Do experiences during the transition to working life Matter? the role of mastery and psychological commitment in personality trait change

Liselotte Den Boer [a,*], Theo A. Klimstra [b], Jaap J. A. Denissen [a]

[a] *Utrecht University*
[b] *Tufts University*

ARTICLE INFO

ABSTRACT

Differences in transition experiences might explain individual differences in personality trait change. In the present six-wave study, we investigated personality trait change during the transition to work in a sample of students who were in their last two years of their study program ($N = 311$). We tested whether the transition (i. e., participation in an internship), psychological commitment (i.e., educational identity), and mastery of the transition (i.e., GPA and fit between master degree and job) would predict individual differences in personality trait change. The results indicated that mastery and commitment did not explain individual differences in personality trait change. Only individual differences in extraversion change could be explained by participation in an internship, by means of reduced extraversion in internship students.

1. Introduction

Life transitions (e.g., transition from school to work, moving out of the parental home, start of a romantic relation, parenthood, retirement, etc.) have been hypothesized to be associated with personality change (Bleidorn et al., 2013; Caspi et al., 2005; Lodi-Smith & Roberts, 2007; Roberts et al., 2006). Society expects students to start working after graduation, and many curricula have a final practical internship that allows students to gradually (and under expert supervision) take up responsibilities and demands that come with the transition to work. The nature of such internships fosters feedback and reflection on one's behavior during this transition and might indirectly shape personality traits over time. Most studies on personality trait changes in relation to life transitions focused on the associations between demographic variables (e.g., first job after graduation, parenthood, marriage) and changes in personality traits (e.g., Bühler, Mund, Neyer, & Wrzus, 2022; Denissen, Luhmann, Chung, & Bleidorn, 2019). The results of these studies are mixed and lack convincing evidence for the association between life events and personality trait change (Bleidorn et al., 2021; Bleidorn et al., 2020). A possible explanation of these mixed results could come from differences in how life transitions unfold in one's life and the individual psychological reaction to them (Lodi-Smith & Roberts, 2007). Differences in psychological commitment to the transition and mastery of the transition are promising factors to explain individual difference in

personality trait changes during a life transition (Roberts & Nickel, 2021). The present longitudinal study therefore investigated personality trait changes during the last years in education. Specifically, we tested whether going through a transition (i.e., participation in an internship that prepares for working life), psychological commitment related to this transition (i.e., educational identity), and mastery of the transition to working life (i.e., GPA graduate degree and fit between master degree and job) would predict individual differences in personality trait change.

2. Personality trait change

There is a convincing body of research that shows personality trait changes throughout the lifespan (Bleidorn et al., 2022; Roberts & DelVecchio, 2000; Roberts et al., 2006). Young adulthood seems to be a key period, in which most personality trait change appears to happen (Bleidorn et al., 2020; Bleidorn et al., 2022; Roberts et al., 2006). Specifically, young adults on average tend to increase in conscientiousness, agreeableness and emotional stability (Bleidorn et al., 2022; Roberts & Mroczek, 2008; Specht et al., 2014). This pattern has been referred to as the maturity principle (Roberts & Nickel, 2017, 2021). The last decades, researchers have been trying to find answers to the question what drives personality trait changes. The accumulated evidence so far suggests that personality trait changes are affected by both genetic and environmental factors (Specht et al., 2014), but little is known about the specific

---

* Corresponding author at: Liselotte den Boer. Address: Utrecht University, Developmental Psychology, Heidelberglaan 1, 3584 CS Utrecht, the Netherlands.
  E-mail address: L.denboer1@uu.nl (L. Den Boer).

sources and processes underlying personality trait changes (Wagner et al., 2020). Recent process models of personality trait change have in common that personality states (i.e., short-term patterns of behaviors and feelings that are more malleable and situation-depended than traits; (Fleeson 2001) are key components trough which personality trait change is hypothesized to manifested (Wrzus & Roberts, 2017).

Much research that emphasized environmental influences on personality trait changes has focused on the potential effects of life transitions. Life transitions can trigger new or modified personality states which are necessary to go through the life transition successfully (Bleidorn & Denissen, 2015; Hennecke et al., 2014). If these states are sufficiently repeated, they can eventually lead to personality trait changes (Bleidorn et al., 2020). Positive reactions by others and other socialization processes (e.g., disapproval of undesired behaviors) are hypothesized to shape behavior resulting in more frequent display of desired personality states. This can facilitate the process of internalization of these states into habits, which could in turn lead to changes in personality traits (Bleidorn et al., 2020; Hennecke et al., 2014).

For example, most work roles demand organized behaviors, such as organizing work and being on time to fulfill job targets, and this might trigger increases in state conscientiousness (Lodi-Smith & Roberts, 2007). In addition, the transition from school to work also requires changes in social behavior, such as professional interacting with colleagues, stakeholders and supervisors, which might trigger changes in state agreeableness (Bleidorn et al., 2018). Finally, work-related tasks such as carrying responsibilities, giving presentations and interacting with clients might require more emotional stable behavior and thus could trigger increases in state emotional stability (Le et al., 2014).

Overall, the evidence on life transitions in relation to personality trait change is mixed and findings do not always replicate across studies (Bleidorn et al., 2021; Bühler et al., 2023). For the transition into working life, some studies suggest that individuals tend to become more conscientious after starting their first job (Bleidorn, 2012; Leikas & Salmela-Aro, 2015; Specht et al., 2011). For example, a 4-year longitudinal study on German high school students showed that individual who started a vocational orientated path or a new job increased in conscientiousness faster than those who started university (Lüdtke et al., 2011). However, not all studies showed increases in conscientiousness. A large panel study on life transitions found that individuals anticipating the transition into paid employment became somewhat more conscientious and open to experiences (but no changes were found after the transition), and increased in emotional stability after the transition (Denissen et al., 2019). A study comparing three groups with different degrees of exposure (i.e., no transition, partial transition by combining work with education, and full transition) to working life did not find differences in personality trait change (Den Boer et al., 2019).

A possible explanation of the mixed empirical results could come from individual differences on how life transitions unfold in one's life and the individual psychological reaction to them. Indeed, research shows that not all individuals demonstrate personality trait change at the same time, in the same direction or to the same degree (Graham et al., 2020). Moreover, individual differences in personality trait change appear to be most prominent in young adulthood (Bleidorn et al., 2022; Schwaba & Bleidorn, 2018). Investigating why individuals differ in personality trait change in response to life transitions might increase our knowledge about sources and processes that contribute to personality trait change (Bolger et al., 2019; Nesselroade, 1991). For example, De Vries et al. (2021) revealed that the subjective experienced valence of graduation and moving out of the parental house explained individual differences in personality trait change while the mere event occurrence did not. Perceived event characteristics are suggested to be important when examining personality trait change (Haehner et al., 2023; Rakhshani et al., 2022). Related to this, Roberts and Nickel (2021) indicated that the cause of personality trait change may not be the life transition itself or even commitment to the new role that is part of this life transition, but rather the sense of mastery that comes with successfully

fulfilling role-consistent obligations. So far, most studies on life transitions have focused on the mere acquisition of a new role (e.g., by comparing people who made the life transition with those who have not) but overlooked the (psychological) differences that are part of the transition experience. Individual differences in psychological commitment to the new role and mastery of the transition are promising factors to explain individual difference in personality trait changes during a life transition (Roberts & Nickel, 2021).

2.1. Personality trait change and commitment

Psychological commitment could promote the desired personality states. For example, someone who feels highly committed to their job will be more likely to invest the necessary resources to become more organized than colleagues that feel less committed and might therefore experience more frequent states of high conscientiousness. Such frequent state sequences might then get more easily under the skin as higher trait levels of conscientiousness. Psychological commitment has been conceptualized in the literature on identity formation (Lodi-Smith & Roberts, 2007). Based on the work of Erikson (1950), identity formation is described as the conscious sense of self that develops through social interactions during different life phases. According to the dual-cycle model of identity formation by Crocetti et al. (2008), being highly committed to a choice in a particular life domain indicates that a person invests psychological resources in this choice and that this choice gives an individual confidence and guidance for the anticipated future. Alternatively, individuals could reevaluate current commitments and compare them with alternatives, which is called reconsideration.

Den Boer et al. (2019) examined a life transition and psychological commitment in relation to personality trait change. This study suggested that psychological commitment to work did not explain individual differences in personality trait change for those who made the transition to working life or for those who partly made this transition by combining school with work. These results are in contrast with other studies of personality trait change and behavioral commitment to work (Hudson & Roberts, 2016; Hudson et al., 2012). Those studies suggested that people who became increasingly committed to their work became more conscientious and more agreeable over time. However, they focused on the behavioral correlates of commitment (e.g., high job involvement, organizational citizenship behavior, and counterproductive behaviors at work) rather than psychological commitment. These differences could explain the contrasting findings between the study by Den Boer et al. (2019) and the studies by Hudson and colleagues (Hudson & Roberts, 2016; Hudson et al., 2012). Also, previous studies have not systematically investigated whether the transition into a new role was actually successful.

2.2. Personality trait change and mastery

Mastery of the transition is highly relevant, as only successful transitions may trigger a positive feedback loop. This idea is similar to the idea of Hutteman et al. (2014), who suggested that mastering age-graded tasks causes personality change in adulthood. The current study aimed to replicate and extend the study by Den Boer et al. (2019). We used a different sample, and we studied personality trait change in relation to the transition into working life and explaining individual differences therein by not only included psychological commitment as a predictor, but also mastery.

Some studies looked into the mastery in relation to personality trait change and found that objective (i.e., occupational prestige and income) and subjective (i.e., job satisfaction) career success were associated with increases in emotional stability and extraversion (i.e., socially dominance) (Roberts et al., 2003; Roberts & Chapman, 2000; Scollon & Diener, 2006; Sutin et al., 2009). A study on objective mastery during school experiences in relation to personality trait changes showed that changes in GPA were positively correlated with changes in

conscientiousness (Israel et al., 2022). Recently a study investigated subjective mastery in relation to the transition into working life, and showed that young adults with higher levels of work-related sense of mastery demonstrated more positive changes in conscientiousness compared to those with lower levels of work-related sense of mastery (Reitz et al., 2022). Although these results are promising, the body of empirical research on this topic in relation to life transitions is still very limited and more studies are needed to unravel how mastery during life transitions affect personality trait change. Overall, psychological commitment to a new role related to a life transition and mastery of that transition are promising factors for explaining individual differences in personality change in young adulthood (Roberts & Nickel, 2017, 2021).

2.3. The current study

The present study examined personality trait changes and individual differences herein during the last years in education until one year after graduation. We investigated whether acquisition of a new work-related role (i.e., participation in a practical internship), psychological commitment to the educational program, and/or indicators of mastery of the transition to working life (i.e., GPA graduate program and fitting job) could explain individual differences in personality trait changes. For this purpose, we employed a longitudinal design with six measurement occasions. The first measurement occasion occurred in the summer before the master's program and the last measurement occasion one year after graduation. We expected that the acquisition of a new role, commitment to, and mastery of the transition to working life would be associated with increases in conscientiousness, and to a lesser extend increases in agreeableness and emotional stability. Moreover, we expected that an interaction between factors would predict personality change. Specifically, we expected that participating in an internship, being highly committed to one's educational program, and obtaining a higher GPA of the graduate program or work in a fitting job (i.e., job in line with graduate level and in the direction of psychology) would lead to more personality trait change than just participating in the internship.[1]

3. Method

Participants. Data for the current study were drawn from the longitudinal research project 'Change Ahead'.[2] Participants in the internship group were graduate students ($N = 163$) enrolled in the one-year master's programs clinical forensic psychology and clinical developmental psychology. Participants in the non-internship group were undergraduate psychology students ($N = 148$) in the last year of their bachelor program. A detailed description on the sampling procedure is provided in the supplementary material. All students were from a research university in the Netherlands. The characteristics of the bachelor's students are similar to the master's students, but they are one year behind in their curriculum. Undergraduate students at research universities in The Netherlands usually proceed to a one-year master's program after completion of a bachelor degree. At this university, about one third of

the undergraduate psychology students chose a clinical psychology master program. The comparison between these groups is similar to the approach of Bleidorn (2012) in a study on personality maturation during the transition from high school to university.

Students in the internship group were enrolled in a practical internship preparing them for junior functions in clinical psychology. During this internship, students experience and learn job-related clinical skills (e.g., execute clinical interviews, test administration, report writing, group treatment and individual treatment sessions). During the internship, students grow to a level that they can execute these tasks independently under responsibility of an expert supervisor. The internship has an important position in the master's program, as it has a study load of 18 EC's in a master's program of 60 EC's. The internship has an average length of 38.1 weeks (SD = 3.94) for three days a week. Besides the internship, students in the internship group and students in the non-internship group followed regular courses and wrote a thesis.

The average age of the students in the internship group was 22.4 years (SD = 1.75) and 85.9 % were women. Within this sample, 50.3 % followed the master program clinical forensic psychology and 48.5 % followed the master program clinical developmental psychology. Preliminary analyses (see supplementary material) showed no differences between master programs on personality and identity dimensions. The average age of the students in the non-internship group was 20.95 years (SD = 1.77) and 81.2 % of these participants were women. Preliminary analyses (see supplementary material) suggested that there were gender differences on the outcome measures and age differences between the two groups. Therefore, age and gender were included in the main analyses as covariates.

A sensitivity power analysis was conducted with the SIMR package in R (Green & MacLeod, 2016). Specifically, we computed the smallest detectable effect size for the three-way interaction between the slope of the personality dimensions, commitment and career status in the subsample of the internship group, as these models have the fewest underlying data points. This approach is comparable to the one used by Asselmann et al. (2021), who like us also dealt with a complex data structure and multiple predictors in the multilevel models. For the power analyses, we standardized all variables and interactions in the multilevel models to obtain a standardized affect size. Our simulation results suggest that effect sizes between 0.83 and 1.7 could have been detected with 80 % of power and an alpha of 0.001. These estimates are based on the models with the least underlying data points, which means that all the other effects would be detected with substantially more power. For example, we tested for one of the most relevant interaction effects (i.e., the interaction between the slope of the personality dimensions and the internship in the total sample), which effect sizes could be detected with 80 % of power and an alpha of 0.001. The results suggested that effect sizes between 0.16 and 0.26 could be detected. Taken together these results suggest that our study was sufficiently powered to detect very large three-way interaction effects in the subsample, and small to medium two-way interaction effects in the total sample (Funder & Ozer, 2019).

Procedure. Students were asked to participate in this study during an information session for the internship before the start of the master's program. Participants were informed that participation was voluntary and that they could stop their participation at any time. Confidentiality of responses was guaranteed. Participants signed the informed consent before starting in the study. The institutional review board approved the research project (EC-2014.05). The questionnaires were sent out online using personalized access codes. Every questionnaire had to be completed within one month. As a reward for participation, participants could request a feedback profile of their personality development during the study.

Data were collected in four consecutive academic years between 2014 and 2018. Preliminary analyses suggested that there were no significant differences between cohorts on personality dimensions (see supplementary material). The study consisted of 6 measurement

---

[1] The hypotheses in this study were not preregistered. The study materials, data and analysis scripts of this study are provided on the Open Science Framework (https://osf.io/nksqp/?view_only=b4a2b89a91c0478eaf335fe198d3eff5).

[2] Data of the project "Change Ahead" have also been used in a study on identity development in the domain of future plans and education. In that study, the focus was on whether an internship could explain individual differences in identity development. https://doi.org/10.1016/j.adolescence.2021.02.005. Both studies used educational commitment and reconsideration variables. However, in the current study we aggregated variables across waves and used them to predict individual differences in personality traits while in the other study educational commitment/reconsideration were outcome variables.

occasions. Not all students encountered the events linked to the mea-
surement occasions at exactly the same time, as assessments were con-
nected to theoretical relevant events during the study period. In the
main analyses, we dealt with this by computing the time since T2 (the
start of the internship for internship group and the start of the academic
year for the non-internship group) to estimate the slope per participant.
The non-internship group only participated in T2-T4, as this is the period
in which most socialization effects were expected. The first measure-
ment (T1) took place during the summer before the start of the graduate
program. The second measurement (T2) coincided with the start of the
internship for the internship group and the start of the academic year for
the non-internship group. The average time between T1 and T2 was
14.5 weeks (SD = 15.0). The third measurement (T3) was connected to
the mid-term evaluation of the internship for the internship group and
the beginning of the second semester for the non-internship group. The
average time between T2 and T3 was 18.1 weeks (SD = 3.2). The fourth
measurement (T4) was connected to the end evaluation of the internship
for the internship group and the end of the academic year for the non-
internship group. The average time between T3 and T4 was 18.7
weeks (SD = 3.1). The fifth measurement (T5) was connected to grad-
uation of the master program. The average time between T4 and T5 was
21.5 weeks (SD = 11.7). The sixth measurement (T6) was about one year
after graduation, with an average time between T5 and T6 of 49.2 weeks
(SD = 5.2).

Personality measurements were available for all time points. Only
participants who had complete data on at least two time points were
included in the analyses. For the included participants, 27.3 % of the
data were missing. Little's (1988) Missing Completely at Random
(MCAR) test indicated that data were missing completely at random
($X^{2=}$ 6034.60, df = 7484, p = 1.000). We therefore used FIML to deal
with missing data.

4. Measures

Personality. Participants filled out the Dutch version (Denissen,
Geenen, van Aken, Gosling, & Potter, 2008) of the Big Five Inventory
(BFI) (John & Srivastava, 1999). This instrument assesses the Big Five
personality dimensions of extraversion, neuroticism, conscientiousness,
agreeableness, and openness to experience. Participants had to indicate
whether they agreed on 44 self-descriptors by using a Likert scale
ranging from 1 (strongly disagree) to 5 (strongly agree). Sample items
are: "I see myself as someone who worries a lot" (neuroticism), "I see
myself as someone who is reserved" (extraversion; reverse-scored), "I
see myself as someone who has an active imagination" (openness to
experience), "I see myself as someone who has a forgiving nature"
(agreeableness), and "I see myself as someone who does things effi-
ciently" (conscientiousness). In the current study, the internal consis-
tency was good for all dimensions with alpha coefficients ≥ 0.807. The
only exception was agreeableness, for which internal consistency was
acceptable (α = 0.740).

Commitment. Psychological educational commitment is conceptual-
ized in the literature on identity formation. Psychological educational
commitment was measured at T2 up to and including T4 with the
commitment and reconsideration subscale of the Utrecht-Management
of Identity Commitments Scale (UMICS) by Crocetti et al. (2008b).
This instrument assesses commitment with five items (e.g., 'my educa-
tion gives me certainty in life') and reconsideration with three items (e.
g., 'I often think it would be better to try and find different education').
Participants answered each item with a 5 point Likert scale, with
response options ranging from 1 (completely true) to 5 (completely
untrue). In the current study, internal consistency for UMICS education
was good to excellent with alpha coefficients ≥ 0.836.

Mastery. We operationalized mastery of the transition into working
life as career success. Career success is a multi-faceted construct with
more objective (documented attainments) and more subjective
(perceived attainments) (Abele et al., 2011). In the current study we

focused on the more objective facets of mastery of the transition into
working life (i.e., GPA and fit between master degree and job). Mastery
was measured with the following (open) questions about the partici-
pant's career status during T5 and T6. The participants had to indicate if
they had a job, if this job was in line with the study direction of psy-
chology, if this job was at the functioning level of a master degree, and in
an open question wrote down their official job title. The information of
the resulting answers was summarized in a career status variable. A
score of 0 indicates that the participant did not have a job in line with
their educational level (i.e., master's degree) and/or study direction (i.
e., psychology). A score of 1 indicates that the participant had a job in
line with their educational level and study direction. In case of missing
values at T6, we assumed that participants still had the same job and
replaced the missing value with the information provided at T5.

The mastery of the transition was also measured with the GPA of the
graduate program. The grade of the internship takes up almost 1/3 of the
GPA. Participants were asked to report their average grade of the
graduate program at T5 and T6. If participants reported a different grade
on both measurement occasions, an average of this grade was
calculated.

Strategy of analysis. As part of the preliminary analyses, we conducted
confirmatory factor analyses to examine measurement invariance across
groups and across time (see supplementary material). For these ana-
lyses, we grouped items into three parcels per dimensions (Little et al.,
2002). The results of the factor analyses suggested, in line with the
theoretical expectations, that a three-factor model for the UMICS was
the best solution and that a five-factor model was the best solution for
the BFI. We found measurement invariance for most dimensions, both
over time and between the two groups of students (i.e., the dimensions
were metric and (partly) scalar invariant). However, for the openness
dimension of the BFI, we found a lack of scalar invariance between
groups, indicating that mean level differences between groups on this
dimension should be interpreted with caution (Vandenberg & Lance,
2000).

Prior to the main analysis we performed the following actions to
prepare the data for analysis. We person-mean centered all variables
with the date of T2 as a reference point, as this measurement moment is
aligned with the start of the internship and thus the moment at which
the socialization process may start. If there was no T2 date (i.e., for 29
participants with missing data on T2), we constructed a proxy date
based on the date of the nearest measurement occasion after T2, minus
the average time between T2 and that measurement occasion. The Likert
scale of the identity dimensions were reverse-coded so that the direction
is similar to the direction of the Likert scale of the personality di-
mensions, with higher scores reflecting higher levels of the underlying
constructs. For every participant, we calculated an average educational
commitment/reconsideration score over the available data from T2-T4
(Level 2). The internship variable was created by coding the non-
internship group with '0' and the internship group with '1'.

For the main analyses we computed a series of multilevel growth
models with the lme4 package (version 1.1–21) in R (version 3.6.1).
Multilevel analysis was used to account for the nested structure of the
data, with repeated measures nested within individuals. As a first step,
we established a growth model for each personality dimension with a
random intercept and a fixed slope. Second, we estimated a growth
model with a random intercept and random slope and used Likelihood
ratio tests to compare the two models. A significant test would suggest
individual differences in the slope could potentially be explained by the
transition, commitment, and mastery. Third, depending on the results of
the Likelihood ratio test, we created a growth model with a random
intercept and random linear and fixed quadratic slope and compared
this model to the model without a quadratic slope. In case of a significant
difference, a model that includes a quadric slope was used to describe
personality trait change.

In the follow-up models, we aimed to explain individual differences
in the slope of the personality dimensions by the internship variable. In a

second step, we aimed to explain individual differences in the slope of the personality dimensions by the internship variable and the commitment variable (i.e., education commitment or educational reconsideration), as well as the interaction between all variables. These models were run on the total sample and on the subsample of the internship group. In the final step, we aimed to explain individual differences in the personality dimensions by the commitment and mastery variable in the internship group, and the interaction between all variables. Gender and age were included in all models as covariates. As we interpreted up to 50 parameters for each research question, we applied a Bonferroni correction for all tests in the main analyses and used a *p*-value of < 0.001 (i.e., the *p*-value of 0.05 divided by 50 tests).

5. Results

Table 1 show the means, standard deviations and the correlations with confidence intervals for the study variables. As preliminary analyses, we investigated whether the data were best described by a model including a random intercept and a fixed slope or by a model that included a random intercept and a random slope. The results of these tests showed that $\Delta\chi^2$ ranged between models from 10.046 to 33.406 with $\Delta df = 2$, and *p*-values ranging from < 0.001 to .007. This suggested that for all personality dimensions, the data were best described by a model that included a random slope. Secondly, we investigated whether the data were best described by a linear slope, or whether adding a fixed quadratic slope improved model fit. The results of these tests showed that $\Delta\chi^2$ ranged between the models of conscientiousness, agreeableness and openness from 0.085 to 0.319 ($\Delta df = 1$), and corresponding *p*-values ranging from 0.572 to 0.770. However, for neuroticism $\Delta\chi^2$ was 10.595 and for extraversion $\Delta\chi^2$ it was 13.411 ($\Delta df = 1$), with *p*-values of $p = 0.001$ and $p < 0.001$, respectively. These results suggested that adding a fixed quadratic slope led to a significant improvement in model fit for neuroticism and extraversion but not for the other traits. Therefore, we included fixed quadratic slopes in the final models of these dimensions. The fixed linear and fixed quadratic slopes of the two models with extraversion within the internship group were significantly different from zero. Fixed linear slopes in both models were negative (i.e., Table 3a, based on Model 3c and 3d). These combined slope results suggest that there was small but significant mean-level personality change for extraversion in the internship group, who became first somewhat less extraverted and later more extraverted over time. In the models in which internship group and non-internship group were combined into one sample, we found significant gender effects for conscientiousness and neuroticism. This suggested that female students were more conscientious and neurotic compared to male students. Age effects were not significant in any of the models. Details on all preliminary analyses are provided in the supplementary material.

In a first step of the main analyses, we examined whether enrollment in the internship explained individual differences in the intercept and slope of the each personality dimension. Table 2 shows the results of these analyses and indicated an intercept difference between the non-internship group and the internship group for agreeableness and neuroticism.[3] These results indicated that students who were enrolled in the internship were more agreeable and less neurotic compared to students who were not enrolled in an internship. There also was an effect of the internship on the linear slope of extraversion. Specifically, students with an internship showed more decreases in extraversion over time compared to students without an internship. For the other dimensions, the results indicated that personality development of the internship group did not differ from the non-internship group. Fig. 1 shows the

change trajectories for the internship group and the non-internship group for all personality dimensions.

In a second step, we examined whether enrollment in the internship and commitment/reconsideration to education explained individual differences in the slope of the personality maturation. We analyzed this for the entire sample (including the internship group and the non-internship group) and for the subsample of the internship group. Tables 3a-e show the results of these analyses. Table 3d, based on Model 3a, indicates that the more committed participants were to their education, the less neurotic they were likely to be. However, educational commitment was not significantly associated with the slopes of the personality dimensions. Educational reconsideration was also unrelated to the intercepts and slopes of the personality dimensions.

We preformed the same analyses for the internship group. Within this subsample, we found positive associations between average levels of educational commitment on the one hand and the intercept of conscientiousness (Table 3c, based on Model 3c) and extraversion (Table 3a, based on Model 3c) on the other hand. This suggested that more extraverted and conscientious students were more likely to be committed to their education (on average across the duration of the study). However, none of the associations of educational commitment with the slopes of the personality dimensions were significant. Also in this subsample, educational reconsideration was unrelated to any of the personality dimensions.

In a final step, we examined whether educational commitment/reconsideration and career status and average grade explained individual differences in the slopes of the personality dimensions in the internship group. Tables 4a-e show the results, which indicate that career status and GPA were not significantly related to the intercepts and slopes of any of the personality dimensions.

6. Additional analyses

In the main analyses we focused on psychological commitment to/reconsideration of the educational program. In additional analyses we focused on a specific part of the curriculum, namely, the internship. We examined the associations between psychological internship commitment/reconsideration with intercepts and slopes of the personality dimensions in the internship group only (see the supplementary material for details). The results indicated that average levels of internship commitment were significantly positively associated with the intercept of extraversion (Table 29, Model 3e supplementary material). Furthermore, internship commitment was negatively associated with the fixed linear slope of extraversion (Table 29, Model 3e supplementary material). Inspection of this interaction indicated that students who were committed to their internship become less extraverted. However, also in these models, internship reconsideration, career status and GPA graduate program were not significantly related to the slopes of any of the personality dimensions.

7. Discussion

The current study investigated personality trait changes during the last years in education. We tested whether going through a transition (i.e., participation in an internship that prepares for working life), psychological commitment related to this transition (i.e., educational identity), and mastery of the transition to working life (i.e., GPA graduate degree and fit between master degree and job) would predict individual differences in personality trait changes.

7.1. Personality trait change

As a first goal of the study, we investigated personality mean-level change during the last years in education. We only found u-shaped mean-level changes in extraversion for the internship students. This u-shape could perhaps be explained by the intensity of the internship.

---

[3] The internship group were also less open compared to non-internship group (see Table 2). However, there was no scalar invariance for openness between groups, indicating that this mean-level differences between groups should be interpreted with much caution (Vandenberg & Lance, 2000).

Table 1
Means, standard deviations, and correlations with confidence intervals.

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1. Conscientiousness	3.71	0.58								
2. Neuroticism	2.84	0.67	-0.07 [-0.13, -0.01]							
3. Agreeableness	3.81	0.47	0.09* [0.03, 0.15]	-0.20* [-0.26, -0.15]						
4. Openness	3.43	0.56	0.03 [-0.03, 0.09]	-0.12* [-0.18, -0.06]	-0.05 [-0.11, 0.01]					
5. Extraversion	3.47	0.64	0.15* [0.09, 0.20]	-0.38* [-0.43, -0.33]	0.08* [0.02, 0.14]	0.14* [0.08, 0.19]				
6. Commitment	−0.00	0.61	0.20* [0.14, 0.25]	-0.19* [-0.24, -0.13]	0.07 [0.01, 0.13]	0.13* [0.07, 0.19]	0.25* [0.19, 0.30]			
7. Reconsideration	−0.00	0.83	-0.21* [-0.27, -0.16]	0.07 [0.02, 0.13]	-0.11* [-0.16, -0.05]	0.13* [0.07, 0.19]	-0.04 [-0.10, 0.02]	-0.39* [-0.43, -0.35]		
8. Grade	−0.00	0.48	0.32* [0.24, 0.39]	0.07 [-0.01, 0.15]	0.02 [-0.07, 0.10]	0.03 [-0.05, 0.11]	0.01 [-0.07, 0.09]	0.10* [0.03, 0.17]	0.05 [-0.03, 0.12]	
9. Career status	0.64	0.48	0.19* [0.10, 0.26]	-0.07 [-0.15, 0.01]	-0.00 [-0.09, 0.08]	-0.07 [-0.16, 0.01]	0.19* [0.11, 0.27]	0.20* [0.12, 0.27]	-0.17* [-0.24, -0.09]	0.17* [0.10, 0.25]

Note. M and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95 % confidence interval for each correlation. * indicates *p* < 0.01.

Students have a very full program during the internship, which may limit their possibilities to meet with friends and go out. After graduation, the balance between work and private life might be restored. This may result in extraversion first decreasing during the internship but increasing again after graduation. We did not find significant mean-level change in the other personality dimensions – neither in the internship nor in the control group. This is in contrast with the neo-socioanalytic perspective of personality, which predicts increases in emotional stability, conscientiousness, and agreeableness in young adults when they invest in new adult roles (Roberts & Nickel, 2021). Our results are also not in line with studies that found increases in conscientiousness during the transition to work (Bleidorn, 2012; Leikas & Salmela-Aro, 2015; Lüdtke et al., 2011; Specht et al., 2011). However, these studies used much longer time intervals (2 to 4 years) compared to our study (average time intervals of 4 months between T1-5 and a time interval of 1 year between T5-6). It might be that increases in conscientiousness build up more slowly over time and become only noticeable after longer time intervals.

We did, however, find substantial individual differences in how students' personality changed during the transition into working life for all personality dimensions. These results indicate that, for example, some individuals became more conscientious while others remained stable or became less conscientious. This finding is similar to the results of Schwaba and Bleidorn (2018), who reported substantial individual differences in personality trait change in emerging adulthood. Our results suggest that there might be a high degree of variability in how personality trait change over time, and that assuming that everyone follows a normative trajectory would misrepresent reality.

7.2. Personality trait change and commitment

As a second goal we investigated whether individual differences in personality trait change could be explained by levels of commitment to education. Our results indicated that levels of commitment were unrelated to personality trait change. Therefore, our findings did not support the suggestion of Roberts and Nickel (2021) that commitment to a new adult role might explain personality trait change. We thus did not

replicate findings of two studies that demonstrated that changes in work commitment predicted changes in conscientiousness and agreeableness (Hudson & Roberts, 2016; Hudson et al., 2012). However, those studies covered a large age range (from 18 to 101 years old), which has benefits as well as drawbacks. On the one hand, their larger age range means their results might be generalizable across adulthood, but on the other hand they were less able to zoom into the personality trait changes in relation to a life transition in early adulthood.

The results of Den Boer et al. (2019) were similar to ours, as psychological commitment did not explain individual differences in personality development. A possible explanation for these results can be gleaned from the study of Rathbone et al. (2008), who examined the relation between autobiographical narratives and social roles. These authors concluded that it may be necessary to accumulate a critical mass of experiences within a social adult role before it is represented in one's cognitive structure and leads to both narrative identity change and personality development. Following this line of reasoning, it might be that experiences during the internship are not yet embedded in one's identity, and therefore might not yet be related to personality change. Moreover, previous research on the dynamic between personality trait change and identity development shows that personality is a stronger predictor of individual differences in identity development than in the reverse direction (Klimstra et al., 2012; Luyckx et al., 2014). This suggest that individual differences in personality trait change might not be explained very well by identity commitment. This could also explain why the studies by Hudson and colleagues (2012, 2016) did find that commitment could explain individual differences in personality trait change, as they used behavioral correlates of commitment (e.g., high job involvement, organizational citizenship behavior, and counterproductive behaviors at work) rather than psychological commitment. Perhaps, individual differences in personality trait change are better explained by measures of behavioral commitment.

7.3. Personality trait change and mastery

The third goal of this study was to examine whether mastery (i.e., GPA graduate program and fitting job) of the transition could explain

Table 2
Fixed Effects for Multilevel Growth Models for Personality Traits.

	Conscientiousness			Neuroticism			Agreeableness			Openness			Extraversion		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
Model 2															
intercept	3.591*	0.376	2.623—4.560	2.483*	0.430	1.376—3.590	4.337*	0.312	3.532—5.142	3.326*	0.373	2.366—4.286	3.290*	0.430	2.182—4.398
linear s.	-0.002	0.001	-0.005 - 0.001	-0.001	0.002	-0.007 - 0.005	0.000	0.001	-0.003 - 0.003	0.001	0.001	-0.002 - 0.004	0.004	0.002	-0.001 - 0.009
quadratic s.	-	-	-	0.000	0.000	0.000 - 0.000	-	-	-	-	-	-	0.000	0.000	0.000 - 0.000
age	-0.013	0.017	-0.057 - 0.032	0.011	0.020	-0.040 - 0.061	-0.035	0.014	-0.072 - 0.001	0.018	0.017	-0.026 - 0.062	0.002	0.020	-0.049 - 0.052
gender	0.393*	0.081	0.183 - 0.602	0.432*	0.093	0.192 - 0.672	0.076	0.068	-0.098 - 0.251	-0.170	0.081	-0.378 - 0.038	0.176	0.093	-0.064 - 0.416
internship	0.109	0.066	-0.060 - 0.278	-0.315*	0.077	-0.513 - -0.117	0.285*	0.054	0.145 - 0.425	-0.219*	0.065	-0.386 - -0.051	-0.035	0.076	-0.231 - 0.161
internship*linear s.	0.001	0.001	-0.002 - 0.005	0.004	0.003	-0.003 - 0.010	0.000	0.001	-0.003 - 0.003	-0.001	0.001	-0.004 - 0.003	-0.007*	0.002	-0.013 - -0.002
internship*quadratic s.	-	-	-	0.000	0.000	0.000 - 0.000	-	-	-	-	-	-	0.000	0.000	0.000 - 0.000

Note. Model 2 for neuroticism and extraversion has a fixed quadratic slope, random intercept and random linear slope; Model 2 for conscientiousness, agreeableness and openness has a random intercept and random linear slope; β = Beta; S.E. = standard error; C.I. = confidence interval; linear s. = linear slope, quadratic s. = quadratic slope; *p < 0.001.

Table 3a
Fixed Effects for Multilevel Growth Models for Extraversion with Internship and Educational Commitment and Educational Reconsideration.

Extraversion	Total sample (N = 311)						Internship group (N = 163)					
	Model 3a Internship*Commitment			Model 3b Internship*Reconsideration			Model 3c Internship*Commitment			Model 3d Internship*Reconsideration		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	3.293*	0.422	2.205—4.381	3.269*	0.436	2.146—4.392	4.055*	0.624	2.448—5.662	3.993*	0.662	2.287—5.699
linear slope	0.004	0.002	-0.001 - 0.009	0.004	0.002	-0.001 - 0.009	-0.004*	0.001	-0.006 - -0.001	-0.003*	0.001	-0.006 - -0.001
quadratic slope	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	0.000*	0.000	0.000 - 0.000	0.000*	0.000	0.000 - 0.000
age	0.001	0.019	-0.049 - 0.051	0.002	0.020	-0.049 - 0.054	-0.038	0.027	-0.106 - 0.031	-0.033	0.028	-0.106 - 0.039
gender	0.191	0.091	-0.043 - 0.424	0.180	0.095	-0.065 - 0.425	0.266	0.130	-0.070 - 0.601	0.220	0.138	-0.135 - 0.575
internship	-0.041	0.075	-0.233 - 0.151	-0.045	0.077	-0.243 - 0.154	-	-	-	-	-	-
commitment	0.099	0.084	-0.118 - 0.315	-	-	-	0.351*	0.075	0.157 - 0.544	-	-	-
reconsideration	-	-	-	0.007	0.060	-0.147 - 0.161	-	-	-	-0.072	0.064	-0.238 - 0.094
internship*linear slope	-0.007*	0.002	-0.013 - -0.002	-0.007	0.002	-0.012 - -0.001	-	-	-	-	-	-
internship*quadratic slope	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	-	-	-	-	-	-
commitment*linear slope	0.000	0.003	-0.008 - 0.008	-	-	-	0.000	0.001	-0.004 - 0.004	-	-	-
commitment*quadratic slope	0.000	0.000	0.000 - 0.000	-	-	-	0.000	0.000	0.000 - 0.000	-	-	-
reconsideration*linear slope	-	-	-	0.003	0.002	-0.003 - 0.009	-	-	-	0.001	0.001	-0.002 - 0.003
reconsideration*quadratic slope	-	-	-	0.000	0.000	0.000 - 0.000	-	-	-	0.000	0.000	0.000 - 0.000
internship*commitment	0.245	0.114	-0.049 - 0.538	-	-	-	-	-	-	-	-	-
internship*reconsideration	-	-	-	-0.076	0.088	-0.302 - 0.150	-	-	-	-	-	-
internship*commitment*linear slope	0.001	0.004	-0.009 - 0.010	-	-	-	-	-	-	-	-	-
internship*commitment*quadratic slope	0.000	0.000	0.000 - 0.000	-	-	-	-	-	-	-	-	-
internship*reconsideration*linear slope	-	-	-	-0.002	0.002	-0.009 - 0.004	-	-	-	-	-	-
internship*reconsideration*quadratic slope	-	-	-	0.000	0.000	0.000 - 0.000	-	-	-	-	-	-

Note. All models has a fixed quadratic slope, random intercept and random linear slope; Model 3a and Model 3b are for internship and educational commitment and random linear slope; Model 3c and Model 3d are only on the internship group; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.
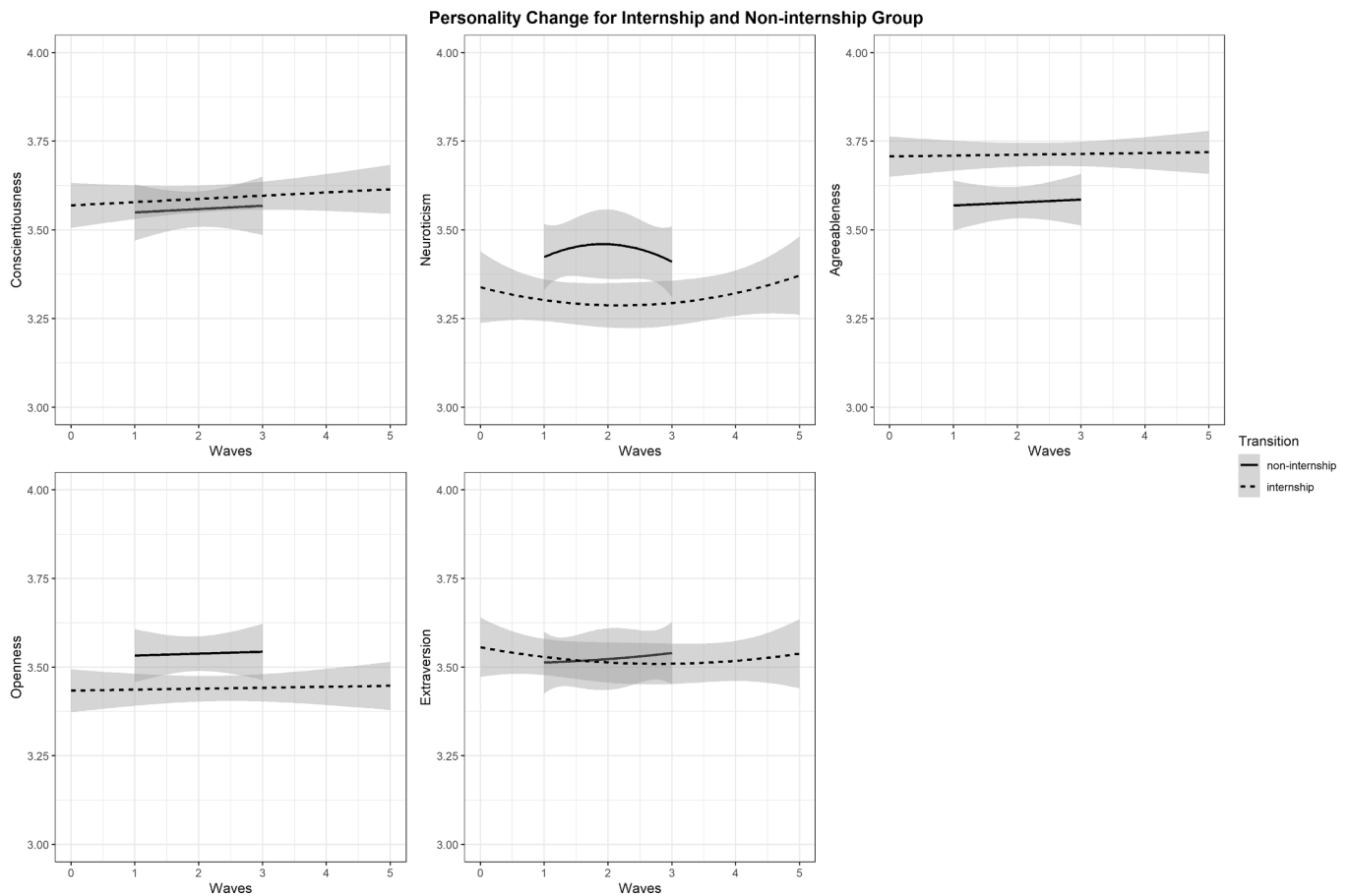
Fig. 1. Personality Change for Internship and Non-internship Group.

individual differences in personality trait change. However, the results of our study indicated that mastery was unrelated to personality trait change. This is not in line with empirical studies demonstrating that subjective and objective career success were associated with increases in emotional stability and extraversion (Roberts et al., 2003; Roberts & Chapman, 2000; Scollon & Diener, 2006; Sutin et al., 2009). The results are also not in line with the study of Reitz et al. (2022), who demonstrated that higher levels of perceived work-related mastery were related to increases in conscientiousness. This difference might be explained by the operationalization of mastery based on the objective facets of career success. Our results extend the existing literature by hinting that objective measures of mastery might be less relevant for explaining individual differences in personality trait change compared to perceived mastery. Future studies on the link between mastery and personality trait change might therefore focus on subjective measures of mastery.

In sum, in line with the mixed results of other studies examining personality trait change in relation to life transitions, we only found that individual differences in extraversion were associated with participation in an internship. Based on the existing literature we expected to explain individual differences in changes in conscientiousness. Individual differences in other personality dimensions could not be explained by commitment to the transition and mastery of the transitions. It is important to note that our results represent very small effect sizes with quite narrow confidence intervals around small (and non-significant) effects, suggesting that if there would be a true effect, this effect might be very small. Based on a recent *meta*-analyses by Bühler et al. (2023), we were expecting small effect sizes, but not very small effects. Especially, as the transition into working life has been indicated as having a stronger effect than other life events on personality change.

Nevertheless, small effects can be relevant when aggregated across many individuals over time (Funder & Ozer, 2019). Almost everyone will make the transition into working life, and thus this transition can have in theory a broad impact on people's lives. However, future studies should be designed in such a way that small effects or the accumulation thereof can be detected. In the following section we discuss the implications.

7.4. Implications

In the current study we focused on a single life event (i.e., practical internship), whereas life experiences do not occur in isolation. For example, the transition into working life might be accompanied by changes in romantic relationships, such as breakups, new relationships, or moving in together. In general, this period of life is characterized by multiple transitions in several life domains (Rindfuss, 1991) and the effect size of single life events on mean-level personality change could be very small (Smith & Bates, 1992). Perhaps, the effects may become stronger if they are combined with other life events. This makes it important to study life events in the context of other possible meaningful experiences (Bleidorn et al., 2020).

Second, up till now researchers have focused on experiences that are assumed to be meaningful for all participants (e.g., Bleidorn, 2012; Specht, Egloff, & Schmukle, 2011; Van Scheppingen et al., 2016). However, there is a considerable heterogeneity in how the same life event is experienced (Kritzler et al., 2023). The same life event could therefore not be meaningful to all participants. Future studies might ask participants to indicate which experiences have been meaningful to them. This is for example done in the study by Schwaba, Denissen, Luhmann, Hopwood, & Bleidorn (2023). They demonstrated that life

7

772232122111122

Table 3b
Fixed Effects for Multilevel Growth Models for Agreeableness with Internship and Educational Commitment and Educational Reconsideration.

Agreeableness

| | Total sample (N = 311) | | | | | | Internship group (N = 163) | | | | | |
| | Model 3a Internship*Commitment | | | Model 3b Internship*Reconsideration | | | Model 3c Internship*Commitment | | | Model 3d Internship*Reconsideration | | |
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	4.371*	0.316	3.558—5.184	4.411*	0.316	3.596—5.226	3.975*	0.435	2.855—5.095	4.006*	0.433	2.891—5.121
linear slope	0.000	0.001	-0.003 - -0.003	0.000	0.001	-0.003 - 0.003	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000
age	-0.037	0.014	-0.074 - 0.000	-0.039	0.014	-0.076 - -0.001	-0.011	0.019	-0.058 - 0.037	-0.012	0.018	-0.059 - 0.035
gender	0.077	0.068	-0.097 - 0.252	0.070	0.069	-0.108 - 0.248	0.187	0.091	-0.047 - 0.421	0.176	0.090	-0.056 - 0.409
internship	0.288*	0.055	0.147 - 0.429	0.283*	0.055	0.141 - 0.425	–	–	–	–	–	–
commitment	0.089	0.061	-0.069 - 0.246	–	–	–	0.040	0.052	-0.094 - 0.174	–	–	–
reconsideration	–	–	–	-0.019	0.042	-0.128 - 0.090	–	–	–	-0.065	0.042	-0.173 - 0.042
Internship*linear slope	0.000	0.001	-0.003 - 0.003	0.000	0.001	-0.003 - 0.003	–	–	–	–	–	–
commitment*linear slope	0.000	0.002	-0.005 - 0.005	–	–	–	-0.001	0.001	-0.003 - 0.001	–	–	–
reconsideration*linear slope	–	–	–	-0.001	0.001	-0.005 - 0.002	–	–	–	-0.001	0.001	-0.002 - 0.001
internship*commitment	-0.049	0.084	-0.264 - 0.167	–	–	–	–	–	–	–	–	–
internship*reconsideration	–	–	–	-0.051	0.062	-0.212 - 0.110	–	–	–	–	–	–
internship*commitment*linear slope	0.000	0.002	-0.006 - 0.006	–	–	–	–	–	–	–	–	–
internship*reconsideration*linear slope	–	–	–	0.001	0.002	-0.003 - 0.005	–	–	–	–	–	–

Note. All models has a random intercept and random linear slope; Model 3c and Model 3d are only on the internship group; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 3c
Fixed Effects for Multilevel Growth Models for Conscientiousness with Internship and Educational Commitment and Educational Reconsideration.

Conscientiousness

| | Total sample (N = 311) | | | | | | Internship group (N = 163) | | | | | |
| | Model 3a Internship*Commitment | | | Model 3b Internship*Reconsideration | | | Model 3c Internship*Commitment | | | Model 3d Internship*Reconsideration | | |
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	3.587*	0.373	2.627—4.547	3.654*	0.375	2.689—4.620	4.182*	0.534	2.805—5.559	4.191*	0.544	2.791—5.591
linear slope	-0.002	0.001	-0.005 - 0.001	-0.002	0.001	-0.005 - 0.002	-0.001	0.001	-0.002 - 0.001	-0.001	0.001	-0.002 - 0.001
age	-0.013	0.017	-0.057 - 0.031	-0.014	0.017	-0.058 - 0.030	-0.037	0.023	-0.095 - 0.022	-0.036	0.023	-0.096 - 0.023
gender	0.402*	0.080	0.196 - 0.608	0.355*	0.082	0.144 - 0.566	0.459*	0.112	0.172 - 0.746	0.429*	0.113	0.137 - 0.721
internship	0.108	0.065	-0.058 - 0.275	0.093	0.065	-0.075 - 0.261	–	–	–	–	–	–
commitment	0.136	0.072	-0.050 - 0.321	–	–	–	0.220*	0.064	0.055 - 0.384	–	–	–
reconsideration	–	–	–	-0.122	0.050	-0.251 - 0.007	–	–	–	-0.138	0.052	-0.273 - -0.003
Internship*linear slope	0.001	0.001	-0.002 - 0.005	0.001	0.001	-0.002 - 0.005	–	–	–	–	–	–
commitment*linear slope	0.000	0.002	-0.006 - 0.006	–	–	–	-0.001	0.001	-0.003 - 0.001	–	–	–
reconsideration*linear slope	–	–	–	-0.001	0.002	-0.005 - 0.002	–	–	–	0.000	0.001	-0.002 - 0.002
internship*commitment	0.079	0.099	-0.175 - 0.333	–	–	–	–	–	–	–	–	–
internship*reconsideration	–	–	–	-0.014	0.074	-0.205 - 0.176	–	–	–	–	–	–
internship*commitment*linear slope	-0.001	0.002	-0.007 - 0.006	–	–	–	–	–	–	–	–	–
internship*reconsideration*linear slope	–	–	–	0.002	0.002	-0.003 - 0.006	–	–	–	–	–	–

Note. All models has a random intercept and random linear slope; Model 3c and Model 3d are only on the internship group; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 3d
Fixed Effects for Multilevel Growth Models for Neuroticism with Internship and Educational Commitment and Educational Reconsideration.

Neuroticism	Total sample (N = 311)						Internship group (N = 163)					
	Model 3a Internship*Commitment			Model 3b Internship*Reconsideration			Model 3c Internship*Commitment			Model 3d Internship*Reconsideration		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	2.480*	0.426	1.382—3.578	2.387*	0.431	1.277—3.497	1.600	0.613	0.020—3.180	1.641	0.613	0.063—3.219
linear slope	-0.001	0.002	-0.007 - 0.005	-0.002	0.002	-0.008 - 0.004	0.002	0.001	0.000 - 0.005	0.002	0.001	0.000 - 0.005
quadratic slope	0.000	0.000	0.000 - 0.000	-0.001	0.000	-0.001 -0.001	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000
age	0.011	0.019	-0.039 - 0.061	0.013	0.020	-0.037 - 0.064	0.041	0.026	-0.027 - 0.108	0.038	0.026	-0.029 - 0.105
gender	0.426*	0.091	0.191 - 0.662	0.476*	0.094	0.234 - 0.718	0.312	0.128	-0.018 - 0.642	0.344	0.128	0.015 - 0.673
internship	-0.311*	0.076	-0.507 - -0.116	-0.303*	0.077	-0.501 - -0.105	–	–	–	–	–	–
commitment	-0.298*	0.086	-0.520 - -0.076	–	–	–	-0.181	0.074	-0.373 - 0.011	–	–	–
reconsideration	–	–	–	0.094	0.060	-0.061 - 0.249	–	–	–	0.052	0.060	-0.103 - 0.208
internship*linear slope	0.003	0.003	-0.003 – -0.010	0.004	0.003	-0.002 - 0.011	–	–	–	–	–	–
internship*quadratic slope	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–
commitment*linear slope	0.001	0.004	-0.009 - 0.012	–	–	–	-0.002	0.002	-0.007 - 0.003	–	–	–
commitment*quadratic slope	0.000	0.000	0.000 - 0.000	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–
reconsideration*linear slope	–	–	–	0.009	0.003	0.002 - 0.016	–	–	–	0.002	0.001	-0.002 - 0.005
reconsideration*quadratic slope	–	–	–	0.001	0.000	0.001 - 0.001	–	–	–	0.000	0.000	0.000 - 0.000
internship*commitment	0.124	0.116	-0.175 - 0.423	–	–	–	–	–	–	–	–	–
internship*reconsideration	–	–	–	-0.042	0.087	-0.267 - 0.184	–	–	–	–	–	–
internship*commitment*linear slope	-0.003	0.004	-0.015 - 0.008	–	–	–	–	–	–	–	–	–
internship*commitment*quadratic slope	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–	–	–	–
internship*reconsideration*linear slope	–	–	–	-0.007	0.003	-0.015 - -0.001	–	–	–	–	–	–
internship*reconsideration*quadratic slope	–	–	–	-0.001	0.000	-0.001 - -0.001	–	–	–	–	–	–

Note. All models has a fixed quadratic slope, random intercept and random linear slope; Model 3c and Model 3d are only on the internship group; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 3e
Fixed Effects for Multilevel Growth Models for Openness with Internship and Educational Commitment and Educational Reconsideration.

Openness	Total sample (N = 311)						Internship group (N = 163)					
	Model 3a Internship*Commitment			Model 3b Internship*Reconsideration			Model 3c Internship*Commitment			Model 3d Internship*Reconsideration		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	3.417*	0.371	2.461—4.373	3.378*	0.374	2.415—4.341	3.628*	0.560	2.185—5.071	3.565*	0.568	2.102—5.028
linear slope	0.001	0.001	-0.002 - 0.004	0.001	0.001	-0.002 - 0.004	0.000	0.001	-0.001 - 0.001	0.000	0.001	-0.001 - 0.001
age	0.014	0.017	-0.030 - 0.058	0.014	0.017	-0.030 - 0.058	-0.005	0.024	-0.066 - 0.057	-0.001	0.024	-0.064 - 0.061
gender	-0.174	0.080	-0.379 - 0.031	-0.153	0.082	-0.363 - 0.057	-0.200	0.117	-0.501 - 0.101	-0.203	0.118	-0.507 - 0.102
internship	-0.229*	0.064	-0.395 - -0.063	-0.209	0.065	-0.377 - -0.041	–	–	–	–	–	–
commitment	0.097	0.072	-0.088 - 0.281	–	–	–	0.148	0.067	-0.024 - 0.320	–	–	–
reconsideration	–	–	–	0.073	0.050	-0.056 - 0.202	–	–	–	0.067	0.055	-0.074 - 0.209
internship*linear slope	-0.001	0.001	-0.004 - 0.003	-0.001	0.001	-0.004 - 0.003	–	–	–	–	–	–
commitment*linear slope	0.001	0.002	-0.005 - 0.006	–	–	–	0.000	0.001	-0.002 - 0.002	–	–	–
reconsideration*linear slope	–	–	–	0.000	0.001	-0.004 - 0.004	–	–	–	0.001	0.001	-0.001 - 0.003
internship*commitment	0.050	0.098	-0.204 - 0.303	–	–	–	–	–	–	–	–	–
internship*reconsideration	–	–	–	-0.003	0.074	-0.193 - 0.188	–	–	–	–	–	–
internship*commitment*linear slope	-0.001	0.002	-0.007 - 0.005	–	–	–	–	–	–	–	–	–
internship*reconsideration*linear slope	–	–	–	0.000	0.002	-0.004 - 0.004	–	–	–	–	–	–

Note. All models has a random intercept and random linear slope; Model 3c and Model 3d are only on the internship group; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 4a

Fixed Effects for Multilevel Growth Models for Extraversion with Educational Commitment and Mastery in the Internship group ($N = 163$).

Extraversion	Model 4a Commitment*Career status			Model 4b Commitment*Grade			Model 4c Reconsideration*Career status			Model 4d Reconsideration*Grade		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	4.063*	0.769	2.082——6.044	4.311*	0.771	2.326——6.296	3.996	0.794	1.951——6.041	3.993	0.866	1.763——6.223
linear slope	-0.002	0.002	-0.006 - 0.002	-0.003	0.001	-0.005 - 0.000	-0.003	0.001	-0.007 - 0.001	-0.003	0.001	-0.005 - -0.001
quadratic slope	0.000	0.000	0.000 - 0.000	0.000*	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000
age	-0.030	0.032	-0.114 - 0.053	-0.042	0.033	-0.126 - 0.042	-0.024	0.034	-0.111 - 0.062	-0.027	0.037	-0.121 - 0.068
gender	-0.045	0.173	-0.491 - 0.401	0.096	0.156	-0.307 - 0.499	-0.170	0.185	-0.646 - 0.306	0.053	0.173	-0.392 - 0.498
commitment	0.276	0.152	-0.115 - 0.667	0.423*	0.087	0.200 - 0.647	–	–	–	–	–	–
reconsideration	–	–	–	–	–	–	0.041	0.112	-0.249 - 0.330	-0.112	0.076	-0.307 - 0.083
career status	0.165	0.116	-0.134 - 0.463	–	–	–	0.239	0.122	-0.075 - 0.553	–	–	–
grade	–	–	–	-0.044	0.112	-0.332 - 0.243	–	–	–	0.037	0.123	-0.279 - 0.353
commitment*linear slope	0.002	0.003	-0.004 - 0.009	0.000	0.002	-0.004 - 0.004	–	–	–	–	–	–
commitment*quadratic slope	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–
reconsideration*linear slope	–	–	–	–	–	–	-0.002	0.002	-0.007 - 0.003	0.000	0.001	-0.003 - 0.003
reconsideration*quadratic slope	–	–	–	–	–	–	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000
career status*linear slope	-0.002	0.002	-0.007 - 0.003	–	–	–	-0.001	0.002	-0.006 - 0.004	–	–	–
career status*quadratic slope	0.000	0.000	0.000 - 0.000	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–
grade*linear slope	–	–	–	0.002	0.002	-0.003 - 0.006	–	–	–	0.002	0.002	-0.003 - 0.006
grade*quadratic slope	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–	0.000	0.000	0.000 - 0.000
commitment*career status	0.152	0.193	-0.346 - 0.649	–	–	–	–	–	–	–	–	–
reconsideration*career status	–	–	–	–	–	–	-0.197	0.148	-0.578 - 0.184	–	–	–
commitment*grade	–	–	–	-0.198	0.218	-0.758 - 0.363	–	–	–	–	–	–
reconsideration*grade	–	–	–	–	–	–	–	–	–	0.120	0.163	-0.300 - 0.539
commitment*career status*linear slope	-0.003	0.003	-0.011 - 0.006	–	–	–	–	–	–	–	–	–
commitment*career status*quadratic slope	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–	–	–	–
reconsideration*career status*linear slope	–	–	–	–	–	–	0.004	0.002	-0.002 - 0.010	–	–	–
reconsideration*career status*quadratic slope	–	–	–	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–
commitment*grade*linear slope	–	–	–	-0.003	0.004	-0.012 - 0.007	–	–	–	–	–	–
commitment*grade*quadratic slope	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–
reconsideration*grade*linear slope	–	–	–	–	–	–	–	–	–	0.004	0.003	-0.002 - 0.011
reconsideration*grade*quadratic slope	–	–	–	–	–	–	–	–	–	0.000	0.000	0.000 - 0.000

Note. All models has a fixed quadratic slope, random intercept and random linear slope. β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 4b

Fixed Effects for Multilevel Growth Models for Agreeableness in the Internship group with Educational Commitment and Mastery ($N = 163$).

Agreeableness	Model 4a Commitment*Career status			Model 4b Commitment*Grade			Model 4c Reconsideration*Career status			Model 4d Reconsideration*Grade		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	4.318*	0.514	2.995—5.641	3.790*	0.517	2.458—5.122	4.553*	0.503	3.256—5.850	3.623*	0.520	2.283—4.963
linear slope	0.000	0.001	-0.002 - 0.002	0.000	0.000	0.000 - 0.000	0.000	0.001	-0.002 - 0.002	0.000	0.000	0.000 - 0.000
age	-0.022	0.022	-0.077 - 0.034	-0.001	0.022	-0.058 - 0.055	-0.031	0.021	-0.086 - 0.023	0.006	0.022	-0.051 - 0.062
gender	0.116	0.115	-0.181 - 0.413	0.183	0.105	-0.087 - 0.454	0.115	0.117	-0.186 - 0.416	0.184	0.104	-0.083 - 0.452
commitment	-0.094	0.100	-0.352 - 0.164	0.074	0.058	-0.074 - 0.223	—	—	—	—	—	—
reconsideration	—	—	—	—	—	—	-0.085	0.070	-0.266 - 0.096	-0.100	0.045	-0.217 - 0.016
career status	-0.054	0.077	-0.252 - 0.144	—	—	—	-0.056	0.077	-0.254 - 0.142	—	—	—
grade	—	—	—	-0.051	0.074	-0.243 - 0.140	—	—	—	-0.021	0.073	-0.209 - 0.168
commitment*linear slope	-0.001	0.001	-0.005 - 0.002	-0.001	0.001	-0.003 - 0.001	—	—	—	—	—	—
reconsideration*linear slope	—	—	—	—	—	—	-0.001	0.001	-0.003 - 0.002	0.000	0.001	-0.002 - 0.002
career status*linear slope	0.000	0.001	-0.003 - 0.003	—	—	—	0.000	0.001	-0.003 - 0.003	—	—	—
grade*linear slope	—	—	—	0.001	0.001	-0.002 - 0.003	—	—	—	0.001	0.001	-0.002 - 0.003
commitment*career status	0.212	0.128	-0.118 - 0.541	—	—	—	—	—	—	—	—	—
reconsideration*career status	—	—	—	—	—	—	0.077	0.093	-0.162 - 0.316	—	—	—
commitment*grade	—	—	—	0.053	0.145	-0.320 - 0.426	—	—	—	—	—	—
reconsideration*grade	—	—	—	—	—	—	—	—	—	0.131	0.097	-0.118 - 0.380
commitment*career status*linear slope	0.001	0.002	-0.004 - 0.005	—	—	—	—	—	—	—	—	—
reconsideration*career status*linear slope	—	—	—	—	—	—	0.001	0.001	-0.003 - 0.004	—	—	—
commitment*grade*linear slope	—	—	—	0.000	0.002	-0.005 - 0.005	—	—	—	—	—	—
reconsideration*grade*linear slope	—	—	—	—	—	—	—	—	—	0.000	0.001	-0.003 - 0.003

Note. All models has a random intercept and random linear slope; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 4c

Fixed Effects for Multilevel Growth Models for Conscientiousness in the Internship group with Educational Commitment and Mastery ($N = 163$).

Conscientiousness	Model 4a Commitment*Career status			Model 4b Commitment*Grade			Model 4c Reconsideration*Career status			Model 4d Reconsideration*Grade		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	3.799*	0.675	2.059—5.539	3.793*	0.681	2.038—5.548	3.827*	0.679	2.078—5.576	3.956*	0.710	2.127—5.785
linear slope	-0.001	0.001	-0.003 - 0.002	-0.001	0.001	-0.002 - 0.001	-0.001	0.001	-0.003 - 0.002	-0.001	0.001	-0.002 - 0.001
age	-0.026	0.029	-0.100 - 0.047	-0.017	0.029	-0.091 - 0.058	-0.025	0.029	-0.099 - 0.049	-0.022	0.030	-0.099 - 0.056
gender	0.551*	0.152	0.159 - 0.942	0.398	0.138	0.042 - 0.754	0.457	0.158	0.051 - 0.864	0.333	0.142	-0.032 - 0.698
commitment	0.215	0.131	-0.123 - 0.554	0.292*	0.076	0.097 - 0.488	—	—	—	—	—	—
reconsideration	—	—	—	—	—	—	-0.049	0.094	-0.292 - 0.195	-0.158	0.062	-0.317 - 0.001
career status	0.099	0.101	-0.161 - 0.359	—	—	—	0.127	0.103	-0.139 - 0.392	—	—	—
grade	—	—	—	0.227	0.098	-0.025 - 0.479	—	—	—	0.276	0.100	0.019 - 0.533
commitment*linear slope	-0.001	0.001	-0.004 - 0.003	-0.001	0.001	-0.004 - 0.001	—	—	—	—	—	—
reconsideration*linear slope	—	—	—	—	—	—	0.000	0.001	-0.003 - 0.003	0.001	0.001	-0.001 - 0.003
career status*linear slope	0.000	0.001	-0.003 - 0.003	—	—	—	0.000	0.001	-0.003 - 0.003	—	—	—
grade*linear slope	—	—	—	0.000	0.001	-0.003 - 0.003	—	—	—	0.000	0.001	-0.003 - 0.003
commitment*career status	0.124	0.168	-0.309 - 0.556	—	—	—	—	—	—	—	—	—
reconsideration*career status	—	—	—	—	—	—	-0.150	0.125	-0.471 - 0.172	—	—	—
commitment*grade	—	—	—	0.041	0.191	-0.450 - 0.532	—	—	—	—	—	—
reconsideration*grade	—	—	—	—	—	—	—	—	—	-0.144	0.132	-0.484 - 0.197
commitment*career status*linear slope	-0.002	0.002	-0.007 - 0.003	—	—	—	—	—	—	—	—	—
reconsideration*career status*linear slope	—	—	—	—	—	—	0.000	0.001	-0.004 - 0.004	—	—	—
commitment*grade*linear slope	—	—	—	0.005	0.002	-0.001 - 0.011	—	—	—	—	—	—
reconsideration*grade*linear slope	—	—	—	—	—	—	—	—	—	-0.003	0.002	-0.007 - 0.001

Note. All models has a random intercept and random linear slope; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 4d

Fixed Effects for Multilevel Growth Models for Neuroticism in the Internship group with Educational Commitment and Mastery ($N = 163$).

Neuroticism	Model 4a Commitment*Career status			Model 4b Commitment*Grade			Model 4c Reconsideration*Career status			Model 4d Reconsideration*Grade		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	0.751	0.690	−1.026——2.528	1.696	0.721	-0.162——3.554	1.066	0.692	-0.716 - 2.848	1.947	0.746	0.025——3.869
linear slope	0.002	0.002	-0.003 - 0.007	0.002	0.001	-0.001 - 0.005	0.003	0.002	-0.002 - 0.008	0.002	0.001	-0.001 - 0.005
quadratic slope	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000
age	0.071	0.029	-0.004 - 0.146	0.030	0.031	-0.049 - 0.109	0.058	0.029	-0.017 - 0.133	0.019	0.032	-0.062 - 0.100
gender	0.511	0.155	0.111 - 0.910	0.430	0.146	0.053 - 0.807	0.525	0.161	0.111 - 0.940	0.439	0.149	0.055 - 0.822
commitment	-0.356	0.137	-0.710 - -0.003	-0.186	0.082	-0.396 - 0.025	–	–	–	–	–	–
reconsideration	–	–	–	–	–	–	0.100	0.099	-0.157 - 0.356	0.110	0.066	-0.06 - 0.279
career status	-0.028	0.105	-0.297 - 0.242	–	–	–	-0.085	0.107	-0.360 - 0.191	–	–	–
grade	–	–	–	0.064	0.105	-0.206 - 0.335	–	–	–	0.017	0.106	-0.256 - 0.291
commitment*linear slope	-0.004	0.003	-0.013 - 0.004	-0.002	0.002	-0.007 - 0.003	–	–	–	–	–	–
commitment*quadratic slope	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–
reconsideration*linear slope	–	–	–	–	–	–	0.003	0.002	-0.003 - 0.009	0.002	0.001	-0.002 - 0.006
reconsideration*quadratic slope	–	–	–	–	–	–	0.000	0.000	0.000 - 0.000	0.000	0.000	0.000 - 0.000
career status*linear slope	-0.001	0.003	-0.007 - 0.006	–	–	–	-0.001	0.002	-0.007 - 0.006	–	–	–
career status*quadratic slope	0.000	0.000	0.000 - 0.000	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–
grade*linear slope	–	–	–	-0.003	0.002	-0.009 - 0.003	–	–	–	-0.004	0.002	-0.010 - 0.002
grade*quadratic slope	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–	0.000	0.000	0.000 - 0.000
commitment*career status	0.257	0.175	-0.193 - 0.707	–	–	–	–	–	–	–	–	–
reconsideration*career status	–	–	–	–	–	–	-0.103	0.130	-0.439 - 0.233	–	–	–
commitment*grade	–	–	–	0.055	0.205	-0.473 - 0.583	–	–	–	–	–	–
reconsideration*grade	–	–	–	–	–	–	–	–	–	-0.148	0.142	-0.514 - 0.217
commitment*career status*linear slope	0.005	0.004	-0.006 - 0.016	–	–	–	–	–	–	–	–	–
commitment*career status*quadratic slope	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–	–	–	–
reconsideration*career status*linear slope	–	–	–	–	–	–	0.000	0.003	-0.008 - 0.008	–	–	–
reconsideration*career status*quadratic slope	–	–	–	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–
commitment*grade*linear slope	–	–	–	0.001	0.005	-0.011 - 0.014	–	–	–	–	–	–
commitment*grade*quadratic slope	–	–	–	0.000	0.000	0.000 - 0.000	–	–	–	–	–	–
reconsideration*grade*linear slope	–	–	–	–	–	–	–	–	–	-0.001	0.003	-0.009 - 0.008
reconsideration*grade*quadratic slope	–	–	–	–	–	–	–	–	–	0.000	0.000	0.000 - 0.000

Note. All models has a fixed quadratic slope, random intercept and random linear slope; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

Table 4e
Fixed Effects for Multilevel Growth Models for Openness in the Internship group with Educational Commitment and Mastery ($N = 163$).

Openness	Model 4a Commitment*Career status			Model 4b Commitment*Grade			Model 4c Reconsideration*Career status			Model 4d Reconsideration*Grade		
	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.	β	S.E.	99 % C.I.
intercept	3.731*	0.648	2.063—5.399	3.119*	0.705	1.304—4.934	3.412*	0.642	1.759—5.065	3.036*	0.731	1.154—4.918
linear slope	0.001	0.001	-0.002 - 0.003	0.000	0.001	-0.001 - 0.001	0.001	0.001	-0.002 - 0.003	0.000	0.001	-0.001 - 0.001
age	-0.001	0.027	-0.072 - 0.069	0.015	0.030	-0.062 - 0.092	0.012	0.027	-0.058 - 0.082	0.019	0.031	-0.060 - 0.099
gender	-0.311	0.146	-0.686 - 0.065	-0.144	0.143	-0.512 - 0.224	-0.318	0.149	-0.702 - 0.067	-0.138	0.146	-0.514 - 0.238
commitment	0.252	0.126	-0.073 - 0.576	0.135	0.079	-0.068 - 0.338	–	–	–	–	–	–
reconsideration	–	–	–	–	–	–	0.044	0.089	-0.187 - 0.274	0.025	0.063	-0.138 - 0.189
career status	-0.114	0.097	-0.363 - 0.135	–	–	–	-0.053	0.098	-0.304 - 0.198	–	–	–
grade	–	–	–	0.034	0.101	-0.227 - 0.296	–	–	–	0.061	0.103	-0.203 - 0.325
commitment*linear slope	0.001	0.001	-0.003 - 0.004	-0.001	0.001	-0.003 - 0.002	–	–	–	–	–	–
reconsideration*linear slope	–	–	–	–	–	–	0.001	0.001	-0.002 - 0.004	0.001	0.001	-0.001 - 0.003
career status*linear slope	-0.001	0.001	-0.004 - 0.002	–	–	–	-0.001	0.001	-0.004 - 0.002	–	–	–
grade*linear slope	–	–	–	0.000	0.001	-0.003 - 0.003	–	–	–	0.000	0.001	-0.003 - 0.003
commitment*career status	-0.171	0.161	-0.586 - 0.243	–	–	–	–	–	–	–	–	–
reconsideration*career status	–	–	–	–	–	–	0.029	0.118	-0.275 - 0.334	–	–	–
commitment*grade	–	–	–	0.120	0.198	-0.389 - 0.629	–	–	–	–	–	–
reconsideration*grade	–	–	–	–	–	–	–	–	–	0.071	0.136	-0.280 - 0.421
commitment*career status*linear slope	-0.001	0.002	-0.006 - 0.004	–	–	–	–	–	–	–	–	–
reconsideration*career status*linear slope	–	–	–	–	–	–	-0.001	0.002	-0.005 - 0.003	–	–	–
commitment*grade*linear slope	–	–	–	0.002	0.002	-0.004 - 0.007	–	–	–	–	–	–
reconsideration*grade*linear slope	–	–	–	–	–	–	–	–	–	0.001	0.002	-0.003 - 0.005

Note. All models has a random intercept and random linear slope; β = Beta; S.E. = standard error; C.I. = confidence interval; *p < 0.001.

events that were retrospectively considered meaningful, were related to individual differences in personality trait change. Alternatively, research on personality trait change could be combined with the narrative identity approach. This approach asks participants to write about an important life event (McAdams, 2001). The use of this approach might lead to finding life events that have had a larger impact on the individual's life, likely with larger effects on their personality traits, as changes in goals and narratives may help explain personality change over the lifespan (Dunlop, 2015). The use of life narratives or interview-based approaches is also relevant for the measurement of commitments, as this would provide insight into how individuals make actual sense of the self and their experiences. It would also provide knowledge on how the individual (retrospectively) formed their commitments and which commitments where relevant at what moment in time (McLean, 2008).

Third, our study demonstrated selection effects, as internship students were more agreeable and emotional stable compared to non-internship students. These results are in line with the idea that individuals select themselves into certain environments (Scarr & McCartney, 1983), and suggests that personality changes that facilitate a transition may take place before the actual transition (Denissen et al., 2019). This point to important issues regarding the timing of personality change. Little is known about the timing of personality change in relation to environmental changes, and study designs should be adapted to get a better understanding of this timing (Bleidorn et al., 2021). It could be that this would help for finding larger effects in studies like ours.

Fourth, our study found few socialization effects as an result of the transition context. An explanation could come from theories that advocate that personality is shaped by biological factors and that the environment has limited effect on personality traits (McCrae & Costa, 2008). Part of the reason could be that effects of the environment on personality are partly genetically driven, as proposed by the theory of genotype - environment effects (Scarr & McCartney, 1983). However, a framework that puts environmental influences to the fore, but without focusing on social role transitions per se, could also be considered. For example, Denissen et al. (2013) proposed that self-regulatory processes may drive personality change. Such alternative theoretical accounts should be considered in future studies trying to explain personality change.

7.5. Strengths and limitations

The present study has a number of strengths. We used longitudinal data and advanced modeling techniques. The data were analyzed thoroughly including factor analysis and measurement invariance of the measures. We examined the recent suggestion that individual differences in how life transitions unfolds in one's life (i.e., mastery of the transition) and the psychological reaction to them (i.e., psychological commitment) might explain personality trait change (Roberts & Nickel, 2021).

Nevertheless, our study has several limitations. First, our study sample was a relatively small, consisting of 311 participants in total and 163 participants in the subsample of students with an internship. This potentially limits the robustness of our findings. Therefore, future studies with larger samples are needed to confirm our results. However, the insights of the current study do contribute to the knowledge base on related research questions and could inspire the field to design studies that are even better suited to unravel how personality trait change is related to environmental changes.

Second, we did not have a perfectly matched control group. As the selection effects indicated, there were personality differences between participants doing an internship and participants who were not doing an internship. Organizing a perfectly matched control group (master students without an internship that were matched on background variables to the internship group) appeared quite challenging, as all clinical psychology master programs in the Netherlands involve a practical

internship. Therefore, similar to the design of Bleidorn (2012), we attempted to control for background variation by choosing a comparison group that was most similar on background variables to our internship students, but just one year behind in their curriculum. We also controlled for background variation between groups (i.e., age). Nevertheless, future studies of the effects of particular events should look beyond naturally occurring comparison groups, as comparison groups likely differ from the group of interest in more ways than just in whether or not they experienced a particular event. Propensity score matching could be used to overcome these issues (e.g., Van Scheppingen et al., 2016).

Third, our sample focused on a specific groups of college students (i. e., psychology students) in The Netherlands. It would be interesting to investigate the influence of the transition into working life in a broader sample, including different study directions and educational paths. For example, Lüdtke et al. (2011) demonstrated that participants on a vocational career path showed larger increases in conscientiousness and smaller increases in agreeableness compared to peers on a university career path. This calls for more research on the generalizability of our results to other cultural contexts and educational directions, levels, and systems.

Fourth, our study is limited to broad Big Five personality traits. Therefore, we were not able to examine whether life events may operate at the level of lower-order personality levels (e.g., facets; Schwaba et al., 2020). Personality change based on lower-order levels of personality may reveal additional individual differences (McCrae, 2015). However, a study on stability and change on Big Five personality trait domains and facets showed very few differences between personality trait development and facets development (Klimstra et al., 2018).

8. Conclusion

Our study did not provide support for the idea that individual differences in mastery of the transition and psychological commitment to a role belonging to the transition would explain individual differences in personality trait change. Only individual differences in change in extraversion could be explained by participation in an internship, but in the direction of reduced extraversion in internship students. A shift towards a more individual and contextualized approach might produce a better understanding of the complex relation between personality changes and environmental influences.

CRediT authorship contribution statement

Liselotte Den Boer: Conceptualization, Project administration, Data curation, Methodology, Formal analysis, Visualization, Writing – original draft. **Theo A. Klimstra:** Conceptualization, Methodology, Formal analysis, Visualization, Writing – original draft. **Jaap J. A. Denissen:** Conceptualization, Methodology, Formal analysis, Visualization, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi. org/10.1016/j.jrp.2023.104433.

References

Abele, A. E., Spurk, D., & Volmer, J. (2011). The construct of career success: Measurement issues and an empirical example. *Zeitschrift für ArbeitsmarktForschung, 43*, 195–206. https://doi.org/10.1007/s12651-010-0034-6

Asselmann, E., Klimstra, T. A., & Denissen, J. J. A. (2021). Unraveling resilience: Personality predicts exposure and reaction to stressful life events. *Personality Science, 1–29*. https://doi.org/10.5964/ps.6055

Bleidorn, W. (2012). Hitting the road to adulthood: Short-term personality development during a major life transition. *Personality and Social Psychology Bulletin, 38*, 1594–1608. https://doi.org/10.1177/0146167212456707

Bleidorn, W., & Denissen, J. J. A. (2015). Virtues in action – the new look of character traits. *British Journal of Psychology, 106*, 700–723. https://doi.org/10.1111/bjop.12117

Bleidorn, W., Hopwood, C. J., Back, M. D., Denissen, J. J. A., Hennecke, M., Hill, P. L., … Zimmermann, J. (2021). Personality trait stability and change. *Personality Science, 2*, 1–20. https://doi.org/10.5964/ps.6009

Bleidorn, W., Hopwood, C. J., Back, M. D., Denissen, J. J. A., Hennecke, M., Jokela, M., Kandler, C., Lucas, R. E., Luhmann, M., Orth, U., Roberts, B. W., Wagner, J., Wrzus, C., & Zimmermann, J. (2020). Longitudinal Experience-Wide Association Studies (LEWAS)—A framework for studying personality change. *European Journal of Personality, 34*, 285–300. https://doi.org/10.1002/per.2247

Bleidorn, W., Hopwood, C. J., & Lucas, R. E. (2018). Life events and personality trait change. *Journal of Personality, 86*, 83–96. https://doi.org/10.1111/jopy.12286

Bleidorn, W., Klimstra, T. A., Denissen, J. J. A., Rentfrow, P. J., Potter, J., & Gosling, S. D. (2013). Personality maturation around the world a cross-cultural examination of social-investment theory. *Psychological Science, 24*, 2530–2540. https://doi.org/10.1177/0956797613498396

Bleidorn, W., Schwaba, T., Zheng, A., Hopwood, C. J., Sosa, S. S., Roberts, B. W., & Briley, D. A. (2022). Personality stability and change: A meta-analysis of longitudinal studies. *Psychological Bulletin, 148*, 588. https://doi.org/10.1037/bul0000365

Bolger, N., Zee, K. S., Rossignac-Milon, M., & Hassin, R. R. (2019). Causal processes in psychology are heterogeneous. *Journal of Experimental Psychology: General, 148*, 601–618. https://doi.org/10.1037/xge0000558

Bühler, J. L., Mund, M., Neyer, F. J., & Wrzus, C. (2022). A developmental perspective on personality–relationship transactions: Evidence from three nationally representative samples. *Journal of Personality, 00*, 1–20. https://doi.org/10.1111/jopy.12757

Bühler, J. L., Orth, U., Bleidorn, W., Weber, E., Kretzschmar, A., Scheling, L., & Hopwood, C. J. (2023). Life events and personality change: A systematic review and meta-analysis. *European Journal of Personality, 1-25*. https://doi.org/10.1177/08902070231190219

Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology, 56*, 453–484. https://doi.org/10.1146/annurev.psych.55.090902.141913

Crocetti, E., Rubini, M., & Meeus, W. H. J. (2008). Capturing the dynamics of identity formation in various ethnic groups: Development and validation of a three-dimensional model. *Journal of Adolescence, 31*, 207–222. https://doi.org/10.1016/j.adolescence.2007.09.002

De Vries, J. H., Spengler, M., Frintrup, A., & Mussel, P. (2021). Personality development in emerging adulthood—How the perception of life events and mindset affect personality trait change. *Frontiers in Psychology, 12*, 671421. https://doi.org/10.3389/fpsyg.2021.671421

Den Boer, L., Klimstra, T. A., Branje, S. J. T., Meeus, W. H. J., & Denissen, J. J. A. (2019). Personality maturation during the transition to working life: Associations with commitment as a possible indicator of social investment. *European Journal of Personality, 33*, 456–467. https://doi.org/10.1002/per.2218

Denissen, J. J. A., Aken, M. A. G., Penke, L., & Wood, D. (2013). Self-regulation underlies temperament and personality: An integrative developmental framework. *Child Development Perspectives, 7*, 255–260. https://doi.org/10.1111/cdep.12050

Denissen, J. J. A., Geenen, R., van Aken, M. A. G., Gosling, S. D., & Potter, J. (2008). Development and validation of a dutch translation of the big five inventory (BFI). *Journal of Personality Assessment, 90*, 152–157. https://doi.org/10.1080/00223890701845229

Denissen, J. J. A., Luhmann, M., Chung, J. M., & Bleidorn, W. (2019). Transactions between life events and personality traits across the adult lifespan. *Journal of Personality and Social Psychology, 116*, 612–633. https://doi.org/10.1037/pspp0000196

Dunlop, W. L. (2015). Contextualized personality, beyond traits. *European Journal of Personality, 29*, 310–325. https://doi.org/10.1002/per.1995

Erikson, E. H. (1950). *Childhood and society*. In. Norton.

Fleeson, W. (2001). Toward a structure-and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology, 80*, 1011–1027. https://doi.org/10.1037/0022-3514.80.6.1011

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science, 2*, 156–168. https://doi.org/10.1177/2515245919847202

Graham, E. K., Weston, S. J., Gerstorf, D., Yoneda, T. B., Booth, T., Beam, C. R., … Mroczek, D. K. (2020). Trajectories of big five personality traits: A coordinated analysis of 16 longitudinal samples. *European Journal of Personality, 34*, 301–321. https://doi.org/10.1002/per.2259

Green, P., & MacLeod, C. J. (2016). SIMR: An R package for power analysis of generalized linear mixed models by simulation. *Methods in Ecology and Evolution, 7*, 493–498. https://doi.org/10.1111/2041-210X.12504

Haehner, P., Rakhshani, A., Fassbender, I., Lucas, R. E., Donnellan, M. B., & Luhmann, M. (2023). Perception of major life events and personality trait change. *European Journal of Personality, 37*, 524–542. https://doi.org/10.1177/08902070221107973

Hennecke, M., Bleidorn, W., Denissen, J. J. A., & Wood, D. (2014). A three-part framework for self-regulated personality development across adulthood. *European Journal of Personality, 28*, 289–299. https://doi.org/10.1002/per.1945

Hudson, N. W., & Roberts, B. W. (2016). Social investment in work reliably predicts change in conscientiousness and agreeableness: A direct replication and extension of Hudson, Roberts, and Lodi-Smith (2012). *Journal of Research in Personality, 60*, 12–23. https://doi.org/10.1016/j.jrp.2015.09.004

Hudson, N. W., Roberts, B. W., & Lodi-Smith, J. (2012). Personality trait development and social investment in work. *Journal of Research in Personality, 46*, 334–344. https://doi.org/10.1016/j.jrp.2012.03.002

Hutteman, R., Hennecke, M., Orth, U., Reitz, A. K., & Specht, J. (2014). Developmental tasks as a framework to study personality development in adulthood and old age. *European Journal of Personality, 28*, 267–278. https://doi.org/10.1002/per.1959

Israel, A., Brandt, N. D., Spengler, M., Göllner, R., Lüdtke, O., Trautwein, U., & Wagner, J. (2022). The longitudinal interplay of personality and school experiences in adolescence. *European Journal of Personality, 1–23*. https://doi.org/10.1177/08902070211062326

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement and theoretical perspectives. In L. A. Pervin, & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 102–138). Guilford.

Klimstra, T. A., Luyckx, K., Germeijs, V., Meeus, W. H. J., & Goossens, L. (2012). Personality traits and educational identity formation in late adolescents: Longitudinal associations and academic progress. *Journal of Youth and Adolescence, 41*, 346–361. https://doi.org/10.1007/s10964-011-9734-7

Klimstra, T. A., Noftle, E. E., Luyckx, K., Goossens, L., & Robins, R. W. (2018). Personality development and adjustment in college: A multifaceted, cross-national view. *Journal of Personality and Social Psychology, 115*, 338–361. https://doi.org/10.1037/pspp0000205

Kritzler, S., Rakhshani, A., Terwiel, S., Fassbender, I., Donnellan, M. B., Lucas, R. E., & Luhmann, M. (2023). How are common major life events perceived? Exploring differences between and variability of different typical event profiles and raters. *European Journal of Personality, 37*, 171–186. https://doi.org/10.1177/08902070221076586

Le, K., Donnellan, M. B., & Conger, R. (2014). Personality development at work: Workplace conditions, personality changes, and the correspondence principle. *Journal of Personality, 82*, 44–56. https://doi.org/10.1111/jopy.12032

Leikas, S., & Salmela-Aro, K. (2015). Personality trait changes among young finns: The role of life events and transitions. *Journal of Personality, 83*, 117–126. https://doi.org/10.1111/jopy.12088

Little's, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*, 1198–1202. https://doi.org/10.2307/2290157

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal, 9*. https://doi.org/10.1207/S15328007SEM0902_1

Lodi-Smith, J., & Roberts, B. W. (2007). Social investment and personality: A meta-analysis of the relationship of personality traits to investment in work, family, religion, and volunteerism. *Personality and Social Psychology Review, 11*, 68–86. https://doi.org/10.1177/1088868306294590

Lüdtke, O., Roberts, B. W., Trautwein, U., & Nagy, G. (2011). A random walk down university avenue: Life paths, life events, and personality trait change at the transition to university life. *Journal of Personality and Social Psychology, 101*, 620–637. https://doi.org/10.1037/a0023743

Luyckx, K., Teppers, E., Klimstra, T. A., & Rassart, J. (2014). Identity processes and personality traits and types in adolescence: Directionality of effects and developmental trajectories. *Developmental Psychology, 50*, 2144–2153. https://doi.org/10.1037/a0037256

McAdams, D. P. (2001). The Psychology of Life Stories. *Review of General Psychology, 5*, 100–122. https://doi.org/10.1037/1089-2680.5.2.100

McCrae, R. R. (2015). A more nuanced view of reliability: Specificity in the trait hierarchy. *Personality and Social Psychology Review, 19*, 97–112. https://doi.org/10.1177/1088868314541857

McCrae, R. R., & Costa, P. T. (2008). Empirical and theoretical status of the five-factor model of personality traits. *Sage handbook of personality theory and assessment, 1*, 273–294.

McLean, K. C. (2008). The emergence of narrative identity. *Social and Personality Psychology Compass, 2*, 1685–1702.

Nesselroade, J. R. (1991). Interindividual differences in intraindividual change. In L. M. Collins & J. L. Horn (Eds.), *Best methods for the analysis of change: Recent advances, unanswered questions, future directions* (pp. 92-105). American Psychological Association. Doi: doi:10.1037/10099-006.

Rakhshani, A., Lucas, R. E., Donnellan, M. B., Fassbender, I., & Luhmann, M. (2022). Personality traits and perceptions of major life events. *European Journal of Personality, 36*, 683–703. https://doi.org/10.1177/08902070211045825

Rathbone, C. J., Moulin, C. J. A., & Conway, M. A. (2008). Self-centered memories: The reminiscence bump and the self. *Memory & Cognition, 36*, 1403–1414. https://doi.org/10.3758/MC.36.8.1403

Reitz, A. K., Den Boer, L., van Scheppingen, M. A., & Diwan, K. (2022). Personality maturation through sense of mastery? Longitudinal evidence from two education-to-work transition studies. *Journal of Personality*. https://doi.org/10.1111/jopy.12789

Rindfuss, R. R. (1991). The young adult years: Diversity, structural change, and fertility. *Demography, 28*, 493–512. https://doi.org/10.2307/2061419

Roberts, B. W., Caspi, A., & Moffitt, T. E. (2003). Work experiences and personality development in young adulthood. *Journal of Personality and Social Psychology, 84*, 582–593. https://doi.org/10.1037/0022-3514.84.3.582

Roberts, B. W., & Chapman, C. N. (2000). Change in dispositional well-being and its relation to role quality: A 30-year longitudinal study. *Journal of Research in Personality, 34*, 26–41. https://doi.org/10.1006/jrpe.1999.2259

Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin, 126*, 3–25. https://doi.org/10.1037//0033-2909.126.1.3

Roberts, B. W., & Mroczek, D. (2008). Personality trait change in adulthood. *Current Directions in Psychological Science, 17*, 31–35. https://doi.org/10.1111/j.1467-8721.2008.00543.x

Roberts, B. W., & Nickel, L. B. (2017). A critical evaluation of the Neo-Socioanalytic Model of personality. In J. Specht (Ed.), *Personality Development Across the Lifespan* (pp. 157–177). Academic Press. https://doi.org/10.1016/B978-0-12-804674-6.00011-9.

Roberts, B. W., & Nickel, L. B. (2021). *Personality development across the life course: A neo-socioanalytic perspective. In Handbook of personality: Theory and research* (4th ed., pp. 259–283). The Guilford Press.

Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132*, 1–25. https://doi.org/10.1037/0033-2909.132.1.1

Scarr, S., & McCartney, K. (1983). How people make their own environments: A theory of genotype → environment effects. *Child development, 54*, 424–435. https://doi.org/10.2307/1129703

Schwaba, T., & Bleidorn, W. (2018). Individual differences in personality change across the adult life span. *Journal of Personality, 86*, 450–464. https://doi.org/10.1111/jopy.12327

Schwaba, T., Rhemtulla, M., Hopwood, C. J., & Bleidorn, W. (2020). A facet atlas: Visualizing networks that describe the blends, cores, and peripheries of personality structure. *PLOS ONE, 15*, 1–21. https://doi.org/10.1371/journal.pone.0236893

Scollon, C. N., & Diener, E. (2006). Love, work, and changes in extraversion and neuroticism over time. *Journal of Personality and Social Psychology, 91*, 1152. https://doi.org/10.1037/0022-3514.91.6.1152

Smith, A. H., & Bates, M. N. (1992). Confidence limit analyses should replace power calculations in the interpretation of epidemiologic studies. *Epidemiology, 3*, 449–452. https://doi.org/10.1097/00001648-199209000-00011

Specht, J., Bleidorn, W., Denissen, J. J. A., Hennecke, M., Hutteman, R., Kandler, C., Luhmann, M., Orth, U., Reitz, A. K., & Zimmermann, J. (2014). What drives adult personality development? A comparison of theoretical perspectives and empirical evidence. *European Journal of Personality, 28*, 216–230. https://doi.org/10.1002/per.1966

Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the big five. *Journal of Personality and Social Psychology, 101*, 862–882. https://doi.org/10.1037/a0024950

Sutin, A. R., Costa, P. T., Miech, R., & Eaton, W. W. (2009). Personality and career success: Concurrent and longitudinal relations. *European Journal of Personality, 23*, 71–84. https://doi.org/10.1002/per.704

Van Scheppingen, M. A., Jackson, J. J., Specht, J., Hutteman, R., Denissen, J. J. A., & Bleidorn, W. (2016). Personality trait development during the transition to parenthood a test of social investment theory. *Social Psychological and Personality Science, 7*, 452–462. https://doi.org/10.1177/1948550616630032

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*, 4–70. https://doi.org/10.1177/109442810031002

Wagner, J., Orth, U., Bleidorn, W., Hopwood, C. J., & Kandler, C. (2020). Toward an Integrative Model of Sources of Personality Stability and Change. *Current Directions in Psychological Science, 29*, 438–444. https://doi.org/10.1177/0963721420924751

Wrzus, C., & Roberts, B. W. (2017). Processes of personality development in adulthood: The TESSERA framework. *Personality and Social Psychology Review, 21*, 253–277. https://doi.org/10.1177/1088868316652279

Schwaba, T., Denissen, J. J. A., Luhmann, M., Hopwood, C. J., & Bleidorn, W. (2023). Subjective experiences of life events match individual differences in personality development.https://doi.org/10.31234/osf.io/veztu.