Personality and ten-year personality development among Norwegians in midlife– do retirement and job type play a role?

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Transparency and Openness. The study was not pre-registered. The NorLAG study and data collections were reviewed and approved by the Norwegian Centre for Research Data and the Data Protection Officer for Research at Statistics Norway. Below, we report how we determined our sample size and describe all data exclusions. NorLAG data is available for research purposes from the Norwegian Agency for Shared Services in Education and Research: https://norlag.nsd.no/?version=v3 (NorLAG, 2023), but signing a data distribution contract is required. Questionnaires are available at https://norlag.nsd.no/questionnaire. For transparency and to allow replication, we provide a SPSS syntax to generate our study sample, as well as Mplus input files to run all models at the OSF server: https://osf.io/p67fy/ (Henning, 2023).

Dissemination. Part of the analyses have been presented at the Aging & Social Change: Thirteenth Interdisciplinary Conference in Ancona, Italy, in September 2023, and in group meetings of the TRILL project. A preprint was added to the OSF server: https://osf.io/preprints/psyarxiv/zfegu

Disclosures: No potential conflict of interest was reported by the authors.

Word count: 7,582

Abstract

Our personality develops over the whole lifespan and in particular when our life circumstances change. Retirement is a life event that brings changes in identity, day structures and social roles of former workers. Therefore, it may affect personality traits such as the Big Five (neuroticism, extraversion, intellect, conscientiousness, and agreeableness). Previous studies have shown conflicting results concerning the question whether and how retirement is associated with changes in personality traits. Furthermore, there is little knowledge about the role of the job people leave behind when retiring. In the present study, we compared personality development over a ten-year period, based on two waves of a Norwegian survey, between retiring and continuously working blue-collar vs. white-collar workers ($n = 1,263$, $M_{age} = 56.58$). Latent change score models showed that neuroticism and openness declined in the sample, but to a comparable degree in all groups. We further found differences in baseline personality traits between blue-collar workers and white-collar workers, as well as between those retiring and not retiring, implying selection into retirement by personality traits. Item level analyses showed declines in some items. We discuss theoretical and methodological implications of our results in light of previous ambiguous findings and emphasize the possible heterogeneity across retirees.

Keywords. Personality Development; Retirement; Big Five; Latent Change Score;

Public Significance Statement: We found that people between midlife and old age became less open for new experience and more emotionally stable across ten years. We did not find any evidence that personality changes in particular ways after retirement. Our research also shows that those who are more conscientious may be more likely to continue working despite being eligible for retirement pensions.

Introduction

Recent work has emphasized the plasticity of personality over the lifespan (Bleidorn et al., 2021; Costa et al., 2019). Despite strong stability over shorter time periods, there are both mean-level changes in personality traits with age and individual differences in these age-trajectories (Bleidorn et al., 2021; Cataldi et al., 2019; Seifert et al., 2023). In our analysis of this phenomenon, we focus on mean-level change in the "Big Five"; neuroticism, extraversion, openness to new experiences / intellect, agreeableness and conscientiousness (Goldberg, 1993). A number of studies provided converging evidence for "personality maturation" in early adulthood, with decreases in neuroticism and increases in conscientiousness and agreeableness (Bleidorn et al., 2021; Costa et al., 2019). The literature is, however, less conclusive with regard to mean trajectories of personality traits in midlife and early old age: Trajectories tend to differ by sample and method applied (Bleidorn et al., 2021). Only neuroticism has consistently been found to further decrease until early old age (Seifert et al., 2023), but tends to increase again in later years (Wagner et al., 2016). Moreover, age itself is an "empty variable" without explanatory power for changes in personality (Baltes & Goulet, 1971; Birren, 1959). Instead, it is theorized that age-associated changes in life circumstances affect personality traits, and it has been shown that normative and non-normative life events may trigger such changes in particular ways (Bleidorn et al., 2018; Denissen et al., 2019; Luhmann et al., 2014; Specht et al., 2011). Retirement is one of those life events that has a broad impact on the conditions of daily living – retirees experience changes in status, social contacts, identity, day structures and income (Froidevaux et al., 2018; Henning et al., 2016; Henning, Stenling, et al., 2021). Nevertheless, previous research is thus far inconclusive as to whether and how personality traits change across the retirement transition (Löckenhoff et al., 2009; Schwaba & Bleidorn, 2019; Specht et al., 2011).

In the current study, we investigate personality changes across retirement in a Norwegian survey sample. We use a non-retiring control group to distinguish change across retirement from age-normative change (Schwaba & Bleidorn, 2019). In particular, we aim at filling a gap in the literature by considering that the effects of retirement on one's life conditions (and consequently on personality) may differ between individuals, depending on their pre-retirement work life and socioeconomic status (Henning, Johansson, et al., 2021; Wetzel et al., 2016). Therefore, we compare personality development among blue-collar workers and white-collar workers.

Personality Development Across Retirement

Retirement is an important life event because it is associated with changes in life circumstances as people give up their work and many work-related resources and need to establish new roles and routines (Wang & Shi, 2014). Although most of the literature seems to support a continuity approach to retirement (Atchley, 1971, 1976; Henning et al., 2016), as retirement does not seem to have a major impact on well-being or health for most retirees, this does not mean that there are no changes. Most likely, this stability in well-being is reached by various behavioural and cognitive adaptation processes that are yet poorly understood (Henning et al., 2016). These adaptation processes may go hand in hand with changes in personality.

Schwaba and Bleidorn (2019) highlight that retirement may influence personality both through top-down mechanism (via changes in status and social roles; Wood & Roberts, 2006) and bottom-up pathways (via changes in everyday experiences, thoughts and feelings; Wrzus & Roberts, 2017). Changes in social roles and status are a common topic in the retirement literature: Despite overall identity continuity (Atchley, 1999), retirees have to adapt to or define their new roles in a life without work, for example, by focusing on their family or partnership (Weber & Hülür, 2020), on leisure activities (Henning, Stenling, et al., 2021;

Ryser & Wernli, 2017), or by finding new meaning and daily structure as volunteers (Bjälkebring et al., 2021). Retirees renegotiate their personal identity over time in the transition phase and are partly guided by expectations and roles for retirees in the community (Froidevaux et al., 2018). Therefore, societal views on aging and normatively-expected roles for retirees are likely to influence how retirees see themselves and may initiate changes in personality as well. For example, the lack of the work-role may decrease the need for productivity and competitiveness, which in turn should influence conscientiousness and agreeableness respectively (Löckenhoff et al., 2009; Marsh et al., 2013).

As mentioned above, not only top-down processes, but also bottom-up processes may lead to personality change – in other words, changes in thoughts and behaviour in everyday life may influence how people's self-concepts change. In the TESSERA framework of personality development (Wrzus, 2021; Wrzus & Roberts, 2017) it is proposed that long-term personality development can be the consequence of repeated and recursive short-term sequences in which **T**riggering situations lead (depending on the individual **e**xpectancies) to specific **S**tates / **S**tate **E**xpressions (e.g., behavioural or emotional responses), which lead to a **R**e**A**ction (within the person or from the outside). If such sequences are experienced repeatedly, associative and reflective processes may lead to trait changes in personality in congruence with the experiences during these sequences. Retirement may, for example, go hand in hand with repeated exposure to social situations with close family or friends, which may trigger more socially desirable, agreeable states (Schwaba & Bleidorn, 2019; Wrzus & Roberts, 2017). If these states are rewarded over time, they are reinforced. In the long run, retirees may thus start to see themselves as more agreeable than they did during their work life.

Previous studies have mostly done exploratory analyses of the relationship between retirement and personality. Schwaba and Bleidorn (2019), however, assumed that *openness to*

new experiences / intellect may increase directly after retirement as retirees search for their new roles but may decline later when new routines are established. *Conscientiousness*, in contrast, was assumed to decline with the lack of work-related obligations and roles. Similarly, some facets of *extraversion* may decline as people get less dominant and active, but *agreeableness* may increase due to the aforementioned increases in social interactions with close others. They did not propose effects for *neuroticism*.

To the best of our knowledge, seven studies so far have addressed changes in Big Five personality traits after retirement. Mrozek and Spiro (2003) found no effects of retirement on the Big Five in their analysis using data from the US Normative Aging Study. Based on the German Socioeconomic Panel, Specht et al. (2011) found that retirees showed stronger decreases in conscientiousness than those not retiring, but the other four traits seemed to be unaffected by the transition. In a later study, including more waves of the same dataset but no control group, these results were supported and it could be shown that the decrease in conscientiousness seemed to begin after retirement, not before (Asselmann & Specht, 2021). In contrast, in another US American sample, Löckenhoff and colleagues found decreases in *activity*, a facet of extraversion, and increases in agreeableness among those retiring over time, compared to non-retiring participants (Löckenhoff et al., 2009). Schwaba and Bleidorn (2019) used data from a Dutch longitudinal study and found that change in personality differed before and after retirement – retirees became more open and more agreeable directly after retirement and decreased more strongly in agreeableness but less strongly in neuroticism and openness, compared to the period before retirement. However, only the change in agreeableness was different from a matched control group (the retirees showed stronger decreases), all other traits changed in comparable ways in both groups. Hansson, Henning, et al., (2020) found declines in neuroticism across three years in a Swedish sample, but had no control group who did not retire. The most recent study, based on data from the US web based

"yourPersonality Project", found that neuroticism and extraversion decreased, and agreeableness increased after the retirement transition compared to the period before (Dugan et al., 2024), but they did not include any control group either.

Taken together, results are not conclusive as to whether or not the Big Five personality traits change: Declines in neuroticism were found in three studies, but two of them had no control group, and the third study did not show differences in changes compared to a non-retired group. The mean score of extraversion increased with retirement in one study, and one specific facet of this personality trait increased in another analysis. Agreeableness increased in two and declined in one study. The mixed results may partly be attributable to methodological reasons but also to cross-country differences between the Netherlands, Sweden, USA and Germany. Given the lack of clear theoretical or empirical support, we see our work as exploratory and do not define specific hypotheses about mean level changes. However, given that most of the studies found some effects of retirement, we assume

H1: Personality development differs between those who retire and those who do not.

The Role of Job Type

The literature on retirement adjustment respectively changes in well-being and health across retirement has long emphasized individual differences in the reaction and adaptation to retirement (Luhmann et al., 2012; Pinquart & Schindler, 2007). Previous studies have shown heterogeneity in the way retirees' well-being changes across the transition to retirement (Heybroek et al., 2015; Pinquart & Schindler, 2007; Wang, 2007) and countless moderators have been identified in the literature (Henning et al., 2016). In contrast to research on well-being, research on changes in personality traits has rarely considered such heterogeneity. Schwaba and Bleidorn (2019), however, emphasized that people are likely to differ in how their personality changes across retirement as well. They noted considerable individual differences in personality development in their sample but could not identify any moderators.

In the present study, we focus on the role of the previous job type – *blue-collar vs. white-collar workers* – in order to address potential sources of heterogeneity (Henning, Johansson, et al., 2021).

Retirees differ in the conditions they retire from, in the circumstances of their transition, and in their living situation in retirement. To navigate the challenges and opportunities of retirement, they need resources (Wang, 2007). Interindividual differences in resources before retirement and changes thereafter are thus important influences on their developmental trajectories (Hansson et al., 2017; Hansson, Buratti, et al., 2020; Wang et al., 2011; Wetzel et al., 2016; Zhan et al., 2023). Unequal access to financial but also physical resources (i.e., health) are likely to enforce social inequalities in the reaction and adaptation to retirement depending on socioeconomic status before retirement (Henning, Johansson, et al., 2021; Wetzel et al., 2016). Furthermore, older workers with lower education or in blue-collar jobs have often less control over when and how they retire than white-collar workers (Engstler, 2019; Hofäcker et al., 2015).

With respect to retirement, we assume that opportunities for personality development vary by job type due to the unequally distributed opportunities and challenges of retirement. White-collar workers may have more opportunities to experience retirement as a time of autonomy, new opportunities and relaxation, whereas blue-collar workers may be more challenged by the hardships of retirement (i.e., financial problems, health problems). "La dolce vita" as Marsh et al. (2013) refer to as a supposedly relaxed, laid back and happy life in older age, may be easier to achieve for white-collar than for blue-collar workers. These differences should be associated with differences in personality development as well. We therefore assume

H2: The effect of retirement on personality development differs between blue-collar and white-collar workers.

Measurement Invariance

A recurrent topic in the literature on personality development is measurement invariance of personality across time. Measurement invariance is often seen as a prerequisite for meaningful group comparisons (Marsh et al., 2013) and thought necessary to understand change over time (Seifert et al., 2023; Specht et al., 2011). There are different stages of measurement invariance: Configural invariance means that the structure (i.e., number of factors and items loading on factors) is the same across groups or over time. Metric invariance means that the factor loadings are the same. Scalar invariance means that the item intercepts are the same. Strict invariance means that residual errors of the items are the same as well. To compare latent means (i.e., differences between groups or change over time), it is often assumed that scalar invariance is required (Kline, 2016). Nevertheless, of the seven studies on retirement and personality development mentioned above, only Hansson et al. (2020) and Dugan et al. (2024) formally tested for measurement invariance and Specht et al. (2011) assumed strict measurement invariance based on overall model fit but did not formally test it. In our analyses, we test for measurement invariance to evaluate if we can compare personality over time and between job types.

However, what happens if scalar invariance is not given? A lack of metric invariance makes it hard to interpret change or group means in a meaningful way, as it implies that items are not measuring the construct in the same way over time (Seifert et al., 2023). In contrast, if there is a lack of scalar invariance, comparisons may still be possible. Unequal item intercepts only indicate that changes or group differences in the latent trait cannot fully explain all changes or all differences in single indicators (Mõttus et al., 2015; Seifert et al., 2023). This can be interpreted as trait-independent changes or differences on the facet or item levels (Seifert et al., 2023). In such cases, only investigating changes on the trait level will overlook that some facets of personality may show particular changes. Therefore, in case of a lack of

scalar invariance, we investigated changes in the single items separately to test if separate items showed particular changes or group differences.

The Present Study

In the present study, we use two waves of the longitudinal Norwegian Life Course, Ageing and Generation Study (NorLAG; Veenstra et al., 2021) and investigate personality change among middle-aged participants who retire, as well as a non-retiring control group. We further distinguish blue-collar and white-collar workers.

Methods

Transparency and Openness

The study was not pre-registered. The NorLAG study and data collections were reviewed and approved by the Norwegian Centre for Research Data and the Data Protection Officer for Research at Statistics Norway. All NorLAG data collections conform to the regulations related to the implementation and supplementation of official statistics and are in line with the regulations on the processing of personal data. Below, we report how we determined our sample size and describe all data exclusions. NorLAG data is available for research purposes from the Norwegian Agency for Shared Services in Education and Research: https://norlag.nsd.no/?version=v3 (NorLAG, 2023), but signing a data distribution contract is required. Questionnaires are available at https://norlag.nsd.no/questionnaire. For transparency and to allow replication, we provide a SPSS syntax to generate our study sample, as well as Mplus input files to run all models at the OSF server https://osf.io/p67fy/ (Henning, 2023).

Sample

The current analyses are based on the second and third wave of NorLAG (NorLAG2 and NorLAG3; Veenstra et al., 2021). NorLAG has been conducted in three rounds (2002, 2007, 2017). Only the second and third waves are included in the present study, because the

personality scale in the first wave was not identical. Data collection included a computer-assisted telephone interview (CATI) and a subsequent self-completion questionnaire, and the individual survey data was linked to register data. Participation and registry linkage was based on informed consent. NorLAG2 (2007) comprised a nationally representative sample of Norwegians born between 1922-1966 ($N = 9,238$; CATI response rate 61%; overall response rate 47%). A total of 5,711 respondents also participated in NorLAG3 (2017), in addition to 388 respondents who participated in NorLAG1, but not in NorLAG2 (CATI response rate 68%; overall response rate 50%; see Veenstra et al. 2021 for more information on the study design and representativeness in NorLAG). In the further, NorLAG2 and NorLAG3 are referred to as baseline and follow-up respectively.

Our study sample comprises those individuals who were 52 to 67 at baseline and therefore eligible for old-age pension between waves, participated in both waves, completed the self-completion questionnaire in both waves and provided information on both job type and personality, were working at baseline, and either retired or were still working at follow-up[1]. Those who were unemployed, on disability pension or not working for other reasons at either wave were excluded, as we focused on differences between work life and retirement. This led to $n = 1,263$ participants, which were divided into four groups for the analyses– blue-collar workers retiring ($n = 194$) or not retiring ($n = 284$), and white-collar workers retiring ($n = 332$) or not retiring ($n = 453$).

Measures

Personality. Personality was assessed by the Norwegian 20-item short form (Engvik & Clausen, 2011) of the Big Five Inventory (John & Srivastava, 1999). The scale starts with the introduction "I am typically someone who...". Each trait was assessed by four items which

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[1] For 27 persons who retired either 2007 or 2017, we could not identify if they retired before or after the respective interview, thus we did not include them.

were rated on a seven-point scale from fits poorly (1) to fits well (7). Example items are "gets nervous easily." (neuroticism), "is talkative." (extraversion), "likes to reflect, play with ideas." (openness), "is considerate and kind to almost everyone." (agreeableness) or "does a thorough job." (conscientiousness). For extraversion, conscientiousness, and agreeableness, two items were reverse coded. For neuroticism and openness, only one item was reverse coded. All items can be found in the supplementary materials (*p*.1). Omega reliability was $\omega = .70$ (t1 = NorLAG 2) and $\omega = .72$ (t2 = NorLAG 3) for neuroticism, $\omega = .78$ (t1) and $\omega = .75$ (t2) for extraversion, $\omega = .70$ (t1) and $\omega = .72$ (t2) for openness, $\omega = .55$ (t1) and $\omega = .55$ (t2) for agreeableness and $\omega = .52$ (t1) and $\omega = .58$ (t2) for conscientiousness. The low reliability for agreeableness and conscientiousness is most likely a sign of the diverse range of facets that are represented (Løset & von Soest, 2023).

Work Status/Retirement. Work status was based on a combination of interview and register data. Respondents were considered workers if they were gainfully employed in the interview data and had labour earnings from employment exceeding 1x the national insurance scheme basic amount [G] in the year of the interview, as recorded in Statistics Norway's Income and wealth statistics. Retirement was coded between baseline and follow-up (2008-2016) using the same annual income data from Statistics Norway. Retirement was set to the year that the respondent's income dropped below 1G and stayed below this limit in the two consecutive years. For respondents who retired in 2016, or later, this latter restriction did not apply because income data was not available after 2017 (see Hellevik et al. (2023) for more details on the operationalization of retirement in NorLAG).

Job Type. Data on job type was derived from the NorLAG2 CATI and classified in broad occupational categories according to the International Standard Classification of Occupations (ISCO-88 1st figure). For respondents who had missing information, current or previous job type measured in NorLAG3 was used. Those who had higher or intermediate

managerial or professional occupations (e.g., legislators, senior official or managers; codes 1-3) were operationalized as white-collar workers, while those who had job types consisting of mainly routine or manual tasks (e.g., plant and machine operators and assemblers; codes 4-9) were classified as blue-collar workers.

Age. Age was measured in years and centered around the overall mean in all analyses.

Analyses

We used a multigroup model in Mplus version 8.4 (Muthén & Muthén, 2020) for our analyses. In all analyses, to account for potential nonnormality and to deal with missing data, the robust full information maximum likelihood estimator (MLR) was used. We ran separate models for each personality trait. Personality traits were modelled as latent factors. Reverse coded items at the same time points were allowed to covary[2]. Similarly, same items were allowed to covary over time as well.

As a first step, we tested for measurement invariance across the four groups (2 job types x retirement vs work) and time. We proceeded stepwise – first testing for overall configural invariance, next testing for metric invariance across time (within groups), then testing for metric invariance across groups, followed by testing for scalar invariance across time and, finally, for scalar invariance across groups. Configural measurement invariance was concluded if the overall model fit was acceptable – according to Marsh (2007) an acceptable fit is given if CFI is larger or equal to .900 and SRMR and RMSEA are smaller or equal to .08. In the literature, there are different recommendations for how to test measurement invariance. In the present paper, we follow Chen (2007) who recommends, based on Monte-

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[2] The model with configural invariance for agreeableness showed a residual covariance matrix that was not positive definite and one residual variance was estimated negative. A model without a correlation of the two reverse coded items converged without problems, therefore we continued without this correlation.

Carlo Simulations, that for metric invariance, the CFI should only decrease less than 0.010 and either the RMSEA should increase less than 0.015 or the SRMR should increase less than 0.030 compared to a model with configural invariance. For scalar invariance, again, the CFI should only decrease less than 0.010 and either the RMSEA should increase less than 0.015 or the SRMR should increase less than 0.010 compared to a model with metric invariance.

Once measurement invariance was established, we proceeded with a multigroup latent change score model (Henning, Segel-Karpas, et al., 2021; McArdle, 2009). For all four groups, personality was modelled as a latent baseline score and a latent change score, which were correlated. A figure, showing the structural model for neuroticism as an example for all traits, can be found in the supplementary materials (Figure S1, p.3). This modelling approach has several advantages compared to other approaches to model changes in personality traits over two time points used in previous studies in the field (Löckenhoff et al., 2009), in particular the better handling of measurement error and the clear separation of baseline levels and change (Castro-Schilo & Grimm, 2018).

We controlled for effects of age on baseline score and change score. Age was centered around the sample mean ($M = 56.58$), so estimates for baseline and change in all groups refer to values at the mean age of the sample. Thereby, age differences between the four groups were accounted for. We started with a model in which baseline score and change score were the same across groups and tested via Sattorra-Bentler scaled χ^2 tests[3] if allowing for group differences, first in baseline personality and then in change, improved the model fit. If there was evidence for group differences, we proceeded with testing which group differed from the others – first assuming retirement effects, next exploring job type effects, and finally contrasting all four groups. Retirement effects on baseline scores would imply selection effects (i.e., people scoring higher on certain traits being more likely to retire) and retirement

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[3] These tests were performed instead of standard χ^2 tests because we used the MLR estimator.

effects on change scores would imply socialization effects (i.e., people changing in response to retirement). If only metric invariance was supported for a personality trait, we added change score models for separate items of the trait.

Our focus was on mean-level change in personality traits, but we further tested for rank-order stability, which shows to what degree people keep their relative position within their group despite possible mean-level changes (Cataldi et al., 2019; Seifert et al., 2022). This was done by looking at the latent correlation of each personality trait over time, based on the STDYX standardization provided by Mplus. In a further sensitivity analysis, we investigated if among those who retired, time since retirement was associated with personality traits and change. We repeated the latent change score in multigroup models (blue-collar vs. white-collar), using years since retirement as a predictor of baseline and change ($2016 = 0 - 2008 = 9$, divided by 9 so one step in the variable describes the additional change for being retired for 9 years). We further included an autoregressive effect (i.e., change in personality was predicted by initial level) to control for regression to the mean. In this model, a significant association of time since retirement and baseline score would imply that personality was associated with earlier / later retirement. A significant association of time since retirement and change would imply particular personality development after retirement.

Results

Descriptive Statistics

Table 1 shows descriptive statistics on age and manifest mean scores for personality traits at both time points for all four groups. Retiring participants were significantly older than those continuing to work ($t(1261) = 18.11$, $p < .001$). However, the age range was the same across groups and we controlled for age in all models.

[please insert Table 1 here]

Measurement Invariance of Personality

We tested for measurement invariance for all five personality traits across the two time points and across the four groups (retiring blue-collar workers, retiring white-collar workers, not retiring blue-collar workers, not retiring white-collar workers). We could establish scalar measurement invariance for neuroticism, extraversion and openness / intellect. We could establish metric measurement invariance for conscientiousness, but not scalar measurement invariance, which we interpret as a sign that there may be group differences or differential changes on facet levels that were captured in the mean-level trends. We therefore computed additional analyses for the separate items assessing conscientiousness. We could not establish metric measurement invariance across groups for agreeableness so we only conducted item level analyses. Model fit for all models can be found in Table 2.

[Please insert Table 2 here]

Rank-Order Stability

We could not test for rank-order stability for agreeableness. *Neuroticism* at both time points was highly correlated for all groups ($r = .78$-$.89$) and could be set equal across groups without a significant loss in fit ($\chi^2(3) = 3.47$, $p = .342$). The same applied for *extraversion* ($r = .83$-$.95$, $\chi^2(3) = 3.23$, $p = .357$), *openness / intellect* ($r = .80$-$.85$, $\chi^2(3) = 0.44$, $p = .931$) and *conscientiousness* ($r = .70$-$.93$, $\chi^2(3) = 1.40$, $p = .705$).

Mean-Level Change in Personality

We started with separate multiple group latent change score models for personality. Baseline and change were only predicted by age (mean centered), and baseline score and change were fixed to equality across groups. We then tested for differences in baseline score and change via model tests. The separate steps and test statistics can be found in the

Supplementary Materials (*p*. 4f). Final model parameters and model fits can be found in Table 3.

[please insert Table 3 here]

We did not find evidence for group differences in *neuroticism* or *extraversion.* *Neuroticism* declined on average in the sample (*M* = -0.05, *SE* = 0.02, *p* = .036) whereas extraversion was stable (*M* = -0.03, *SE* = 0.03, *p* = .338). For *openness / intellect* and *conscientiousness* we found group differences in baseline scores, but not in change. In the final model for *openness / intellect*, the two white-collar groups had the highest level (*M* = 4.22, *SE* = 0.05). Among the blue-collar workers, the retiring workers had lower levels (*M* = 3.54, *SE* = 0.09) than the blue-collar workers not retiring (*M* = 3.83, *SE* = 0.08). *Openness / intellect* showed mean-level declines in all groups (*M* = -0.10, *SE* = 0.03, *p* = .001). In the final model for *conscientiousness*, the two retiring groups had lower conscientiousness scores (*M* = 5.70, *SE* = 0.05) than those not retiring (*M* = 5.87, *SE* = 0.04). Conscientiousness was stable on average (*M* = -0.04, *SE* = 0.04, *p* = .330). Figure 1 illustrates personality differences across groups and Figure 2 illustrates personality change for the four traits included in the analyses in our analyses.

[please insert Figure 1 here]

There were only few significant age effects in our models. Older adults reported lower neuroticism (*B* = -0.02, *SE* = 0.01, *p* = .046) and stronger declines in conscientiousness (*B* = -0.02, *SE* = 0.01, *p* = .003). For almost all groups and traits, we found significant residual variances in level and change, showing that people developed in different ways, even after taking age into account.

[please insert Figure 2 here]

Sensitivity Analyses – Time Since Retirement

We ran sensitivity analyses to investigate if retirement timing was associated with pre-retirement personality and change in personality among those who retired. We started with a model in which the effects of time in retirement on baseline personality and change were fixed across groups and tested if releasing them improved fit. Effects did not differ between groups for either of the traits. Only one effect of time since retirement was significant: Those with lower scores of openness at baseline retired earlier (B = -0.54, SE = 0.01, p = .039). Results of these analyses can be found in the supplementary materials (p. 5).

Item Level Analyses

We finally repeated the latent change score models using the separate items assessing conscientiousness and agreeableness, as we could not establish scalar measurement invariance for those traits. Again, we controlled for age. Results of model comparisons can be found in the supplementary materials (p. 7).

Conscientiousness. For the item "*does a thorough job*", we found group differences in baseline scores – those who retired had lower scores (M = 5.70, SE = 0.05, vs. M = 5.88, SE = 0.04). Groups did not differ in change and there was no significant mean change (M_{Change} = -0.04, SE = 0.04, p = .280). For the item "*tends to be disorganized*", there were group difference showing that among the blue-collar workers, those who continued to work felt more disorganized than those retiring (M = 3.23, SE = 0.09, vs. M = 2.89, SE = 0.10). There were no significant group differences with respect to change; all groups felt less disorganized at the second assessment (M_{Change} = -0.23, SE = 0.05, p < .001). For the item "*makes plans and follows through with them*" there were group difference showing that blue-collar workers scored lower on this item (M = 4.81, SE = 0.06, vs. M = 5.17, SE = 0.04). Change did not differ between groups, all groups showed no significant change (M_{Change} = -0.04, SE = 0.04, p = .289). For the item "*can be somewhat careless*" we found that those retiring had lower

scores than those not retiring ($M = 3.25$, $SE = 0.06$, vs. $M = 3.02$, $SE = 0.07$). Change values did not differ significantly, all groups felt less careless at the second time point ($M_{Change} = -0.22$, $SE = 0.05$, $p < .001$).

Agreeableness. We found no group differences in baseline scores or change for any of the items. Agreement with the items "*can be cold and aloof*" ($M_{Change} = -0.17$, $SE = 0.05$, $p = .001$) and "*is sometimes rude to others*" ($M_{Change} = -0.20$, $SE = 0.05$, $p < .001$), however, declined over time. For the items "*is helpful and unselfish with others*" ($M_{Change} = -0.05$, $SE = 0.04$, $p = .239$) and "*is considerate and kind to almost everyone*" ($M_{Change} = -0.03$, $SE = 0.04$, $p = .349$), there was no significant change.

Discussion

The present study, using a nationwide, population-based, Norwegian longitudinal survey sample, combined with registry data, showed evidence for some degree of personality development over a ten-year period in late midlife. Based on previous studies and theories on personality development after life events, we expected that individuals retiring may show distinct patterns of personality development compared to those who continued to work, as their life circumstances change, and that this effect may differ by job type (blue-collar vs. white-collar). However, personality development did not seem to vary either by job type or work-to-retirement transition.

Personality Change Around Retirement

Our sample showed mean-level declines in neuroticism and openness, but stability in conscientiousness and extraversion. Mean-level changes in agreeableness could not be investigated due to a lack of metric measurement invariance across groups.

Declines in neuroticism were commonly found around late midlife in previous longitudinal studies (Bleidorn et al., 2021; Hansson, Henning, et al., 2020; Seifert et al., 2023;

Specht, 2017). One explanation for such changes comes from Denissen and colleagues (2013), who assumed that people apply self-regulation strategies to change according to social norms and expectations through adulthood (Denissen et al., 2013). This adaptation results in "personality maturation" throughout adulthood, which denotes increases in socially desirable traits and decreases in less socially desirable traits such as neuroticism. Later on, in very old age, there may be increases in neuroticism, for example, because anxiety about the end of one's life and serious health issues set in (Graham et al., 2020; Mueller et al., 2017). However, research about a late life increase in neuroticism is thus far rather inconclusive and our sample is likely too young and healthy to already show such changes. Although both Schwaba and Bleidorn (2019) and Dugan et al. (2024) found that neuroticism declined faster after retirement than before, and Hansson et al. (2020) also found declines among retiring individuals, this decrease seems to be rather an age effect as for example Schwaba and Bleidorn (2019) found no difference between retirees and the control group. Other studies did not show such effects either (Mroczek & Spiro, 2003; Specht et al., 2011). Thus, taken together our findings are in line with the majority of studies. The mean level of neuroticism tends to slightly decrease in late midlife and early old age, but the effect of the retirement transition seems to play a minor role in this development.

The stability in extraversion in our sample is in line with some studies that found stability of extraversion in midlife and reported declines only later in life (Berg & Johansson, 2014; Seifert et al., 2023), although others suggest linear declines throughout adulthood (Graham et al., 2020). The lack of retirement effects on extraversion is, however, partly in contrast to the results from Löckenhoff et al. (2009), who found declines in *activity*, which is a facet of extraversion. This decline in activity was interpreted as a consequence of the lack of work-related need for dominance and activity. However, our results are in line with other

studies showing no particular change in extraversion after retirement (Schwaba & Bleidorn, 2019) and our items do not capture activity.

Declines in openness, as in our sample, have also been found in this age range previously (Schwaba et al., 2018; Specht et al., 2011). This may be due to an increasing stability in life circumstances and less exposure to new situations in late adulthood, as increases in openness typically happen after introduction to new contexts (Schwaba et al., 2018; Specht et al., 2011; Zimmermann & Neyer, 2013). The lack of retirement effects is also in line with previous studies. Schwaba and Bleidorn (2019) found short-term increases in openness directly after retirement, but our analysis, with only two time points, was not likely to replicate this short-term effect. One reason for the absence of a retirement effect could be that changes in living conditions may start before the actual transition and may endure in retirement when the retiring individual prepares for and adapts to the transition from work respectively.

Conscientiousness was stable in our sample, which is also in line with age-normative changes found in other samples (Allemand et al., 2010; Seifert et al., 2023; Specht et al., 2011). However, because the lack of scalar measurement invariance over time implied that some items may not follow the overall change pattern of the higher-order trait, we tested for change in the four items separately and found that people felt less disorganized and careless at the second time point, but did not show change in the two other items. The lack of retirement effects is also in line with all previous studies apart from Specht et al. (2011).

We could not establish metric invariance across time for the agreeableness subscale, thus we only investigated change in the single items. For two of the items, there was some evidence for declines in agreeableness, which has been found in previous studies in this age group (Seifert et al., 2023). Löckenhoff et al. (2009) had found particular increases after

retirement, whereas Schwaba and Bleidorn (2019) found decreases, but we could not replicate such effects in either direction.

Taken together, our results do not suggest that retirement plays a strong role in personality development between midlife and old age. Selectivity analyses, taking time since retirement into account, did not show different results. One explanation for this finding may be the large time interval between measurements. Changes may be especially pronounced directly after retirement (Schwaba & Bleidorn, 2019). Furthermore, our non-retiring control group was on the verge of retirement as well and anticipatory effects may have led to declines in neuroticism in this group already before retirement. It is further important to consider that Graham et al. (2020) showed that the specific personality scale used in a study seems to moderate the extent to which changes in personality are detected. None of the previous studies used the exact scale that was assessed in the NorLAG study. Specht et al. (2011) analyzed a different short form of the BFI than we used (Gerlitz & Schupp, 2005), Schwaba and Bleidorn (2019) used the International Personality Item Pool (Goldberg, 1992), Dugan et al. (2024) and Hansson et al. (2020) used a short form of the same scale (Donnellan et al., 2006), Löckenhoff et al. (2009) used the NEO-PI-R (Costa & McCrae, 2008) and Mrozeck et al. (2003) used a short form of the Eysenck Personality Inventory (Floderus, 1974). Given psychometric differences and the variety of personality facets represented by each scale, it is not surprising that effects differ by study. The use of short-scales in our paper, as well as in most of the other studies on the subject, means that the Big-5 traits cannot be fully captured and this further restricts the possibility to identify change in personality over time, in particular on the facet level.

It should also be considered that retirement is an event with varying consequences, depending on the individual psychosocial and physical resources, the work situation, the transition type and post-retirement opportunities (Wang et al., 2011; Wang & Shi, 2014).

Consequently, Schwaba and Bleidorn (2019) found heterogeneity in the way people changed in response to retirement. Our sample size and the fact that only two waves of data were available prevents a broader investigation of moderators and the analysis of short- and long-term change in personality traits across retirement. Nevertheless, we assume that to understand psychological change across the transition to retirement, in particular concerning personality traits, future studies need to focus on individual differences and the different meanings of retirement for different individuals. For some, retirement may not come as a major change in life as they had already long ago started to reduce their working hours, found leisure activities to enjoy and spend more time with their families – for them, retirement may simply mean to fully embrace this lifestyle. For others, retirement may be a relief after a stressful life with a fulltime job (van den Bogaard et al., 2016). If, for example, family care obligations lead to one's retirement, or if people continue to work in retirement because of a low pension, they may have little time to enjoy the "dolce vita" (Marsh et al., 2013) and rather continue to live like a "worker". Finally, for some retirees, retirement may come as a shock, in particular if they were not able to prepare for retirement or did not choose to retire themselves (Hershey & Henkens, 2014), which may require much more adaptation and therefore come with more abrupt changes in life circumstances and personality. Taking these heterogeneous meanings of retirement seriously may allow to reconcile previous conflicting findings in the future. However, given that rank order stability was similar between those who retired and those who did not, our results do not imply that retirees are necessarily more heterogeneous as workers in the same age range.

Finally, it is possible that Big-5 personality traits are too broad and general constructs to be expected to change across retirement. One alternative framework of personality, brought forward by Hooker and McAdams (2003a;b), which moves beyond traits, is the six foci model. In this multi-level model, there are three levels of personality which are each

accompanied by process constructs: traits, personal action constructs (e.g., goals or motivations) and life stories. The respective process constructs are states, self-regulatory processes and self-narration (e.g., remembering or reminiscing). Across retirement, the broader traits such as Big-5 traits may be less likely to change than personal action constructs (i.e., preferences, Wetzel et al., 2023) or aspects of one's identity (Froidevaux et al., 2018). Changes may also occur at the level of process constructs. Future studies focusing on the other levels of this model may be more fruitful.

Baseline differences – job-specific selection into retirement?

We did not find that blue-collar and white-collar workers showed different change in personality either. We had expected differences due to different changes in life circumstances, but personality development in this life phase seems to be unrelated to socioeconomic status, at least in our sample. However, Norway is one of the richest countries in the world, with a very high standard of living and a strong welfare system. Countries with a lower GDP and higher social inequality, where blue-collar workers experience more existential challenges, may show different results. Nevertheless, we found that not only blue-collar and white-collar workers, but also those retiring and those not retiring differed in baseline personality.

More specifically, our analyses showed that blue-collar and white-collar workers differed in openness. This is not unexpected due to the strong association of openness with education and cognitive ability (DeYoung et al., 2014; Lüdtke et al., 2011; Ziegler et al., 2015). Blue-collar workers also showed lower scores on some of the conscientiousness items. With respect to the topic of our study it is interesting to see that those retiring differed from those working in terms of conscientiousness and openness. The literature on the role of personality for the timing of retirement is scarce. Löckenhoff et al. (2009), Specht et al. (2011) and Blekesaune and Skirbekk (2012) did not find that personality predicted normal retirement. Lucifora and Repetto (2022) found that higher conscientiousness, openness and

extraversion were related to later retirement, and neuroticism with earlier retirement. In our sample, those retiring showed lower conscientiousness scores. Higher conscientiousness may make it more likely to feel responsible for one's job and have a stronger attachment to the work role, as well as showing a greater interest in accumulating wealth (Boyce et al., 2010), and therefore may make retirement look like a less attractive alternative. Conscientiousness is also related to more adaptive health behavior and better health (Roberts et al., 2005), around retirement as well (Henning, Berg, et al., 2021), and may therefore allow a longer healthy working life. In addition, only among blue-collar workers, those retiring had lower openness scores than those continuing to work. Blue-collar workers scoring higher in openness may either be more interested in continuing to work (e.g., because they find enrichment in their work environments), or they may be more able to work because of better cognitive abilities. In addition, among retirees, those with lower scores in openness retired earlier. Future studies could look in more detail at how personality shapes the retirement process, also given that previous studies found that personality moderates the impact of retirement on well-being (Henning et al., 2017; Kesavayuth et al., 2016).

Strengths and Limitations

Our study has a number of strengths. First, the use of a control group allows for a better distinction of retirement-specific and age-normative change. The use of register data to assess work and retirement status helps to circumvent the self-report bias, if for example personality may influence whether or not people see themselves as retired. Our sample is distinct from previous studies on the topic as it is a Norwegian study. The distinction of blue-collar workers and white-collar workers pays tribute to socioeconomic inequalities in the retirement transition. Finally, we formally tested for measurement invariance, which several previous studies did not.

However, we also acknowledge some weaknesses. As other studies on the subject (e.g., Löckenhoff et al., 2009; Specht et al., 2011), we only had two waves of survey data available and they were ten years apart, which limits our analytical possibilities. In particular, we were not able to look at short-and long-term development in personality or anticipation effects before the transition. Future studies need more survey waves with data on personality. Furthermore, our dataset only included a short scale of personality, and for agreeableness and conscientiousness, scale properties were suboptimal. Our scales may not have assessed facets which changed across retirement or may not have been reliable enough to capture change. Longer and psychometrically better scales are needed to also reliably test changes on the facet level with retirement (Löckenhoff et al., 2009). Finally, we only included one moderator of change, job type. Future studies should include more moderators (cf. Schwaba & Bleidorn, 2019), including leisure activity before and after retirement (Henning, Stenling, et al., 2021), perceived work environment (Stahlhofen et al., 2024) or care obligations (Szinovacz et al., 2001) .

Conclusion

In the present study, we found little evidence for a lasting effect of retirement on the Big Five personality traits. However, there was some evidence for personality predicting retirement behavior, which should be further investigated in future studies. We also encourage researchers to consider the heterogeneity in the reaction and adaptation to retirement and use knowledge from research on retirement to understand if and for whom retirement comes with personality development.

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Tables

Table 1. Descriptive statistics

	Not Retiring, blue-collar (*n* = 284) *M (SD)*	Not Retiring, white-collar (*n* = 453) *M (SD)*	Retiring, blue-collar (*n* = 194) *M (SD)*	Retiring, white-collar (*n* = 332) *M (SD)*
Age at T1	55.23 (2.94)	55.33 (3.12)	58.01 (2.89)	58.62 (2.94)
Neuroticism T1	2.94 (1.15)	2.88 (1.12)	2.89 (1.22)	2.86 (1.07)
Neuroticism T2	2.87 (1.25)	2.72 (1.10)	2.81 (1.17)	2.85 (1.09)
Extraversion T1	4.53 (1.17)	4.61 (1.12)	4.38 (1.27)	4.72 (1.21)
Extraversion T2	4.50 (1.24)	4.66 (1.10)	4.52 (1.10)	4.69 (1.16)
Openness T1	4.17 (1.16)	4.57 (1.07)	3.89 (1.17)	4.33 (1.19)
Openness T2	4.04 (1.21)	4.49 (1.17)	3.78 (1.25)	4.43 (1.13)
Agreeableness T1	5.52 (0.82)	5.49 (0.87)	5.53 (0.89)	5.49 (0.86)
Agreeableness T2	5.57 (0.88)	5.59 (0.86)	5.59 (0.87)	5.56 (0.86)
Conscientiousness T1	4.96 (0.95)	5.23 (0.84)	5.16 (0.93)	5.26 (0.83)
Conscientiousness T2	5.08 (1.01)	5.35 (0.90)	5.20 (0.95)	5.29 (0.90)
Gender	157 men 127 women	250 men 203 women	93 men 101 women	166 men 166 women

Note. The personality scores refer to manifest mean scores.

Table 2. Measurement Invariance Testing

Trait	Configural Invariance	Metric Invariance (time)	Metric Invariance (time and groups)	Scalar Invariance (time)	Scalar Invariance (time and groups)
Neuroticism	CFI = 0.981	CFI = 0.977	CFI = 0.977	CFI = 0.970	CFI = 0.968
	RMSEA = 0.042,	RMSEA = 0.043,	RMSEA = 0.040,	RMSEA = 0.043,	RMSEA = 0.042,
	90%CI[0.025;0.058]	90%CI[0.027;0.057]	90%CI[0.025;0.054]	90%C[I0.029;0.055]	90%C[I0.028;0.054]
	SRMR = 0.034	SRMR = 0.042	SRMR = 0.048	SRMR = 0.051	SRMR = 0.051
Extraversion	CFI = 0.972	CFI = 0.973	CFI = 0.973	CFI = 0.967	CFI = 0.961
	RMSEA = 0.067,	RMSEA = 0.059,	RMSEA = 0.055,	RMSEA = 0.057,	RMSEA = 0.059,
	90%CI[0.052;0.082]	90%CI[0.045;0.073]	90%CI[0.042;0.069]	90%CI[0.045;0.069]	90%CI[0.048;0.071]
	SRMR = 0.041	SRMR = 0.048	SRMR = 0.057	SRMR = 0.061	SRMR = 0.063
Openness	CFI = 0.998	CFI = 0.998	CFI = 0.997	CFI = 0.991	CFI = 0.982
	RMSEA = 0.014,	RMSEA = 0.014,	RMSEA = 0.017,	RMSEA = 0.025,	RMSEA = 0.035,
	90%CI[0.000;0.038]	90%CI[0.000;0.036]	90%CI[0.000;0.037]	90%C[I0.000;0.041]	90%CI[0.019;0.048]
	SRMR = 0.028	SRMR = 0.034	SRMR = 0.045	SRMR = 0.049	SRMR = 0.056

Agreeableness	CFI = 0.927	CFI = 0.918	CFI = 0.905	-	-
	RMSEA = 0.059, 90%CI[0.044;0.073]	RMSEA = 0.057, 90%CI[0.043;0.070]	RMSEA = 0.058, 90%CI[0.045;0.070]		
	SRMR = 0.054	SRMR = 0.067	SRMR = 0.077		
Conscientiousness	CFI = 0.976	CFI = 0.978	CFI = 0.973	CFI = 0.911	-
	RMSEA = 0.040, 90%CI[0.019;0.057]	RMSEA = 0.033, 90%CI[0.011;0.050]	RMSEA = 0.035, 90%CI[0.016;0.051]	RMSEA = 0.059, 90%CI[0.047;0.071]	
	SRMR = 0.039	SRMR = 0.047	SRMR = 0.054	SRMR = 0.081	

Table 3. Final estimates from latent change score models

	Blue-Collar workers, not retiring B (SE)	White-Collar workers, not retiring B (SE)	Blue-Collar workers, retiring B (SE)	White-Collar workers, retiring B (SE)
Neuroticism				
Level	2.07 (0.04)***	2.07 (0.04)***	2.07 (0.04)***	2.07 (0.04)***
Change	-0.05 (0.02)*	-0.05 (0.02)*	-0.05 (0.02)*	-0.05 (0.02)*
σ^2 Level	0.54 (0.10)***	0.55 (0.08)***	0.68 (0.11)***	0.51 (0.07)***
σ^2 Change	0.28 (0.08)***	0.21 (0.05)***	0.15 (0.08)*	0.22 (0.05)***
Age → level	-0.02 (0.01)*	-0.02 (0.01)*	-0.02 (0.01)*	-0.02 (0.01)*
Age → change	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Model fit	CFI = 0.970, RMSEA = 0.036, 90%CI[0.023;0.047]; SRMR = 0.055. $\chi^2(138) = 193.29$**, scaling correction factor = 1.05			
Extraversion				
Level	4.39 (0.04)***	4.39 (0.04)***	4.39 (0.04)***	4.39 (0.04)***
Change	-0.03 (0.03)	-0.03 (0.03)	-0.03 (0.03)	-0.03 (0.03)
σ^2 Level	1.25 (0.14)***	1.06 (0.10)***	1.37 (0.16)***	1.22 (0.10)***
σ^2 Change	0.46 (0.11)***	0.22 (0.06)***	0.03 (0.11)	0.19 (0.07)**
Age → level	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
Age → change	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
Model fit	CFI = 0.957, RMSEA = 0.053, 90%CI[0.043;0.063]; SRMR = 0.074. $\chi^2(134) = 252.89$***, scaling correction factor = 1.08			
Openness / Intellect				

|				
Level	3.83 (0.08)***	4.22 (0.05)***	3.54 (0.09)***	4.22 (0.05)***
Change	-0.10 (0.03)**	-0.10 (0.03)**	-0.10 (0.03)**	-0.10 (0.03)**
σ^2 Level	0.98 (0.15)***	0.86 (0.11)***	1.08 (0.18)***	1.08 (0.13)***
σ^2 Change	0.44 (0.12)***	0.32 (0.07)***	0.33 (0.15)*	0.35 (0.08)***
Age → level	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
Age → change	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Model fit	CFI = 0.976, RMSEA = 0.035, 90%CI[0.022;0.047]; SRMR = 0.058. $\chi^2(136) = 106.72$***, scaling correction factor = 1.07			

Conscientiousness

Level	5.87 (0.04)***	5.87 (0.04)***	5.70 (0.05)***	5.70 (0.05)***
Change	-0.04 (0.04)	-0.04 (0.04)	-0.04 (0.04)	-0.04 (0.04)
σ^2 Level	0.32 (0.09)***	0.27 (0.05)***	0.31 (0.08)***	0.24 (0.05)***
σ^2 Change	0.14 (0.08)	0.10 (0.04)*	0.21 (0.09)*	0.04 (0.06)
Age → level	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Age → change	-0.02 (0.01)**	-0.02 (0.01)**	-0.02 (0.01)**	-0.02 (0.01)**
Model fit	CFI = 0.964, RMSEA = 0.035, 90%CI[0.019;0.047]; SRMR = 0.061. $\chi^2(108) = 148.67$**, scaling correction factor = 1.05			

*p < .05 **p < .01 **p < .001. **Note**. Effects of age were set equal across groups. Residual variances were allowed to vary freely across groups.
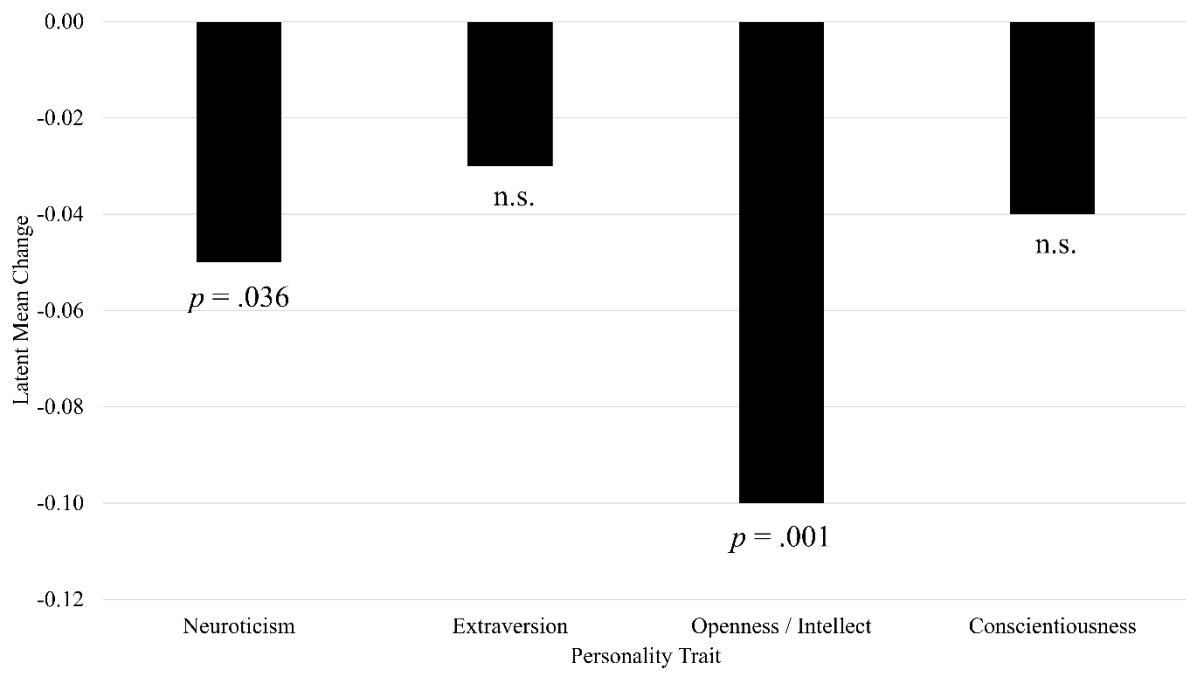
Figures.

Figure 1. Baseline differences in personality by retirement and work type
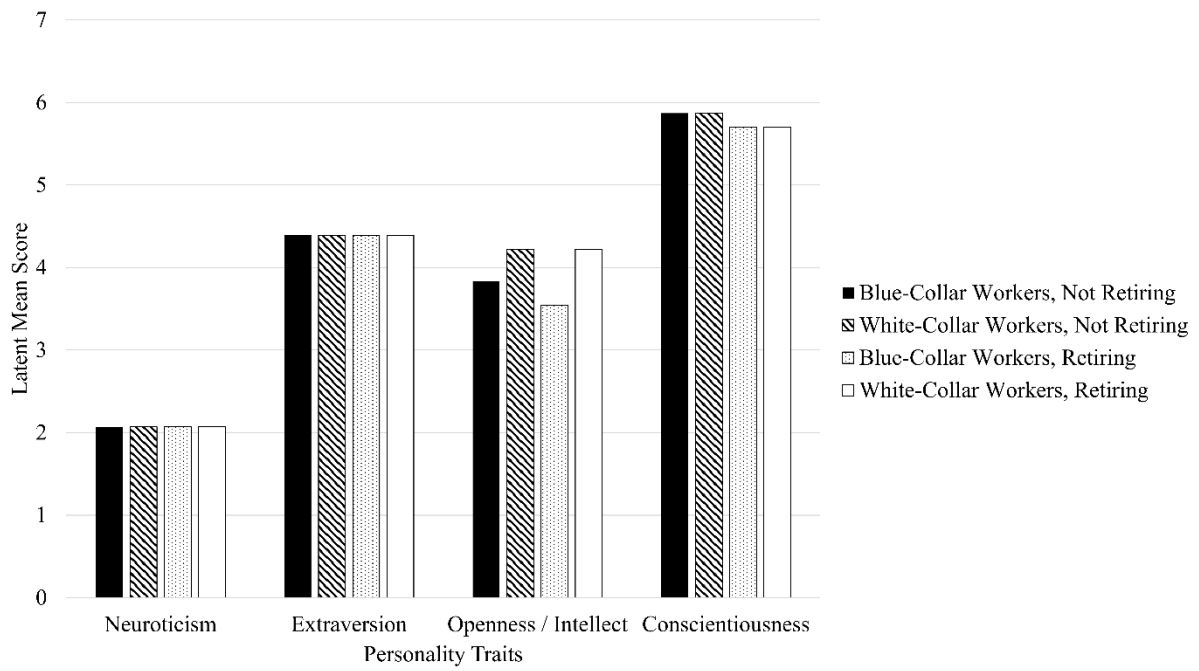
Note. Controlling for age, with age centered around the sample mean.

Figure 2. Personality development in our sample

Note. Controlling for age, with age centered around the sample mean.