ORIGINAL ARTICLE

# The effects of socioeconomic status on personality development in adulthood and aging

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## Abstract

**Intro:** The current study examined the effects of adulthood socioeconomic status (SES) on levels of and changes in the Big Five personality traits domains and nuances in adulthood and during aging. We also tested whether the relations between adulthood SES and personality traits differed by childhood SES and age.

**Methods:** Data were drawn from three longitudinal studies: the Swedish Adoption/Twin Study of Aging (SATSA, $N = 2000$), the Midlife in the United States (MIDUS, $N = 6428$), and the Health and Retirement Study (HRS, $N = 23{,}238$).

**Results:** Using the latent growth models, across samples, we found associations between high SES and low levels of neuroticism and high levels of extraversion, openness, and conscientiousness. The effects of SES on changes in personality traits were mainly observed in the aging sample of HRS. In general, a similar pattern was observed at the nuance level. Analyses of the moderating effects of age suggested some evidence for the increasingly important role of SES in levels of and changes in personality traits in older ages.

**Conclusion:** The findings support SES as a source that partially accounts for individual differences in personality traits level. Some evidence was found for the relations between SES and changes in personality traits in old age.

KEYWORDS
adulthood development, aging, longitudinal, personality, socioeconomic status

## 1 | INTRODUCTION

Defined as the relatively enduring and automatic patterns of thoughts, feelings, and behaviors that people exhibit in similar situations across time (Roberts & Nickel, 2021), personality traits have been consistently demonstrated to be related to important life outcomes such as stress, health, achievement, and relationship quality (Bleidorn et al., 2021; Roberts & Yoon, 2022). Moreover, research in the last two decades has consistently shown that personality traits continue to change throughout the life course (Damian et al., 2019; Graham et al., 2020; Roberts et al., 2006). However, little is known about factors and

processes that contribute to the development of personality traits.

Socioeconomic status (SES), which refers to individuals' possession of normatively valued social and economic resources (Antonoplis, 2022), has been found to play an essential role in the developmental processes of consequential life outcomes such as cognitive functioning, mental, and physical health (Bierman & Pearlin, 2011; Chen & Miller, 2013; Lyu & Burr, 2016). Moreover, theoretical and empirical work also suggested the possible links between SES and personality traits (Hughes et al., 2021; Roberts & Nickel, 2021). However, research examining the relations between SES and individuals'

personality development is sparse. How are individuals' SES connected to the *level* (model-predicted scores at the first time of measurement) and *changes* (the degree of mean-level increase/decrease across time) in personality traits over time? Do general SES and different components of SES show differential relations to the levels of and changes in personality traits? Does the pattern vary across different domains of personality traits? Whether SES shows differential connections with personality level/change for individuals with different childhood SES and individuals of different ages? Whether the associations between SES and personality level/change are more observable in personality traits assessed at certain levels of the trait hierarchy than others (e.g., domain vs. nuance levels)? The current study investigated these questions for the Big Five personality traits using data from three large longitudinal studies to enhance our understanding of the developmental process of personality traits in relation to contextual factors.

## 1.1 | Personality development in adulthood

Researchers have consistently found that personality traits display substantial and meaningful changes throughout the lifespan (Bleidorn et al., 2022; Roberts & Yoon, 2022). Specifically, throughout young to middle adulthood, personality traits change in a pattern reflecting psychological maturity such that increases in extraversion, conscientiousness, agreeableness, and openness, along with decreases in neuroticism were observed (Bleidorn et al., 2019, 2022; Lucas & Donnellan, 2011; Roberts et al., 2006). When examined in older age groups, some studies reported a reversed pattern such that extraversion, conscientiousness, agreeableness, and openness declined in late adulthood (Bleidorn et al., 2022; Graham et al., 2020; Kandler et al., 2015).

Despite the general pattern of personality change, there are individual differences in personality development such that for different people, their personality traits may change in different directions and/or to different degrees (Graham et al., 2020; Mroczek, 2014). Therefore, different theoretical frameworks have been proposed to account for the factors and processes driving changes in personality traits. For example, the neo-socioanalytic model of personality development (Roberts & Nickel, 2021) predicts that, across the life course, personality traits develop in response to changes in social roles, which are conceptualized as an aggregation of various environmental components (e.g., situations and concomitant expectations, rewards, punishments) that drive life experiences. According to the social investment principle of the neo-socioanalytic

model (Roberts & Nickel, 2021), age-graded changes and investments in different social roles lead to changes in personality traits. Other theories also provide explanations for changes in personality traits, especially for changes in late adulthood. For instance, the theory of selective optimization with compensation (SOC) posits that developmental processes include both gains and losses, and late adulthood is mostly characterized by losses (Baltes, 1997; Mroczek et al., 2021). In order to optimize development and compensate for the losses, individuals in late adulthood engage in selection behaviors and restrict goals and activities in domains where functionality is impaired. Such optimization and compensation processes may act as mechanisms responsible for personality development in late adulthood (Kandler et al., 2015; Mueller et al., 2016). However, despite these theoretical predictions, we still know little about the specific sources for changes in personality traits across the lifespan.

## 1.2 | SES and personality in adulthood

As suggested by Mroczek et al. (2021), the trajectories of personality change are manifested at different tiers of similarity, one of which is at a subgroup level such that the developmental trajectories for people of certain subgroups (e.g., a demographic group) share similar patterns. Thus, contextual factors, such as SES, are likely to play roles in personality development. Previous research has found some evidence for the connections between different dimensions of SES and personality trait levels: generally, higher education and/or income were associated with lower neuroticism and higher extraversion, conscientiousness, and openness (Hughes et al., 2021; Jonassaint et al., 2011). As for the relationship between SES and personality development, however, very few studies were conducted, particularly using longitudinal designs. Among the few studies that used cross-sectional designs, Hughes et al. (2021) found a significant interaction between education and age in predicting openness; however, no significant interactions were reported for other dimensions of SES and other domains of personality traits. Jackson et al. (2009) reported statistically significant interactions between SES and age when predicting some facets of conscientiousness but not the conscientiousness domain. Using a longitudinal design, lower family SES was found to be associated with higher levels of adolescent negative personality traits, and the findings were replicated across generations (Martin & Donnellan, 2021). A recent study found small moderating effects of SES on the links between personality and other life outcomes (e.g., unemployment), suggesting that SES is potentially impactful in the way personality manifests itself in daily life

(Beck & Jackson, 2022). Previous research also reported associations between SES and changes in psychological states that are closely related personality traits, such as depressive symptoms and subjective well-being (Bierman & Pearlin, 2011; Ginexi et al., 2000; Wanberg et al., 2020).

Thus, based on previous findings, SES is likely to be associated with personality development, but more research is needed, especially that using a longitudinal design. Following the social investment principle (Roberts & Nickel, 2021), SES is likely to contribute to changes in personality traits as people differ in SES may engage in very different social roles (e.g., different occupational roles), resulting in divergent trajectories of personality change. Also, as people enter older ages, people in low SES are likely to suffer from more losses compared to those in high SES. As suggested by the SOC hypothesis (Baltes, 1997; Mroczek et al., 2021), individuals in low SES may use compensatory strategies different from that used by those in high SES, leading to different change patterns of personality traits.

### 1.2.1 | SES and neuroticism

Low SES demonstrates connections with high levels of stressor exposure (Chandola & Marmot, 2011), which have been found to be related to increases in neuroticism (Riese et al., 2014). Relatedly, lower SES has been suggested to be associated with lower levels of perceived and actual control over life constraints (Kraus et al., 2012), both of which play essential roles in stress experiences (Folkman, 1984). Thus, lower SES may contribute to the negative development of neuroticism due to its impacts on stress experiences.

### 1.2.2 | SES and extraversion

Individuals with lower SES were found to have smaller social networks, a lower sense of belonging, and experience greater social isolation and loneliness (Algren et al., 2020; House et al., 1988; Stewart et al., 2009). Given its social core, low SES is likely to show negative impacts on the level of and changes in extraversion due to the limited interpersonal resources (e.g., social support, social integration, connectedness; Link & Phelan, 1995) associated with low SES.

### 1.2.3 | SES and openness

As previous research indicates, openness contains a proportion of components that are closely related to cognitive

abilities (DeYoung, 2015). In a meta-analytic review, education showed robust and consistent beneficial effects on cognitive abilities across the life course and categories of cognitive abilities (Ritchie & Tucker-Drob, 2018). Hence, it is possible that higher SES, especially education, is related to higher levels of and increases in openness over time by exerting effects on the cognitive components of openness. Additionally, increasing physical activity, being promoted at work, and increasing cultural activity, the resources of which are more accessible for people with higher SES, have been found to be related to increases in openness (Allen et al., 2017; Nieß & Zacher, 2015; Schwaba et al., 2018).

### 1.2.4 | SES and conscientiousness

Previous research reported evidence for changes in conscientiousness in response to school- and work-related experiences, such as the transition from high school to college, entering the workforce, and unemployment (Bleidorn et al., 2018). School- and work-related experiences involve practices of planning and goal-directed behaviors, which may contribute to changes in conscientiousness through cumulative effects. Thus, higher levels of SES, especially education- and occupation-related indicators, are likely to be associated with the positive development of conscientiousness.

### 1.2.5 | SES and agreeableness

Research on social class and prosocial behaviors has consistently reported that compared to higher-class individuals, individuals of lower social class exhibit heightened attention and compassion toward others and tend to engage in higher levels of other-beneficial prosocial behaviors (Piff & Robinson, 2017). Based on previous findings, it is possible that lower SES is associated with higher levels of and increases in agreeableness through engaging in prosocial behaviors.

In sum, SES is likely to be related to the development of the Big Five personality traits through its relation to individuals' life experiences, emotions, and behaviors. The *first purpose* of the current study was to test the associations between SES and *levels* of and *changes* in the Big Five personality traits in adulthood longitudinally. Moreover, a recent study recommended examining individual SES indicators (Antonoplis, 2022) as different components of SES are also likely to show distinct linkages to developmental processes (Duncan & Magnuson, 2012) and differential relations between SES composite and specific dimensions of SES and personality traits (Hughes

et al., 2021; Jonassaint et al., 2011) exist. However, it remained unknown how specific SES indicators and development in each domain of the Big Five personality traits were connected to each other. Thus, in the current study, we examined the effects of the composite SES which captured the aggregate effects of multiple indicators, as well as the effects of the key components of SES, including education, household income/material resources, and occupational prestige. Examining the relations of SES to levels of and changes in personality traits can clarify the role of contextual factors that are imbedded in the societal structure in the developmental processes of personality traits, enhancing our understanding of the potential sources driving individual differences and changes in personality traits. Also, such investigation can help us identify individuals who may be more likely to have negative changes in personality traits than others and better inform the development of interventions to trigger positive development in personality traits. Given the relevance of personality traits to other important life outcomes (Bleidorn et al., 2021), findings about the SES-personality link can also have implications for improving individuals' development in other life areas.

## 1.3 | Moderating effects of childhood socioeconomic status and age

Aside from the potential main effects, it remains unknown whether the associations between SES and personality levels and changes vary across different demographic and/or contextual factors. Specifically, some theoretical work suggests that the relations between SES and the levels of and changes in personality traits may vary for individuals with different childhood SES. Previous research has demonstrated both continuity and mobility in SES from childhood to adulthood (Jeon & Neppl, 2016; Krzyżanowska & Mascie-Taylor, 2013). In addition, childhood SES and adulthood SES are likely to show synergistic effects on life outcomes. Specifically, the stress sensitization model posits synergistic effects between early and later stress such that early stress-related experiences may amplify the effects of stressors experienced later in life (Hammen et al., 2000; McLaughlin et al., 2010). Although originally proposed for explaining the effects of stress on depression, stress early in life has been found to show sensitizing effects on the links between subsequent stress and other life outcomes, such as anxiety disorders and substance use (Hammen et al., 2000; McLaughlin et al., 2010; Myers et al., 2014). As individuals low on SES are likely to suffer from various stressors (e.g., financial difficulty), those who are exposed to childhood adversities due to low family SES may show heightened reactions to stressors linked

to low SES later in life. That is, the negative impacts of low SES on life outcomes are amplified among individuals with low childhood SES. Given the established connections between personality traits and other life outcomes (e.g., depression, anxiety, and substance use disorders) tested for the stress sensitization effects in previous research (Kotov et al., 2010), it is possible that low childhood SES can further sensitize the negative effects of low SES on personality in adulthood. Through accumulating processes, individuals with low childhood SES increasingly diverge from others in personality traits, resulting in more observable associations between low adulthood SES and negative changes in personality traits among individuals with low childhood SES. Therefore, *the second purpose* of the current study was to test whether the associations between adulthood SES and personality level and change were contingent upon individuals' childhood SES. Testing the moderating effects of childhood SES can enhance our understanding of how individuals' SES in different life phases exerts effects on personality traits in adulthood in concert with each other, helping us further identify contextual factors that may amplify the beneficial/deleterious effects of SES on personality development.

Meanwhile, it is also possible that the associations between SES and the levels of and changes in personality traits differ across life stages. As suggested by the lifespan developmental theory (Baltes, 1997), certain resources may be more relevant to age-related challenges in certain life stages (von Soest et al., 2018; Wagner et al., 2014). Similarly, given the importance of changes in social roles and age-related gains and losses in shaping personality development (Mroczek et al., 2021; Roberts & Nickel, 2021), factors linked to the developmental process of personality traits may differ as people enter different life phases. However, very few studies have examined the potential differential effects of certain factors on personality development across different life stages. Thus, the *third purpose* of the current study was to test whether SES showed differential associations with personality level and change across ages. Results of the moderating effects of age can contribute to identifying the life period during which personality development is more sensitive to access to socioeconomic resources, deepening our understanding of the SES-personality links across adulthood, and improving the precision of interventions targeting stimulating positive changes in personality traits.

## 1.4 | The present study

The current study examined the associations between SES and the *levels* of and *changes* in the Big Five personality traits using data from three longitudinal studies.

Specifically, we first tested the effects of baseline SES (the composite score of SES and different components of SES) on the levels of and changes in personality traits at the domain level over time. Second, we examined the generalizability of the SES-personality links across demographic and contextual factors by testing the moderating effects of childhood SES and baseline age on the associations between SES and the levels of and changes in personality traits at the domain level. Finally, previous research suggested that, nuances of personality traits (operationalized as individual questionnaire items) displayed developmental trajectories distinct from the broader domain the items were designed to measure and the items contained unique developmental information (Mõttus & Rozgonjuk, 2021). Thus, we also tested the effects of baseline SES on the levels of and changes in personality traits at the nuance level, the analyses of which helps to uncover whether the SES-personality links can be generalized to different levels of personality traits. Overall, the present study is exploratory as we did not have strong theories to make directional hypotheses about the specific associations between each SES component and each trait domain, as well as the moderating roles of childhood SES and age in those specific associations.

We tested these research questions in three longitudinal samples. For Sample 1, we used data from the Swedish Adoption/Twin Study of Aging (SATSA), a longitudinal study designed to investigate the origins of individual differences in aging and the involvement of genetic and environmental factors underlying the aging processes. For Sample 2, the data were drawn from the Midlife in the United States (MIDUS), a study that aims to investigate the role of behavioral, psychological, and social factors in accounting for age-related variations in health and well-being. For Sample 3, we used data from the Health and Retirement Study (HRS, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020; the HRS is sponsored by the National Institute on Aging and is conducted by the University of Michigan), a longitudinal study aiming to investigate the challenges and opportunities of aging.

## 2 | MATERIALS AND METHODS

### 2.1 | Participants

#### 2.1.1 | Swedish Adoption/Twin Study of Aging

The present study used a sample of 2000 participants (58.8% female) who provided data on at least one of the indicators of SES at baseline and personality traits in at least one of six waves of assessment (time intervals were 11 years between Wave 4 and Wave 5 and 3 years between other waves of assessments). The mean age of the sample at baseline was 60.05 (SD = 13.98, Range: 26–93). On average, participants completed 3.78 waves of assessment (SD = 1.74, Range: 1–6) with 24.9% of the participants completing all of the six waves of assessment.

#### 2.1.2 | Midlife in the United States

The current study focused on a sample of 6428 participants (52.6% female) who provided data on at least one of the SES indicators at baseline and personality traits in at least one of three waves of assessment (time intervals were about 10 years between Wave 1 and Wave 2 and about 8 years between Wave 2 and Wave 3). The mean age of the sample at baseline was 46.90 (SD = 12.93, Range: 20–75). On average, participants completed 2.03 waves of assessment (SD = 0.87, Range: 1–3) with 38.8% of the participants completing all three waves of assessment.

#### 2.1.3 | Health and Retirement Study

The present study used a sample of 23,238 participants who provided data on at least one of the SES indicators at baseline and personality traits in at least one of four waves of assessment[1] (time intervals were 4 years between waves of assessments). The mean age of the sample at baseline was 68.29 (SD = 10.52, Range: 25–107). On average, participants completed 2.27 waves of personality assessment (SD = 1.12, Range: 1–4) with 18.0% of the participants completing all of the four waves of personality assessment.

Across the three samples, we conducted analyses to examine whether attrition resulted in unrepresentative longitudinal samples for participants who provided data at baseline. Details can be found in the supplement (in the section of Attrition Analyses). Overall, compared to their counterparts, participants who completed all waves of assessments scored higher on the SES composite and its constituting components, higher on positive personality traits (e.g., openness), and lower on neuroticism.

### 2.2 | Measures

#### 2.2.1 | Socioeconomic status

Across the 3 samples, SES was assessed by multiple components, including educational attainment, financial status (household income or material resources), and

occupational status (SATSA and MIDUS only). The composite score of SES was constructed by averaging standardized scores of each component.

### Swedish Adoption/Twin Study of Aging

SES was assessed by education, occupational status, and material resources. Education was measured with four levels from lowest to highest. Occupational status was classified into four ranked categories based on the information obtained from the SEI scale (Swedish socioeconomic classification) about the type of occupation the participants had most during their life (Lichtenstein et al., 1993). The log-transformed scores constructed in the SATSA data (performed by researchers involved in SATSA) were used for analyses. Material resources were indexed by items assessing ownership of dwellings and cars, rent subsidies, insurance coverage, savings, and household conveniences.

### Midlife in the United States

SES was assessed according to scores on education, occupational status, and household income. Educational attainment was measured on a 12-point scale from lowest to highest. Occupational status was measured using the Duncan socioeconomic index scores which were ratings of occupational prestige (Hauser & Warren, 1997). Total household income was computed in the MIDUS data by summing annual income from various sources.

### Health and Retirement Study

SES was measured on the basis of education and household income. Education was assessed by the total years of education completed. Total household income was computed in the HRS data by summing income from different sources of the respondents and their spouses. The data used for household income in the current study had data imputation conducted (performed by researchers involved in the HRS) based on a combination of relevant information.

## 2.2.2 | Personality

### Swedish Adoption/Twin Study of Aging

Neuroticism and extraversion were measured by a short form of the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1975; Pedersen et al., 1988) in which each of the two personality domains was assessed by 9 dichotomous items. Cronbach alphas ranged from 0.71 to 0.75, and 0.65 to 0.68 for neuroticism and extraversion across the 6 waves, respectively. Openness was measured by 6 items from the NEO-Personality Inventory (NEO-PI; Bergeman et al., 1993; Costa & McCrae, 1985). The items were rated on a 5-point scale with 1 as "exactly right" and 5 as "not right at all". Cronbach alphas ranged from 0.64 to 0.71 across the 6 waves.

### Midlife in the United States

The Big Five personality traits were assessed by the Midlife Development Inventory (MIDI; Lachman & Weaver, 1997) using 25 adjectives. The items were rated on a 4-point scale from 1 "a lot" to 4 "not at all". Across the 3 waves, Cronbach alphas ranged from 0.71 to 0.75 for neuroticism, 0.76 to 0.78 for extraversion, 0.77 to 0.78 for openness, 0.56 to 0.58 for conscientiousness, and 0.77 to 0.81 for agreeableness.

### Health and Retirement Study

The Big Five personality traits were measured using the MIDUS Big Five Adjectival scale (Lachman & Bertrand, 2001) using 26 adjectives. Each adjective was rated on a 4-point scale with 1 as "a lot" and 4 as "not at all". Across the 4 waves, Cronbach alphas ranged from 0.71 to 0.72 for neuroticism, scored at 0.75 for extraversion (across waves), ranged from 0.79 to 0.80 for openness, from 0.66 to 0.67 for conscientiousness, and from 0.78 to 0.79 for agreeableness. Personality items were coded so that a higher score indicates a higher level of the latent trait.

## 2.2.3 | Childhood socioeconomic status (childhood SES)

### Swedish Adoption/Twin Study of Aging

Childhood SES was computed by averaging the standardized scores of items assessing childhood economic situations, material resources, and parental occupation status.

### Midlife in the United States

Childhood SES scores were constructed by averaging the standardized scores for parental education, frequency of family on welfare, and financial level compared to the average.

### Health and Retirement Study

Childhood SES was indexed by parental educational attainment in years.

## 2.3 | Statistical analysis

All the analyses were conducted using Mplus 8.7 (Muthén & Muthén, 1998–2017). The scripts for the analyses can be found at https://osf.io/3a65j/?view_only=685c4c9482 954aed9bf7c1a42c298c50. Due to missingness in data across waves, full information maximum likelihood (FIML) was used for estimation. Measurement invariance for each of the Big Five personality traits across waves was tested in each sample. Details about the analyses and

results can be found in online supplementary materials (see the section for Test of measurement invariance of personality traits and Table S1). Overall, measurement invariance was confirmed for most traits in the three samples at the configural, metric, and scalar levels of analyses.

To test the effects of baseline SES on the levels of and changes in personality traits, latent growth models were fitted, and the intercepts and slopes constructed in the models were used to represent levels of and changes in personality traits across waves. In each of the 3 samples, separate models were fitted to test the effects of the SES composite and its constituting components on each of the personality trait domains. In each model, the latent variables for each of the personality traits were specified at each time point of assessment, and the latent variables were used to estimate the latent intercept and slope (loadings on the slope were set to reflect the time intervals between measurement occasions) for each of the personality traits. The intercept and slope parameters of the variables were set to correlate with each other. All the loadings and residual variance of the same item were fixed to be equivalent across waves. The intercept and slope parameters were regressed on the SES variables. In the SATSA, each twin pair was viewed as a cluster and robust standard errors were estimated to account for the dependency within each pair of twins. In the current study, we only considered linear changes in personality traits. To test the moderating effects of childhood SES on the links between SES and levels and changes in personality traits, the intercept and slope parameters were regressed on the composite variable of childhood SES, the baseline SES variables, and the product term between the childhood SES and the baseline SES variables. To test the moderating effects of baseline age, in each model, the intercept and slope parameters were regressed on the SES variable, baseline age, and the interaction term between the SES and age.

Finally, across the samples, latent growth models were fitted to each item of the personality measures to examine the effects of composite scores and specific dimensions of SES on the levels of and changes in personality traits at the nuance level.[2] Item scores at each time point were used to construct the intercept and slope to represent the levels of and changes in personality nuances.

# 3 | RESULTS

## 3.1 | Descriptive statistics

Tables S2–S4 present the correlations among baseline SES composite and specific dimensions, childhood SES, and personality traits across waves in the SATSA, MIDUS, and HRS samples, respectively. First, as shown in the tables, different dimensions of SES displayed small to moderate correlations with each other, suggesting the necessity for separate tests for their effects on personality. Also, the correlations across waves indicated moderate stability of personality traits over time. In addition, generally, baseline SES composite and its constituting components and childhood SES demonstrated negative associations with neuroticism and positive associations with extraversion, openness, conscientiousness, and agreeableness, with the relations to openness consistently stronger in magnitude than that to other trait domains.

## 3.2 | Effects of socioeconomic status on levels and changes in personality traits

Because of the large number of tests conducted, we applied the Benjamini-Hochberg method to control for false discovery rate for models fitted for each set of analyses (e.g., testing effects of SES on personality levels and changes, testing the moderating effects of childhood SES, and testing the moderating effects of baseline age) for each SES variable (SES composite, education, financial status, and occupational status) in each sample (Benjamini & Hochberg, 1995; Thissen et al., 2002). Table 1 shows the effects of the SES composite on levels of and changes in personality traits at the domain level in the 3 samples. Across the samples, SES scores at baseline displayed negative relations with the level of neuroticism and positive relations with the levels of extraversion (except MIDUS) and openness, indicating that when compared to those with lower SES scores, individuals with higher SES at baseline demonstrated lowers scores on neuroticism and higher scores on extraversion and openness. SES also exhibited positive relations with the level of conscientiousness in both MIDUS and HRS, whereas SES showed negative relations with the level of agreeableness in MIDUS but positive relations in HRS. Regarding changes in personality traits, effects of the SES composite were observed in HRS only, a sample in which the majority of participants were older than age 50 throughout the assessment occasions. Specifically, positive effects of SES were found for changes in extraversion, openness, conscientiousness, and agreeableness such that higher SES was associated with increases in the 4 trait domains. Unexpectedly, in HRS, higher SES was also related to increases in neuroticism.

Tables 2–4 present the effects of education, financial status, and occupational status on levels of and changes in personality traits, respectively. As Table 2 reveals, similar to the patterns found for the SES composite, higher education was linked to a lower level of neuroticism and higher levels of extraversion (except MIDUS) and openness in the 3 samples. Education was also positively related to the

**TABLE 1** Standardized estimates and 95% confidence intervals for the effects of baseline SES composite and the moderating effects of childhood SES and baseline age of personality change on the levels and changes in personality traits.

| | Effects of aSES | Moderating effects of cSES | | | Moderating effects of age | | |
|---|---|---|---|---|---|---|---|
| | aSES | aSES | cSES | aSES × cSES | aSES | Age | aSES × age |
| *SATSA* | | | | | | | |
| N Level | **−0.14 [−0.20, −0.08]** | **−0.14 [−0.20, −0.07]** | 0.02 [−0.05, 0.09] | −0.04 [−0.10, 0.03] | **−0.25 [−0.33, −0.16]** | −0.06 [−0.13, 0.01] | **0.12 [0.03, 0.20]** |
| N Change | −0.13 [−0.26, 0.01] | −0.10 [−0.24, 0.04] | −0.15 [−0.32, 0.02] | 0.12 [−0.04, 0.29] | 0.04 [−0.11, 0.18] | **0.25 [0.11, 0.40]** | −0.16 [−0.36, −0.03] |
| E Level | **0.13 [0.07, 0.19]** | **0.12 [0.06, 0.19]** | −0.01 [−0.07, 0.05] | 0.02 [−0.04, 0.08] | **0.16 [0.07, 0.25]** | 0.00 [−0.07, 0.07] | −0.05 [−0.13, 0.04] |
| E Change | 0.04 [−0.10, 0.19] | 0.04 [−0.11, 0.19] | −0.04 [−0.21, 0.14] | 0.00 [−0.18, 0.17] | −0.03 [−0.18, 0.13] | −0.12 [−0.26, 0.02] | 0.02 [−0.22, 0.26] |
| O Level | **0.28 [0.22, 0.34]** | **0.24 [0.17, 0.31]** | **0.15 [0.08, 0.22]** | 0.01 [−0.05, 0.08] | **0.24 [0.15, 0.33]** | −0.04 [−0.11, 0.03] | 0.06 [−0.03, 0.15] |
| O Change | 0.14 [−0.05, 0.32] | 0.16 [−0.03, 0.35] | −0.13 [−0.28, 0.02] | 0.12 [−0.08, 0.31] | 0.16 [−0.04, 0.35] | −0.25 [−0.44, −0.06] | **−0.43 [−0.74, −0.12]** |
| *MIDUS* | | | | | | | |
| N Level | **−0.14 [−0.18, −0.10]** | **−0.15 [−0.19, −0.11]** | −0.03 [−0.067, 0.001] | **0.06 [0.02, 0.09]** | **−0.16 [−0.20, −0.11]** | **−0.15 [−0.18, −0.12]** | −0.02 [−0.06, 0.02] |
| N Change | −0.07 [−0.17, 0.02] | −0.07 [−0.18, 0.04] | 0.03 [−0.07, 0.13] | −0.05 [−0.16, 0.05] | −0.10 [−0.22, 0.02] | 0.05 [−0.05, 0.16] | −0.02 [−0.14, 0.10] |
| E Level | −0.01 [−0.05, 0.02] | **−0.04 [−0.077, −0.001]** | 0.00 [−0.02, 0.04] | 0.00 [−0.03, 0.04] | −0.03 [−0.07, 0.01] | −0.02 [−0.05, 0.01] | −0.04 [−0.074, 0.003] |
| E Change | 0.09 [−0.01, 0.19] | 0.08 [−0.02, 0.18] | −0.08 [−0.17, 0.01] | 0.07 [−0.02, 0.17] | **0.15 [0.04, 0.26]** | 0.04 [−0.05, 0.13] | **0.17 [0.05, 0.29]** |
| O Level | **0.20 [0.16, 0.23]** | **0.17 [0.14, 0.21]** | **0.12 [0.09, 0.15]** | −0.04 [−0.071, −0.001] | **0.23 [0.19, 0.27]** | **−0.06 [−0.09, −0.03]** | **0.07 [0.03, 0.11]** |
| O Change | 0.01 [−0.06, 0.08] | 0.03 [−0.05, 0.11] | −0.06 [−0.13, 0.01] | 0.03 [−0.05, 0.10] | 0.01 [−0.07, 0.08] | 0.02 [−0.05, 0.09] | −0.02 [−0.10, 0.07] |
| C Level | **0.14 [0.10, 0.18]** | **0.16 [0.12, 0.21]** | 0.01 [−0.03, 0.05] | −0.06 [−0.10, −0.02] | **0.14 [0.09, 0.18]** | **0.07 [0.04, 0.11]** | −0.03 [−0.08, 0.01] |
| C Change | 0.08 [−0.05, 0.21] | 0.13 [−0.03, 0.28] | −0.08 [−0.21, 0.06] | 0.00 [−0.14, 0.14] | 0.17 [0.01, 0.32] | **−0.45 [−0.66, −0.23]** | 0.19 [0.02, 0.36] |
| A Level | **−0.11 [−0.15, −0.08]** | **−0.10 [−0.14, −0.07]** | −0.02 [−0.05, 0.01] | 0.00 [−0.04, 0.04] | **−0.12 [−0.16, −0.08]** | **0.09 [0.06, 0.12]** | −0.02 [−0.06, 0.02] |
| A Change | 0.04 [−0.05, 0.13] | 0.02 [−0.07, 0.12] | −0.02 [−0.10, 0.07] | 0.07 [−0.03, 0.16] | 0.08 [−0.02, 0.18] | −0.06 [−0.15, 0.03] | 0.11 [−0.001, 0.219] |
| *HRS* | | | | | | | |
| N Level | **−0.15 [−0.17, −0.13]** | **−0.14 [−0.17, −0.12]** | **−0.03 [−0.052, −0.008]** | **0.07 [0.05, 0.09]** | **−0.12 [−0.15, −0.09]** | **−0.19 [−0.21, −0.17]** | **−0.08 [−0.11, −0.05]** |
| N Change | **0.06 [0.02, 0.09]** | **0.08 [0.04, 0.13]** | −0.02 [−0.07, 0.02] | **−0.12 [−0.17, −0.08]** | **0.05 [0.01, 0.10]** | **0.20 [0.15, 0.25]** | 0.04 [−0.02, 0.10] |
| E Level | **0.08 [0.06, 0.10]** | **0.08 [0.06, 0.10]** | 0.00 [−0.02, 0.02] | **−0.04 [−0.07, −0.02]** | **0.03 [0.01, 0.06]** | **−0.03 [−0.05, −0.01]** | **0.06 [0.03, 0.09]** |
| E Change | **0.09 [0.06, 0.13]** | **0.06 [0.01, 0.10]** | **0.09 [0.04, 0.13]** | 0.01 [−0.04, 0.05] | **0.07 [0.03, 0.11]** | **−0.23 [−0.28, −0.19]** | 0.02 [−0.03, 0.07] |
| O Level | **0.26 [0.24, 0.28]** | **0.21 [0.19, 0.23]** | **0.15 [0.13, 0.17]** | **−0.05 [−0.07, −0.03]** | **0.13 [0.11, 0.16]** | **−0.09 [−0.11, −0.07]** | **0.16 [0.14, 0.19]** |
| O Change | **0.06 [0.02, 0.10]** | 0.02 [−0.03, 0.06] | **0.07 [0.02, 0.12]** | 0.02 [−0.03, 0.07] | 0.04 [−0.01, 0.09] | **−0.27 [−0.33, −0.22]** | 0.06 [−0.004, 0.120] |
| C Level | **0.22 [0.20, 0.24]** | **0.19 [0.17, 0.21]** | **0.07 [0.04, 0.09]** | **−0.06 [−0.08, −0.04]** | **0.12 [0.09, 0.15]** | **−0.05 [−0.07, −0.03]** | **0.12 [0.09, 0.15]** |
| C Change | **0.09 [0.05, 0.13]** | 0.03 [−0.01, 0.07] | **0.12 [0.08, 0.17]** | 0.01 [−0.03, 0.06] | 0.05 [0.01, 0.09] | **−0.29 [−0.34, −0.24]** | **0.07 [0.02, 0.12]** |
| A Level | **0.05 [0.03, 0.07]** | **0.06 [0.04, 0.08]** | −0.01 [−0.03, 0.01] | **−0.09 [−0.12, −0.07]** | **0.03 [0.01, 0.06]** | 0.00 [−0.02, 0.02] | 0.02 [−0.01, 0.05] |
| A Change | **0.15 [0.10, 0.19]** | **0.12 [0.07, 0.17]** | **0.15 [0.10, 0.21]** | −0.05 [−0.105, 0.004] | **0.08 [0.03, 0.13]** | **−0.19 [−0.25, −0.13]** | **0.15 [0.09, 0.22]** |

*Note:* Estimates significant after applying Benjamini-Hochberg correction are in bold.

Abbreviations: A, agreeableness; aSES, adulthood SES at baseline; C, conscientiousness; cSES, childhood SES; E, extraversion; N, neuroticism; O, openness.

**TABLE 2** Standardized estimates and 95% confidence intervals for the effects of education and the moderating effects of childhood SES and baseline age of personality change on the levels and changes in personality trait domains.

| | Effects of education | Moderating effects of cSES | | | Moderating effects of age | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Education | Education | cSES | Education × cSES | Education | Age | Education × age |
| *SATSA* | | | | | | | |
| N Level | **−0.07 [−0.12, −0.02]** | −0.07 [−0.12, −0.01] | 0.00 [−0.08, 0.08] | −0.01 [−0.07, 0.06] | −0.06 [−0.11, 0.00] | 0.00 [−0.07, 0.06] | −0.03 [−0.09, 0.02] |
| N Change | −0.05 [−0.14, 0.04] | −0.03 [−0.14, 0.07] | −0.15 [−0.30, 0.01] | 0.09 [−0.04, 0.22] | −0.01 [−0.10, 0.09] | **0.26 [0.11, 0.41]** | −0.08 [−0.20, 0.04] |
| E Level | **0.09 [0.03, 0.15]** | **0.11 [0.04, 0.18]** | 0.00 [−0.07, 0.07] | −0.04 [−0.10, 0.03] | 0.08 [0.02, 0.15] | −0.04 [−0.10, 0.03] | 0.00 [−0.07, 0.06] |
| E Change | **−0.13 [−0.22, −0.03]** | **−0.15 [−0.25, −0.04]** | 0.03 [−0.13, 0.18] | 0.03 [−0.10, 0.15] | **−0.16 [−0.26, −0.06]** | −0.16 [−0.31, −0.01] | −0.02 [−0.15, 0.11] |
| O Level | **0.34 [0.29, 0.40]** | **0.31 [0.25, 0.37]** | **0.11 [0.04, 0.18]** | −0.04 [−0.11, 0.02] | **0.30 [0.24, 0.36]** | −0.06 [−0.13, 0.01] | 0.05 [−0.01, 0.11] |
| O Change | 0.08 [−0.04, 0.20] | 0.10 [−0.03, 0.23] | −0.14 [−0.30, 0.03] | 0.09 [−0.06, 0.25] | 0.04 [−0.08, 0.16] | −0.25 [−0.43, −0.06] | −0.03 [−0.19, 0.13] |
| *MIDUS* | | | | | | | |
| N Level | **−0.14 [−0.17, −0.11]** | **−0.13 [−0.17, −0.10]** | −0.03 [−0.06, 0.01] | **0.06 [0.03, 0.09]** | **−0.16 [−0.19, −0.13]** | **−0.16 [−0.20, −0.13]** | 0.01 [−0.03, 0.04] |
| N Change | −0.01 [−0.10, 0.08] | 0.00 [−0.10, 0.09] | 0.01 [−0.08, 0.11] | −0.13 [−0.23, −0.02] | −0.01 [−0.10, 0.09] | 0.07 [−0.04, 0.17] | −0.06 [−0.17, 0.05] |
| E Level | **−0.04 [−0.07, −0.01]** | **−0.07 [−0.11, −0.04]** | **0.10 [0.07, 0.14]** | −0.01 [−0.04, 0.02] | **−0.05 [−0.08, −0.01]** | −0.02 [−0.05, 0.01] | −0.02 [−0.05, 0.01] |
| E Change | 0.02 [−0.06, 0.10] | 0.03 [−0.06, 0.11] | −0.06 [−0.15, 0.03] | 0.11 [0.02, 0.20] | 0.04 [−0.04, 0.12] | 0.04 [−0.05, 0.13] | 0.12 [0.02, 0.21] |
| O Level | **0.22 [0.19, 0.25]** | **0.18 [0.15, 0.21]** | **0.11 [0.08, 0.14]** | −0.04 [−0.07, −0.01] | **0.22 [0.19, 0.25]** | **−0.05 [−0.08, −0.02]** | **0.04 [0.01, 0.07]** |
| O Change | 0.01 [−0.05, 0.07] | 0.03 [−0.04, 0.09] | −0.06 [−0.13, 0.01] | 0.03 [−0.03, 0.10] | 0.01 [−0.05, 0.07] | 0.02 [−0.05, 0.09] | −0.01 [−0.08, 0.06] |
| C Level | **0.14 [0.10, 0.17]** | **0.13 [0.10, 0.17]** | 0.01 [−0.02, 0.05] | −0.04 [−0.072, −0.002] | **0.14 [0.11, 0.18]** | **0.08 [0.05, 0.12]** | −0.04 [−0.071, −0.001] |
| C Change | 0.04 [−0.08, 0.16] | 0.06 [−0.07, 0.19] | −0.06 [−0.20, 0.07] | 0.05 [−0.07, 0.18] | 0.02 [−0.10, 0.14] | **−0.45 [−0.68, −0.23]** | 0.09 [−0.05, 0.22] |
| A Level | **−0.11 [−0.15, −0.08]** | **−0.11 [−0.14, −0.08]** | −0.02 [−0.05, 0.02] | −0.02 [−0.05, 0.01] | **−0.11 [−0.14, −0.08]** | **0.08 [0.05, 0.11]** | −0.03 [−0.062, −0.001] |
| A Change | 0.04 [−0.04, 0.12] | 0.04 [−0.04, 0.13] | −0.01 [−0.10, 0.07] | 0.06 [−0.03, 0.14] | 0.06 [−0.03, 0.14] | −0.06 [−0.15, 0.03] | **0.13 [0.03, 0.23]** |
| *HRS* | | | | | | | |
| N Level | **−0.17 [−0.19, −0.15]** | **−0.15 [−0.17, −0.13]** | −0.02 [−0.040, 0.004] | 0.02 [0.003, 0.045] | **−0.21 [−0.24, −0.18]** | **−0.18 [−0.20, −0.16]** | 0.02 [−0.01, 0.05] |
| N Change | **0.08 [0.04, 0.12]** | **0.07 [0.02, 0.12]** | −0.02 [−0.07, 0.03] | **−0.07 [−0.12, −0.03]** | **0.16 [0.09, 0.22]** | **0.21 [0.16, 0.26]** | −0.07 [−0.140, −0.003] |
| E Level | **0.08 [0.06, 0.09]** | **0.06 [0.04, 0.09]** | 0.00 [−0.02, 0.02] | **−0.03 [−0.05, −0.01]** | 0.02 [−0.01, 0.05] | **−0.04 [−0.06, −0.02]** | **0.06 [0.03, 0.09]** |
| E Change | **0.10 [0.06, 0.14]** | 0.05 [0.002, 0.098] | **0.09 [0.04, 0.13]** | −0.01 [−0.05, 0.04] | **0.14 [0.08, 0.20]** | **−0.24 [−0.28, −0.19]** | −0.05 [−0.12, 0.02] |
| O Level | **0.31 [0.29, 0.33]** | **0.27 [0.25, 0.30]** | **0.12 [0.09, 0.14]** | **0.05 [0.03, 0.07]** | **0.27 [0.24, 0.30]** | **−0.11 [−0.13, −0.09]** | 0.03 [0.001, 0.056] |
| O Change | **0.08 [0.04, 0.13]** | 0.05 [−0.01, 0.10] | **0.07 [0.01, 0.12]** | 0.02 [−0.03, 0.07] | 0.08 [0.01, 0.15] | **−0.28 [−0.34, −0.22]** | 0.02 [−0.05, 0.10] |
| C Level | **0.24 [0.23, 0.26]** | **0.23 [0.21, 0.26]** | **0.04 [0.02, 0.07]** | **0.03 [0.01, 0.05]** | **0.21 [0.18, 0.25]** | **−0.07 [−0.09, −0.04]** | 0.02 [−0.01, 0.05] |
| C Change | **0.13 [0.09, 0.17]** | **0.08 [0.03, 0.13]** | **0.11 [0.06, 0.15]** | 0.03 [−0.02, 0.07] | **0.13 [0.07, 0.19]** | **−0.29 [−0.34, −0.24]** | 0.00 [−0.06, 0.07] |
| A Level | **0.07 [0.06, 0.09]** | 0.04 [0.01, 0.06] | 0.00 [−0.03, 0.02] | **−0.10 [−0.12, −0.07]** | **0.06 [0.03, 0.09]** | 0.00 [−0.02, 0.02] | 0.01 [−0.02, 0.04] |
| A Change | **0.25 [0.19, 0.30]** | **0.18 [0.12, 0.24]** | **0.13 [0.08, 0.19]** | 0.00 [−0.06, 0.05] | **0.27 [0.19, 0.35]** | **−0.20 [−0.26, −0.14]** | −0.05 [−0.13, 0.03] |

*Note*: Estimates significant after applying Benjamini-Hochberg correction are in bold.

Abbreviations: A, agreeableness; C, conscientiousness; cSES, childhood SES; E, extraversion; N, neuroticism; O, openness.

**TABLE 3** Standardized estimates and 95% confidence intervals for the effects of financial status and the moderating effects of childhood SES and baseline age of personality change on the levels and changes in personality trait domains.

| | Effects of finance | Moderating effects of cSES | | | Moderating effects of age | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | Finance | Finance | cSES | Finance × cSES | Finance | Age | Finance × age |
| *SATSA* | | | | | | | |
| N Level | **−0.14 [−0.20, −0.08]** | **−0.14 [−0.20, −0.07]** | 0.00 [−0.06, 0.06] | −0.04 [−0.10, 0.02] | **−0.25 [−0.33, −0.17]** | −0.05 [−0.12, 0.02] | **0.13 [0.05, 0.21]** |
| N Change | −0.12 [−0.26, 0.02] | −0.11 [−0.24, 0.03] | −0.14 [−0.28, 0.01] | 0.11 [−0.04, 0.26] | 0.02 [−0.12, 0.17] | **0.25 [0.11, 0.39]** | −0.16 [−0.36, 0.04] |
| E Level | **0.11 [0.05, 0.17]** | **0.10 [0.04, 0.16]** | 0.01 [−0.05, 0.07] | 0.03 [−0.03, 0.09] | **0.13 [0.04, 0.22]** | −0.02 [−0.09, 0.05] | −0.03 [−0.12, 0.05] |
| E Change | 0.13 [−0.02, 0.28] | 0.12 [−0.02, 0.27] | −0.04 [−0.18, 0.11] | −0.01 [−0.17, 0.15] | 0.08 [−0.08, 0.23] | −0.09 [−0.23, 0.04] | 0.01 [−0.24, 0.25] |
| O Level | **0.19 [0.13, 0.26]** | **0.16 [0.10, 0.23]** | **0.19 [0.13, 0.25]** | 0.01 [−0.05, 0.07] | **0.09 [0.01, 0.18]** | **−0.09 [−0.16, −0.02]** | **0.12 [0.03, 0.21]** |
| O Change | 0.09 [−0.09, 0.27] | 0.11 [−0.08, 0.29] | −0.09 [−0.22, 0.05] | 0.12 [−0.05, 0.28] | 0.12 [−0.06, 0.31] | **−0.28 [−0.47, −0.10]** | −0.40 [−0.71, −0.08] |
| *MIDUS* | | | | | | | |
| N Level | **−0.10 [−0.13, −0.07]** | **−0.09 [−0.13, −0.06]** | **−0.06 [−0.09, −0.03]** | 0.01 [−0.03, 0.04] | **−0.13 [−0.16, −0.09]** | **−0.16 [−0.20, −0.13]** | −0.03 [−0.07, 0.01] |
| N Change | −0.01 [−0.09, 0.07] | −0.01 [−0.10, 0.08] | 0.01 [−0.08, 0.10] | −0.03 [−0.13, 0.06] | 0.01 [−0.08, 0.11] | 0.08 [−0.03, 0.19] | 0.08 [−0.03, 0.20] |
| E Level | **0.05 [0.02, 0.08]** | **0.04 [0.01, 0.07]** | **0.07 [0.04, 0.10]** | −0.01 [−0.04, 0.02] | **0.05 [0.01, 0.08]** | −0.02 [−0.05, 0.02] | −0.01 [−0.04, 0.02] |
| E Change | **0.11 [0.03, 0.20]** | **0.10 [0.02, 0.19]** | −0.06 [−0.14, 0.02] | 0.08 [−0.01, 0.16] | **0.15 [0.05, 0.24]** | 0.07 [−0.02, 0.15] | 0.11 [0.01, 0.20] |
| O Level | **0.07 [0.04, 0.10]** | **0.05 [0.02, 0.08]** | **0.16 [0.13, 0.19]** | 0.00 [−0.03, 0.03] | **0.09 [0.05, 0.12]** | **−0.05 [−0.08, −0.02]** | **0.06 [0.02, 0.09]** |
| O Change | 0.06 [0.00, 0.13] | 0.07 [0.001, 0.132] | −0.06 [−0.128, 0.004] | 0.02 [−0.05, 0.08] | 0.08 [0.01, 0.14] | 0.03 [−0.04, 0.10] | 0.06 [−0.02, 0.13] |
| C Level | **0.13 [0.10, 0.17]** | **0.13 [0.09, 0.17]** | 0.04 [−0.001, 0.070] | −0.02 [−0.06, 0.01] | **0.14 [0.11, 0.18]** | **0.08 [0.05, 0.12]** | 0.02 [−0.02, 0.06] |
| C Change | 0.16 [0.02, 0.30] | 0.17 [0.03, 0.32] | −0.07 [−0.20, 0.06] | 0.01 [−0.11, 0.14] | 0.16 [0.02, 0.29] | **−0.44 [−0.66, −0.22]** | 0.06 [−0.07, 0.20] |
| A Level | **−0.09 [−0.12, −0.06]** | **−0.08 [−0.11, −0.05]** | **−0.04 [−0.07, −0.01]** | 0.00 [−0.03, 0.03] | **−0.08 [−0.12, −0.05]** | **0.09 [0.05, 0.12]** | −0.01 [−0.04, 0.03] |
| A Change | 0.07 [−0.01, 0.15] | 0.05 [−0.03, 0.13] | −0.01 [−0.09, 0.07] | 0.09 [0.003, 0.170] | 0.08 [−0.002, 0.169] | −0.04 [−0.13, 0.05] | 0.05 [−0.04, 0.15] |
| *HRS* | | | | | | | |
| N Level | **−0.05 [−0.07, −0.04]** | **−0.10 [−0.13, −0.07]** | **−0.09 [−0.11, −0.07]** | **0.07 [0.03, 0.10]** | **−0.05 [−0.07, −0.03]** | **−0.16 [−0.18, −0.14]** | **−0.04 [−0.06, −0.02]** |
| N Change | 0.01 [−0.02, 0.04] | **0.09 [0.02, 0.15]** | 0.02 [−0.02, 0.06] | **−0.10 [−0.18, −0.03]** | 0.02 [−0.02, 0.05] | **0.19 [0.14, 0.24]** | 0.01 [−0.03, 0.05] |
| E Level | **0.04 [0.02, 0.06]** | **0.07 [0.04, 0.11]** | **0.03 [0.01, 0.05]** | **−0.05 [−0.09, −0.02]** | 0.02 [0.002, 0.042] | **−0.04 [−0.06, −0.02]** | **0.03 [0.01, 0.05]** |
| E Change | **0.04 [0.01, 0.07]** | 0.04 [−0.02, 0.11] | **0.10 [0.06, 0.14]** | −0.02 [−0.08, 0.05] | 0.03 [−0.003, 0.059] | **−0.24 [−0.28, −0.19]** | 0.04 [−0.001, 0.073] |
| O Level | **0.08 [0.06, 0.10]** | **0.12 [0.09, 0.15]** | **0.23 [0.21, 0.24]** | **−0.08 [−0.11, −0.05]** | **0.04 [0.02, 0.06]** | **−0.13 [−0.15, −0.11]** | **0.07 [0.05, 0.09]** |
| O Change | 0.03 [−0.01, 0.06] | 0.02 [−0.05, 0.09] | **0.07 [0.03, 0.12]** | 0.00 [−0.08, 0.08] | 0.02 [−0.02, 0.05] | **−0.27 [−0.33, −0.22]** | 0.03 [−0.01, 0.08] |
| C Level | **0.08 [0.06, 0.10]** | **0.15 [0.11, 0.18]** | **0.14 [0.12, 0.16]** | **−0.11 [−0.14, −0.08]** | **0.05 [0.03, 0.07]** | **−0.08 [−0.10, −0.06]** | **0.06 [0.04, 0.08]** |
| C Change | 0.03 [0.002, 0.064] | −0.01 [−0.07, 0.06] | **0.13 [0.09, 0.17]** | 0.03 [−0.04, 0.10] | 0.02 [−0.01, 0.05] | **−0.29 [−0.34, −0.24]** | 0.04 [0.01, 0.08] |
| A Level | 0.00 [−0.02, 0.02] | **0.04 [0.01, 0.08]** | **0.03 [0.01, 0.05]** | **−0.05 [−0.09, −0.02]** | 0.01 [−0.01, 0.03] | −0.02 [−0.04, 0.01] | **−0.02 [−0.045, −0.003]** |
| A Change | **0.05 [0.01, 0.09]** | 0.08 [−0.001, 0.152] | **0.20 [0.14, 0.25]** | −0.05 [−0.13, 0.04] | 0.03 [−0.01, 0.07] | **−0.20 [−0.26, −0.14]** | **0.11 [0.06, 0.16]** |

*Note:* Estimates significant after applying Benjamini-Hochberg correction are in bold. For financial status, material resources were assessed in SATSA and household income was assessed in MIDUS and HRS.

Abbreviations: A, agreeableness; C, conscientiousness; cSES, childhood SES; E, extraversion; N, neuroticism; O, openness.

**TABLE 4** Standardized estimates and 95% confidence intervals for the effects of occupational status and the moderating effects of childhood SES and baseline age of personality change on the levels and changes in personality trait domains.

| | Effects of OS | Moderating effects of cSES | | | Moderating effects of age | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | OS | OS | cSES | OS × cSES | OS | Age | OS × age |
| *SATSA* | | | | | | | |
| N Level | −0.07 [−0.148, 0.004] | −0.06 [−0.15, 0.03] | 0.00 [−0.08, 0.08] | −0.04 [−0.13, 0.06] | −0.11 [−0.19, −0.02] | 0.01 [−0.05, 0.07] | 0.04 [−0.05, 0.14] |
| N Change | 0.02 [−0.10, 0.15] | 0.02 [−0.12, 0.16] | −0.18 [−0.34, −0.02] | 0.13 [−0.05, 0.31] | 0.06 [−0.07, 0.19] | **0.25 [0.11, 0.39]** | −0.01 [−0.23, 0.20] |
| E Level | **0.09 [0.02, 0.17]** | 0.09 [0.004, 0.166] | 0.02 [−0.05, 0.09] | −0.03 [−0.11, 0.05] | 0.10 [0.01, 0.19] | −0.05 [−0.12, 0.01] | −0.03 [−0.11, 0.06] |
| E Change | **−0.16 [−0.29, −0.04]** | −0.18 [−0.33, −0.03] | 0.00 [−0.16, 0.16] | 0.05 [−0.13, 0.22] | −0.18 [−0.31, −0.04] | −0.12 [−0.26, 0.02] | −0.10 [−0.28, 0.09] |
| O Level | **0.28 [0.21, 0.36]** | **0.25 [0.16, 0.34]** | **0.14 [0.07, 0.22]** | −0.01 [−0.10, 0.08] | **0.28 [0.19, 0.36]** | **−0.12 [−0.19, −0.06]** | 0.04 [−0.06, 0.13] |
| O Change | −0.02 [−0.20, 0.16] | 0.03 [−0.17, 0.22] | 0.01 [−0.17, 0.18] | −0.08 [−0.33, 0.17] | −0.02 [−0.20, 0.16] | **−0.29 [−0.47, −0.12]** | **−0.36 [−0.65, −0.06]** |
| *MIDUS* | | | | | | | |
| N Level | **−0.11 [−0.14, −0.07]** | **−0.11 [−0.15, −0.07]** | **−0.05 [−0.08, −0.01]** | **0.08 [0.04, 0.11]** | **−0.13 [−0.17, −0.09]** | **−0.15 [−0.18, −0.12]** | −0.03 [−0.07, 0.01] |
| N Change | −0.06 [−0.16, 0.03] | −0.06 [−0.16, 0.05] | 0.02 [−0.08, 0.11] | −0.03 [−0.14, 0.07] | −0.09 [−0.20, 0.03] | 0.05 [−0.05, 0.15] | −0.05 [−0.17, 0.07] |
| E Level | −0.02 [−0.06, 0.01] | −0.04 [−0.08, −0.01] | **0.09 [0.06, 0.12]** | 0.00 [−0.04, 0.03] | −0.03 [−0.07, 0.01] | −0.02 [−0.05, 0.01] | −0.01 [−0.05, 0.03] |
| E Change | 0.01 [−0.09, 0.10] | 0.01 [−0.08, 0.10] | −0.04 [−0.13, 0.05] | 0.04 [−0.05, 0.13] | 0.06 [−0.04, 0.15] | 0.05 [−0.04, 0.13] | 0.11 [−0.002, 0.216] |
| O Level | **0.19 [0.16, 0.23]** | **0.17 [0.14, 0.21]** | **0.13 [0.10, 0.16]** | −0.05 [−0.08, −0.01] | **0.23 [0.19, 0.27]** | **−0.06 [−0.09, −0.03]** | **0.08 [0.04, 0.12]** |
| O Change | −0.04 [−0.11, 0.03] | −0.03 [−0.10, 0.04] | −0.04 [−0.11, 0.03] | 0.02 [−0.05, 0.10] | −0.05 [−0.13, 0.03] | 0.02 [−0.05, 0.09] | −0.03 [−0.11, 0.06] |
| C Level | **0.09 [0.05, 0.13]** | **0.10 [0.06, 0.15]** | 0.03 [−0.01, 0.07] | **−0.08 [−0.12, −0.04]** | **0.10 [0.05, 0.14]** | **0.07 [0.04, 0.11]** | −0.01 [−0.05, 0.04] |
| C Change | 0.06 [−0.07, 0.18] | 0.08 [−0.06, 0.22] | −0.05 [−0.18, 0.08] | −0.01 [−0.15, 0.13] | 0.13 [−0.03, 0.27] | **−0.44 [−0.65, −0.23]** | 0.18 [0.01, 0.35] |
| A Level | **−0.09 [−0.12, −0.05]** | **−0.08 [−0.12, −0.04]** | −0.03 [−0.063, 0.001] | −0.01 [−0.04, 0.03] | **−0.10 [−0.13, −0.06]** | **0.09 [0.06, 0.12]** | −0.02 [−0.06, 0.02] |
| A Change | 0.04 [−0.05, 0.13] | 0.02 [−0.06, 0.11] | −0.01 [−0.09, 0.08] | 0.05 [−0.04, 0.14] | 0.07 [−0.03, 0.17] | −0.05 [−0.14, 0.04] | 0.08 [−0.03, 0.18] |

*Note*: Estimates significant after applying Benjamini-Hochberg correction are in bold.

Abbreviations: A, agreeableness; C, conscientiousness; cSES, childhood SES; E, extraversion; N, neuroticism; O, openness; OS, occupational status.

level of conscientiousness in both MIDUS and HRS and negatively related to the agreeableness level in MIDUS but positively linked to the agreeableness level in HRS. When financial status at baseline was tested (Table 3), negative relations with neuroticism level, positive relations with the levels of extraversion and openness in the 3 samples, and positive relations with conscientiousness level in MIDUS and HRS were observed. A negative relation between income and the level of agreeableness emerged in MIDUS but not HRS. The effects of occupational status were examined in SATSA and MIDUS. As Table 4 depicts, across the 2 samples, occupational status showed positive relations with the level of openness. In MIDUS, higher occupational status was also found to be linked to a higher level of conscientiousness but a lower level of agreeableness. Regarding changes in personality traits, consistent with the results found for the SES composite, positive relations between education and changes in all five trait domains were found in HRS. Higher household income at baseline was consistently related to increases in extraversion (but not material resources in SATSA) in both MIDUS and HRS, as well as to increases in agreeableness in HRS.

We also conducted analyses to examine the associations of baseline SES composite and its constituting components and levels of and changes in personality traits at the nuance level. Overall, the pattern found at the domain level could be generalized to the nuance level such that higher SES was related to positive levels of/changes in personality traits. The effects of SES and its components were more observable on the levels than changes in the nuances. Details of the results can be found in the supplement (Tables S5–S7).

## 3.3 | Moderating effects of childhood socioeconomic status

As presented in Tables S2–S4, across the 3 samples, childhood SES showed small to moderate positive correlations ($r_s = 0.12$–$0.51$) to adulthood SES composite and different components. Estimates of the moderating effects of childhood SES on the relations between SES composite and its constituting components at baseline and levels of and changes in personality traits can be found in Tables 1–4. We focus on interpreting the effects of the interaction between baseline SES in adulthood and childhood SES. For levels of personality traits, no consistent support was found for the stress sensitization hypothesis across samples. Replicable moderating effects of childhood SES were only observed for the level of neuroticism (in MIDUS and HRS); however, the direction was contrary to the stress sensitization hypothesis.

In terms of changes in personality traits, sensitizing effects of childhood SES were only found in HRS. Specifically, in HRS, although high levels of SES, education, and household income were related to increases in neuroticism (contrary to our expectation), as Tables 1–3 indicate, such undesirable effects of high SES were reduced among individuals with high childhood SES.

## 3.4 | Moderating effects of age

Tables 1–4 display the moderating effects of baseline age on the connections between SES composite and its components and levels of and changes in personality trait domains. As Table 3 presents, when compared to younger individuals, the positive effects of high household income on the level of openness were consistently found to be stronger among older individuals in both MIDUS and HRS. Compared to SATSA and MIDUS, the moderating effects of age were more observable in HRS. In HRS, the beneficial effects of higher SES, education attainment, and household income on the level of extraversion were more salient among older individuals than those who were younger in age. A consistent pattern emerged for the associations between SES composite, household income, and the levels of neuroticism, openness, and conscientiousness. Similarly, the beneficial effects of higher SES composite and higher household income on changes in agreeableness were more observable among older than younger individuals.

## 3.5 | Additional analyses at the within-person level

Although education, occupational status, and household income/material resources are common indicators of SES, compared to education, occupational status and household income/material resources are more likely to vary across time in adulthood. Given the dynamic nature of both SES indicators and personality traits, we conducted additional analyses to examine the reciprocal relations between changes in household income/material resources (longitudinal data of occupational status are not available in the samples) and changes in personality traits within individuals over time after controlling for their between-person variance. Random intercept cross-lagged panel models (RI-CLPMs) were fitted to data of the three samples (details about the analyses are presented in the supplement). As shown in Table S8, consistently, at the between-person level, higher levels of household income/material resources were linked to lower neuroticism and higher extraversion, openness, conscientiousness, and

agreeableness across samples. However, although changes in personality traits displayed effects on changes in household income/material resources at the within-person level in each sample, no replicable pattern was found across samples (Tables S9–S11).

# 4 | DISCUSSION

The current study investigated the effects of SES on levels of and changes in the Big Five personality traits in adulthood using data from SATSA, MIDUS, and HRS. Across the 3 samples, overall, the SES composite and its constituting components demonstrated negative effects on the level of neuroticism and positive effects on the levels of extraversion, openness, and conscientiousness. When compared to the samples from SATSA and MIDUS, the effects of SES measures on changes in personality traits were more likely to be observed in the HRS sample, in which the majority of participants were assessed during the aging process and were older than those in the other two samples across assessment occasions. When the generalizability of the SES-personality associations was examined across individuals differ in childhood SES and age, childhood SES did not moderate the associations between adulthood SES and personality level and change. When the moderating effects of baseline age were examined, in general, the effects were more observable in HRS than in SATSA and MIDUS such that the beneficial effects of higher SES on the levels of neuroticism, extraversion, openness, and conscientiousness, as well as changes in agreeableness, were more salient in older individuals than in those were younger.

## 4.1 | Socioeconomic status and personality traits

As expected, individuals with higher SES at baseline displayed lower levels of neuroticism and higher levels of extraversion, openness, and conscientiousness. The findings were generally consistent across different indicators of SES and the 3 samples, suggesting that differential access to various socioeconomic resources was relevant to relatively stable individual differences in these personality traits in adulthood. Individuals with differential access to socioeconomic resources may undertake different social roles and have different experiences of aging-related losses. Given the importance of social roles and development-related gains and losses in shaping personality traits (Mroczek et al., 2021; Roberts & Nickel, 2021), it is possible that such disparities play substantial roles in maintaining differential levels of personality traits

among individuals. Despite the largely convergent findings across samples, different SES indicators consistently showed negative relations to the level of agreeableness in MIDUS, whereas different SES measures generally displayed positive associations with agreeableness levels in HRS. Although most previous studies found an association between lower SES and greater engagement in prosocial behaviors, discrepant findings were also reported by others (Piff & Robinson, 2017). Furthermore, it has been suggested that the relation between social class and prosociality is more nuanced than simple categorical relationships, and different moderators, such as people's motivation and contextual inequality may play roles (Piff & Robinson, 2017). Thus, future research should examine the relation between SES and agreeableness in a more nuanced way by testing the effects of different moderators (e.g., contextual inequality).

Compared to personality levels, results for the effects of SES on changes in personality traits were less consistent across samples. Overall, the effects of the SES composite and its constituting components on changes in personality trait domains were consistently observed in HRS across SES indicators and trait domains but not in SATSA or MIDUS. According to the results, it is possible that SES only exhibits some effects on personality change as people enter the late phases of adulthood but does not show a meaningful impact on personality development earlier in life. As predicted by the SOC theory (Baltes, 1997; Mroczek et al., 2021), people tend to make adjustments and engage in behaviors to compensate for losses related to aging. The influences of SES may be more salient as people become older because compared to those with high SES, people low in SES are likely to experience more losses (e.g., compromised health, shrink in the social network) and have more limited resources to rely on for compensation, leading to divergent trajectories of personality changes among people with different SES. Previous research has shown the effects of aging-related experiences, such as retirement, on changes in personality traits (Schwaba & Bleidorn, 2019). Transition to retirement usually requires people to adapt to a new economic situation and find new goals outside of the work domains (Schwaba & Bleidorn, 2019). Compared to the other two samples, more participants in HRS were likely to have retired or anticipate transitioning to retirement. Thus, future research is needed to examine whether aging-related experiences moderate the effects of SES on personality development. In addition, differences in the operationalization of SES indicators may result in differential links between SES dimensions and changes in personality traits. For example, in the present study, higher household income at baseline was associated with increases in extraversion in MIDUS and HRS.

However, when financial status was operationalized by material resources in SATSA, no connection to changes in extraversion was found. Also, the magnitude of the effects of SES on changes in personality traits was generally small, suggesting that large sample sizes are required to adequately detect these effects. Within each sample, compared to intercepts (modeled for personality levels), there were even higher requirements for power to detect effects for slope parameters, making it less likely for the effects to be significant for changes in personality. In some cases, the effect sizes found in SATSA were comparable to those observed in HRS, thus, the nonsignificance of the effects, especially those for personality changes, may be due to the issue of underpower even though the sample size was large according to common standards. Finally, compared to the two U.S. samples (MIDUS and HRS), the sample in SATSA was originated from a country with a different social welfare system, which may contribute to the discrepancies in the results. Future studies should compare the effects of SES on personality development among samples from countries with different social welfare policies.

## 4.2 | Moderating effects of childhood socioeconomic status and age

Overall, no sensitizing effects of childhood SES were found on the links between adulthood SES and the levels of and changes in personality traits. While stress sensitization suggests heightened negative effects of low adulthood SES on personality development among those with low childhood SES, other theoretical framework proposes more complicated relations between early stress experiences and outcomes later in life. For example, the stress inoculation hypothesis assumes that exposure to a low or high level of stress early in life can have negative effects on subsequent outcomes, whereas exposure to a moderate level of early stress may confer protective effects (Dienstbier, 1989; Liu, 2015). Therefore, it is possible that depending on the links between specific SES dimensions and specific personality trait domains, childhood SES may show differential effects on the SES-personality association. Future research should also examine the potential curvilinear effects of childhood SES on the relations between adulthood SES and levels of personality traits. Also, both the stress sensitization and stress inoculation hypotheses suggest adulthood stress reaction (e.g., psychological stress perception) as a mechanism mediating the effects of childhood SES on subsequent experiences. Hence, future research should incorporate the assessment of adulthood stress reaction to better uncover the relations among childhood SES, adulthood SES, and personality development. Meanwhile, previous research suggested

differential relations between different indicators of childhood SES (e.g., father or mother's educational attainment) and personality traits (Jonassaint et al., 2011). Future studies are needed to further test whether childhood SES displays moderating effects specific to certain indicators. In addition, the time interval between childhood experiences and the assessment of adulthood SES/personality varies across individuals, which may also play a role in how childhood SES impacted the connections between adulthood SES and personality.

We also tested whether the associations between SES and levels of and changes in personality differed across baseline ages. In both MIDUS and HRS, evidence was found for stronger links between household income and the level of openness among individuals who were older at baseline than those younger individuals. Personality traits have been found to reveal a differential pattern of change as people enter old age (Graham et al., 2020; Kandler et al., 2015), indicating that certain factors may function differently in personality development in younger and older ages. The moderating effects of baseline age on the relations between the SES composite and its components and the levels of other trait domains and changes in agreeableness largely emerged in the HRS sample. Together with the differential pattern across samples such that the effects of SES on changes in personality traits were found in HRS only, it is possible that the influences of SES on personality development may be more evident in late adulthood than in younger ages. Compared to those in younger ages, different levels of SES may result in larger discrepancies in age-related challenges in health and other life domains, triggering more divergencies on patterns of thoughts, feelings, and behaviors for adaptation.

## 4.3 | Dynamic relations between socioeconomic status and personality

In addition to interindividual differences in SES and its indicators, there are also intraindividual changes in SES. People's SES is not static across the life course; their education level, especially income, and occupation can change throughout adulthood. Moreover, there may be reciprocal relations between SES and personality. For example, previous work found the effects of personality traits in predicting earnings and occupational attainment (Denissen et al., 2018; Roberts et al., 2007). Therefore, we also conducted analyses to examine the within-person effects of changes in SES on subsequent changes in personality traits and vice versa after controlling for their between-person variance. Although within-person associations between changes in SES components and changes in personality traits emerged in each sample, no consistent pattern was

found across samples. The results suggested that there may be sample-specific and/or study-design-specific factors that influenced the dynamic reciprocal relations between SES change and personality change. Further investigation is needed for future research. In addition, different SES indicators are a sequence of achievements and acquisitions (Antonoplis, 2022). For example, higher educational attainment makes higher levels of occupational status and income more likely. Future work should take the sequence into account and test the mediating effects of occupational status/income on the links between education attainment and personality development.

## 4.4 | Limitations and future directions

The current study has many strengths such as the use of three longitudinal samples across different life phases and the examination of different dimensions of SES. Admittedly, there are qualifications that need to be considered when interpreting the study findings. First, despite the large sample sizes, the majority of participants in the 3 samples were in the stages of middle and late adulthood across measurement occasions (in HRS, participants were mainly in the late phases of middle adulthood and late adulthood). Changes in personality traits in young adulthood were not well captured in the current samples. Research has shown that a substantial amount of changes in personality traits occur in young adulthood (Bleidorn et al., 2021; Roberts & Yoon, 2022). Future research with broader coverage of age is needed to uncover the role of SES in personality development in young adulthood. Second, facet data for personality traits were not available in the present study. Future studies should also examine the effects of SES on levels of and changes in personality traits at the facet level to obtain a more comprehensive understanding of the influences of SES on personality traits across different levels of the trait hierarchy. Third, SES indicators were operationalized in different ways across samples. Future studies should examine how SES indicators operationalized in different ways may lead to differential relations between SES and personality development. Finally, despite the use of multiple samples, all three samples were dominated by participants from the WEIRD populations. Future work is needed to test the generalizability of our results to non-WEIRD samples.

## 5 | CONCLUSION

In the current, we examined the effects of the SES composite and its constituting components on levels of and changes in the Big Five personality traits in adulthood

and during the aging process. Findings from the current study support SES as a source that partially accounts for individual differences in personality traits across adulthood. Regarding changes in personality traits, the current results suggest that SES may play a role in shaping the trajectories of personality development as people enter the late stage of adulthood.

## AUTHOR CONTRIBUTIONS

**Jing Luo**: Conceptualization, Data Curation, Formal Analysis, Writing - Original Draft Preparation, Writing - Review & Editing. **Bo Zhang**: Conceptualization, Formal Analysis, Writing - Review & Editing. **Stephen Antonoplis**: Conceptualization, Writing - Review & Editing. **Daniel K. Mroczek**: Conceptualization, Writing - Review & Editing.

## CONFLICT OF INTEREST
The authors disclose no conflict of interest.

## ETHICS STATEMENT
Data from SATSA, MIDUS, and HRS are publicly available and the use of which is declared by Northwestern University as exempt IRB review.

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## ENDNOTES
[1] In HRS, half of the participants completed psychosocial measures (e.g., personality traits) in 2006, 2010, 2014, and 2018, and the other half completed the measures in 2008, 2012, 2016, and 2020. The two samples were combined to maximize sample size in the longitudinal analyses such that personality traits were assessed every 4 years at 4 time points.

[2] In SATSA, nuances for neuroticism and extraversion were not examined as the items were assessed on a binary scale. Only nuances for openness were tested in SATSA.

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