Article

Longitudinal Associations of Conscientiousness and Neuroticism With Perceived Mastery and Constraints for Aging Adults

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Abstract

It has not been well understood how conscientiousness and neuroticism are associated with two related but distinct dimensions of perceived control (i.e., perceived mastery and constraints) among aging adults. The present study examined these associations and their change over time, while addressing whether they differ by age or gender. For respondents aged 50+ at baseline (N = 2,768) in the Midlife in the United States (MIDUS) study, multilevel modeling analyses were conducted to assess how conscientiousness and neuroticism predicted perceived mastery and constraints over 2 decades. As expected, higher conscientiousness and lower neuroticism (for both between- and within-person variability) predicted higher perceived mastery and lower perceived constraints overall. Nuanced findings emerged related to age, gender and change over time for different associations of conscientiousness and neuroticism with the outcomes. These findings can inform future research suggesting directions of further investigations for these complex associations.

Keywords

perceived mastery, perceived constraints, personality, gender, aging

Introduction

Perceived control, or one's beliefs that they have the ability to influence their life circumstances (Infurna & Okun, 2015; Pearlin & Schooler, 1978), has been studied in relation to aging-related experiences (Lachman et al., 2011), with previous research addressing both its potential antecedents as well as consequences (e.g., health) (e.g., Gerstorf et al., 2011; Infurna & Okun, 2015). However, individual characteristics including personality traits have not been fully addressed as antecedents of perceived control. Thus, further longitudinal research is needed to better understand how personality traits are related to multiple dimensions of perceived control. Since aging-related experiences may have great implications for trajectories of perceived control as discussed later in detail, it is important to address this gap in the literature by examining how personality traits may play a role in developmental trajectories of perceived control among aging adults.

The present study aimed to make a unique contribution by using multilevel modeling to address: 1) associations of personality traits, particularly conscientiousness and neuroticism, with levels and trajectories of different dimensions of perceived control (i.e., perceived mastery and perceived constraints) for aging adults, while taking into consideration the variability of these personality traits between and within individuals; and 2) age and gender differences in these associations.

Multiple Dimensions of Perceived Control and Their Trajectories During Adulthood

While perceived control had been widely studied as a dynamic factor that can be influenced by aging-related and other life experiences (for review, see Lachman et al., 2011; Robinson & Lachman, 2017), recent research (Drewelies et al., 2018; Infurna et al., 2018; Infurna & Mayer, 2015) highlighted the multidimensionality of perceived control, which involves two related but distinct constructs: perceived mastery and perceived constraints. Perceived mastery refers to one's beliefs about their abilities to achieve desired outcomes; in contrast, perceived constraints refers to one's beliefs about having obstacles that interfere with their goal achievement (Drewelies et al., 2018; Skinner, 1996). The present study addressed these two dimensions of perceived control separately that may have different trajectories from middle to late adulthood.

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Theoretically, lifespan developmental theory (Baltes et al., 1980; Baltes & Smith, 2004) may help explain how various factors including age-related experiences can influence perceived mastery and constraints through late adulthood. The theory suggests that all phases of life can involve gains and losses; yet, adults tend to experience decreasing gains (e.g., decreased opportunities to expand their knowledge and skills) and increasing losses (e.g., increased decline in physical abilities and health) as they age (Ebner et al., 2006). While such increased loss-related challenges seem to lead to decreased perceived control (i.e., decreased mastery and increased constraints), previous findings on trajectories of perceived control were somewhat mixed suggesting its stability or decline in late adulthood (for review, see Lachman et al., 2011). However, recent longitudinal research (Drewelies et al., 2017; Infurna & Okun, 2015; Lachman et al., 2009; Mirowsky & Ross, 2007) has shown a curvilinear trend of perceived control peaking in late midlife and acceleratingly declining in later life. When examining the distinct dimensions of perceived control, Lachman and Firth (2004) found age differences cross-sectionally only for perceived constraints (i.e., greater constraints for older individuals), not for perceived mastery, among young, middle-aged, and older participants of the Midlife in the United States (MIDUS). Yet, both for perceived mastery and constraints, the oldest group aged 65–74 at baseline experienced worsened changes (i.e., decreased mastery and increased constraints) over 9 years between two waves of the MIDUS survey longitudinally (Lachman et al., 2009). Lachman et al. (2009) also indicated distinct trends for perceived mastery and constraints, showing that perceived constraints decreased (i.e., improved) while perceived mastery was more stable or had a smaller decrease for middle-aged groups (aged 45–64 at baseline) as compared to the oldest group. Thus, although perceived mastery and constraints may eventually worsen in old age, their trajectories may differ across middle and older adulthood.

Research suggests that demographic factors such as gender and educational level are related to perceived control. Women tend to have lower perceived mastery and higher perceived constraints (Lachman & Firth, 2004). This gender difference, as well as the age difference discussed earlier, may be related to educational level, which is positively related to perceived control: women and older individuals have lower educational levels compared to their male and younger counterparts (Lachman et al., 2011). Thus, when addressing those differences, varying educational levels should be taken into consideration; yet, research (Schieman, 2001; Slagsvold & Sørensen, 2008) also suggests that gender and age differences are still present even after controlling for educational variation. With regard to gender differences, women and men typically have different lifelong experiences (e.g., work, family) that affect their developmental trajectories (Baltes & Smith, 2004). For example, the societal disadvantages that women experience (e.g., less privileged social positions, more limited financial resources) (Calasanti, 2010; O'Rand, 1996) may lead them to face greater constraints or obstacles and decrease their mastery beliefs for successful goal attainment.

Conscientiousness and Neuroticism and Their Relevance to Perceived Mastery and Constraints

Other individual differences, such as personality traits, may account for levels and trajectories of perceived mastery and constraints (Lachman et al., 2011). Among the Big Five personality traits (Goldberg, 1981), the present study specifically addressed conscientiousness and neuroticism considering prior findings on their relevance to perceived control for aging adults (Kandler et al., 2015). Conscientiousness refers to characteristics of being responsible, attentive, self-regulated, and planful; whereas, neuroticism refers to tendencies represented by negative emotionality particularly involving fear, worry, and irritability[1] (Bates et al., 2010). Although these and other personality traits are often considered to be relatively stable during adulthood, recent research suggests that they can continue to develop, potentially being shaped by age-related and other life experiences (Bates et al., 2010; Terracciano et al., 2006). Thus, it is important to address these personality traits as dynamic factors that may change over time.

Previous research showed that higher conscientiousness and lower neuroticism are associated with higher levels of perceived control or closely related constructs (Johnson et al., 2009; Kaiseler et al., 2012; Kandler et al., 2015; McEachan et al., 2010). Conscientiousness and neuroticism may be related to how one views life experiences and their inclination to adopt different approaches to coping with those experiences (Connor-Smith & Flachsbart, 2007; Kaiseler et al., 2012), which may affect their perceived mastery and constraints. For example, when facing aging-related challenges (e.g., increased losses), highly conscientious individuals may attempt to take constructive strategies and use planning and persistence to solve the problems (Connor-Smith & Flachsbart, 2007), which may help them maintain their beliefs about their ability to achieve goals. In contrast, as neuroticism may involve overwhelming emotional reactions to such difficulties, highly neurotic individuals may be likely to disengage from those problems (Connor-Smith & Flachsbart, 2007), possibly thinking that the problems cannot be overcome and viewing them as obstacles for their goal attainment.

Limitations of Previous Research on Personality-Perceived Control Associations

Previous research on associations of personality traits including conscientiousness and neuroticism with perceived control is limited in multiple ways. First, prior research has not addressed potentially varying roles of these personality traits for different dimensions of perceived control including perceived mastery and constraints. Since perceived mastery and constraints are suggested to be distinct constructs, their patterns of associations with personality traits may vary. In addition, prior research tended to focus on examining how differences in

personality traits between individuals (i.e., between-person variations) were associated with perceived control without addressing the within-person variations (i.e., variations over time within the same individual). Thus, longitudinal research is needed to address perceived mastery and constraints as distinct outcomes potentially related to both between- and within-person variations of personality traits.

In addition, while the adult participants of previous studies (e.g., Johnson et al., 2009; Kaiseler et al., 2012; Kandler et al., 2015; McEachan et al., 2010) varied by age, there is a dearth of research addressing age differences in the strength of personality-perceived control associations. If conscientiousness and neuroticism may be related to one's view of and approaches to life challenges, the roles of these personality traits for perceived mastery and constraints may be greater for older adults than younger individuals due to increasing losses with age.

Moreover, there is little research addressing how personality traits are associated with changes or trajectories of perceived control over time. Among few such studies, Kandler et al. (2015) showed that increasing neuroticism and decreasing conscientiousness were associated with decreases in perceived control over 5 years among older adults (aged 64–85 at baseline), though this study did not distinguish between the two dimensions of perceived control. If higher or increased conscientiousness and lower or decreased neuroticism have positive implications for perceived control, it stands to reason that such variations in personality could lead to increased perceived mastery and decreased perceived constraints over time. Thus, trajectories of perceived mastery and constraints may diverge over time between those with different patterns of these personality traits (in terms of both between- and within-person variations). Due to limited prior research, additional longitudinal research is needed to investigate how interpersonal and intrapersonal variations in these personality traits predict not only levels but also trajectories of perceived mastery and constraints over a longer period of time.

Research is also lacking for gender differences in associations between personality and perceived control. Similar to older individuals (of both genders), the role of personality may increase for women, who may experience greater societal challenges than men as discussed earlier, as their personality may affect their appraisals of and approaches to challenging life circumstances (Connor-Smith & Flachsbart, 2007) including perceived potential obstacles for achieving their goals. For example, prior research suggests that neuroticism may have greater negative implications for emotional, psychological, and behavioral outcomes particularly in stressful experiences (Schneider, 2004; Vinkers et al., 2014). Further longitudinal investigations are needed to examine such gender differences.

Purpose of the Present Study

The present study aimed to overcome the aforementioned limitations of previous research and make a unique contribution to the literature by addressing age- and gender-related implications of conscientiousness and neuroticisms for perceived mastery and constraints focusing on middle and late adulthood. This study also sought to disentangle differing implications of between- and within-person variability in the personality traits for these distinct dimensions of perceived control, which is another new direction of inquiry.

The main research question of the present study was whether and how conscientiousness and neuroticism predicted perceived mastery and constraints longitudinally for aging women and men. Building on the aforementioned previous findings, we made multiple hypotheses as outlined below.

> Hypothesis 1. Higher conscientiousness and lower neuroticism, in terms of both their between- and within-person variability, would overall predict higher perceived mastery and lower perceived constraints.

Due to the lack of prior research, we did not make specific hypotheses on possibly different results for the two dimensions of perceived control and for the associations of between- and within-person personality with each of the two outcomes, but rather investigated such possible differences in an exploratory manner.

In addition, despite sparse previous research, based on our aforementioned speculations, we hypothesized the following:

> Hypothesis 2. The associations of higher conscientiousness and lower neuroticism with higher and lower levels of perceived mastery and constraints, respectively, would be stronger for older individuals than younger ones.
>
> Hypothesis 3. These associations would increase over time, as the trajectories of perceived mastery and constraints would diverge over time among those with different patterns of personality traits.
>
> Hypothesis 4. These associations would be stronger for women than men.

Moreover, while it might be possible that these associations would change over time differently among those of varying ages and between women and men, it was too complex to predict such patterns. Thus, we made an additional, nondirectional hypothesis as follows:

> Hypothesis 5. Different patterns would be observed for those of varying ages and for women and men in how conscientiousness and neuroticism were associated with trajectories (as well as levels, as stated in Hypotheses 2 and 4) of perceived mastery and constraints over time.

Method

Data

Data from Midlife in the United States (MIDUS; University of Wisconsin–Madison Institute on Aging, 2020) was used for the present study. MIDUS is a national multi-wave longitudinal

Table 1. Descriptive Statistics of Measures Selected in the Present Study.

Item/Variable		MIDUS1 (1995–1996)	MIDUS2 (2004–2006)	MIDUS3 (2013–2014)	Within-Person Differences Among MIDUS1 (M1), MIDUS2 (M2), and MIDUS3 (M3)
Number of respondents		2,768	1,946	1,198	
Sex (% women)		53%	54%	56%	N/A (see the note below for attrition)
Race (% white)		93%	94%	94%	N/A (see the note below for attrition)
Age (Mean (SD))	Women	60.2 (7.0)	68.5 (6.8)	76.1 (6.0)	N/A (see the note below for attrition)
	Men	60.0 (6.9)	68.3 (6.7)	75.9 (6.1)	
Education (in years) (Mean (SD))	Women	13.0 (2.5)	13.3 (2.5)	13.6 (2.5)	N/A (see the note below for attrition)
	Men	13.8 (3.1)	14.1 (3.0)	14.6 (2.9)	
Chronic health conditions (Mean (SD))	Women	3.18 (2.80)	3.23 (2.79)	4.09 (3.67)	No difference between M1 and M2
	Men	2.62 (2.53)	2.78 (2.87)	3.41 (3.03)	No difference between M1 and M2
Functional limitations (Mean (SD))	Women	1.93 (0.89)	2.23 (0.96)	2.46 (0.97)	All significant
	Men	1.65 (0.80)	1.91 (0.88)	2.18 (0.91)	All significant
Conscientiousness (Mean (SD))	Women	3.48 (0.43)	3.48 (0.45)	3.44 (0.47)	No differences among three waves
	Men	3.39 (0.43)	3.41 (0.46)	3.40 (0.46)	No differences among three waves
Neuroticism (Mean (SD))	Women	2.18 (0.66)	1.99 (0.59)	2.02 (0.59)	No difference between M2 and M3
	Men	2.08 (0.61)	1.88 (0.54)	1.91 (0.57)	No difference between M2 and M3
Perceived mastery (Mean (SD))	Women	5.73 (1.10)	5.66 (1.11)	5.41 (1.14)	No difference between M1 and M2
	Men	5.86 (1.00)	5.79 (0.95)	5.59 (1.05)	No difference between M1 and M2
Perceived constraints (Mean (SD))	Women	2.91 (1.42)	2.70 (1.27)	2.82 (1.27)	No differences between M1 and M3 and between M2 and M3
	Men	2.60 (1.26)	2.47 (1.13)	2.63 (1.22)	No difference between M1 and M3

Note. Only for Level 1 variables, within-person differences, or non-differences, among M1, M2, and M3 (compared including all available data for each pair of waves) are reported above; unless noted to the contrary, means at each wave were significantly different from all other means. For demographic characteristics, attrition analyses revealed: among MIDUS1 participants, older people, men, non-white people, and those with lower education were less likely to participate in MIDUS2; among MIDUS2 participants, older people and those with lower education were less likely to participate in MIDUS3. There were significant gender differences in education, chronic health conditions, functional limitations, perceived mastery, and perceived constraints at each wave. Descriptive statistics of between- and within-person levels of conscientiousness and neuroticism are provided in our online supplemental material (Table S1).

survey of American adults aimed to assess the roles of psychosocial and behavioral factors for health and well-being throughout adulthood. Three waves of the MIDUS survey were conducted in 1995–96 (MIDUS1; $N = 7{,}108$; age 20–75), in 2004–06 (MIDUS2; $N = 4{,}963$), and in 2013–14 (MIDUS3; $N = 3{,}294$).

For the present study, due to its focus on middle and late adulthood, only 2,768 respondents aged 50 or older at MIDUS1 (female: 53%) were included, and their average age at MIDUS1 was 60.1 (SD = 7.0). Detailed demographic information and descriptive statistics for the measures described below (Brim et al., 2019) are provided in Table 1.[2]

Measures

Demographic characteristics. MIDUS participants reported their date of birth, which was subtracted from the survey date to compute age in years. Sex was recoded as male = 0 and female = 1. The participants reported their highest level of education completed, which was recoded into a continuous variable in years.[3]

Time. For the present study, a time variable was created indicating the time of measurement elapsed (in years) since MIDUS1. As the three waves of MIDUS data included the year and month of survey completion, the time elapsed from MIDUS1 was computed by using this information. The time varied from 8 to 11 years for the measurement at MIDUS2 and 17 to 19 years for that at MIDUS3.[4]

Conscientiousness and neuroticism. MIDUS adopted scales for personality traits using self-descriptive adjectives related to the Big Five traits (Rossi, 2001), and amongst these conscientiousness and neuroticism were selected for the current study. Participants were asked how much a list of adjectives representing each personality trait described themselves. The adjectives for conscientiousness included four items (i.e., "organized," "responsible," "hardworking," "careless" (negatively worded)), and those for neuroticism included four items (i.e., "moody," "worrying," "nervous," "calm" (negatively worded)). Responses were given on a four-point scale that ranged from 1 (a lot) to 4 (not at all); items were reverse-coded as necessary so that higher scores indicate higher levels of each trait. The recoded items for each personality trait were averaged as its overall score. For the three waves of data used in the present study, Cronbach's αs were from .53 to .58 for conscientiousness and from .68 to .74 for neuroticism: the conscientious scale had lower internal consistency than the conventionally satisfactory level (i.e., $\alpha = .7$) (Nunnally, 1978); whereas, the αs for neuroticism were close to or higher than this conventional level.

Number of chronic health conditions. MIDUS participants were asked whether they had experienced chronic health conditions

(e.g., high blood pressure, stroke, diabetes) in the past 12 months (Brim et al., 2019). The summed number of chronic conditions was counted as an overall score.

Functional limitations. MIDUS adopted the Medical Outcomes Study 36-item short-form health survey (SF-36) (Ware & Sherbourne, 1992), which included a measure of functional limitations (i.e., how much their health limited each of seven activities of daily living).[5] Responses were given on a four-point scale that ranged from 1 (a lot) to 4 (not at all). The scores were reverse-coded so that higher scores would indicate greater functional limitations, and then averaged as an overall score.

Perceived mastery and constraints. MIDUS participants were asked how much they agreed with each of four items related to perceived mastery (e.g., "I can do just about anything I really set my mind to") and eight items related to perceived constraints (e.g., "Other people determine most of what I can and cannot do") (Lachman & Weaver, 1998). Responses were given on a seven-point scale that ranged from 1 (strongly agree) to 7 (strongly disagree). For each scale of perceived mastery and constraints, the items were reverse-coded (so that higher scores would indicate higher levels of each of the constructs) and then averaged. Cronbach's αs for the three waves of MIDUS were from .68 to .73 for perceived mastery and from .85 to .87 for perceived constraints, which were close to or higher than the conventionally satisfactory level (Nunnally, 1978).

Analysis Strategy

In order to examine effects of conscientiousness and neuroticism on the levels and trajectories of perceived mastery and constraints, two-level multilevel models were analyzed separately for these two outcomes.[6] Estimates were computed with maximum likelihood with Mplus (Muthén & Muthén, 1998–2017) using all available data from the three waves of MIDUS data (i.e., full information maximum likelihood).[7] The separate models for the outcomes of perceived mastery and constraints included the main effects of Level-1 and Level-2 predictors/covariates and their interactions as follows.[8]

Level-1 and level-2 predictors and covariates. In each multilevel model for perceived mastery or constraints, two levels of predictors and covariates were included. Conscientiousness and neuroticism were separated into two levels: between-person (i.e., the average level of each individual across the three waves) and within-person (i.e., variation within each individual; computed by subtracting their average across the three waves from the level of personality at a certain wave). Level-1 time-varying variables include time, within-person conscientiousness and neuroticism, chronic health conditions, and functional limitations; Level-2 time-invariant, individual-level variables include between-person conscientiousness and neuroticism, baseline age, sex, and education.

Time variables. In addition to the (linear) time measure described above, the quadratic time variable (i.e., squared values of the linear time variable) was also included in the multilevel model analyses in order to assess the curvilinearity of the trajectories of perceived mastery and constraints.[9]

Centering and rescaling. Between-person conscientiousness and neuroticism were centered at their grand mean, and chronic health conditions and functional limitations were centered at their grand mean across the three waves. As within-person conscientiousness and neuroticism were centered at their between-person levels when creating these within-person variables, no further centering was conducted. Baseline age was centered at its mean (i.e., 60.08 years) while the time variables were used without re-centering (i.e., 0 year indicating the time point of the first survey at MIDUS1). In addition, one unit of the age and time variables was set as 10 years, or divided by 10, in order to improve the interpretability while avoiding having too small (unstandardized) coefficients.

Interactions. In addition to the fixed main effects of the predictors and covariates, interaction terms of time, age, sex, and/or personality (i.e., conscientiousness or neuroticism) were entered. This addition was aimed at assessing systematically varying effects on trajectories for those of different ages and sexes. Specifically, these interaction terms included cross-level three-way interactions of time (Level 1), baseline age (Level 2), and each within- or between-person personality trait (Level 1 or 2) and of time, sex (Level 2), and each within- or between-person personality trait, as well as their lower two-way interactions. Non-significant interactions were removed from the final model unless they were lower components of significant three-way interactions.[10]

Results

The results of the final multilevel models for perceived mastery and constraints are summarized in Table 2.[11]

Results for Perceived Mastery

Significant fixed effects of linear time (per 10 years) (−.060, $p < .05$) and quadratic time (−.069, $p < .001$) were found for perceived mastery. This means that the slope was negative and concave with an accelerating decline. While the other interactions are discussed later, the interaction of time by age was significant (−.064, $p < .05$), which indicates that the slope of perceived mastery was more negative for older individuals compared to their younger counterparts. The interaction of time by sex was not significant, showing no gender differences in slope. Figure 1 (for perceived mastery) illustrates different trajectories estimated for those with one standard deviation below and above the mean age.

Main effects of conscientiousness, neuroticism, and covariates. Significant main effects were found for both levels of conscientiousness (within-person: .225, $p < .001$; between-person: .615,

Table 2. Two-Level Multilevel Models Predicting Perceived Mastery and Constraints (Final Models).

		Perceived Mastery		Perceived Constraints	
Level	Predictors/Parameters	Unstandardized Coefficients	Relative Effects	Unstandardized Coefficients	Relative Effects
Fixed effects:					
Intercept	Intercept	5.852 (0.027)***		2.685 (0.032)***	
Level 1	Time (per 10 years; linear slope)	−0.060 (0.030)*		−0.142 (0.049)**	
(L1)	Time-squared (quadratic slope)	−0.069 (0.019)***		0.136 (0.027)***	
	Chronic health conditions	−0.014 (0.005)**		0.037 (0.006)***	
	Functional limitations	−0.068 (0.018)***		0.147 (0.019)***	
	Conscientiousness-W	0.225 (0.051)***	0.044	−0.375 (0.054)***	−0.060
	Neuroticism-W	−0.242 (0.038)***	−0.063	0.505 (0.040)***	0.109
Level 2	Age (per 10 years)	−0.066 (0.028)*		0.099 (0.032)**	
(L2)	Sex (female)	−0.125 (0.034)***		0.183 (0.044)***	
	Education (in years)	−0.015 (0.006)*		−0.065 (0.007)***	
	Conscientiousness-B	0.615 (0.064)***	0.237	−0.735 (0.071)***	−0.234
	Neuroticism-B	−0.336 (0.032)***	−0.180	0.581 (0.055)***	0.258
L1 × L2	Time × Age	−0.064 (0.025)*		0.160 (0.027)***	
	Time × Sex	n.s. (removed)		−0.083 (0.034)*	
	Time × Conscientiousness-B	0.117 (0.042)**		n.s. (removed)	
	Age × Conscientiousness-W	n.s. (removed)		−0.183 (0.078)*	
L2 × L2	Sex × Conscientiousness-B	−0.231 (0.083)**		0.215 (0.098)*	
	Sex × Neuroticism-B	n.s. (removed)		0.171 (0.072)*	
Random effects:					
L1	Residual	0.554 (0.015)***		0.552 (0.019)***	
L2	Intercept	0.419 (0.024)***		0.745 (0.038)***	
	Slope	0.007 (0.003)*		0.100 (0.018)***	
	Covariance (Intercept-Slope)	0.005 (0.009)		−0.152 (0.022)***	

Note. *** p < .001, ** p < .01, * p < .05. The letters "W" and "B" added to the variable names of conscientiousness and neuroticism indicate within- and between-person levels, respectively. Non-significant three-way interactions of time, age, and personality and of time, sex, and personality and two-way interactions among these variables (as noted as "n.s. (removed)" above if they were significant for the other outcome) were removed from the final models. The "relative effects" (only for within- and between-person conscientiousness and neuroticism) indicate estimated change in perceived mastery or constraints (in standard deviation units) for every one standard deviation increase in the personality trait.

p < .001) and neuroticism (within-person: −.242, p < .001; between-person: −.336, p < .001), which indicates that overall, both within- and between-person variability of conscientiousness positively predicted perceived mastery, whereas those of neuroticism negatively predicted the outcome. As seen in Table 2, all covariates also predicted perceived mastery significantly and independently.

Two-way interactions of age and personality. None of the two-way interactions of age with within- or between-person conscientiousness or neuroticism were significant, which indicates that no age differences were found in the effects of conscientiousness and neuroticism.

Two-way interactions of time and personality. Among the interactions of time with within- and between-person personality traits, only the interaction of time by between-person conscientiousness was significant (.117, p < .01) indicating that the effect of conscientiousness on perceived mastery increased over time. This interaction suggests that the gap in perceived mastery between those who are one deviation below and above average in conscientiousness grows wider by .090 standard deviation unit every 10 years.[12]

Two-way interactions of sex and personality. Among the two-way interactions of sex with within- and between-person personality traits, only the interaction with between-person conscientiousness (−.231, p < .01) was significant, which indicates that the positive association of conscientiousness with perceived mastery was weaker for women as compared to men as seen in Table 3.

Three-way interactions of time, age, and personality and time, sex, and personality. None of the three-way interactions assessed were significant. This suggests that patterns of age and gender differences (or invariance) in the effects of within- and between-person conscientiousness and neuroticism did not change over time.

Results for Perceived Constraints

Significant fixed effects of linear time (per 10 years) (−.142, p < .01) and quadratic time (.136, p < .001) were found for perceived constraints. This means that the slope or trajectory of perceived constraints initially decreased, but it was convex with an accelerating increase. While the other interactions are discussed later, significant interactions of time by age (.160, p < .001) and of time by sex (−.083, p < .05) were found,

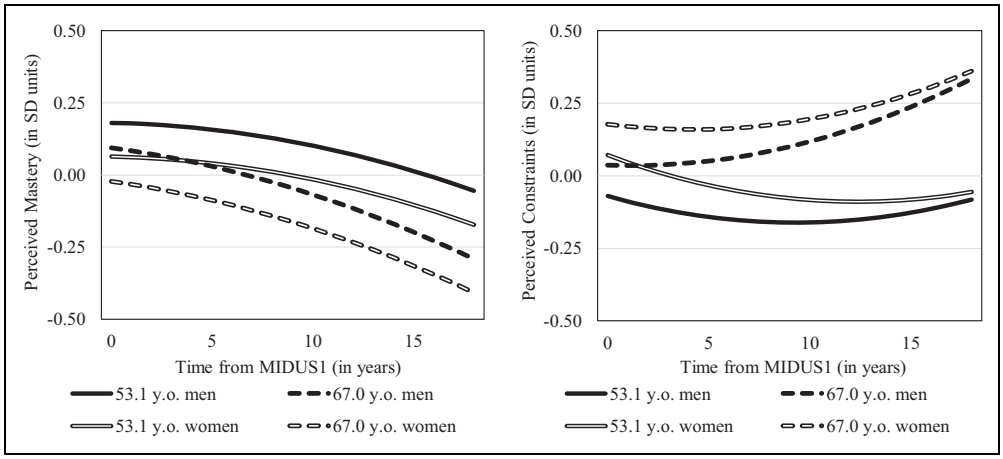

Figure 1. Trajectories of perceived mastery and constraints for women and men of different ages. *Note.* Trajectories are depicted for women and men with the reference conditions of the covariates (other than age and sex) and predictors: average levels of all between- and within-person personality traits, education, chronic health conditions, and functional limitations. For age at MIDUS1, one standard deviation (6.96 years) below and above the mean age (60.08 years) were used to illustrate different trajectories.

Table 3. Age and Gender Differences in the Effects of Conscientiousness and Neuroticism on Perceived Mastery and Constraints.

Predictor	Perceived Mastery				Perceived Constraints			
	Unstandardized Coefficients		Relative Effects		Unstandardized Coefficients		Relative Effects	
	53.1 y.o.	67.0 y.o.	53.1 y.o.	67.0 y.o.	53.1 y.o.	67.0 y.o.	53.1 y.o.	67.0 y.o.
Conscientiousness-W	0.225		0.044		−0.248	−0.502	−0.040	−0.080
Predictor	Perceived Mastery				Perceived Constraints			
	Unstandardized Coefficients		Relative Effects		Unstandardized Coefficients		Relative Effects	
	Male	Female	Male	Female	Male	Female	Male	Female
Conscientiousness-B	0.615	0.384	0.237	0.148	−0.735	−0.520	−0.234	−0.165
Neuroticism-B	−0.336		−0.180		0.581	0.752	0.258	0.333

Note. The letters "W" and "B" added to the variable names of conscientiousness and neuroticism indicate within- and between-person levels, respectively. Estimates for relative effects indicate estimated changes in perceived mastery or constraints (in standard deviation units) for every one standard deviation increase in each personality trait. For age differences in the effect of within-person conscientiousness, the above effects are estimated for one standard deviation (6.96 years) below and above the mean age (60.08 years).

which indicates that older individuals and men experienced greater increases (or smaller decreases) in perceived constraints compared to their younger and female counterparts, respectively, as seen in Figure 1. In the figure, the gender differences appear to have disappeared over two decades. This was confirmed with an additional, post-hoc multilevel model (Hoffman, 2015) using the linear time variable recentered at 1.8 units (i.e., 18 years, which corresponds to the time point approximately when MIDUS3 was conducted) while including the other predictors/covariates and interaction terms same as those of the final multilevel model. The results of the post-hoc model indicate that the main effect of sex was not significant, which suggests that perceived constraints did not differ by sex at MIDUS3.

Main effects of conscientiousness, neuroticism, and covariates. Significant main effects were found for both levels of conscientiousness (within-person: −.375, $p < .001$; between-person: −.735, $p < .001$) and neuroticism (within-person: .505, $p < .001$; between-person: .581, $p < .001$), which indicates that overall, both within- and between-person variability of conscientiousness negatively predicted perceived constraints, whereas those of neuroticism positively predicted perceived constraints. As seen in Table 2, all covariates also predicted perceived constraints significantly and independently.

Two-way interactions of age and personality. Among the interactions of age with within- and between-person personality traits, only that with within-person conscientiousness was significant (−.183, $p<.05$), which indicates that the negative association of conscientiousness with perceived constraints was greater for older individuals than their younger counterparts as seen Table 3.

Two-way interactions of time and personality. None of the two-way interactions of time with within- or between-person conscientiousness or neuroticism were significant, which suggests that the effects of conscientiousness and neuroticism did not change over time.

Two-way interactions of sex and personality. While no two-way interactions of sex were found with within-person conscientiousness nor with neuroticism, those with between-person conscientiousness (.215, $p < .05$) and neuroticism (.171, $p < .05$) were significant. These interactions indicate that in terms of the between-person variability of these personality traits, the positive association of neuroticism with perceived constraints was stronger for women as compared to men and the negative association of conscientiousness was stronger for men as compared to women, as seen in Table 3.

Three-way interactions of time, age, and personality and time, sex, and personality. None of the three-way interactions assessed were significant. This suggests that patterns of age and gender differences (or invariance) in the effects of within- and between-person conscientiousness and neuroticism did not change over time.

Discussion

The present study focused on examining longitudinal associations of conscientiousness and neuroticism with two dimensions of perceived control (i.e., perceived mastery and constraints) during middle and late adulthood. The present findings show that the trajectories of perceived mastery and constraints differed, which aligns with previous research suggesting that these two dimensions of perceived control are distinct constructs (Infurna & Mayer, 2015). Specifically, unlike perceived mastery with accelerating declines, trajectories of perceived constraints were relatively stable or even decreased overall among aging adults. Increasing age-related losses, such as declining physical abilities, may lead aging adults to realize that they may no longer be able to achieve highly demanding goals as they did when they were younger, which may reduce perceived mastery. However, they may still perceive challenges associated with aging-related losses as manageable without viewing them as constraints toward achieving their important goals. As seen in Figure 1, the trajectories of perceived constraints varied among those of different ages and sexes, but participants did not appear to experience considerable increases in perceived constraints until their 70 s. Interestingly, the gender gap (i.e., lower perceived constraints for men) disappeared over two decades, possibly suggesting that the impacts of increasing age-related losses for men becomes comparable to their female counterparts over time. Additional investigations are warranted on what specific factors could reduce the gender gap over time or with age.

Our hypotheses were partially supported and the present findings contribute to furthering the literature by providing findings on the nuance of these associations and their age and gender differences. With regard to the study hypotheses, the present findings indicated both similarities and differences between the two outcomes as discussed next.

Overall Associations of Personality With Perceived Mastery and Constraints (Hypothesis 1)

As hypothesized, overall, higher conscientiousness and lower neuroticism predicted higher perceived mastery and lower perceived constraints. Given conscientiousness and neuroticism may be related to how one views and adapts to life experiences such as aging-related or loss-related challenges (Connor-Smith & Flachsbart, 2007; Kaiseler et al., 2012; Lachman et al., 2011), their associations with perceived mastery and constraints may involve such mediators as coping. Specifically, conscientiousness may facilitate coping in a constructive manner by planning and persistence, whereas neuroticism may lead to maladaptive coping such as disengagement from their problems (Connor-Smith & Flachsbart, 2007). These varying coping approaches may result in having different levels of perceived mastery and constraints: highly conscientious individuals may perceive their challenging goals as achievable and view possible obstacles to their goal attainment as manageable; in contrast, highly neurotic individuals may disengage from their important goals and consider those obstacles to be out of control. In addition to such variations of personality between individuals, increasing conscientiousness and decreasing neuroticism within individuals may also lead them to having more constructive or adaptive coping, which may in turn result in having higher perceived mastery and lower perceived constraints. These speculations should be tested in future research addressing coping as a mediator.

Age Differences (Hypothesis 2)

Aligned with Hypothesis 2, the association of higher within-person conscientiousness with lower perceived constraints was stronger for older individuals than younger ones. However, unexpectedly, no age differences were found in the associations of the other within- and between-person personality predictors for perceived constraints, nor in those of any personality predictors for perceived mastery. This finding suggests that variations or changes in conscientiousness over time within individuals have greater implications for perceived constraints among older individuals than their younger counterparts. However, the association of this within-person variability with perceived constraints did not change over time or as people became older (as seen in the findings related to Hypothesis 3), suggesting a possible difference between younger and older cohorts rather than aging-related effects within each individual. Although the characteristics of different age groups would need to be thoroughly examined, this age difference may be related to generational differences such as older generations' emphasis on conscientiousness-related values (e.g., responsibility, work ethic) (Watroba, 2018). In addition, this age difference was observed only for perceived constraints, not for perceived

mastery. Regardless of individual differences in conscientiousness, if older individuals experienced increased conscientiousness, this experience could further motivate them to effortfully overcome potential obstacles. This may help them lower their perceived constraints by viewing existing apparent constraints as manageable challenges. However, such improved perceptions may not necessarily lead to boosting their mastery beliefs or overall confidence about their goal-achievement ability. This speculation needs to be further developed within the context of changes over time (i.e., as respondents became older) as discussed next.

Changes Over Time (Hypothesis 3)

Hypothesis 3 was partially supported as only the association of between-person variability, but not within-person variability, of conscientiousness changed over time for perceived mastery, but not perceived constraints. This finding suggests that being more conscientious relative to other individuals may become more important for maintaining higher perceived mastery over time. This should be contrasted with the previously mentioned age difference found only for the association of the within-person (but not between-person) variability of conscientiousness with perceived constraints, not with perceived mastery. Temporary increases in conscientiousness (within individuals) may not be sufficient to enhance perceived mastery over time, but rather aging adults may need to maintain overall high conscientiousness (higher than others) in order to develop strong beliefs about their goal-achievement ability. However, the present findings indicated no difference between those of varying ages for the same association of between-person conscientiousness and perceived mastery. Additional empirical investigations are needed to explain these complex associations, since the present findings cannot fully disentangle these age differences and change over time for different combinations of levels of personality (i.e., within- versus between-person) and dimensions of perceived control (i.e., perceived mastery versus constraints).

Gender Differences (Hypothesis 4)

While we hypothesized stronger associations of conscientiousness and neuroticism with the outcomes for women than men, the findings were more nuanced. Gender differences were found only for between-person variability, but not within-person variability, of conscientiousness and/or neuroticism predicting the two outcomes. The associations of higher conscientiousness with higher perceived mastery and lower perceived constraints were weaker for women than men. In contrast, the association of higher neuroticism and higher perceived constraints was stronger for women than men. The observed gender differences may be related to different use of coping between women and men. Specifically, previous research suggests that women tend to use emotion-focused coping (aimed at reducing negative emotions without attempting to directly change the stressful event itself) more frequently while men tend to use problem-focused coping (aimed at eliminating or influencing the source of the stress) more frequently, and these tendencies may be related to gender differences in socialization and life experiences (Howerton & Van Gundy, 2009; Matud, 2004; Meléndez et al., 2012). Problem-focused coping can involve strategies such as planning and decision making to solve the problem, which may align with characteristics of conscientiousness (e.g., being planful, organized) (Bates et al., 2010; Connor-Smith & Flachsbart, 2007; Folkman, 2010). Individuals with high conscientiousness may rely more on planning and decision making, which may help improve their confidence about achieving goals while tackling potential obstacles. This tendency may be stronger for men with high conscientiousness than their female counterparts due to their general preference for problem-focused coping. Emotion-focused coping can also be helpful in dealing with challenging experiences, especially when involving emotional regulation and seeking emotional support (Connor-Smith & Flachsbart, 2007). While many aging adults may use these adaptive strategies in dealing with their challenges, those with high neuroticism may be likely to use avoidance and disengagement as their emotion-focused coping (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007), which may keep them from facing such obstacles toward their goal achievement and increase their perceived constraints. This tendency may be stronger for women with high neuroticism than their male counterparts due to their overall preference for emotion-focused coping. However, this explanation remains speculative and does not explain the nuanced differences in the findings: why gender differences were found for the associations of conscientiousness with both perceived mastery and constraints but only for the association of neuroticism with perceived constraints, not with perceived mastery.

Moreover, this speculation does not account for the different results for the between- and within-person variability of these personality traits. Possibly, since the effects of the within-person predictors were small relative to those of the between-person predictors (see Table 2), such gender differences, if any, may have been too subtle to be noticed. Additional investigations are needed to better explain these gender differences or similarities while addressing how coping can be related to the between- and within-person variability of conscientiousness and neuroticism as well as the two dimensions of perceived control differently.

Changes (or Stability) in Age and Gender Differences Over Time (Hypothesis 5)

Though unexpected, there was no evidence showing that age and gender differences in the associations of conscientiousness and neuroticism with perceived mastery and constraints changed over two decades. This suggests that the aforementioned age and gender differences may remain stable over time, which may need to be taken into consideration in the further investigations of these differences.

Limitations and Future Directions of Research

Despite the strengths and contributions of the present study, there are also multiple limitations to discuss. First, while the present study examined associations assuming the directionality from personality to the two dimensions of perceived control, it may be possible that these associations are actually bidirectional and reciprocal. Thus, future research should also address the opposite direction of such potentially reciprocal relationships. Another potential issue concerns the generalizability of the present findings. MIDUS respondents were not necessarily representative of the general population as more than 90% of the respondents reported that their race was White. This fact highlights the importance of replicating the present findings by using multiple, more diverse samples. In addition, related to the specific measures adopted by the present study, the internal consistency of the conscientiousness scale was lower than the conventional level of a reliable scale (i.e., $\alpha = .7$) (Nunnally, 1978). This was due to the use of the short (i.e., four-item) scale, and MIDUS adopted a five-item scale (adding one more item) for conscientiousness at the second wave, which improved the reliability. However, because the present study used three waves of MIDUS data to address trajectories of perceived mastery and constraints over two decades, it was not possible to use the five-item conscientiousness scale with higher internal consistency.

Another important direction of future research that would build upon the contributions of the present study and aim to expand its findings is to explore approaches to enhancing perceived mastery and reducing perceived constraints while examining potential mediators (e.g., coping) for the personality-perceived control associations. Considering the present findings, individuals with lower conscientiousness and higher neuroticism would have higher risks for lower perceived mastery and higher perceived constraints. For these individuals, enhancing coping or other relevant factors may be one avenue to promoting perceived control while taking gender differences into account. For example, potential options may include teaching adaptive problem-focused coping (e.g., planning, decision making) and emotion-focused coping (e.g., emotional regulation) especially for men with lower conscientiousness and women with greater neuroticism. In addition, considering the findings for the within-person variability of personality, some interventions to increase conscientiousness and reduce neuroticism (e.g., cognitive-behavioral and mindful approaches; Armstrong & Rimes, 2016; Javaras et al., 2019) may be effective to help aging adults maintain higher perceived mastery and lower perceived constraints.[13]

Conclusions

The present study can contribute to improving the understanding of longitudinal associations of conscientiousness and neuroticism with perceived mastery and constraints during middle and late adulthood. In particular, this study indicated some age and gender differences, which can inform future research further investigating these complex associations and exploring effective approaches to promoting the two dimensions of perceived control while taking personality into consideration.

Authors' Note

Masahiro Toyama is now affiliated with University of the Ozarks.

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Supplemental Material

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Notes

1. As one of the Big Five traits, neuroticism is sometimes labeled as "emotional stability" (e.g., Goldberg, 1990) indicating the opposite pole of this personality dimension and involving poised and self-confident traits (Bates et al., 2010).
2. Table S2 in our online supplemental material shows a correlational matrix for the measures at baseline (i.e., MIDUS1) for the respondents included in the present study. A complete correlational matrix for the measures at all three waves will also be available upon request.
3. For MIDUS's answer options for educational level, years of education were coded as: 4 years for "no school/some grade school"; 8 years for "eighth grade/junior high school"; 10 years for "some high school"; 12 years for "GED" or "graduated from high school"; 13 years for "1 to 2 years of college, no degree yet"; 14 years for "graduated from a 2-year college or vocational school, or associate's degree"; 15 years for "3 or more years of college, no degree yet"; 16 years for "graduated from a 4- or 5-year college, or bachelor's degree"; 17 years for "some graduate school"; 18 years for "master's degree"; and 20 years for "PH.D, ED.D, MD, DDS, LLB, LLD, JD, or other professional degree."
4. The time variable, instead of participant age, was adopted as the time metric in the present study's analyses in order to differentiate change over time (indicated as the effect of this time variable) from cross-sectional age differences (indicated as the effect of baseline age).
5. The seven items for functional limitations included "lifting or carrying groceries," "climbing several flights of stairs," "bending, kneeling, or stooping," "walking more than a mile," "walking several blocks," "moderate activities (e.g., bowling, vacuuming)," and "vigorous activities (e.g., running, lifting heavy objects)."
6. Figure S1 in our online supplemental material visually depicts the multilevel modeling analyses adopted in the present study.
7. We expected that adopting full information maximum likelihood (rather than listwise deletion for missing values) could lead to

producing less biased estimates using the multilevel data with missing values (Black et al., 2011) despite its selection bias. We conducted attrition analyses with a set of logistic regressions to assess whether each of the demographic characteristics or measures predicted the participation of the following waves of the MIDUS survey. Among MIDUS1 participants, younger individuals (OR = .961; 95% CI: .949, .972), women (OR = 1.190; 95% CI: 1.011, 1.401), and those with higher education (OR = 1.133; 95% CI: 1.099, 1.168), fewer chronic health conditions (OR = .932; 95% CI: .904, .962), fewer functional limitations (OR = .614; 95% CI: .557, .678), higher conscientiousness (OR = 1.365; 95% CI: 1.118, 1.668), lower neuroticism (OR = .845; 95% CI: .736, .970), higher perceived mastery (OR = 1.101; 95% CI: 1.015, 1.194), or lower perceived constraints (OR = .838; 95% CI: .787, .893) were more likely than their counterparts in terms of each of the measures to participate in MIDUS2. Among MIDUS2 participants, younger individuals (OR = .917; 95% CI: .904, .930) and those with higher education (OR = 1.121; 95% CI: 1.083, 1.160), fewer chronic health conditions (OR = .910; 95% CI: .877, .945), fewer functional limitations (OR = .563; 95% CI: .504, .629), higher conscientiousness (OR = 1.847; 95% CI: 1.481, 2.304), higher perceived mastery (OR = 1.103; 95% CI: 1.002, 1.214), or lower perceived constraints (OR = .700; 95% CI: .643, .762) were more likely than their counterparts to participate in MIDUS3, whereas there were no differences in the participation for sex (OR = 1.171; 95% CI: .975, 1.406) nor neuroticism (OR = .889; 95% CI: .746, 1.059).

8. Other than these fixed effects, random effects were also added to Level-2 individual-level intercept and the slope of the linear time variable considering possible differences in levels and trajectories of perceived mastery and constraints between individuals which could not be explained by main effects nor systematically varying effects of the interactions described in this section.
9. In a multilevel model, for the number of time points of measurement (n) per person, up to $n - 1$ fixed effects and $n - 2$ random effects for time can be estimated (Hoffman, 2015). The data used in the present study included three time points of measurement, which would allow only one random effect for time (and two fixed effects for time: linear and quadratic time effects included in the present study) to be estimated. As assessing random effects was not a main focus of the present study, the quadratic time slope was treated as fixed while the linear time slope was treated as random aiming to improve the model fit. Since curvilinear trajectories could be estimated more precisely and accurately with more time-points of data, follow-up studies should be conducted to support the findings of the present study when additional waves of MIDUS are available.
10. More specifically, the multilevel model for each outcome was revised in the following way: (1) non-significant three-way interactions were removed; (2) the model was reassessed without the non-significant three-way interactions; (3) non-significant two-way interactions were removed if they were not a part of significant three-way interactions.
11. Table S3 in our online supplemental material summarizes random effects of the final models for perceived mastery and constraints as compared to more parsimonious models. The table for each outcome also indicates how much of the random effects (i.e., variances) of intercept and slope between individuals (i.e., Level 2) and residual variance within individuals (i.e., Level 1), which were unexplained by the more parsimonious models, the final model could explain.
12. Figure S2 in our online supplemental material illustrates trajectories for those with different levels of between-person conscientiousness.
13. As some research (e.g., Graham et al., 2020; Weston et al., 2020) suggests positive implications of the combination of high neuroticism with high conscientiousness for health outcomes (i.e., "healthy neuroticism"), the possible interactive effect of neuroticism and conscientious should also be taken into consideration when developing interventions for these personality traits to promote health relating to perceived mastery and constraints.

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