doing chores. Higher values in extraversion predicted more often being with friends, at the moment and at the proximate assessment. Higher values in openness predicted engaging less often in passive leisure activities, such as watching TV. And higher values in conscientiousness were associated with doing work activities or chores more often, but being with friends, doing leisure activities, or watching TV less often. Most of these associations were congruent for predicting both momentary and proximate situations a few hours later, indicating that personality effects are not static, but actively shape people's environment.

**Age differences in personality-situation transactions.** The descriptive results showed age differences in all types of reported momentary situations in daily life (except being with strangers, Figure 1A and 1B). In addition, older participants varied somewhat less in the persons that were present in daily life, but they did not vary less with respect to the pursued activities. Furthermore, all age groups exhibited sufficient variance in the present persons and momentary activities to analyze individual differences related to personality traits.

We found little support for our hypotheses that with older age personality-situation associations increase. Interestingly, some of the "established" personality effects, such as between extraversion and being with friends, or conscientiousness and doing work

activities, were only significant in adolescence and young adulthood. Significant age interactions mainly occurred in situations with freedom for choices and few constraints, such as being with friends, doing chores or leisure activities. Yet, most of the personality-situation transactions effects were not significantly moderated by age of participants. We computed the percentage of age-moderated trait effects from all significant trait effects: 30% for neuroticism (3 age-specific effects out of 10), 25% for extraversion (3 age-specific effects out of 12), 29% for openness (4 age-specific effects out of 14), 67% for agreeableness (2 age-specific effects out of 3), and 38% for conscientiousness (5 age-specific effects out of 13). The relatively small number of significant age moderation effects is unlikely attributable to insufficient power to detect effects. For the OLS regression analyses, we computed that the observed power to find significant trait-by-age interactions ( $p = .05$ ) predicting the occurrence of specific situations ranged between .58 and .93 (Faul, Erdfelder, Lang & Buchner, 2007). Regarding the multilevel analyses, we estimated that with 50 assessments per person, 200 participants are sufficient to detect small effects for within-person associations and cross-level interactions with  $p < .05$  (Bolger, Stadler, & Laurenceau, 2011).

**Number of chance findings.** We took care of Type I error (i.e., false discovery of significant effects in our sample although the Null hypothesis is true in the population) in two ways. First, we included all personality trait predictors into the same model to reduce the number of independent tests (Shaffer, 1995).<sup>3</sup> Second, we computed the number of significant effects found by chance using the rule of thumb<sup>4</sup> (Block, 1960) from the number of predictors (5 traits and 5 associated interaction terms=10) and dependent variables (occurrence of 10 momentarily, 10 maintained and 10 changed proximate situations =30). We would have expected 15 significant chance effects with  $p < .05$  ( $0.5 \times 300$ ) and instead observed 52 significant effects (20 for momentary occurrence and 32 for occurrence at the next assessment). This greatly exceeds

the number one would have expected to occur by chance alone.

### Discussion

People presumably seek out situations that are compatible with their personality traits (Allport, 1961). The current study extended previous research and addressed whether such personality-situation transactions increase with people's age, presumably due to increasing selectivity and knowledge about one's preferences. We generally observed personality-situation associations in people's daily life, which, however, often did not significantly vary with people's age. Age differences in personality-situation associations were most likely in situations with few constraints. Importantly, we found that personality traits predicted both being in, maintaining, and changing to trait-relevant situations.

### Implications for Knowledge about Personality-Situation Transactions

Many theoretical positions propose that personality-situation associations occur because people seek or create situations that are compatible with their personality. Such situations should allow people to act on their existing behavioral dispositions. For example, more extraverted people presumably seek social situations to satisfy their motivational disposition for social interactions (Ashton & Lee, 2001; Denissen & Penke, 2008; McCrae & Costa, 1987). Confirming and extending previous studies that used retrospective or general reports of situations (for review see Ickes et al., 1997), we found evidence for personality-situation transactions, such that Big Five traits predicted reports of being with certain people or engaging in certain activities in daily life (the section *Summary of Results* and Table 1 summarize the specific findings). The personality-situation associations were numerous, although the effects sizes were small to moderate. This might be attributable to focusing on situational information as objectively as possible to distinguish clearly personality and situations and to obtain situational information that can be compared across the life span. More subjective perceptions of situations likely yield stronger

personality-situation associations (Rauthmann et al., 2014; Sherman, Nave, & Funder, 2010; Sherman et al., 2015) because, for example, more conscientious people might perceive a specific situation as more task-oriented, thus, enhancing personality-situation associations through the personality-driven situation perception (Funder, 2008). Since objective cues underlie perceived situation characteristics (Rauthmann et al., 2014, 2015a), future research on personality-situation transactions might benefit from studying the associations between situation cues and characteristics to better understand at which level people select and create situations (i.e., specific cues, dimensional characteristics, or broad classes of situations, Wrzus, 2015).

Our innovative approach of predicting maintaining or changing to trait-relevant situations in daily life further extends previous studies on personality-situation transactions that used retrospective reports or concurrent assessments of situations. The prospective personality-situation associations extend concurrent associations and highlight the shaping role of personality on the environment. People might indeed seek or create situations that are compatible with their traits. For example, people higher in conscientiousness were more likely to report doing chores (concurrent association). In addition, they were more likely to do chores at the next assessment when they already did chores at that moment and when they did something else before (proximate associations). Such lead effects provide first evidence for how concurrent personality-situation association manifest—by maintaining and/or changing the current situation to a potentially more trait-relevant situation. For example, people higher in extraversion were less likely to remain alone and more likely to be with people. These findings are in line with theoretical assumptions that people active seek or create situations (Ickes et al., 1997; Funder, 2008). Although we observed changes in situations over time, conclusions on situation selection and creation are not fully supported because situations might have changed due to efforts of

others. We readdress this issue when discussing future research directions.

Do certain traits better predict being in specific situations? Although we observed more effects for conscientiousness, openness, extraversion, and neuroticism compared to agreeableness, the traits could be similarly predictive. Traits likely only differ in the type of situations they predict. The Five Individual Reaction Norms (FIRN) model (Denissen & Penke, 2008) describes the Big Five personality traits as tendencies to motivate different types of behavior based on distinct rewards. For example, extraversion is conceived as motivational tendency that acts upon rewards related to social situations, whereas conscientiousness is a motivational tendency acting upon immediate vs. delayed rewards during task achievement and goal pursuit (Denissen & Penke, 2008). Accordingly, we observed that extraversion mainly predicted social situations and conscientiousness mainly predicted situations describing activities. Neuroticism and openness predicted both social and activity-related situations. The FIRN model conceptualizes neuroticism as a system that responds to environmental threats, both social (e.g., social exclusion) and non-social (e.g., avoiding harm by completing chores). Openness is conceptualized as “differences in the reward value of engaging in cognitive activity”, which can be social (e.g., discussions with friends) or non-social (e.g., reading books). We expected and found that agreeableness hardly predicts the frequency of being with specific persons because agreeableness relates more strongly to relationship qualities (Denissen & Penke, 2008; Heyl & Schmitt, 2007; Lodi-Smith & Roberts, 2012). In sum, personality traits all predict being in certain situations, yet the types of situations differ.

Are certain situations better predicted by personality traits? The current results suggest that indeed certain situations may be influenced more strongly by people’s traits (e.g. being with friends, doing chores or leisure activities). Presumably, such situations have more freedom for choices and fewer constraints than other situations, that is, people

can choose to enter or leave such situations. In contrast, few personality effects occurred for situations with strangers, family members, or colleagues. Perhaps external constraints shape more strongly whether such persons are present or not. For example, being in public places often implies being around strangers, and the work place structure (e.g., single offices vs. shared offices) may prevent or enforce the presence of colleagues. Previous research on personality-relationship transactions supports the interpretation of certain relationships having more constraints: Personality traits predict individual differences in family relationships less compared to differences in friendships or work relationships (Mund & Neyer, 2014; Neyer & Asendorpf, 2001; Wrzus & Neyer, 2015). In sum, certain situations may exert strong situational, external demands, which restrict the possibility of personality traits to select or change such situations (Cooper & Withey, 2009; Mischel, 1977; Schmitt et al., 2013). A conclusive and theoretically grounded taxonomy of situations would foster the understanding, which situations are predicted by which traits. Such a taxonomy is still needed (see Rauthmann, 2015 for review on existing taxonomies) and would have to consider the different levels of situational information: cues, characteristics, and classes (Rauthmann et al., 2015a).

### **Age Differences in Personality-Situation Transactions**

The current study found that personality-situation transactions are at least as pronounced in middle and late adulthood compared to young adulthood—with two notable exceptions. Often reported effects of higher conscientiousness being related to engaging more often in work-related activities or higher extraversion predicting having more friends or spending more time with friends (Asendorpf & Wilpers, 1998; Back, Schmukle, & Egloff, 2011; Mehl et al., 2006) did not hold for people beyond middle adulthood in the current study. Among older adults, openness predicted being with or changing to situations with friends. Lehmann and colleagues (Lehmann, Denissen, Allemand, & Penke,

2013) argued that extraversion might be more important for regulating social relationships during adolescence and young adulthood because establishing multiple peer relationships is an important developmental task of this time. Decreasing contact with friends and decreasing extraversion with older age seem to follow normative patterns (Lehmann et al., 2013; Roberts, Walton, & Viechtbauer, 2006; Wrzus, Hänel, Wagner, & Neyer, 2013; Wrzus & Neyer, 2015), whereas individual differences in openness might counteract the normative pattern. Also, conscientiousness-work associations were observed only among adolescents and young adults, which might be explained by more conscientious young adults work harder than their peers, whereas “everybody has to work hard” when they enter the work force (Lodi-Smith & Roberts, 2007; Roberts, 2006). In general, the findings emphasize that personality effects observed among young adults might not always generalize across the entire (adult) lifespan.

Three factors might explain why personality-situation transactions did not consistently increase across the lifespan although previous theoretical perspectives suggest so. First, external constraints in health or social environments may limit the possibilities to choose and create personality-compatible situations (Baltes, 1987). For example, one’s occupation may restrict or enforce being with colleagues or doing work-related activities. Even so, constraints regarding situational choices may exist already during adolescence and young adulthood, not only in late adulthood. For example, school- or work-schedules and financial resources may constrain the time and money available to young people for being with friends or doing leisure activities.

A second explanation, why we did not observe increasing personality-situation associations, might be that people increasingly know themselves and their preferences better (Helson et al., 1995), but may not (be able to) act on it (Staudinger & Kunzmann, 2005). Highly conscientious people may be motivated to work often, with older age they may have learned that this impairs their health or social



relationships, and hence work less than they want to but invest more time in health-related and/or social activities (Shanahan, Hill, Roberts, Eccles, & Friedman, 2012).

A third explanation relates to cohort effects. Perhaps we largely observed similar personality-situation associations for different age groups because younger cohorts are more focused on self-fulfillment compared to older cohorts (Twenge & Campbell, 2001; Yankelovich, 1981), and this nullifies older cohorts presumably increased self-knowledge. Put differently, if younger cohorts are strongly motivated to live according to their personality, they might equally seek or create situations that correspond to their personality characteristics.

### Future research

Although the current research studied age differences in personality-situation transactions in a large, age-stratified sample and assessed situations on average 55 times in people's daily lives, limitations need to be discussed. Future studies might want to incorporate both cues and psychological characteristics of situations to describe differences between situations better. For example, being with friends might relate to individual differences in neuroticism, extraversion, and openness because "being with friends" actually describes different situations, such as "arguing", "chatting", or "visiting a cultural event". Thus, assessing more information on the situations including causes for changes in situations might foster the understanding how situations differ and how personality-situation transactions occur. The current study cannot distinguish between selective, manipulative, evocative, and reactive personality-situation transactions (Buss, 1987; Funder, 2008) because no information was available whether the focal person or others actively changed or maintained the situation.

Ideally, situations should be continuously assessed or every time the situation changes. Such an approach might be technically and ethically challenging. The current research focused on random samples of peoples situations by applying a time-contingent

pseudo-random sampling procedure during the experience-sampling period. Previous studies showed that this approach captures individual differences in time use well (i.e., how much time per day is spent with family, for work, etc. Sonnenberg et al., 2012).

Finally, longitudinal studies are necessary to replicate both the observed and the non-significant age differences and to answer whether the observed cross-sectional age differences correspond to intraindividual change as people age (Lindenberger, von Oertzen, Ghisletta, & Hertzog, 2011). Longitudinal studies, however, would have to limit themselves to a shorter time span compared to the age range of more than 70 years covered in the current study.

### Conclusion

People indeed often shape daily environments according to their personality traits. It was proposed that with older age, personality-situation transactions increase due to increasing selectivity and self-knowledge. The current study mainly observed personality effects that did not vary significantly with people's age. Thus, some personality-situation transactions, related to selecting or shaping situations, may be equally important and a similarly defining feature of personality characteristics across the lifespan.

### Footnotes

<sup>1</sup> The coefficient  $\beta_{0j}$  and the moderation effects  $\gamma_{01}$  to  $\gamma_{017}$  refer to effects when situations are changed due to the coding of the Level 1 predictor "same momentary situation (0=different person or activity). We computed a second set of analyses, where the Level 1 predictor was reverse coded (i.e., 0=same person or activity, 1=different person or activity) and report the results for the coefficients  $\gamma_{01}$  to  $\gamma_{017}$  when reporting the personality effects on maintaining situations. The coefficient  $\beta_{1j}$  and the associated moderation effects  $\gamma_{01}$  to  $\gamma_{017}$  actually test the difference in personality effects between assessments when situations are changed and when situations are maintained.

<sup>2</sup> Means and standard deviations of the traits were: Neuroticism  $M = 3.40$ ,  $SD = 1.23$ ,

Extraversion  $M = 5.20$ ,  $SD = 1.13$ , Openness  $M = 5.10$ ,  $SD = 1.09$ , Agreeableness  $M = 5.19$ ,  $SD = 0.99$ , Conscientiousness  $M = 5.49$ ,  $SD = 1.11$ .

<sup>3</sup> We additionally analyzed the data with only one trait and the respective age interaction as predictors per model. The findings were highly similar, only the effects of E on leisure situations and C on situations with colleagues (age  $\times$  C interaction) were reduced slightly, and we obtained some additional effects: Higher E, more likely changing to a work situation (positive main effect). Higher O, less likely maintaining to watch TV (negative main effect), more likely changing to conversation (positive main effect), more likely to work with higher age (positive age  $\times$  O interaction). Higher C, more likely changing to a work situation (positive main effect). The tables with detailed results are available from the first author.

<sup>4</sup> The number of chance findings for bivariate correlations can be computed using random permutation of data (Sherman & Funder, 2009), but no tools for interactions and especially multilevel interaction effects are currently available. We therefore used the approximation of the expected number of chance findings based on the  $p$ -level and the number of analyses (Block, 1960). For bivariate correlations with (nearly) independent predictor variables, the number of chance findings based on random permutation of data was practically identical to the expected number based on the  $p$ -level and the number of analyses, but this agreement may depend on the used data sets and the independence of the variables (Sherman & Funder, 2009).

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Table 1.

*Hypotheses and Summary of Results*

	<b>Hypotheses</b>	<b>Results</b>	
	occurrence & change of situations	occurrence of situations	proximate change of situations
Neuroticism	<b>alone</b>	alone	alone
	-	-	<b>friends</b>
	-	work	work
	<b>chores</b>	<b>chores</b>	<b>chores</b>
	-	-	leisure
	-	TV	TV
Extraversion	-	-	alone
	-	family	-
	<b>friends</b>	<b>friends</b>	friends
	<b>colleagues</b>	colleagues	colleagues
	-	stranger	stranger
	-	work	-
	-	<b>chores</b>	
	-	leisure	
Openness	<b>alone</b>	-	alone
	-	family	family
	-	<b>friends</b>	<b>friends</b>
	-	-	<b>colleagues</b>
	-	stranger	stranger
	-	work	work
	<b>leisure</b>	-	leisure
	TV	TV	
Agreeableness	-	friends	-
	-	-	<b>family</b>
	-	-	<b>TV</b>
Conscientiousness	-	friends	friends
	<b>colleagues</b>	-	<b>colleagues</b>
	<b>work</b>	<b>work</b>	<b>work</b>
	<b>chores</b>	chores	chores
	<b>leisure</b>	leisure	<b>leisure</b>
	<b>TV</b>	TV	TV

*Note.* Results summarize main effects of traits (regular font) and age interactions with traits

(**bold font**), i.e., when trait effects occur only in specific age range. Situations are ordered such that consistent effects appear in the same row.



Table 2.

*Descriptive Statistics and Zero-order Correlations with Personality Traits for Being with Specific Persons or Doing Specific Activities*

	<i>M (SD)</i>	Age <sup>a</sup>	Neuroti- cism	Extra- version	Open- ness	Agree- ableness	Conscien- tiousness
<i>Persons present</i>							
Nobody	0.31 (0.20)	lin <b>.18</b>	<b>.08<sup>a</sup></b>	-.07	.07	-.01	.06
Family & spouse	0.41 (0.24)	lin .06 sq <b>.17</b>	-.05	<b>-.09</b>	<b>-.10</b>	-.02	.02
Friends	0.12 (0.12)	lin <b>-.40</b> sq <b>.28</b>	-.02	<b>.17</b>	-.02	<b>.08</b>	<b>-.26</b>
Colleagues	0.14 (0.15)	lin <b>-.30</b> sq <b>-.23</b>	-.08	<b>.14</b>	.02	.04	-.03
Strangers	0.11 (0.12)	lin -.04	.03	<b>.10</b>	<b>.11</b>	.01	-.06
<i>Activities</i>							
Work	0.23 (0.19)	lin <b>-.29</b> sq <b>-.30</b>	<b>-.11</b>	<b>.09</b>	<b>.10</b>	.03	.03
Chores	0.20 (0.13)	lin <b>.38</b>	<b>.13</b>	-.05	.04	-.05	<b>.24</b>
Leisure	0.19 (0.12)	lin -.09 sq <b>.23</b>	-.00	.05	.00	-.04	<b>-.16</b>
TV/nothing	0.23 (0.14)	lin <b>-.21</b> sq <b>.30</b>	<b>.12</b>	-.02	<b>-.18</b>	.01	<b>-.23</b>
Conversation	0.12 (0.11)	lin .22**	.07	.04	.07	.03	<b>.08<sup>a</sup></b>

*Note:* <sup>a</sup>standardized regression coefficients, lin = linear age effect, sq = squared age effect, only linear age effect was reported if the squared age effect was  $p > .05$ .

Coefficients in bold are significant with  $p \leq .05$ . <sup>a</sup>  $p \leq .06$

Table 3.

*Frequency of Being with Specific Person or Doing Specific Activity Predicted by Personality Traits and Age (Multiple regression)*

Predictor	Persons		Activities			
	Friend		Work		Chores	
	<i>b</i>	[95% CI]	<i>b</i>	[95% CI]	<i>b</i>	[95% CI]
Age	<b>-.30</b>	[-.41; -.19]	<b>-.33</b>	[-.44; -.22]	<b>.31</b>	[.20; .41]
Age <sup>2</sup>	<b>.22</b>	[.12; .33]	<b>-.25</b>	[-.35; -.14]	/	
Neuroticism	.00	[-.09; .10]	<b>-.08</b>	[-.18; .02]	<b>.15</b>	[.05; .25]
Extraversion	<b>.13</b>	[.03; .23]	-.03	[-.14; .07]	.00	[-.10; .11]
Openness	.03	[-.07; .14]	.06	[-.04; .17]	.01	[-.10; .12]
Agreeableness	.05	[-.05; .15]	-.04	[-.14; .06]	-.02	[-.12; .08]
Conscientiousness	<b>-.13</b>	[-.24; -.02]	.06	[-.06; .17]	<b>.19</b>	[.08; .31]
Age × Neuroticism	.07	[-.02; .17]	.03	[-.07; .13]	<b>.17</b>	[.08; .27]
Age × Extraversion	<b>-.08</b>	[-.17; -.00]	.04	[-.05; .13]	-.03	[-.13; .07]
Age × Openness	<b>.12</b>	[.01; .23]	.06	[-.05; .17]	.01	[-.10; .12]
Age × Agreeableness	-.02	[-.12; .08]	.02	[-.07; .12]	.00	[-.10; .10]
Age × Conscientiousness	.05	[-.06; .16]	-.08 <sup>a</sup>	[-.20; .02]	.07	[-.04; .18]
Model fit: $F(12,376)$	10.04, $p < .001$		9.26, $p < .001$		8.78, $p < .001$	
$R^2_{\text{traits}}$	14%		3%		13%	
$R^2_{\text{total}}$	25%		23%		21%	

*Note:* Only models with significant age interactions and significant model fit are presented here, see results section for main effects of age and personality traits on other persons and activities.

Coefficients denote standardized regression coefficients with 5% confidence intervals in brackets.

Coefficients in bold are significant with  $p \leq .05$ . <sup>a</sup>  $p \leq .06$

Table 4

*Proximate Occurrence of Being With Specific Person at Next Measurement Occasion Predicted by Personality Traits and Age*

	Alone		Family		Friends		Colleagues		Stranger	
	OR	%	OR	%	OR	%	OR	%	OR	%
<i>Maintain situation</i>										
Age	1.00	0.09	1.00	-0.00	0.99	-0.11	<b>0.99</b>	<b>-0.27</b>	1.00	-0.02
Neuroticism	<b>1.07</b>	<b>1.70</b>	0.95	-1.27	1.05	1.21	0.97	-0.69	1.03	0.76
Extraversion	<b>0.88<sub>a</sub></b>	<b>-3.07</b>	0.94	-1.48	0.96 <sub>a</sub>	-0.93	1.01 <sub>a</sub>	0.22	1.02	0.49
Openness	<b>1.18<sub>b</sub></b>	<b>4.22</b>	0.97 <sub>a</sub>	-0.68	1.08	1.93	1.01	0.14	<b>1.16</b>	<b>3.77</b>
Agreeableness	1.00	0.11	0.97	-0.64	1.07	1.71	1.00	0.06	0.93	-1.69
Conscientiousness	0.98	-0.60	1.04	0.99	0.95	-1.39	1.03	0.74	0.96	-1.07
Age × Neuroticism	1.00	0.04	1.00	-0.11	1.00	-0.02	1.00	-0.06	1.00	-0.01
Age × Extraversion	1.00	0.05	1.00	0.02	<b>0.99</b>	<b>-0.15</b>	1.01	0.17	1.00	-0.10
Age × Openness	1.00	-0.07	1.00	-0.08	<b>1.01</b>	<b>0.21</b>	1.00	-0.05	1.00	-0.03
Age × Agreeableness	1.00	0.05	1.00	-0.04	1.00	0.01	<b>1.01<sub>b</sub></b>	<b>0.26</b>	1.00	0.06
Age × Conscientiousness	1.00	-0.02	1.00	-0.02	1.00	-0.09	<b>0.99</b>	<b>-0.25</b>	1.00	0.03

*(table continues)*

Table 4 (continued)

	Alone		Family		Friends		Colleagues		Stranger	
	OR	%	OR	%	OR	%	OR	%	OR	%
<i>Change Situation</i>										
Age	1.00	0.09	1.01	0.13	<b>0.99</b>	<b>-0.18</b>	<b>0.99</b>	<b>-0.30</b>	1.00	-0.01
Neuroticism	1.02	0.51	0.97	-0.64	0.98	-0.44	0.96	-0.93	1.02	0.53
Extraversion	0.99 <sub>a</sub>	-0.37	0.99	-0.32	<b>1.14<sub>a</sub></b>	<b>3.37</b>	<b>1.20<sub>a</sub></b>	<b>4.60</b>	<b>1.08</b>	<b>1.98</b>
Openness	1.01 <sub>b</sub>	0.13	<b>0.86<sub>a</sub></b>	<b>-3.76</b>	1.07	1.59	<b>1.09</b>	<b>2.16</b>	<b>1.10</b>	<b>2.35</b>
Agreeableness	1.05	1.13	1.01	0.26	1.06	1.48	0.92	-1.95	1.01	0.29
Conscientiousness	1.03	0.62	1.03	0.80	<b>0.86</b>	<b>-3.85</b>	0.96	-1.00	0.93	-1.89
Age × Neuroticism	1.00	0.04	1.00	-0.03	<b>1.01</b>	<b>0.13</b>	1.00	-0.04	1.00	-0.11
Age × Extraversion	1.00	-0.02	1.00	-0.06	1.00	-0.05	1.00	0.06	1.00	-0.03
Age × Openness	1.00	0.01	1.00	0.04	<b>1.01</b>	<b>0.13</b>	<b>1.00</b>	<b>0.10</b>	1.00	-0.05
Age × Agreeableness	1.00	0.01	<b>0.99</b>	<b>-0.16</b>	1.00	-0.03	1.00 <sub>b</sub>	-0.02	1.00	0.08
Age × Conscientiousness	1.00	0.02	1.00	0.08	1.00	0.05	<b>1.00</b>	<b>-0.10</b>	1.00	0.07

*Note:* OR = odds ratio based on logistic multilevel regression using PQL estimation and robust standard errors. % = percentage change in probability of being in specific situation with one unit change in predictors (see section *Analytic strategy* for further information on interpretation). Coefficients with same subscripts vary significantly with  $p < .05$  between situations that are maintained vs. changed (i.e., in one column concerning the same trait). Coefficients in bold are significant with  $p \leq .05$ .

Table 5

*Proximate Occurrence of Doing Specific Activity at Next Measurement Occasion Predicted by Personality Traits and Age*

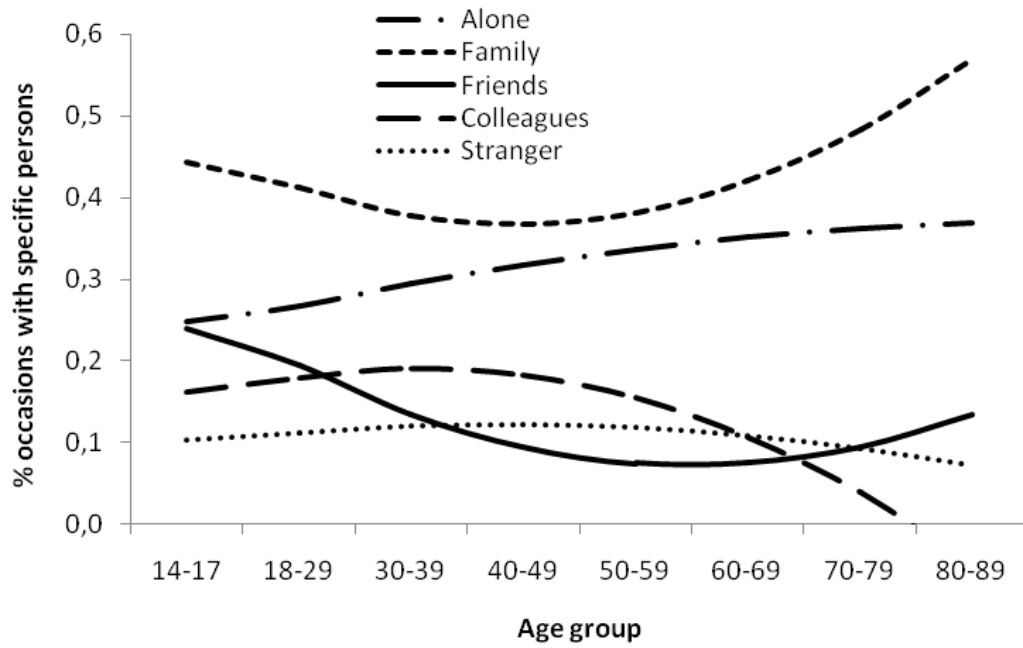
	Work		Chores		Leisure		TV/nothing		Conversation	
	OR	%	OR	%	OR	%	OR	%	OR	%
<i>Maintain situation</i>										
Age	0.99 <sub>a</sub>	-0.13	1.00 <sub>a</sub>	0.04	<b>0.99<sub>a</sub></b>	<b>-0.24</b>	<b>0.99<sub>a</sub></b>	<b>-0.22</b>	1.01	0.17
Neuroticism	<b>0.91</b>	<b>-2.31</b>	1.06	1.47	<b>0.91<sub>b</sub></b>	<b>-2.35</b>	<b>1.16<sub>b</sub></b>	<b>3.74</b>	1.05	1.24
Extraversion	0.99	-0.31	1.03	0.74	<b>0.89<sub>c</sub></b>	<b>-3.03</b>	0.95	-1.15	0.99	-0.29
Openness	1.08 <sub>b</sub>	1.82	1.03	0.75	<b>1.15</b>	<b>3.41</b>	0.91	-2.47	1.04	0.98
Agreeableness	0.92	-1.99	0.99	-0.26	0.99	-0.28	0.95	-1.29	1.06	1.48
Conscientiousness	1.05	1.18	<b>1.17</b>	<b>3.84</b>	0.97	-0.73	1.05	1.28	0.94	-1.44
Age × Neuroticism	1.00	-0.11	1.00	0.09	1.00	0.06	1.00	-0.06	1.00	0.02
Age × Extraversion	1.00	0.09	<b>1.00<sub>b</sub></b>	<b>-0.12</b>	1.00	-0.06	1.00	-0.01	1.00	-0.03
Age × Openness	1.00	0.04	1.00	0.07	1.00	0.05	1.00	0.01	1.00	0.00
Age × Agreeableness	<b>1.01<sub>c</sub></b>	<b>0.17</b>	1.00	0.04	1.00	-0.03	1.00	-0.05	1.00	0.11
Age × Conscientiousness	<b>0.99<sub>d</sub></b>	<b>-0.29</b>	1.00	-0.04	1.00	0.04	1.00	0.04	1.00	0.00

*(table continues)*

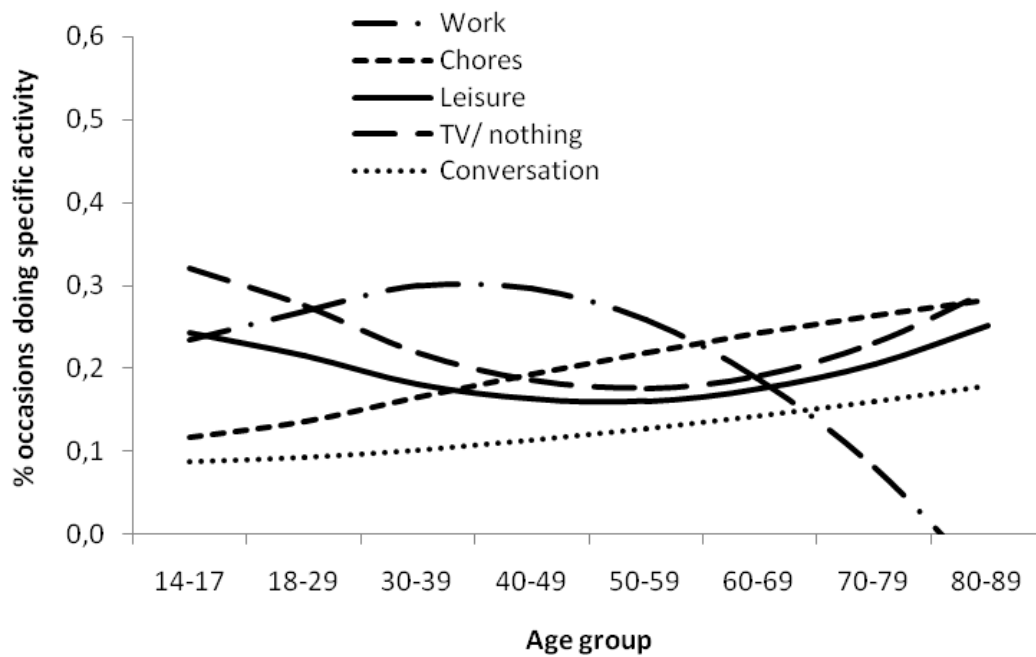
Table 5 (continued)

	Work		Chores		Leisure		TV/nothing		Conversation	
	OR	%	OR	%	OR	OR	%	OR	%	OR
<i>Change Situation</i>										
Age	<b>0.98<sub>a</sub></b>	<b>-0.46</b>	<b>1.01<sub>a</sub></b>	<b>0.20</b>	1.00 <sub>a</sub>	0.06	1.00 <sub>a</sub>	0.08	<b>1.01</b>	<b>0.32</b>
Neuroticism	1.00	0.03	<b>1.07</b>	<b>1.77</b>	1.01 <sub>b</sub>	0.15	1.02 <sub>b</sub>	0.51	1.04	0.98
Extraversion	1.01	0.23	1.03	0.76	1.00 <sub>c</sub>	0.01	1.02	0.43	<b>1.09</b>	<b>2.16</b>
Openness	<b>1.24<sub>b</sub></b>	<b>5.39</b>	1.00	-0.10	1.04	1.04	<b>0.87</b>	<b>-3.36</b>	1.06	1.45
Agreeableness	0.95	-1.19	0.94	-1.56	0.98	-0.44	1.07	1.64	1.05	1.13
Conscientiousness	1.01	0.24	<b>1.12</b>	<b>2.79</b>	<b>0.88</b>	<b>-3.14</b>	<b>0.92</b>	<b>-2.17</b>	1.00	0.00
Age × Neuroticism	1.00	0.02	<b>1.00</b>	<b>0.12</b>	1.00	0.06	1.00	0.01	1.00	0.01
Age × Extraversion	1.00	-0.06	1.00 <sub>b</sub>	0.01	1.00	-0.05	1.00	0.01	1.00	-0.01
Age × Openness	1.00	0.08	1.00	0.00	1.00	0.01	1.00	-0.05	1.00	-0.03
Age × Agreeableness	1.00 <sub>c</sub>	-0.02	1.00	-0.02	1.00	-0.04	<b>0.99</b>	<b>-0.14</b>	1.00	-0.03
Age × Conscientiousness	1.00 <sub>d</sub>	-0.01	1.00	0.01	<b>1.00</b>	<b>0.11</b>	1.00	0.05	1.00	0.10

*Note:* OR = odds ratio based on logistic multilevel regression using PQL estimation and robust standard errors. % = percentage change in probability of being in specific situation with one unit change in predictors (see section *Analytic strategy* for further information on interpretation). Coefficients with same subscripts vary significantly with  $p < .05$  between situations that are maintained vs. changed (i.e., in one column concerning the same trait). Coefficients in bold are significant with  $p \leq .05$ .



(A)



(B)

Figure 1. Percentage of measurement occasions in daily life, when participants (A) were with specific persons or (B) did specific activities.

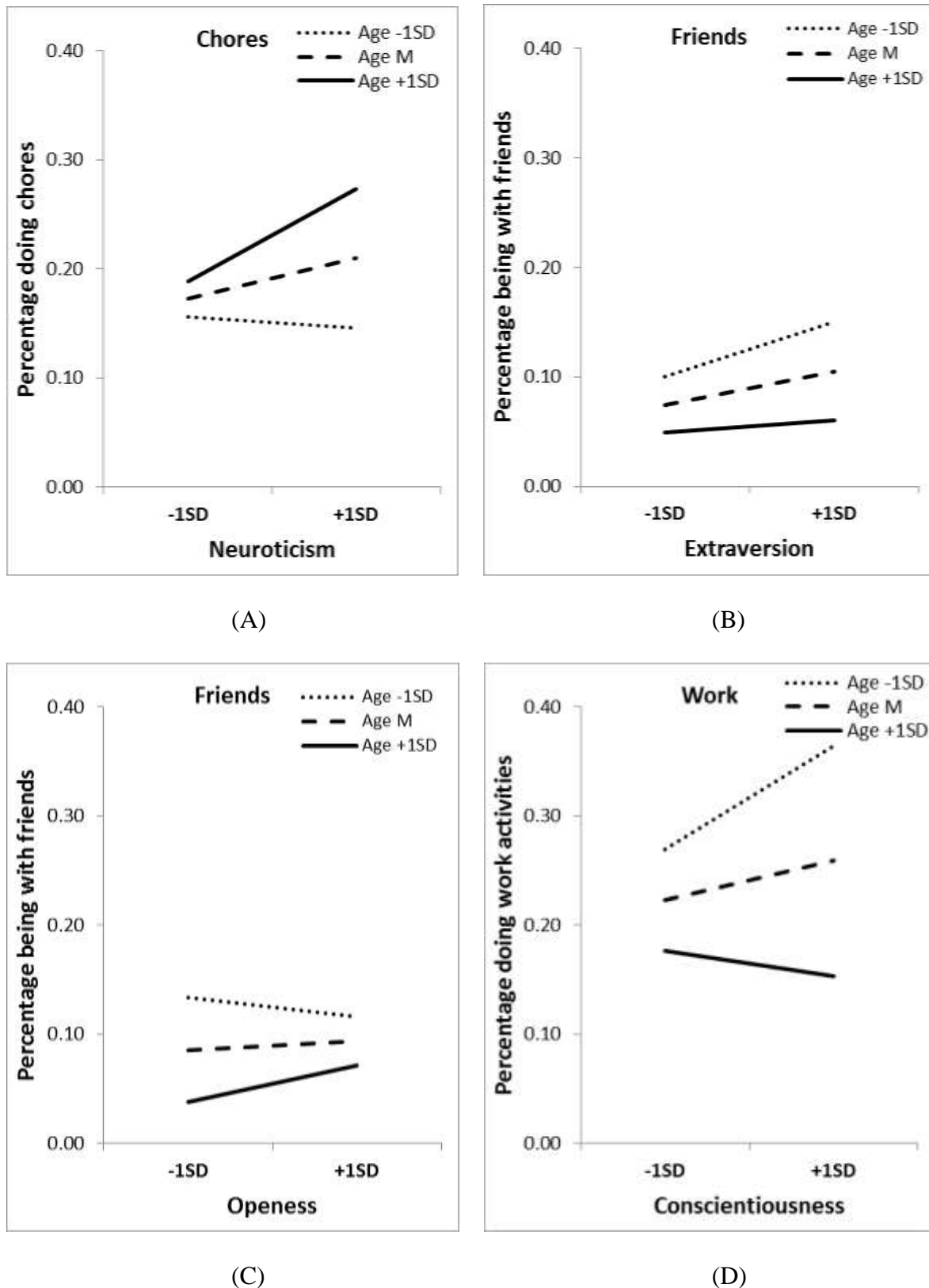
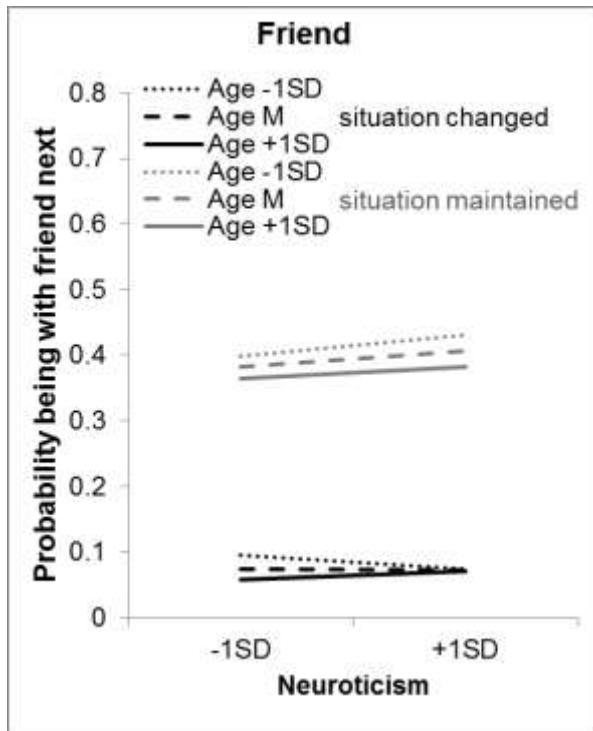
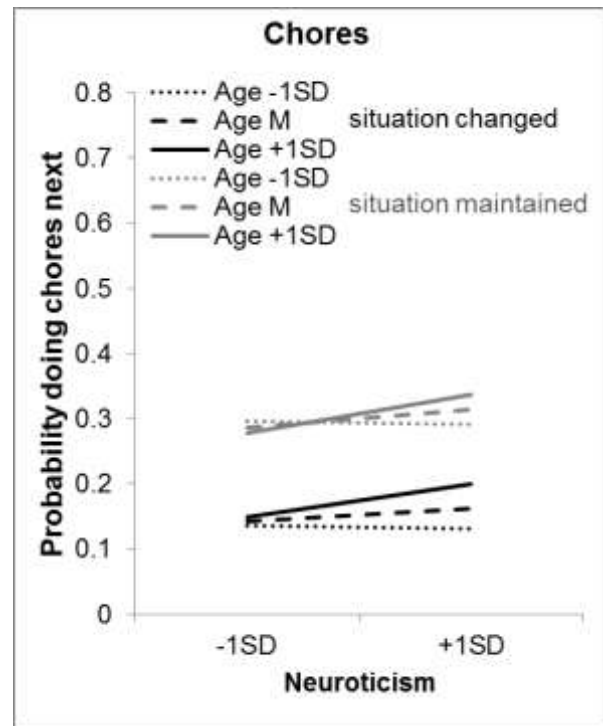


Figure 2. Trait-age interactions regarding the occurrence of different situations: (A) Neuroticism and age predict doing chores, (B) Extraversion and age predict being with friends, (C) Openness and age predict being with friends, (D) Conscientiousness and age predict doing work activities. Model-predicted values from ordinary least squares (OLS) regression analyses.

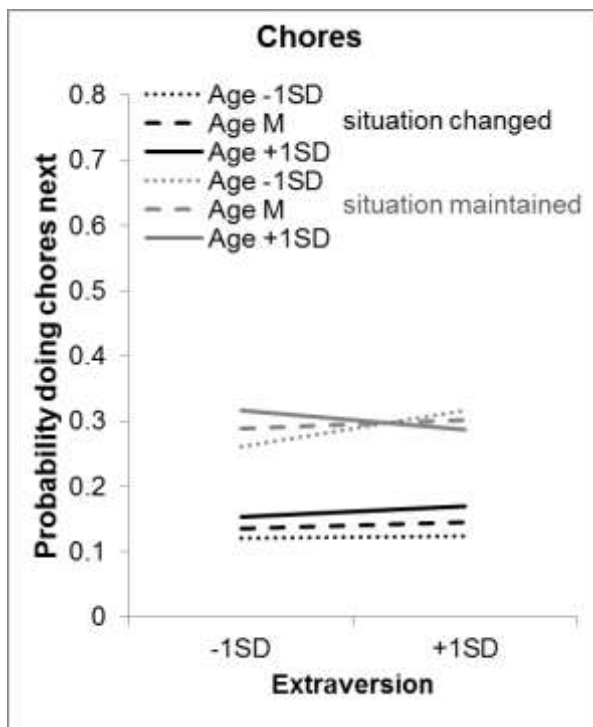




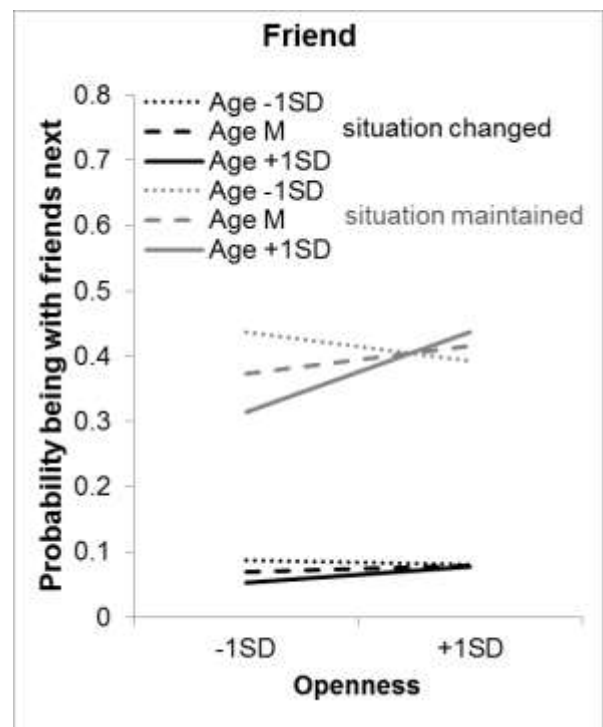
(A)



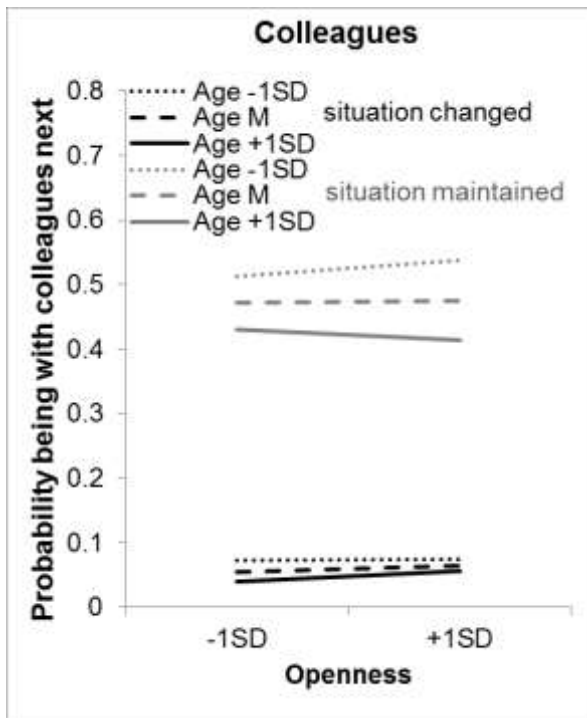
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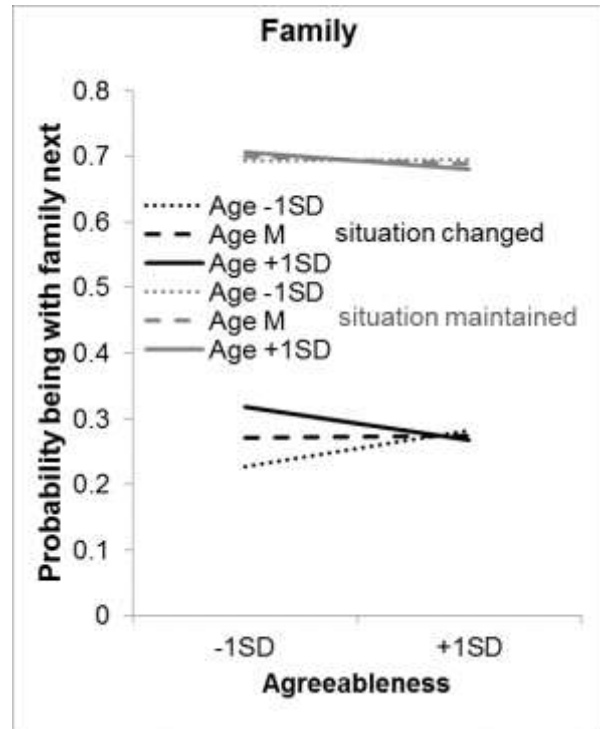
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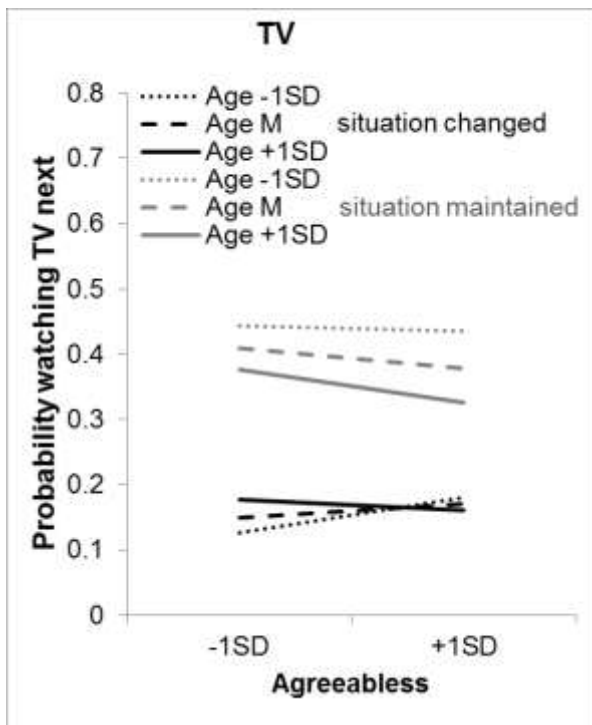
(D)



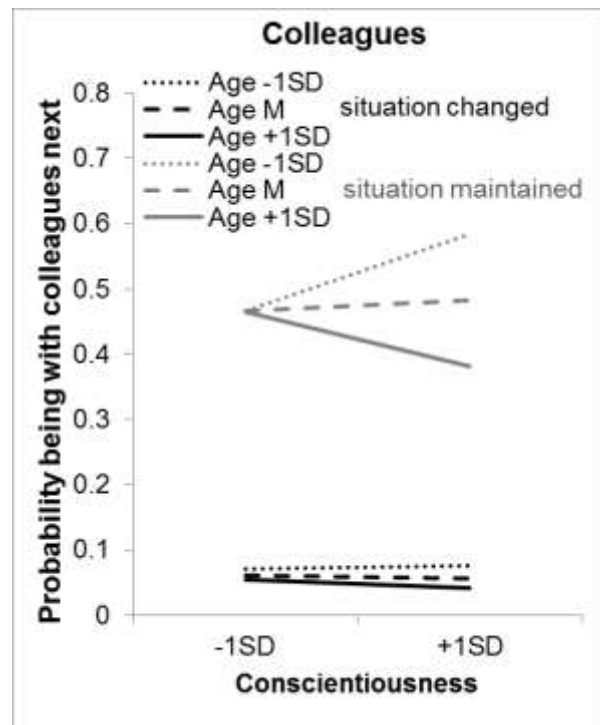
(E)



(F)



(G)



(H)

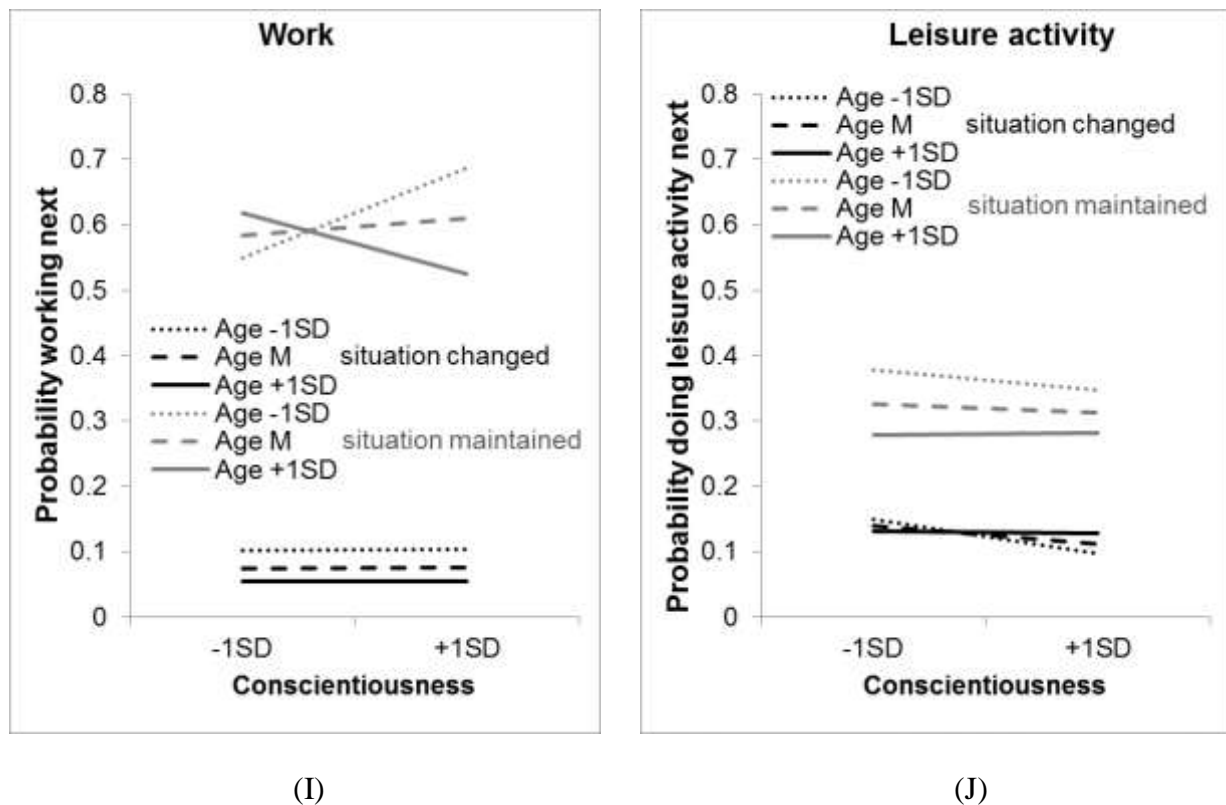


Figure 3. Trait-age interactions regarding the **proximate** occurrence of different situations at the next assessment depending on whether participants were in the same (=situation maintained) or different situation (=situation changed) before: (A) Neuroticism and age predict being with friends, (B) Neuroticism and age predict doing chores, (C) Extraversion and age predict doing chores, (D) Openness and age predict being with friends, (E) Openness and age predict being with colleagues, (F) Agreeableness and age predict being with family, (G) Agreeableness and age predict watching TV/doing nothing, (H) Conscientiousness and age predict being with colleagues, (I) Conscientiousness and age predict doing work activities, (J) Conscientiousness and age predict engaging in leisure activities. Note that the y-axes depict the probability of being in certain situations, which ranges between 0 and 1. This scaling, which is equal for different situations (0 to 0.8) and covers almost the entire possible range, needs to be considered when interpreting the size of the age-interaction effects.