LONGITUDINAL ASSOCIATIONS AMONG PERSONALITY, PERCEIVED CONTROL, AND HEALTH FOR AMERICAN AND JAPANESE AGING ADULTS

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ABSTRACT

Perceived control is associated with health throughout adulthood, yet has also been found to decline with age possibly due to age-related experiences of increasing losses and limitations in life circumstances. Perceived control may also be affected by individual personality characteristics, which also predict health through late adulthood. Although previous studies have addressed these associations, research is lacking in examining nuanced associations among personality, perceived control, and health all together as well as age and gender differences in these associations. Moreover, perceived control may be related to individualistic values (e.g., autonomy, agency) that vary cross-culturally and the implications of perceived control as well as personality for health may differ in distinct cultures. However, cross-cultural research on longitudinal associations of personality, perceived control, and health is further limited. In order to address the gap in the literature, the present dissertation, consisting of three studies, focuses on investigating longitudinal associations among personality, perceived control, and health for American and Japanese middle-aged and older adults. The first two studies address longitudinal associations between personality and perceived control (Study 1) and the potential mediation of perceived control for longitudinal associations between personality and health (Study 2) for 4,611 American adults (aged 40 to 75 at baseline). Study 3 examines associations among personality, perceived control, and health for 827 Japanese adults (aged 40 to 79 at baseline) in contrast to Americans. The findings suggest that neuroticism and conscientiousness are consistent predictors for perceived control over time and that perceived control mediates longitudinal associations of neuroticism and conscientiousness with functional health for American adults. Such mediation was not found for Japanese adults despite overall similar tendencies except for associations between personality and perceived control. No age differences

in associations among personality, perceived control, and health were found for both nationalities (who were in their 40s to 70s at baseline) while there were some gender differences in a limited few associations for Americans. The dissertation contributes to the literature by furthering the understanding of longitudinal associations of personality, perceived control, and health and indicating future directions for research including exploring potential avenues to promoting health through perceived control.

TABLE OF CONTENTS

ABSTRACT iii

LIST OF TABLES ix

LIST OF FIGURES x

1. INTRODUCTION 1

2. BACKGROUND 2

2.1. Focus of the Present Dissertation 2

2.2. Perceived Control 5

2.3. Personality Traits 8

2.4. Three Studies of the Present Dissertation 13

3. STUDY 1: PERSONALITY TRAITS AND PERCEIVED CONTROL 14

3.1. Background 14

3.1.1. Age Differences in Personality Traits and Perceived Control 14

3.1.2. Gender Differences in Personality Traits and Perceived Control 16

3.1.3. Study 1 Objectives 17

3.2. Method 18

3.2.1. Data 18

3.2.2. Measures 19

3.2.3. Analysis Strategy 23

3.3. Results 24

3.3.1. Trajectories of Perceived Control and Their Age and Sex Differences 24

3.3.2. Effects of Personality Traits and Their Age and Sex Differences 28

3.3.3. Variances of Level and Slope of Perceived Control Explained by Predictors 31

3.3.4. Quadratic Effects of Personality Traits 33

3.4. Discussion 36

3.4.1. Main Findings 36
3.4.2. Limitations 42
3.4.3. Conclusions 43
4. STUDY 2: PERSONALITY, PERCEIVED CONTROL, AND HEALTH 45
4.1. Background 45
4.1.1. Personality Traits and Health 45
4.1.2. Perceived Control and Health 47
4.1.3. Personality Traits, Perceived Control, and Health 49
4.1.4. Study 2 Objectives 50
4.2. Method 52
4.2.1. Data 52
4.2.2. Measures 52
4.2.3. Analysis Strategy 53
4.3. Results 56
4.3.1. Main Analysis 56
4.3.2. Results of Additional Analysis 65
4.4. Discussion 66
4.4.1. Main Findings 66
4.4.2. Longitudinal Associations of Perceived Control with Functional and Physical Health 67
4.4.3. Longitudinal Mediation of Perceived Control for Longitudinal Associations of Neuroticism and Conscientiousness with Functional Health 71
4.4.4. Longitudinal Associations of Agreeableness, Extraversion, and Openness with Perceived Control and Health 72
4.4.5. Discrepancy between the Findings of Study 1 and Study 2 73
4.4.6. Limitations 74

4.4.7. Conclusions 75

5. STUDY 3: IMPLICATIONS OF CULTURE FOR ASSOCIATIONS AMONG PERSONALITY, PERCEIVED CONTROL, AND HEALTH 77

5.1. Background 77

5.1.1. Implications of Culture 77

5.1.2. Cultural Differences in Perceived Control 83

5.1.3. Cultural Differences in Personality Traits 85

5.1.4. Links of Personality Traits and Perceived Control to Health 86

5.1.5. Study 3 Objectives 88

5.2. Method 90

5.2.1. Data 90

5.2.2. Measures 91

5.2.3. Analysis Strategy 92

5.3. Results 96

5.3.1. Analysis for Japanese Women and Men 96

5.3.2. Analysis for Japanese versus American Adults 102

5.3.3. Results with the Longer Conscientiousness Scale for American Adults 109

5.4. Discussion 110

5.4.1. Main Findings 110

5.4.2. Limitations 115

5.4.3. Conclusions 119

6. FINAL CONCLUSIONS 120

6.1. Future Directions 121

6.1.1. Addressing Various Dimensions of Personality 121

6.1.2. Further Investigations of Age Differences 122

6.1.3. Explanations of Gender Differences 124

6.1.4. Cross-Cultural Research 125

6.1.5. Mechanisms of Associations among Personality, Perceived Control, and Health 127

6.1.6. Interventions to Promote Health 128

6.2. Conclusions 131

REFERENCES 132

APPENDIX A. SCALES FOR BIG FIVE PERSONALITY TRAITS 149

APPENDIX B. PERCEIVED CONTROL SCALE 150

LIST OF TABLES

Table		Page
1.	Descriptive Statistics for American Adults (2,389 Women and 2,222 Men) in Studies 1 and 2	21
2.	Two-Level Multilevel Model Predicting Perceived Control (Final Model) in Study 1	26
3.	Relative Size of Main Effects of Personality on Perceived Control (Study 1)	28
4.	Comparisons of Random Effects between the Final Model and More Parsimonious Models (Study 1)	32
5.	Quadratic Effects of Personality on Perceived Control (Study 1)	35
6.	Correlation Matrix for Three Waves of Measures for American Women and Men	57
7.	Summary of Model Fit for Path Analysis Models for American Adults (Study 2)	59
8.	Standardized Effects in the Final Model for American Women and Men (Study 2)	63
9.	Descriptive Statistics for Japanese Adults (422 Women and 405 Men) (Study 3)	98
10.	Correlation Matrix for Japanese Women and Men (Study 3)	99
11.	Summary of Model Fit for Path Analysis Models for Study 3 (Multigroup Analysis for Japanese Women and Men)	101
12.	Standardized Effects in the Final Model for Japanese Women and Men (Study 3)	104
13.	Descriptive Statistics for Two Waves of Data from Japanese versus American Adults (Study 3)	105
14.	Standardized Effects for Japanese and American Adults and Results of Chi-Square Difference Tests (Study 3)	106

LIST OF FIGURES

Figure		Page
1.	Trajectories of perceived control over two decades for those aged 45 (A) and 65 (B) at MIDUS1 who graduated from high school without completing 4-year college education with average levels of the five personality traits	27
2.	Trajectories of perceived control for women and men with high level (i.e., one standard deviation above the mean) and low level (i.e., one standard deviation below the mean) of neuroticism and average levels of the other personality traits who were aged 55 at MIDUS1 and had graduated from high school without completing a four-year college education	29
3.	Trajectories of perceived control for women and men with high level (i.e., one standard deviation above the mean) and low level (i.e., one standard deviation below the mean) of conscientiousness and average levels of the other personality traits who were aged 55 at MIDUS1 and had graduated from high school without completing a four-year college education	30
4.	Estimated effects by different levels of neuroticism for perceived control	34
5.	Study 2 path model for multigroup analysis (with female and male groups) with three waves of MIDUS (MU) data	55
6.	Mediational paths form neuroticism and conscientiousness to functional limitations (ADL) through perceived control with standardized coefficients	65
7.	Estimated effects by different levels of MIDUS1 agreeableness for MIDUS2 functional limitations for women	67
8.	Study 3 path model for multigroup analysis (with female and male groups) with the MIDJA (MJ) data from Japanese adults	94
9.	Estimated effects by different levels of MIDUS2 extraversion for MIDUS2 perceived control	109

1. INTRODUCTION

Given previously documented implications of perceived control for health as well as its relationship with personality throughout adulthood, the present dissertation aims to specifically examine associations among personality traits, perceived control, and health outcomes for aging women and men in culturally distinct countries and consists of three studies. This dissertation first provides the general background (Chapter 2) that is a basis of these three studies, then presents specific research questions, methods, results, and interpretation for the three studies including Study 1 (Chapter 3), Study 2 (Chapter 4), and Study 3 (Chapter 5), and finally discusses the overarching implications of findings from these studies and future directions of research (Chapter 6) in conclusion.

2. BACKGROUND

The main purpose of the present dissertation is to address nuanced longitudinal associations among personality, perceived control, and health as well as age, gender, and cultural differences by examining such associations for American and Japanese aging women and men. This chapter starts with an explanation of the focus of this dissertation and review of previous research on the constructs of perceived control and personality traits addressing potential age, gender, and cultural differences. Based on this background, three studies were designed and conducted.

2.1. Focus of the Present Dissertation

The present dissertation uses a developmental lens to study psychological characteristics and experiences, including perceived control and personality, and their longitudinal implications for health particularly during middle and late adulthood. Middle-aged adults tend to focus on generative tasks such as career success and raising children (Erikson, 1959), yet as they transition to later adulthood their focus in life often shifts particularly after their retirement and children leaving home. The age-related shift may lead to positive socioemotional experiences while cultivating meaningful relationships (Carstensen, Fung, & Charles, 2003) and development of ego integrity with a sense of fulfillment and wholeness of one's life through life review and acquired life experience or wisdom (Bauer & Park, 2010; Erikson, 1959) in later life. At the same time, aging may also be associated with increasing losses and limitations in life circumstances that have negative implications for psychological characteristics such as perceived control (Lachman, Neupert, & Agrigoroaei, 2011).

Whereas young adults tend to seek opportunities to acquire new skills and expand their potential, this tendency or priority may begin to gradually change in middle adulthood. While

middle-aged adults may maintain relatively high physical and cognitive abilities, build on their acquired skills, and develop expertise, they may also start experiencing more losses such as declining physical health and losses of their loved ones (Bauer & Park, 2010; Ebner, Freund, & Baltes, 2006; Krampe & Charness, 2006; Lachman, 2004). Such increasing losses can limit the abilities of aging adults to control their environments, which can negatively affect perceived control and other psychological experiences (Lachman et al., 2011). As these limitations can threaten their independent living, the importance of having a sense of control and responsibility for their own lives, may increase in later life (Hung, Kempen, & De Vries, 2010) even though they may actually be becoming less independent. The aging process associated with those losses and limitations continues for years or decades, which suggests the importance of undertaking research to investigate perceived control over a long period of time. As discussed in detail later, perceived control has been found to change across adulthood, which may be influenced by such age-related experiences (Lachman et al., 2011).

In addition, individual psychological characteristics such as personality have been found to continue developing even after childhood and adolescence and remain influential for psychological well-being and health throughout adulthood, yet their implications for well-being outcomes may change with age (Bates, Schermerhorn, & Goodnight, 2010; Ryff, 2014). Considering the importance of a longitudinal focus in aging research, the present dissertation investigated longitudinal associations between these constructs and their potential impacts on health over time while addressing possibly different implications due to varying ages.

In addition to the examination of age-related developmental shifts in perceived control and personality and their associations, the present study focused on gender differences as well. Gender is a social construct deeply embedded in societies, in which women and men tend to

have distinct values and/or behaviors (Hofstede, 2001; Taras et al., 2014). For example, investigating value priorities for samples including college students and other adults from 70 countries, Schwartz and Rubel (2005) suggested that while both women and men emphasized benevolence (i.e., preserving and enhancing the welfare of close others) above all other values, compared to women, men generally put greater emphases on self-enhancement values such as power and achievement as well as self-direction value (that emphasizes independent thoughts and acts) and focused less on benevolence and other values that emphasize caring. These different values may influence how women and men perceive their circumstances (e.g., how much independence or control they feel they have in their situations), which may affect perceived control and other psychological experiences associated with health outcomes (Cheng, Cheung, Chio, & Chan, 2013; Heine & Buchtel, 2009; Lachman et al., 2011). Personality also varies by gender, which can be explained from an evolutionary perspective (related to adaptation and reproduction) or a sociocultural perspective (related to social expectations toward gender roles) (Lippa, 2010; Schmitt, Realo, Voracek, & Allik, 2008; Weisberg, DeYoung, & Hirsh, 2011). The present dissertation addresses gender differences recognizing that gender norms and expectations may have implications for psychological constructs including perceived control and personality.

Finally, culture is another important factor that the present dissertation addresses. Distinct values of those in different cultures may lead to varying approaches to their lives, which may also influence their perceived control and personality; in particular, the degree of emphasis on individualistic values (e.g., agency, autonomy) has great implications for these psychological constructs, which may in turn affect health (Cheng et al., 2013; Oyserman, Coon, & Kemmelmeier, 2002). For instance, non-Western adults tend to have lower perceived control

than Western adults as they focus more on external or environmental factors rather than individual characteristics or experiences in accounting for their behaviors and outcomes (Cheng et al., 2013; Oyserman et al., 2002). This means that having a sense of control may not necessarily lead them to engage in behaviors, for example, related to health, thus, perceived control may be less influential for their health than Western individuals. These cultural variations (which may also be related to age and gender differences) are discussed in detail in Study 3.

Thus, the present dissertation focuses on studying age, gender, and cultural differences in longitudinal associations of perceived control and personality and their roles for health over time. By examining the age periods of middle and late adulthood, stages during which perceived control as well as health may continue to be affected by age-related experiences and losses, and examining longitudinal changes in these outcomes, this dissertation aims to assess developmental implications for aging women and men in distinct cultures.

2.2. Perceived Control

The present dissertation addresses continued development or change across adulthood of perceived control or perception of control over life circumstances or outcomes (Lachman et al., 2011). Perceived control is also referred to as sense of control or control beliefs and is rooted in the construct of locus of control (Lachman et al., 2011; Rotter, 1966). Rotter (1966) introduced the internal-external distinction of locus of control or subjective appraisal of control over events: perceptions that the person has control over the outcomes of those events (i.e., internal locus of control) and that the outcomes are under the control of powerful others, chance, or fate (i.e., external locus of control).

The construct of perceived control addresses a subjective aspect of control. While perceived control may affect strategies and behaviors to control life circumstances, it is possible

that perceived control does not match the person's actual ability to produce desired outcomes (Chipperfield et al., 2012; Lachman et al., 2011; Schulz & Heckhausen, 1999). In other words, people may feel in control even when outcomes are objectively out of their control (Chipperfield et al., 2012). According to a life-span developmental theory of control proposed by Heckhausen and colleagues (Heckhausen & Schulz, 1995; Heckhausen, Wrosch, & Schulz, 2010; Schulz & Heckhausen, 1999), perceived control facilitates striving for primary control or "behaviors aimed at generating effects in the external world" (Schulz & Heckhausen, 1999, p. 142) while subjectively appraising opportunities to control the environment. In contrast to primary control, secondary control refers to "behaviors and cognitions aimed at changing the internal world (e.g., perceptions) of the individual" (Schulz & Heckhausen, 1999, p. 142) and may serve as compensatory strategies when primary control fails or help the individual selectively focus on the goals pursued by enhancing their attractiveness and disengaging from other alternatives that are not selected. In addition, Chipperfield et al. (2012) suggested that secondary control may also foster perceived control by promoting adjustment to and acceptance of an objectively uncontrollable situation (i.e., alternative ways to maintain sense of control in life circumstances). Thus, perceived control is closely related to behaviors (e.g., use of primary and secondary control strategies) that may influence health and other outcomes (Lachman et al., 2011).

Perceived control has been found to be protective for a variety of health outcomes through late adulthood (Chipperfield et al., 2012; Infurna & Gerstorf, 2014; Infurna, Ram, & Gerstorf, 2013; Jacelon, 2007; Lachman et al., 2011) and is considered a key component for successful aging (Rowe & Kahn, 1997). Perceived control over life circumstances can motivate aging adults to engage in productive or meaningful activities and health-promoting behaviors (e.g., exercising, eating healthy) to positively influence their life and health on their own, which

potentially lead to successful aging or healthy aging with active engagement in life (Mallers, Claver, & Lares, 2014; Rowe & Kahn, 1997). Maintaining a sense of control and responsibility over one's environment and choices has implications for longevity and health across adulthood (Lachman et al., 2011; Langer & Rodin, 1976; Mallers et al., 2014).

Levels of perceived control may change over time. Previous research suggests that perceived control generally declines with age (Lachman et al., 2011; Lachman, Rosnick, & Röcke, 2009). Though middle-aged adults tend to have high levels of perceived control as they maintain relatively healthy and productive lives, perceived constraints and limitations in life may increase in later life possibly due to incurring more unavoidable events and experiences such as age-related health decline (Lachman et al., 2011). Those unavoidable factors may lead older people to acknowledge their increased constrains and limitations as well as decreased opportunities for control and then experience a decline in perceived control (Lachman et al., 2011). With regard to gender, women tend to have lower perceived control than men (Lachman et al., 2011; Slagsvold & Sørensen, 2008; Specht, Egloff, & Schmukle, 2013) while such differences may be less pronounced among older women and men (Infurna, Gerstorf, Ram, Schupp, & Wagner, 2011). Both gender and age differences can be at least partially explained by disparities in socioeconomic status, particularly educational level (Lachman et al., 2011). Higher educational level predicts higher perceived control, and a smaller gender difference in perceived control has been found for college-educated women and men (Lachman et al., 2011; Mirowsky & Ross, 2007; Slagsvold & Sørensen, 2008; Specht et al., 2013). Lachman et al. (2011) suggested that those with higher education may have developed higher perceived control with their acquired problem-solving and coping skills, material and psychological resources, or personal experiences that support their belief that their actions can influence outcomes.

Moreover, culture may be another factor that can influence perceived control. Research suggests that cultural values and psychological tendencies of those in different cultures may affect their beliefs about how much control they have over their life circumstances and outcomes (Cheng et al., 2013). Thus, levels of perceived control may differ among women and men of different ages in distinct cultures. However, research has lacked such age and gender comparisons in perceived control together with other psychosocial constructs that may influence health in different cultural contexts.

Although perceived control is sometimes treated as a personality trait (Kandler, Kornadt, Hagemeyer, & Neyer, 2015; Pallant & Lae, 2002), previous research suggests that perceived control is more receptive to change compared to traditional personality traits which are thought to be relatively stable across adulthood (Lachman et al., 2011). At the same time, some personality traits (i.e., Big Five personality traits) are associated with perceived control (Kandler et al., 2015), which implies that perceived control may be influenced by more stable individual characteristics. Understanding which personality traits can facilitate or inhibit perceived control among aging adults may inform the varying strategies needed to promote increased perceived control for those with varying levels of personality traits; thus, the present dissertation addresses personality traits as well as perceived control.

2.3. Personality Traits

Personality continues to develop during childhood and adolescence while being greatly influenced by genetic and biological factors but also environmental factors (e.g., reinforcement or discouragement for desirable or undesirable characteristics through interactions with parents, teachers, and peers) (Bates et al., 2010). In adulthood, personality is considered to be relatively stable over time or "set like plaster" after age 30 as suggested by William James, yet recent

research suggests personality continues to change across adulthood (Bates et al., 2010; Boyle, Matthews, & Saklofske, 2008; Terracciano, Costa Jr., & McCrae, 2006).

While recent researchers have developed varying models to explain personality structures, Raymond Cattell's work has remained influential (Block, 1995; Boyle et al., 2008; Digman, 1990; Goldberg, 1990). Investigating thousands of English terms used to describe stable individual characteristics using factor analysis, Cattell attempted to reduce those terms into a limited number of factors to account for personality features (Block, 1995). Cattell's systematic, factor-analytic approach has largely influenced the development of later personality theories and models including the widely used five-factor model (FFM) of personality structure (Digman, 1990; McCrae & Costa, 1985) or 'Big Five' (Goldberg, 1990) (Boyle et al., 2008).

The structure of the FFM consists of five personality traits: extraversion or "social outgoingness, high activity, enthusiastic interest, and assertive tendencies", agreeableness or "trusting, cooperative, helpful, caring behaviors and attitudes toward others", conscientiousness or "tendencies to be responsible, task-oriented, and planful", neuroticism or "negative affect tendencies, especially fear, worry, and irritability", and openness or how explicitly one shows his or her curiosity and intellect and "how open one is to experience" (Bates et al., 2010, p. 212). Research suggests that these personality traits, particularly conscientiousness and neuroticism, predict health outcomes possibly because they are related to health-promoting behaviors (e.g., physical activity) and risk behaviors (e.g., smoking, excessive drinking) (Friedman, Kern, Hampson, & Duckworth, 2014; Mroczek, Spiro, Turiano, & Turiano, 2009; Shanahan, Hill, Roberts, Eccles, & Friedman, 2014; Weston, Hill, & Jackson, 2015).

Whereas the FFM has been widely accepted and studied (Heine & Buchtel, 2009); yet, it has some limitations. For instance, because the FFM was originally constructed with factor

analysis (in which the five factors/dimensions were extracted), the model lacks a solid theoretical basis (Block, 1995; Boyle, 2008). Related to this limitation, previous research suggested that its reduced factors could not completely address the complex human personality structure and might have eliminated other important dimensions of personality (Bates et al., 2010; Boyle, 2008). While acknowledging these limitations, the present dissertation uses the five personality traits adopting the FFM for multiple reasons considering its strengths and benefits. First, the FFM has continued to be validated and generally accepted in the literature while being studied cross-culturally (Bates et al., 2010; Heine & Buchtel, 2009). Moreover, a large body of research continues to investigate associations of personality with related constructs and health outcomes using the Big Five traits (Heine & Buchtel, 2009; Lachman et al., 2011). Thus, the FFM helps conduct thorough investigations by using its widely validated five personality traits.

While personality traits are considered stable across adulthood, previous research suggests some general tendencies of changes in the Big Five traits during adulthood (Bates et al., 2010; Boyle, 2008). Agreeableness and conscientiousness increase with age possibly due to increasing responsibilities at home and work after young adulthood; yet, these "positive" personality traits (associated with better outcomes in family and workplaces) seem to remain stable or even increase in older age (when such responsibilities may be reduced due to retirement and children leaving home) while less research has focused on such changes specifically for older adults (Allemand & Hill, 2015; Bates et al., 2010). In contrast, extraversion decreases with age, which may be related to shifts in priorities from social expansion in young adulthood to spending more energy and time in raising children and engaging in other family and work tasks in middle adulthood (Bates et al., 2010) and cultivating close, limited relationships in later life (Allemand & Hill, 2015; Carstensen, 1992; Carstensen et al., 2003). However, more complicated

trends have been found for neuroticism and openness. Neuroticism decreases as people age likely related to having more stable family and work situations, while there is some evidence of an increase in neuroticism in later life (possibly due to increasing age-related losses and stress; Bates et al., 2010). On the other hand, openness increases early in adulthood (for instance, increased focus on seeking new friends and work experiences) and then starts decreasing with age (Bates et al., 2010; Boyle, 2008).

In addition, gender differences in personality traits have been addressed frequently in the literature. Research collectively suggests that women are more likely than men to score higher on traits of neuroticism, extraversion, and agreeableness among adults with a broad age range (Lehmann, Denissen, Allemand, & Penke, 2013; Lippa, 2010; Schmitt et al., 2008; Vianello, Schnabel, Sriram, & Nosek, 2013; Weisberg et al., 2011). Additionally, some studies have indicated that women reported higher conscientiousness (Schmitt et al., 2008; Weisberg et al., 2011), while men reported higher levels of openness to experience (Lehmann et al., 2013). There are multiple possible explanations about such gender differences in personality traits, which remain controversial (Lippa, 2010; Schmitt et al., 2008; Weisberg et al., 2011). Evolutionary explanations suggest that women are inclined to be agreeable, socially oriented (i.e., extraverted), and emotionally involved and cautious (possibly related to neuroticism) in order to successfully raise children; whereas, men are prone to be assertive, aggressive, and take risks (i.e., being open to new experience) in order to increase the chance of their reproductive success. In contrast, socio-cultural approaches explain these tendencies as a consequence of gender socialization or social expectations for women and men to serve certain gender roles (e.g., for women to look after the home raising children; for men to succeed in their work environment) in a given society. At this point, the research is inconclusive as to the cause of gender differences in

personality traits. Furthermore, these gender differences in personality traits may vary by age. For instance, Lehmann et al. (2013) suggested smaller gender differences in extraversion for older people (i.e., older women reporting *less* higher extraversion), though it was unclear because of their cross-sectional design whether the results were due to cohort differences or changes with age.

With regard to cultural implications for personality, research suggests that the five-dimensional structure of the FFM may be applicable for those in various countries including non-Western countries (Heine & Buchtel, 2009; McCrae & Costa, 1997). Cross-cultural studies (Chopik & Kitayama, 2018; McCrae et al., 1999; Schmitt et al., 2008) indicated similar tendencies of age and gender differences in Big Five personality traits (as discussed earlier) in multiple nations while levels of these traits may vary among those in different countries. More details in these cultural issues are addressed in Study 3.

In sum, there is substantial evidence for some age, gender, and cultural differences in personality traits. While previous studies suggested associations of personality traits with perceived control (Johnson, Batey, & Holdsworth, 2009; Kaiseler, Polman, & Nicholls, 2012; Kandler et al., 2015; Lachman et al., 2011; McEachan, Sutton, & Myers, 2010) and health outcomes (Friedman & Kern, 2014; Friedman et al., 2014; Takahashi, Edmonds, Jackson, & Roberts, 2013; Terracciano et al., 2008; Turiano, Pitzer, et al., 2012; Weston et al., 2015), possibly varying implications of personality by age, gender, and culture have not been fully addressed. Thus, the present dissertation specifically focuses on studying the role of personality traits for perceived control and health that may vary for aging women and men in different cultures.

2.4. Three Studies of the Present Dissertation

The present dissertation addresses possible age, gender, and cultural differences in perceived control and personality traits and furthermore their associations with health outcomes. Specifically, this dissertation consists of three studies. The first two studies focus on investigating developmental changes among American middle-aged and older adults by examining nuanced relationships between personality traits and perceived control (Study 1) and the potential mediational role of perceived control for longitudinal associations between personality traits and health outcomes (Study 2). Study 3 addresses the associations among personality traits, perceived control, and health outcomes for those in two different cultural contexts (i.e., the United States and Japan). As discussed in detail as follows, these three studies focus on investigating possible age and gender differences in these associations (as well as their cultural differences in Study 3). The overall expectation of the studies of this dissertation was that age would be a key factor affecting the role of personality and perceived control. For instance, the implications of perceived control for health may become greater as people age (Infurna, Gerstorf, & Zarit, 2011; Kempen et al., 2005). In contrast, the potential impact by gender is examined in an exploratory manner referring to the limited literature. Culture was also expected to have great implications for how personality and perceived control may affect health. Specifically, associations of perceived control and personality with health may be stronger for American middle-aged and older adults than Japanese individuals as they tend to have more individualistic values closely related to these psychological characteristics (Cheng et al., 2013).

3. STUDY 1: PERSONALITY TRAITS AND PERCEIVED CONTROL

Previous research has addressed relationships between personality traits and perceived control during adulthood (Johnson et al., 2009; Kaiseler et al., 2012; Kandler et al., 2015; Lachman et al., 2011; McEachan et al., 2010). However, nuanced relationships between personality traits and perceived control, including possible differences based on age and gender, have not been fully examined in the literature. Of particular interest is how personality traits could affect perceived control over time for women and men of different ages as such age and gender differences have been understudied. Study 1 focuses on this unestablished area of research on age and gender differences in nuanced, longitudinal relationships between personality traits and perceived control for American middle-aged and older adults.

3.1. Background

3.1.1. Age Differences in Personality Traits and Perceived Control

Previous studies have identified associations between personality traits and perceived control, for example, indicating that lower neuroticism (i.e., higher emotional stability) and higher conscientiousness are associated with greater perceived control for adults of different ages (Johnson et al., 2009; Kaiseler et al., 2012; Kandler et al., 2015; Lachman et al., 2011; McEachan et al., 2010). These studies suggest that the personality traits of emotional stability (i.e., low neuroticism) and conscientiousness seem to help maintain or increase perceived control during adulthood. The findings for the other personality traits (i.e., extraversion, agreeableness, and openness) in relation to perceived control were less consistent or conclusive (Johnson et al., 2009; Kaiseler et al., 2012; Kandler et al., 2015; McEachan et al., 2010), which suggests the need for further investigations, particularly longitudinal studies.

As discussed earlier, both personality traits and perceived control have been suggested to change during adulthood (Bates et al., 2010; Lachman et al., 2011). While personality traits are often considered stable, they may change with age (see Bates et al., 2010 for complete review). For example, conscientiousness tends to increase and neuroticism tends to decrease with age, while neuroticism may again increase in later life. As these personality traits are related to perceived control, their age-related changes may affect levels of perceived control, which has been found to be lower for older people and decline over time particularly in later life (Lachman et al., 2011, 2009). Despite this tendency of decline in perceived control, there are a wide range of differences in levels of perceived control across individuals within age groups (Lachman et al., 2011), which may be accounted for by varying individual characteristics such as personality traits.

There is a dearth of research that examines potential age differences in the associations between personality traits and perceived control. Whereas personality traits may be key elements that can influence perceived control during adulthood, it is possible that the effect or importance of personality traits for perceived control differs between different age groups or changes with age. The possibly varying associations between personality traits and perceived control should be understood more comprehensively, especially in exploring options to enhance perceived control for aging adults with different individual characteristics. The present study aimed to better understand the associations between personality and perceived control and specifically examine age differences and possible change with age in these associations by using longitudinal analyses.

3.1.2. Gender Differences in Personality Traits and Perceived Control

Gender is another important factor that is associated with levels of personality traits and perceived control (Infurna, Gerstorf, Ram, et al., 2011; Lehmann et al., 2013; Specht et al., 2013; Weisberg et al., 2011). As discussed earlier, women tend to have higher levels of neuroticism, extraversion, and agreeableness than men (Lehmann et al., 2013; Lippa, 2010; Schmitt et al., 2008; Vianello et al., 2013; Weisberg et al., 2011) and experience lower perceived control, which may be partly due to their lower average educational levels (Infurna, Gerstorf, Ram, et al., 2011; Slagsvold & Sørensen, 2008; Specht et al., 2013), though education may not fully account for such gender differences.

Thus, previous research suggests that levels of some personality traits and perceived control differ between women and men. It may be the case that differing levels of personality traits between genders such as higher neuroticism among women (Schmitt et al., 2008) may account for women's lower perceived control (e.g., neuroticism leading to overwhelming them in dealing with difficulties and reducing their sense of control). Another possibility is that high or low levels of certain personality traits affect perceived control differently for women and men, though few studies have examined gender differences in the effects of personality traits on perceived control. As perceived control has great implications for health and well-being as discussed earlier, it is important to accurately understand the role of personality traits in predicting perceived control for women and men in order to explore gender-specific approaches as well as personality-informed approaches (e.g., personalized treatment; Chapman, Hampson, & Clarkin, 2014) to promoting perceived control. As the understanding of possible gender as well as age differences in the effects of personality traits on perceived control is limited, this area of research, particularly longitudinal research for aging adults, is warranted.

3.1.3. Study 1 Objectives

The purpose of Study 1 was to investigate possible differences in longitudinal associations between personality traits and perceived control for women and men of varying ages. While a number of prior studies have addressed age and gender differences, particularly for personality traits, little research has been conducted taking into consideration the potential effects by age and gender on the associations between personality traits and perceived control. Specifically, the research question of the present study was whether and how the Big Five personality traits predicted perceived control longitudinally for women and men of different ages. Although this was a single question, it was multifaceted and includes different components to be examined.

The first component of the research question was whether or how each personality trait would predict perceived control for the general adult population. Based upon previous findings (Johnson et al., 2009; Kaiseler et al., 2012; Kandler et al., 2015; McEachan et al., 2010), it was hypothesized that lower neuroticism and higher conscientiousness would predict higher perceived control while no specific hypotheses were made for the remaining three personality traits due to the lack of consistent previous findings.

The next component to be addressed was whether associations between each personality trait and perceived control differed among those of varying ages. It was hypothesized that associations between (all five) personality traits and perceived control would be weaker (or negligible) for older people than their younger counterparts; those associations would become weaker over time for those of any age. Due to greater acceptance of those uncontrollable life circumstances with age (Infurna, Gerstorf, Ram, et al., 2011; Lachman, 2006), the effects of individual characteristics such as personality traits on perceived control may decrease over time

and be lower in older age. Thus, similar trends of having weaker associations between the five personality traits and perceived control among older individuals and over time were expected.

In addition, it was examined whether effects of each personality trait on perceived control varied between women and men. A hypothesis for gender differences was not made due to the lack of prior research on such differences in associations between personality and perceived control. While different levels of personality traits between genders (e.g., women's higher neuroticism) as well as women's lower educational levels (Lachman et al., 2011; Lehmann et al., 2013) may be related to gender differences in perceived control, it was unclear whether these variations alone could fully account for women's lower perceived control. As previous findings remained inconclusive for gender differences in the effects of personality on perceived control, this component of the research question was addressed in an exploratory manner without having a specific hypothesis.

Thus, the present study investigated longitudinal associations between personality traits and perceived control and their age and gender differences.

3.2. Method

3.2.1. Data

3.2.1.1. Midlife in the United States

Data from Midlife in the United States (MIDUS) was used for Study 1. MIDUS is a national multi-wave longitudinal survey of American adults conducted by an interdisciplinary research team aiming to assess the roles of psychosocial and behavioral factors for health and well-being throughout adulthood (University of Wisconsin - Madison Institute on Aging, 2018). Three waves of the MIDUS survey were conducted in 1995-96 (MIDUS1; $N = 7{,}108$), in 2004-06 (MIDUS2; $N = 4{,}963$), and in 2013-14 (MIDUS3; $N = 3{,}294$).

3.2.1.2. Data for the Present Study

Though MIDUS included a broad age range of adults (e.g., age 20 to 75 at MIDUS1), the present study focused on studying middle-aged and older men and women, and so excluded those younger than 40 at the first wave as well as those who did not report their age or sex.

Data of MIDUS1, MIDUS2, and MIDUS3 for those aged 40 or older at MIDUS1 were merged and multiple imputation was conducted to impute missing data using NORM (Schafer, 1999). Although it was impossible to verify the degree to which each missing data mechanism was involved, those missing data due to attrition and nonresponse were likely to involve missing at random (MAR) or missing completely at random (MCAR) processes, for which modern imputation approaches such as multiple imputation could lead to making less biased conclusions with the imputed data (Little, 2013). Thus, multiple imputation procedures were used to prepare the data. Twenty imputations were created (i.e., 20 separate datasets were created), each of which consisted of 200 iterations of the data augmentation chain (Enders, 2010). In imputing missing data, all the measures of interest as well as health measures (i.e., number of chronic health conditions and scale for functional limitations) across the three waves were included. After multiple imputation was conducted, all subsequent analyses were conducted using the set of the imputed 20 datasets with Mplus, which produced average estimates for effects of interest among these multiple datasets (Muthén & Muthén, 2017).

The selected data included 2,389 women (with an average age of 54.1 (SD = 9.6) at MIDUS1) and 2,222 men (with an average age of 53.6 (SD = 9.5) at MIDUS1).

3.2.2. Measures

Each wave of the MIDUS study used a variety of measures (Brim et al., 2017; Ryff, Almeida, Ayanian, Binkley, et al., 2017; Ryff, Almeida, Ayanian, Carr, et al., 2017). For Study

1, the following measures were selected: demographic characteristics, time elapsed, personality traits, and perceived control. Descriptive statistics for these measures are summarized in Table 1. The measures of personality traits and perceived control were centered at their overall average across the three waves (before imputing missing data). The Cronbach's alphas reported below were for original data before conducting multiple imputation.

3.2.2.1. Demographic characteristics

MIDUS participants reported their date of birth, which was subtracted from the survey date to compute age in years. Baseline age (at MIDUS1) was centered at 55 (close to the average baseline age). Sex (i.e., gender) was coded as male = 0 and female =1. The participants reported their highest level of education completed, which was recoded into two dichotomous variables: (1) completion of high school degree (i.e., high school graduates = 1; not graduating from high school = 0) and (2) completion of four-year college degree (i.e., earning at least bachelor's degree or equivalent education) = 1 and having less than a bachelor's degree or equivalent education = 0).

3.2.2.2. Time variable

For the present study, a time variable was created indicating the time of measurement elapsed (in years) since MIDUS1 (i.e., 0 year for the measurement at 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 the information (i.e., MIDUS2 or MIDUS3 survey date compared to MIDUS1 survey date). The time varied from 8 to 10 years for the measurement at MIDUS2 and 17 to 19 years for that at MIDUS3.

Table 1

Descriptive Statistics for American Adults (2,389 Women and 2,222 Men) in Studies 1 and 2

Variables	Gender	MIDUS1		MIDUS2		MIDUS3		Difference among MIDUS1 (M1), MIDUS2 (M2), and MIDUS3 (M3)
		Mean	(SD)	Mean	(SD)	Mean	(SD)	
Age (in Years)	Women	54.1	(9.6)	-		-		-
	Men	53.6	(9.5)	-		-		-
High School Graduate	Women	88%		-		-		-
	Men	90%		-		-		-
Four-Year College Graduate	Women	24%		-		-		-
	Men	36%		-		-		-
Race (% of White)	Women	92%		-		-		-
	Men	93%		-		-		-
Agreeableness	Women	3.63	(0.41)	3.60	(0.41)	3.55	(0.41)	Significant differences across waves
	Men	3.37	(0.51)	3.34	(0.49)	3.27	(0.48)	Significant differences across waves
Extraversion	Women	3.22	(0.56)	3.15	(0.56)	3.09	(0.57)	Significant differences across waves
	Men	3.15	(0.56)	3.07	(0.57)	3.01	(0.59)	Significant differences across waves
Neuroticism	Women	2.25	(0.67)	2.08	(0.62)	2.11	(0.61)	Significant differences across waves
	Men	2.14	(0.64)	1.98	(0.59)	2.00	(0.59)	No difference between M2 and M3
Conscientiousness	Women	3.47	(0.44)	3.46	(0.45)	3.41	(0.46)	No difference between M1 and M2
	Men	3.38	(0.44)	3.39	(0.45)	3.35	(0.46)	No differences between M1 and M2 and between M1 and M3
Openness to Experience	Women	2.97	(0.55)	2.88	(0.55)	2.85	(0.56)	Significant differences across waves
	Men	3.02	(0.51)	2.92	(0.53)	2.86	(0.54)	Significant differences across waves
Perceived Control	Women	5.34	(1.10)	5.36	(1.05)	5.14	(1.11)	No difference between M1 and M2
	Men	5.54	(1.01)	5.56	(0.97)	5.33	(1.06)	No difference between M1 and M2
Number of Chronic Health Conditions	Women	3.01	(2.71)	3.23	(2.74)	4.39	(3.42)	Significant differences across waves
	Men	2.36	(2.42)	2.68	(2.60)	3.66	(3.12)	Significant differences across waves
Functional Limitations	Women	1.81	(0.85)	2.16	(0.94)	2.46	(0.98)	Significant differences across waves
	Men	1.58	(0.75)	1.89	(0.86)	2.21	(0.94)	Significant differences across waves

3.2.2.3. Personality traits

MIDUS adopted scales for personality traits using self-descriptive adjectives related to the Big Five traits (Rossi, 2001). MIDUS participants were asked how much a list of self-descriptive adjectives described themselves; each adjective represented one of the Big Five personality traits (see Appendix A for the adjectives including four items for neuroticism, five items for extraversion, seven items for openness to experience, four or five items for conscientiousness, and five items for agreeableness). As a longer five-item version of the conscientiousness scale was only available starting at MIDUS2, the four-item version was used for the three-wave analyses of the present study. Responses were given on a four-point scale that ranged from 1 (*a lot*) to 4 (*not at all*), which required these items (except negatively worded items) to be reverse-coded so that higher scores would indicate higher levels of each trait. The recoded items for each personality trait were averaged as its overall score. For the three waves of MIDUS, the alphas for the five personality traits were: between .76 to .81 for the five-item agreeableness scale; between .76 to .78 for the five-item extraversion scale; between .71 to .75 for the four-item neuroticism scale; between .55 to .59 for the four-item conscientiousness scale; and, between .77 to .78 for the seven-item openness to experience scale.

3.2.2.4. Perceived control

MIDUS participants were asked how much they agreed with each of 12 statements which included four items related to personal mastery and eight items related to perceived constraints (see Appendix B for details). Responses were given on a seven-point scale that ranged from 1 (*strongly agree*) to 7 (*strongly disagree*). The personal mastery items were reverse-coded so that higher scores would indicate higher levels of perceived control. The 12 items were averaged as

an overall score of perceived control. The alphas were between .85 and .87 for the three waves of MIDUS.

3.2.3. Analysis Strategy

In order to assess trajectories of perceived control and examine effects of personality traits as well as demographic characteristics on the level and trajectory of perceived control, a two-level multilevel modeling analysis was conducted by including Level-1 time-variant predictors (i.e., time variables, five personality traits) and Level-2 time-invariant or individual-level predictors/covariates (i.e., baseline age, sex, education) with maximum likelihood estimation. One unit of the time and age variables (described earlier) was set as 10 years (i.e., divided by 10) in order to improve the interpretability while avoiding having too small (unstandardized) coefficients. The time variables included both the linear time variable and the quadratic time variable (i.e., squared values of the linear time variable), and their effects indicate change rates per 10 years in perceived control. Random effects were added to Level-2 individual-level intercept and the slope of the linear time variable in order to assess whether the levels and trajectories, respectively, of perceived control varied among individuals. Related to the research question, in addition to the fixed main effects of all the predictors and covariates, three-way interactions of a) time, age, and each personality trait and b) time, sex, and each personality trait (as well as their lower two-way interactions) were entered into the model in order to assess systematically varying effects on trajectories for those of different ages and sexes. Non-significant interactions were removed from the final model unless they were lower components of significant three-way interactions or removing the interactions worsened the quality of model. Using estimates for main effects and interactions in the final model, trajectories

of perceived control were depicted so that tendencies due to significant interaction effects could be assessed.

Moreover, as the effects of personality traits might be curvilinear (e.g., Williams, O'Brien, & Colder, 2004), additional analyses were conducted including quadratic (in addition to the linear) terms of each personality trait. Due to the complexity of such a model, two separate analyses were conducted analyzing (1) main effects of quadratic terms of the five personality traits (controlling for their linear effects) and (2) age and sex differences (i.e., interactions of time by age by personality and time by sex by personality) in the quadratic effect of each personality trait on level and trajectory of perceived control separately (with five models in which interactions of each of the personality traits were assessed).

3.3. Results

The results of the multilevel modeling analysis are summarized in Table 2 for the final model in which non-significant interactions were excluded, except that of sex by conscientiousness. Although the interaction of sex by conscientiousness was only marginally significant ($p = .055$), it was kept in the final model as removing it would worsen the value of the criterion in comparing models (i.e., a larger value of Akaike's information criterion). The values of the Akaike's information criterion show that this final model (31,253) improved from the full model that included all (non-significant as well as significant) interactions of time, age, and personality and of time, sex, and personality (31,270).

3.3.1. Trajectories of Perceived Control and Their Age and Sex Differences

As shown in Table 2, the fixed effect of the linear time variable (per 10 years) was not significant, but its random effect was significant (.045, $p < .001$). This means that the linear component of the trajectory of perceived control did not differ from zero (i.e., flat slope) on

average, but it varied among individuals. In contrast, the fixed effect of the quadratic time variable (i.e., Time-Squared) was significant and negative (-.090, $p < .001$). While the slope or trajectory was initially flatter due to the non-significant linear effect, it was concave with an accelerating decline over time as shown in Figure 1.

There were significant main effects of age (-.084 per 10 years, $p < .001$) and sex (-.145, $p < .001$), indicating that perceived control was lower for older people and women even after controlling for high school and college education (which both significantly predicted perceived control). The effects of both variables of education were significant ($p < .001$) and positive, suggesting that completion of a four-year college education predicted higher perceived control above and beyond the positive effect of completion of a high school education. In addition, there was a significant interaction between time and age (-.074, $p < .001$), indicating that the trajectories of perceived control differed between younger and older people. However, there was no sex difference in the trajectories (so the non-significant interaction of time by sex was removed from the final model).

Figure 1 (including two subfigures) shows these effects of time, age, and sex for levels and trajectories of perceived control by depicting the predicted trajectories for hypothetical women and men of two specific ages, 45 and 65 (at MIDUS1) with average levels of the five personality traits based on the estimates of effects in the final model (Hoffman, 2015). Older women and men experienced steeper decline in perceived control than their younger (i.e., middle-aged) counterparts: the perceived control of those aged 65 at MIDUS1 decreased by .369, which is equivalent to .347 standard deviation of perceived control, over 19 years (i.e., the period of three waves of MIDUS study).

Table 2

Two-Level Multilevel Model Predicting Perceived Control (Final Model) in Study 1

	Estimate (Unstandardized)	S.E.
Fixed Effects:		
Intercept	5.295***	0.040
Time (per 10 years)	0.051	0.035
Time-Squared	-0.090***	0.019
Age (per 10 years)	-0.084***	0.014
Sex (Female)	-0.145***	0.025
High School Graduate	0.227***	0.040
College Graduate	0.176***	0.027
Agreeableness	-0.038	0.024
Extraversion	0.324***	0.021
Neuroticism	-0.444***	0.023
Conscientiousness	0.363***	0.037
Openness	0.193***	0.022
Time x Age	-0.074***	0.013
Sex x Neuroticism	-0.070*	0.028
Sex x Conscientiousness	-0.077†	0.040
Time x Conscientiousness	0.048*	0.022
Random Effects (Variances):		
Intercept	0.425***	0.018
Time (Slope)	0.045***	0.009
Level-1 Residual	0.315***	0.010

Notes: *** p< .001, ** p<.01, * p< .05, † p< .10; the following interaction terms were removed from the final model due to their non-significant effects: time by sex, time by agreeableness, age by agreeableness, time by age by agreeableness, sex by agreeableness, time by sex by agreeableness, time by extraversion, age by extraversion, time by age by extraversion, sex by extraversion, time by sex by extraversion, time by neuroticism, age by neuroticism, time by age by neuroticism, time by sex by neuroticism, time by conscientiousness, age by conscientiousness, time by age by conscientiousness, time by sex by conscientiousness, time by openness, age by openness, time by age by openness, sex by openness, and time by sex by openness.

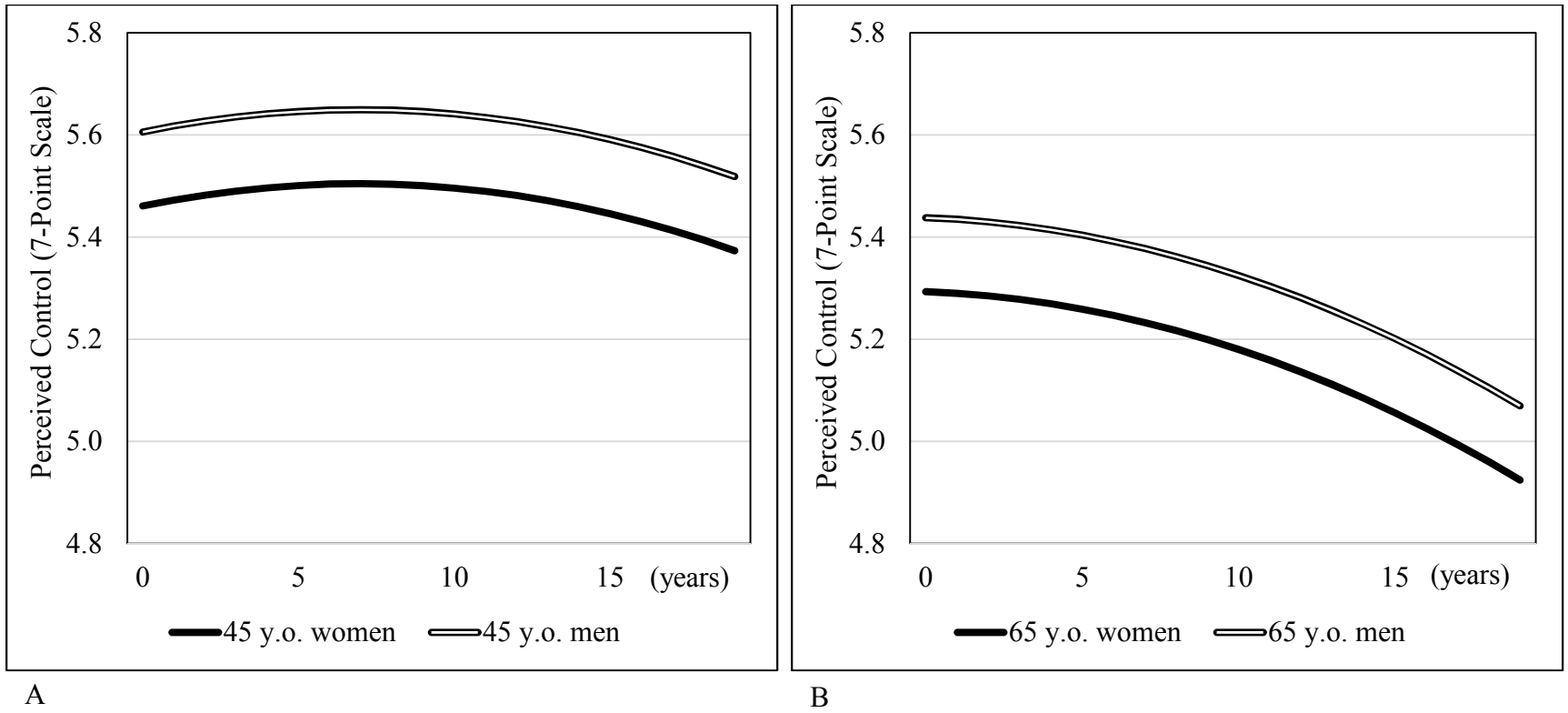

Figure 1. Trajectories of perceived control over two decades for those aged 45 (A) and 65 (B) at MIDUS1 who graduated from high school without completing 4-year college education with average levels of the five personality traits.

3.3.2. Effects of Personality Traits and Their Age and Sex Differences

As seen in Table 2, the main effects of all personality traits except agreeableness were significant. For a comparison of the relative size of these effects, estimated differences per standard deviation in perceived control by one standard deviation increase of each personality trait are summarized in Table 3, which indicates larger effect of neuroticism.

Table 3

Relative Size of Main Effects of Personality on Perceived Control (Study 1)

	Change per standard deviation in perceived control by one standard deviation increase of personality
Extraversion	0.175
Neuroticism	-0.262
Conscientiousness	0.154
Openness	0.099

Note. The effect of agreeableness is not shown here due to its non-significant effect.

In addition, there were significant and marginal interactions of sex with neuroticism (-.070, $p < .05$) and conscientiousness (-.077, $p = .055$), respectively. These results indicated that though the negative effect of neuroticism was stronger for women, the positive effect of conscientiousness was stronger for men. The other three personality characteristics' associations with perceived control did not vary by sex. Figure 2 and Figure 3 show these sex effects of neuroticism and conscientiousness, respectively, by depicting the predicted trajectories for hypothetical women and men with low and high levels of the personality trait and average levels of the other traits based on the estimates of effects in the final model.

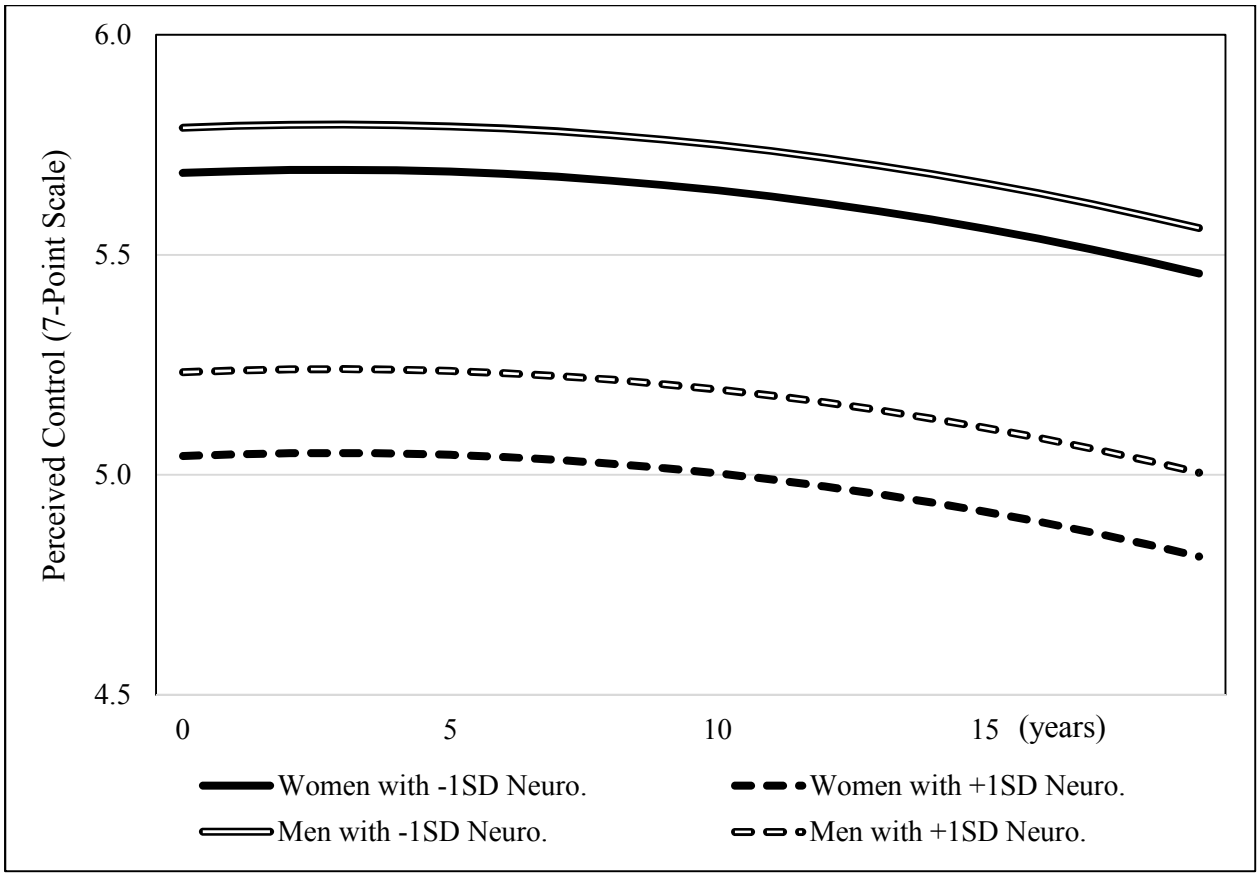

Figure 2. Trajectories of perceived control for women and men with high level (i.e., one standard deviation above the mean) and low level (i.e., one standard deviation below the mean) of neuroticism and average levels of the other personality traits who were aged 55 at MIDUS1 and had graduated from high school without completing a four-year college education.

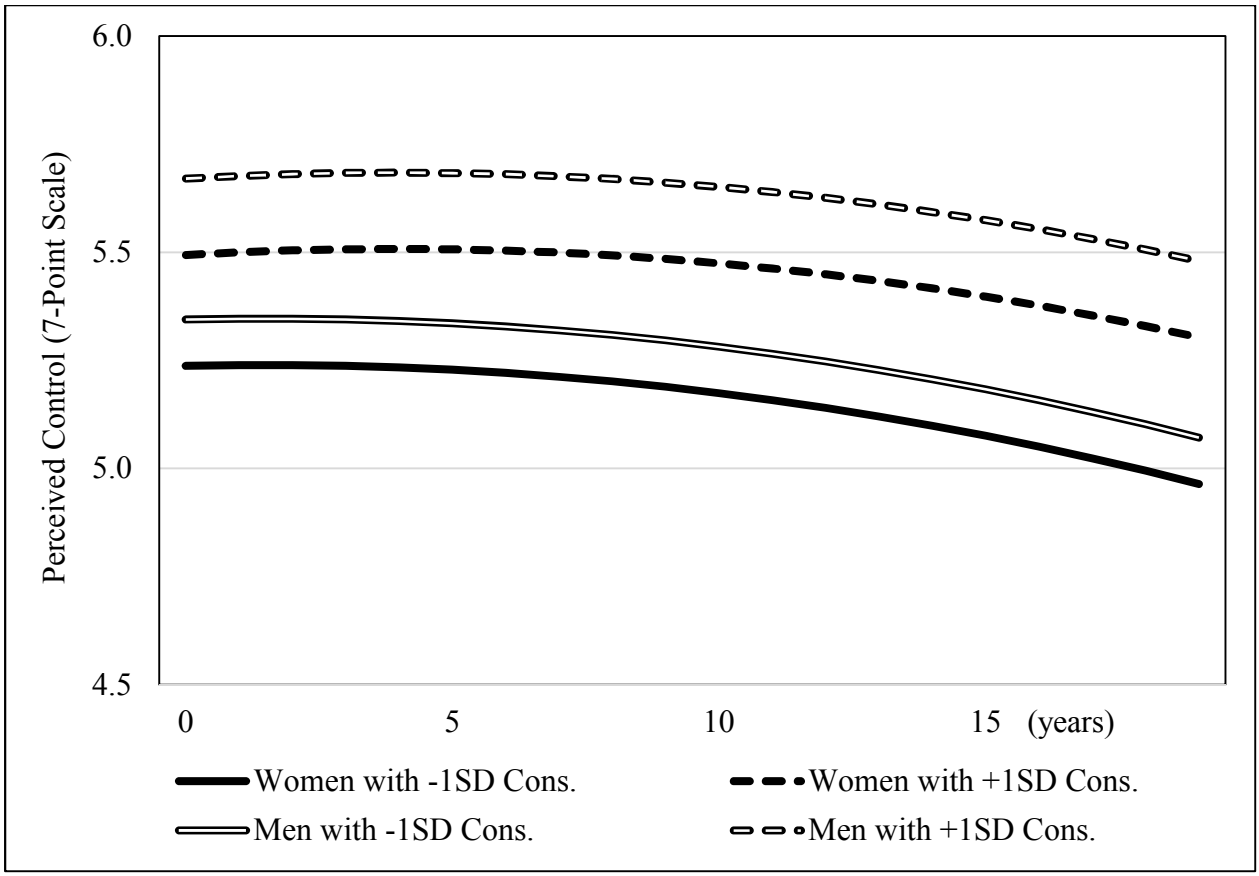

Figure 3. Trajectories of perceived control for women and men with high level (i.e., one standard deviation above the mean) and low level (i.e., one standard deviation below the mean) of conscientiousness and average levels of the other personality traits who were aged 55 at MIDUS1 and had graduated from high school without completing a four-year college education.

Among the middle-aged and older adults (aged 40 to 75 at MIDUS1), there were no age differences in the effects of personality traits on levels or trajectories of perceived control (so the non-significant interactions were removed from the final model). However, in terms of change over time (i.e., with age), the interaction of time by conscientiousness was significant (.048, $p < .05$) indicating that the effect of conscientiousness increased over time. There were no interactions of time with the other four personality traits (so the non-significant interactions were removed from the final model) suggesting that the associations between the personality traits and perceived control did not change over time. Figure 3 shows the interaction of time by conscientiousness along with that of sex by conscientiousness as described earlier (i.e., stronger

effect of conscientiousness for men). Although the interaction of time by conscientiousness indicated an increasing effect of conscientiousness over time, the difference in the effect of conscientiousness between those with one standard deviation below and above the average level of conscientiousness increased by only .043 (i.e., .041 standard deviation of perceived control) for 10 years.

3.3.3. Variances of Level and Slope of Perceived Control Explained by Predictors

As summarized in Table 4, comparing with more parsimonious models with fewer predictors, it was assessed how much of the variances (i.e., random effects) of intercept (i.e., level of perceived control) and slope/trajectory between individuals (i.e., Level 2) and residual variance within individuals (i.e., Level 1) the final model could explain. The predictors/covariates and their interactions included in the final model accounted for 42.4% of the variance between and 10.5% of the variance within individuals unexplained by the model that just included linear and quadratic time variables predicting perceived control (i.e., Base Model in Table 4). Adding these interactions (i.e., systematic varying effects) of the final model led to accounting for 11.8% of the variance of slope/trajectory of perceived control between individuals that could not be explained only by main effects of the predictors/covariates as well as linear and quadratic effects of time (i.e., Main Effects Model in Table 4).

Table 4

Comparisons of Random Effects between the Final Model and More Parsimonious Models (Study 1)

Model	Predictors Included	Random Effects		
		Intercept	Slope	Level-1 Residual
Base Model	Only linear and quadratic time variables	0.738	0.071	0.352
Main Effects Model	Only main effects (without interactions included in the final model)	0.428	0.051	0.315
Final Model	Main effects and interactions (see Table 2)	0.425	0.045	0.315
	- Reduction in random effect from Base Model to Final Model	42.4%	36.6%	10.5%
	- Reduction in random effect from Main Effects Model to Final Model	0.7%	11.8%	0.0%

3.3.4. Quadratic Effects of Personality Traits

In order to verify whether personality traits had curvilinear effects on perceived control, additional analyses were conducted adding quadratic terms to the models with linear terms. The results for the additional analyses on the quadratic effects of personality traits are summarized in Table 5. In the model for main effects of quadratic terms of each personality trait, only the quadratic effect of neuroticism was significant. The curvilinear difference in the effect of neuroticism on perceived control is depicted in Figure 4, which indicates that the negative association between neuroticism and perceived control was even stronger when the level of neuroticism was higher. As seen in Table 5, in the models that also included interactions of the quadratic term of each personality trait with time and age and with time and sex, no significant interactions were found. Since this indicates no age or sex differences in the quadratic effects of the five personality traits on perceived control, curvilinear analysis was not pursued further.

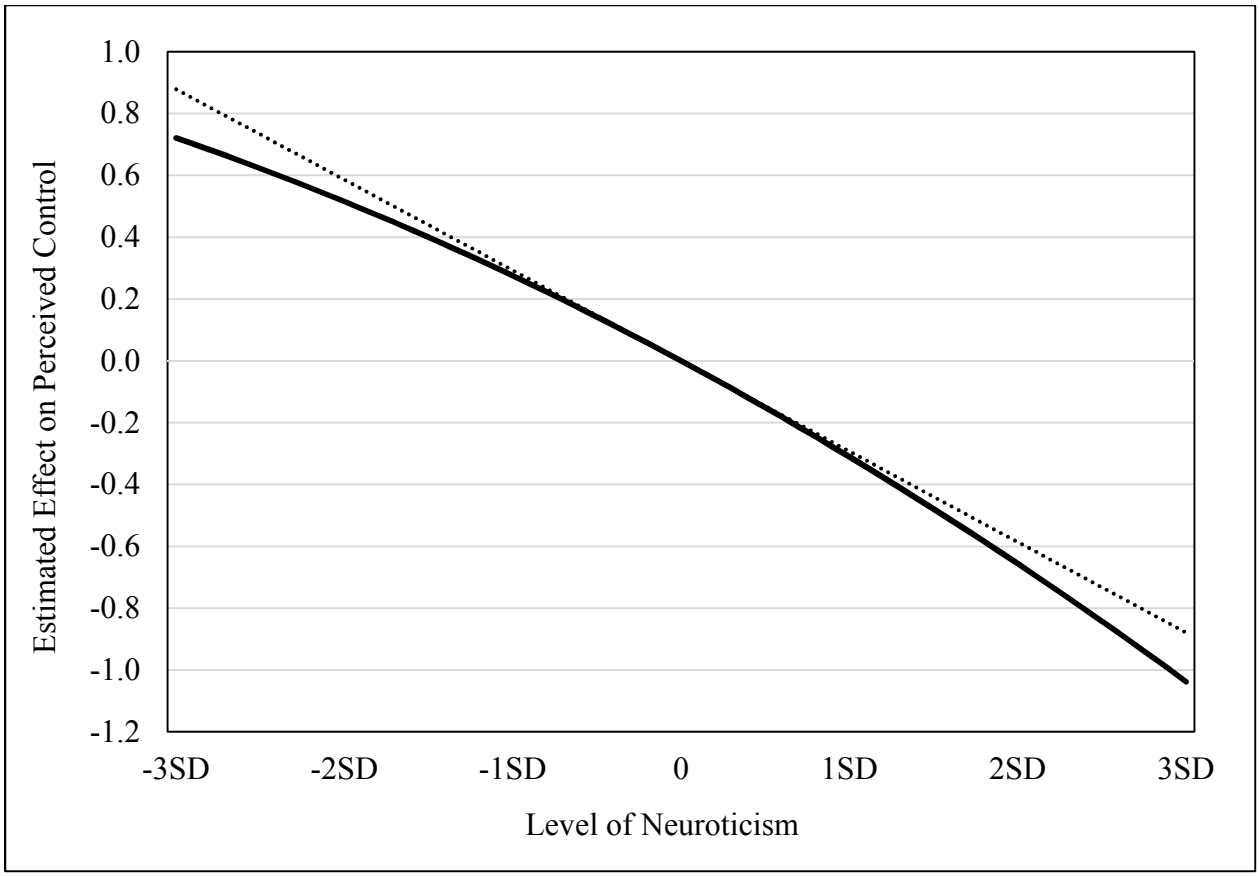

Figure 4. Estimated effects by different levels of neuroticism for perceived control. The solid line is for the estimated effects. The dashed line indicates the straight line that is tangent to the curvilinear line of the effect at the point of the average level (i.e., zero in x-axis) of neuroticism; the scale of perceived control is unstandardized.

Table 5

Quadratic Effects of Personality on Perceived Control (Study 1)

Results in the Model for Main Effects of Quadratic Terms of Five Personality Traits

	Agreeableness	Extraversion	Neuroticism	Conscientiousness	Openness
Main Effects of Quadratic Terms	n.s.	n.s.	-0.045** (S.E.: 0.015)	n.s.	n.s.

Results in the Models for Interactions of Quadratic Terms of Each Personality Trait with Time, Age, and Sex

	Agreeableness	Extraversion	Neuroticism	Conscientiousness	Openness
Time x Personality (Quadratic)	n.s.	n.s.	n.s.	n.s.	n.s.
Age x Personality (Quadratic)	n.s.	n.s.	n.s.	n.s.	n.s.
Time x Age x Personality (Quadratic)	n.s.	n.s.	n.s.	n.s.	n.s.
Sex x Personality (Quadratic)	n.s.	n.s.	n.s.	n.s.	n.s.
Time x Sex x Personality (Quadratic)	n.s.	n.s.	n.s.	n.s.	n.s.

Note: ** $p<.01$; n.s. (not significant): $p > .05$

3.4. Discussion

3.4.1. Main Findings

The present study focused on examining longitudinal associations between personality traits and perceived control among midlife and older adults. Specifically, using MIDUS data from those aged 40 or older, this study investigated whether and how the Big Five personality traits predicted perceived control over two decades for American women and men of different ages. There were multiple strengths of the present study. First, its focus on age and gender differences in associations between personality traits and perceived control was unique as previous studies tended to study such differences separately for personality traits and perceived control. In addition, the use of a large-scale, national sample whose data had been collected over nearly 20 years allowed thorough longitudinal analysis of the long-term relationships between these constructs. Moreover, due to having three waves of data, it was feasible to assess non-linear trajectories of perceived control over time. With these strengths, the present study contributes to improving the understanding of longitudinal associations between personality traits and perceived control.

The findings of the present study partially support the hypotheses: all personality traits but agreeableness predicted the level of perceived control; however, the associations of these personality traits with perceived control did not differ among varying ages. In addition, while no specific hypothesis was made for gender differences in whether personality traits would be associated with perceived control, some gender differences in the associations of neuroticism and conscientiousness with perceived control were found.

As expected, lower neuroticism (i.e., higher emotional stability) and higher conscientiousness were associated with higher perceived control, which corresponds to the

findings of previous research. Conscientiousness promotes planning, organization, self-regulation, and persistence (Bartley & Roesch, 2011; Bates et al., 2010), which may help deal with difficulties and enhance sense of control over life situations. In contrast, neuroticism is related to emotional instability and maladaptive coping (e.g., avoidance, disengagement), which can inhibit the maintenance of perceived control by preventing stressful experiences from being dealt with (Connor-Smith & Flachsbart, 2007; Lachman et al., 2011). The association of neuroticism with perceived control was also curvilinear suggesting that extreme levels of neuroticism could be associated with even lower perceived control.

While no specific hypotheses were made for the other three personality traits, the present study indicated that higher extraversion and higher openness to new experience, but not agreeableness, predicted higher perceived control. As a possible explanation, the association between extraversion and perceived control may involve social relationships as a mediator. Previous research suggests associations between extraversion and perceived social support (Swickert, Hittner, & Foster, 2010) and between high quality of social support and perceived control (Lachman et al., 2011), thus extraversion may have positive influences on perceived control through enhancing quality of social relationships and helping maintain a sense of having support when facing hardships. For the association between openness and perceived control, openness has been found to be associated with planning as a coping strategy (Kaiseler et al., 2012). In addition, those with high levels of openness may tackle stressful experiences flexibly, which may help them cope with those experiences effectively and then maintain their sense of control over their outcomes (Kaiseler et al., 2012). Moreover, as openness is associated with intellectuality and creativity (Bates et al., 2010), this trait may help develop unique strategies to deal with life circumstances, which may enhance perceived control. These speculations should

be tested in future research examining the mechanisms of each personality trait affecting perceived control.

With regard to age differences, the findings of the present study supported previous studies suggesting that older adults had lower perceived control than middle-aged adults and experienced general decline in perceived control with age. The present study further suggested that the trajectories of perceived control were curvilinear. As seen in Figure 1, the level of perceived control remained relatively stable over two decades for middle-aged adults unlike older adults who appeared to experience decline during the same period. Interestingly, the trajectories of perceived control within Figure 1 appear to be continuous between the two subfigures: individuals aged 45 at MIDUS1 approached age 65 at MIDUS3, and their extended, projected future trajectories after MIDUS3 seem to become similar to the trajectories for those individuals aged 65 at MIDUS1 over the two decades (from MIDUS1 to MIDUS3). Both of these trajectories indicate steeper decline in perceived control for individuals in their late 60s and older ages, apparently regardless of cohort. Although continued longitudinal research is needed, differences in levels and trajectories of perceived control between individuals aged 45 and 65 at MIDUS1 seem to be due to change with age rather than cohort differences.

For associations between personality traits and perceived control, the present study did not support the hypothesis that there would be age differences indicating that personality traits would have less influence on perceived control among older adults. In contrast, the findings indicated that the associations did not differ between adults of different ages (i.e., age 40 to 75 at MIDUS1). However, the positive association of conscientiousness with perceived control was found to slightly increase over time. Thus, despite the lack of difference by age (i.e., cohort difference), conscientiousness seems to have become more important as the respondents aged

over the two decades of MIDUS study. As this change was not age-specific, some historical or social influences may have been involved, which requires further investigations. For the other personality traits, the lack of change in their associations with perceived control over time (i.e., with age) was consistent with the results of no age differences (between those of different ages) in these associations, which suggests that aging may have little implications for associations between these personality traits and perceived control.

These findings suggest that conscientiousness, (low) neuroticism, extraversion, and openness remain important (or become more important in the case of conscientiousness) for perceived control through late adulthood. While older adults' perceived control decreased at a greater rate possibly due to their declining health and inevitable events (e.g., losses of significant others) (Lachman et al., 2011, 2009), older individuals with these "adaptive" personality traits experienced relatively high perceived control. As these personality traits may be related to other factors that can promote perceived control (e.g., coping, social relationships) as discussed earlier, enhancing those potential mediators particularly in later life may be a possible way to help aging adults maintain perceived control. On the other hand, the malleability of personality traits is another area that warrants further investigation given that prior research suggests changes in personality traits even in later adulthood (Allemand & Hill, 2015). For example, if effective interventions to enhance conscientiousness in later life are identified, they can be applied in order to help older adults maintain their perceived control, which would be beneficial because perceived control may increase active engagement in life, health, and well-being (i.e., successful aging) (Mallers et al., 2014; Rowe & Kahn, 1997).

The present study also indicated gender differences in the associations of neuroticism and conscientiousness with perceived control. Specifically, while the negative association of

neuroticism with perceived control was stronger for women, the positive association of conscientiousness with perceived control was stronger for men. This suggests that women's perceived control may vary more greatly depending on their levels of neuroticism as compared to men; whereas, in contrast, conscientiousness has greater implications for men's perceived control than women's. These gender differences may be related to how personality characteristics are related to strategies to cope with stressful situations. In particular, conscientiousness is associated with problem-focused coping (aimed to solve the problem or eliminate or influence the source of the stress) while neuroticism is associated with emotion-focused coping (aimed to reduce negative emotions by using alternative strategies without attempting to directly change the stressful event itself) (Connor-Smith & Flachsbart, 2007). Gender differences in the use of these coping strategies suggest that women tend to use emotion-focused coping more frequently (Howerton & Van Gundy, 2009; Matud, 2004; Meléndez, Mayordomo, Sancho, & Tomás, 2012) and problem-focused coping less frequently than men (Matud, 2004). Some strategies of emotion-focused coping can be beneficial for dealing with stressful experiences (which may promote perceived control by increasing confidence about staying in control of the circumstances) especially when involving emotional regulation and seeking emotional support (Matud, 2004). However, neuroticism may facilitate less adaptive strategies of emotion-focused coping such as avoidance and disengagement, which can negatively affect perceived control and psychological well-being (Kaiseler et al., 2012; Lachman et al., 2011; Matud, 2004). Women with high levels of neuroticism may be likely to use those maladaptive types of emotion-focused coping more frequently than men with high levels of neuroticism because of gender differences in frequency of using emotion-focused coping in general. If they rely more on such maladaptive coping strategies, they would avoid facing their

real problems and associated emotions (Connor-Smith & Flachsbart, 2007), which may prevent them from having a sense of control over the circumstances. In contrast, if women have high emotional stability (i.e., low neuroticism), they may be more likely to rely on adaptive emotion-coping strategies (i.e., emotional regulation, seeking emotional support) than their male counterparts, which may in turn influence their perceived control more positively. In terms of conscientiousness, in an opposite way, men with high conscientiousness may be likely to more frequently use adaptive problem-focused coping strategies as compared to their highly conscientious female counterparts. As a result, a gender difference emerges with men more likely to use problem-focused coping strategies which have been found to be associated with better adjustment to stressful experiences and psychological health outcomes (Boehm, Eisenberg, & Lampel, 2011; Duangdao & Roesch, 2008; Penley, Tomaka, & Wiebe, 2002) and which may help them to maintain their perceived control. These associations among personality traits, coping styles, and perceived control have been understudied and should be investigated in future research.

In addition, it should be noted that women had lower perceived control than men even after controlling for education and levels of personality traits in the present study while previous research suggested the role of education in partially accounting for gender differences in perceived control (i.e., women's lower educational level explaining their lower perceived control; Slagsvold & Sørensen, 2008; Specht, Egloff, & Schmukle, 2013). This finding suggests the involvement of other factors in addition to education (and personality traits such as neuroticism, which tends to be higher for women). The gender differences may be related to women and men's differential use of coping strategies as discussed earlier; yet, it is probably only a part of the whole picture of the gender differences in perceived control after taking personality traits into

consideration. As previous research lacks conclusive explanations about such gender differences, more studies are needed in this area of research in order to identify gender-specific approaches to enhancing perceived control, which may in turn help to improve health and well-being (Lachman et al., 2011).

3.4.2. Limitations

Despite the strengths and contributions of the present study, there were also multiple limitations to discuss. First, 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 original use of the short (i.e., four-item) scale, which the MIDUS study eventually rectified at the second wave by adopting a five-item scale (adding one more item) for conscientiousness (see Appendix A) which improved the reliability. However, because the present study used three waves of MIDUS data to assess the effects of personality traits on trajectories of perceived control over two decades, it was not possible to use the five-item conscientiousness scale with higher internal consistency. Another limitation to note was the effect of time by conscientiousness was quite small. Although the large sample size of the present study led to having statistically significant results, the meaning of the effect should be interpreted with caution. While this interaction effect seemed to show some change by aging in the effect of conscientiousness on perceived control, the change may remain trivial due to the effect size. In addition, MIDUS is a complex dataset as data were collected from national subsamples of the general population and twin pairs (using a random digit dialing method) as well as the siblings of the national population respondents and oversamples from metropolitan areas (University of Wisconsin - Madison Institute on Aging, 2018); however, their actual respondents were not necessarily representative of the general population. For instance, 92% of the respondents aged

40 or older (i.e., those selected for the present study) reported that their race was White. As this does not adequately reflect the general population, future research should address associations between personality traits and perceived control using more diverse samples. This limitation continues to be discussed in the subsequent chapters while relating to cultural implications for associations between personality and perceived control (as well as their associations with health). Moreover, whereas MIDUS study used the terms of 'sex' and 'gender' interchangeably, sex and gender refer to different (i.e., biological and social/cultural, respectively) aspects of variations between women and men in a strict sense (Muehlenhard & Peterson, 2011). Due to the difference in the focus of these two concepts, it is possible that sex and gender have varying implications for perceived control, personality, and other psychological traits that are susceptible to biological and social influences. Future research is needed to distinguish between the potential effects of sex and gender for associations between personality traits and perceived control. Lastly, although the present study indicated quadratic trajectories of perceived control, which was one of its unique findings, such curvilinear trajectories could be estimated better 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.

3.4.3. Conclusions

Despite these limitations, the present study can inform research by contributing to improving the understanding of longitudinal associations between personality traits and perceived control. In particular, this study indicated some gender differences in the associations of personality traits with perceived control (i.e., stronger association with neuroticism and weaker association with conscientiousness for women) while indicating curvilinear trajectories of perceived control with age, which had not been fully addressed in previous research.

As perceived control as well as personality traits have implications for the health of aging adults, which is addressed in Study 2, these constructs and their relationships should continue to be examined in future research.

4. STUDY 2: PERSONALITY, PERCEIVED CONTROL, AND HEALTH

While Study 1 focused on investigating longitudinal relationships between personality traits and perceived control for women and men of different ages, Study 2 expands this investigation to address the effects of personality and perceived control on health outcomes. Previous research has suggested that personality traits and perceived control are associated with various health outcomes among adult samples including middle-aged and older adults (Friedman & Kern, 2014; Infurna & Gerstorf, 2014; Kempen et al., 2005; Surtees et al., 2010; Turiano, Chapman, Agrigoroaei, Infurna, & Lachman, 2014; Turiano, Pitzer, et al., 2012). The present study specifically addresses the potential of perceived control to mediate the longitudinal associations between personality traits and health outcomes (i.e., chronic health conditions, functional limitations).

4.1. Background

4.1.1. Personality Traits and Health

Personality traits have been found to be associated with health and well-being across adulthood. Among the Big Five personality traits, conscientiousness appears to be a particularly consistent predictor of health with positive associations to better physical health and lower mortality during adulthood (Friedman & Kern, 2014; Friedman et al., 2014; Takahashi et al., 2013; Terracciano et al., 2008; Turiano, Pitzer, et al., 2012; Weston et al., 2015). In addition, multiple studies (e.g., Terracciano et al., 2008; Turiano et al., 2012; Weston et al., 2015) have suggested that low neuroticism (i.e., emotional stability) is associated with better health and mortality outcomes. In contrast, fewer studies provided evidence for associations of the remaining three personality traits (i.e., extraversion, agreeableness, openness to experience) with physical health, yet some studies (e.g., Magee, Heaven, & Miller, 2013; Turiano, Pitzer, et al.,

2012; Turiano, Spiro III, & Mroczek, 2012; Williams, Rau, Cribbet, & Gunn, 2009) showed that extraversion, agreeableness, and openness also predicted health outcomes.

There are multiple possible explanations for links between personality and health. For example, conscientiousness and neuroticism may positively and negatively influence health outcomes, respectively, by affecting health-related behaviors such as exercising and smoking (Friedman et al., 2014; Mroczek et al., 2009; Shanahan et al., 2014; Weston et al., 2015). In addition, personality traits, particularly conscientiousness, are also linked to other factors related to physical health, such as social relationships, coping with stress, and socioeconomic attainment (Friedman et al., 2014; Kern & Friedman, 2011; Shanahan et al., 2014).

These effects of personality traits may differ by age and gender. Whereas a number of studies (e.g., Takahashi et al., 2013; Terracciano et al., 2008; Turiano et al., 2012b; Weston et al., 2015) examined personality traits relating to health and mortality outcomes for adult samples with a broad age range controlling for age, fewer studies have addressed possible age differences in the effects of personality traits on physical health. One such study (Duberstein et al., 2003) focused on examining primary care medical patients aged 60 or older and found that associations of higher neuroticism and lower extraversion with worse perceived health and functional status were more pronounced for the older subsample (aged 75 or older), but their findings were limited due to their cross-sectional design. A more recent study (Magee et al., 2013) assessed longitudinal relationships between personality traits and self-reported health using a representative sample of Australian households (aged 20 to 79). Their results indicated that increased neuroticism and decreased extraversion were associated with poorer physical health, yet these associations were stronger for younger cohorts, which was the opposite direction to that of the aforementioned cross-sectional study of Duberstein and colleagues (2003).

Sex (or gender) is often included as a covariate when assessing effects of personality traits on health (e.g., Turiano et al., 2012b; Weston & Jackson, 2015), yet potential gender differences in associations between personality traits and physical health are an area in which more research is needed. As discussed in Study 1, there may be gender differences in levels of personality traits (Lehmann et al., 2013; Lippa, 2010; Schmitt et al., 2008; Vianello et al., 2013; Weisberg et al., 2011), which may in turn have varying implications for health outcomes. However, it has not been fully addressed in the literature whether the effects of personality traits on health differ between women and men. One study, by Friedman, Kern, and Reynolds (2010), addressed gender differences in longitudinal personality-health links and found that neuroticism during early adulthood predicted poorer late-life physical health more strongly for women than men. In addition, when assessing four of the Big Five traits (i.e., neuroticism, conscientiousness, agreeableness, extraversion) together, their results showed that agreeableness was the strongest and only significant predictor of better physical health for men whereas only neuroticism predicted poorer physical health for women. Further longitudinal research is warranted to strengthen evidence for such age and gender differences as the effects of personality traits may change with age and different personality traits may play an important role in the health of women and men over time.

4.1.2. Perceived Control and Health

Perceived control has also been found to predict better physical and functional health (e.g., chronic diseases, cardio-metabolic risk, functional limitations) (Gerstorf, Rocke, & Lachman, 2011; Infurna & Gerstorf, 2014; Infurna, Gerstorf, Ram, et al., 2011; Infurna, Gerstorf, & Zarit, 2011; Kempen et al., 2005) as well as lower mortality (Infurna, Gerstorf, Ram, et al., 2011; Surtees et al., 2010; Turiano et al., 2014) among adult samples including middle-aged and

older adults. As a possible explanation for the link between perceived control and health, maintaining a sense of control over outcomes may be associated with health-promoting behaviors such as physical activity and smoking cessation as well as other protective factors such as social support (Gerstorf et al., 2011; Lachman et al., 2011; Schnoll et al., 2011).

In addition to its generally protective nature for health, some studies have addressed age differences in perceived control and health outcomes. For instance, Kempen et al. (2005) found that perceived control was associated with lower levels of disability eight years later, with this effect being stronger for older adults (aged 65 or older) than younger people. Infurna, Gerstorf, and Zarit (2011) also found that lower perceived control predicted worsening health (i.e., increase in the number of health conditions) only for those aged 65 or older but not for younger people. The authors concluded that perceived control might have more proximal or immediate effects on health outcomes for older adults, who are experiencing irreversible health declines. These findings suggest that the implications of perceived control for health may be greater for older adults. Feeling a loss or decline of control seems to be detrimental for the health of aging adults who are facing age-related declines (Lachman et al., 2011).

Although women tend to have lower levels of perceived control, which may negatively affect health outcomes (Infurna, Gerstorf, Ram, et al., 2011; Lachman et al., 2011; Slagsvold & Sørensen, 2008; Specht et al., 2013), there is a dearth of studies that have addressed gender differences in the effects of perceived control on physical and functional health for aging adults. One of Study 2's aims was to focus on longitudinal associations between perceived control and health outcomes and examine the effects of perceived control on health over time among women and men of different ages.

4.1.3. Personality Traits, Perceived Control, and Health

Research examining relationships among personality traits, perceived control, and health outcomes together is limited; yet, some studies have addressed these variables all together. For example, Kempen, Sonderen, and Ormel (1999) compared the effects of personality traits (i.e., neuroticism and extraversion) and perceived control on increase in disability over two years for older people and indicated that lower perceived control was a significant predictor for greater functional decline while the personality traits did not predict functional decline. Perceived control has also been found to be a potential mediator for links of personality traits to health related outcomes (Johnson et al., 2009; McEachan et al., 2010). Johnson et al. (2009) suggested that two components related to perceived control, trait emotional intelligence (involving perceived control over emotions) and perception of control at work, mediated the association between each of the Big Five personality traits and mental health among college students. In addition, McEachan et al. (2010) found that conscientiousness predicted physical activity, and perceived control over behavior (marginally) mediated the association between conscientiousness and physical activity among their sample of graduate students (with an average age of 29.1 years). However, these studies focused only on young adults, thus the literature lacks research that examines such potential mediational relationships for various health outcomes particularly among middle-aged and older adult populations.

Since research on the potential role of perceived control as a mediator is lacking, there have been few studies, if any, that examined age and gender differences in the relationships among personality traits, perceived control, and health. The present study intended to contribute to improving the understanding of the role of perceived control for associations between personality traits and health outcomes among aging women and men. It was hoped that improved

knowledge about implications of perceived control, which is a potentially modifiable factor (Lachman et al., 2011), relating to its antecedents and consequences, would inform practice in developing approaches to promoting perceived control and health taking individual differences (i.e., personality traits) of aging women and men into consideration.

4.1.4. Study 2 Objectives

The objective of Study 2 was to investigate the potential mediational role of perceived control for links between personality traits and health among aging women and men. While a number of studies have addressed the associations of personality traits and perceived control with health outcomes separately for adult populations, research on the comprehensive relationships among these variables is lacking. Given the documented associations between personality traits and perceived control and between perceived control and health outcomes, perceived control may play a role in mediating the link between personality and health. The present study aimed to examine how the role or importance of perceived control for associations between personality traits and health outcomes (i.e., chronic health conditions, functional limitations) might vary or change over time among aging women and men. This longitudinal study was expected to contribute to providing more nuanced explanations about the protective effects of perceived control for health, taking individual differences into consideration.

Specifically, Study 2 examined two research questions: (1) whether perceived control mediated longitudinal associations between personality traits and health outcomes; (2) whether the relationships among personality traits, perceived control, and health outcomes over time varied by age and gender.

For the first research question, it was hypothesized that perceived control would mediate the links between some personality traits, specifically conscientiousness and neuroticism, and

health outcomes during adulthood in general. This hypothesis was built upon previous findings showing associations between these personality traits and perceived control and between perceived control and health outcomes. No specific hypotheses were made for the other personality traits (i.e., extraversion, agreeableness, openness) due to lack of consistent findings for their effects on health outcomes.

For the second research question, it was hypothesized that perceived control would have mediational effects regardless of age, but that the strength of associations between personality traits and perceived control and between perceived control and health outcomes would differ depending on age. Based on the reviewed literature, it was expected that for older individuals, in contrast to younger individuals, the associations between personality traits and perceived control would be weaker while those between perceived control and health outcomes would be stronger. This means that while personality traits such as conscientiousness and neuroticism were expected to overall affect health outcomes through perceived control regardless of age, there would actually be age differences in associations among personality traits, perceived control, and health outcomes. With regard to gender differences, while the findings of Study 1 indicated some differences in the associations of neuroticism and conscientiousness with perceived control, the literature lacks evidence showing whether potential protective effects of perceived control for health are gender specific. Similar to Study 1, this aspect of the research question was addressed in an exploratory manner without having any specific hypothesis.

Thus, overall, it was hypothesized that perceived control would mediate the longitudinal links between some personality traits and health outcomes regardless of age while some associations between personality traits and perceived control and between perceived control and health outcomes might vary by age and gender.

4.2. Method

4.2.1. Data

For Study 2, the same three waves of data from MIDUS (for 2,389 women and 2,222 men aged 40 or older at MIDUS1 with multiple imputation) used in Study 1 were analyzed.

4.2.2. Measures

In addition to the measures of demographic characteristics, personality traits, and perceived control included in Study 1, two health outcome measures were added for Study 2: number of chronic health conditions and functional limitations.

4.2.2.1. Number of chronic health conditions

MIDUS participants were asked whether they had experienced each of 29 chronic health conditions (e.g., high blood pressure, stroke, diabetes) in the past 12 months (Brim et al., 2017; Ryff, Almeida, Ayanian, Binkley, et al., 2017; Ryff, Almeida, Ayanian, Carr, et al., 2017). The summed number of chronic conditions was counted as an overall score.

4.2.2.2. Functional limitations

MIDUS adopted the MOS 36-item short-form health survey (SF-36) (Ware Jr. & Sherbourne, 1992) and this included a seven-item measure of functional limitations (i.e., activities of daily living). The participants were asked how much their health limited each of seven activities of daily living including "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)". 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 difficulty

in doing those activities. The items were averaged into an overall score of difficulty in activities of daily living.

4.2.3. Analysis Strategy

Similar to Study 1, in order to address potential curvilinear effects of personality (and perceived control) on health outcomes (Williams et al., 2004), the analyses of the linear effects (i.e., main analysis) and quadratic effects (i.e., additional analysis) of the predictors were conducted in separate models considering the complexity of the latter analysis.

4.2.3.1. Main analysis

In order to address the research questions about the mediating role of perceived control for the personality-health links as well as differences in these relationships among women and men of different ages, a longitudinal path analysis model was constructed as shown in Figure 5. In this model, longitudinal relationships between personality traits and perceived control (i.e., personality traits predicting perceived control at a later wave) and those of personality traits and perceived control to health outcomes (i.e., personality traits and perceived control predicting the health outcomes at a later wave) were addressed while controlling for the previous levels of the predictors as well as baseline (MIDUS1) age and educational level (i.e., completion of high school degree and completion of four-year college degree). Exogenous variables at MIDUS1 were allowed to correlate with each other, and error terms of endogenous variables at MIDUS2/MIDUS3 were correlated with each other concurrently within their same wave.

Assessment of possible age and sex differences. Different strategies were taken to assess possible differences by age and sex considering the types of the age and sex variables: while interaction terms of the continuous variable of age were added to the path analysis model, multigroup analysis with female and male groups based on the dichotomous variable of sex was

conducted for the constructed model (in which the interaction terms of age were added). Although it was possible to conduct multigroup analysis with age (and sex) groups (by dividing the participants into multiple groups using arbitrarily selected age ranges (e.g., age 40 to 59 versus 60+)), it would lead to losing the nuance of the continuous age variable (Little, 2013); thus, adopting interaction terms was considered preferable for the age variable.

After adding the interaction of age with each predictor of interest for its outcome in the model shown in Figure 5 (controlling for the effects of the covariates), multigroup analysis was conducted with female and male groups (with no constraints to any structural paths). Non-significant interactions of age for both sex groups (indicating no age difference in the effects of the predictors for either women or men) were then removed, and the model fit of the modified multigroup model was assessed using a set of model fit statistics. The criteria of RMSEA < .08, CFI > .90, and SRMR < .08 were used to determine whether the model fit was acceptable, rather than using the chi-square statistic as it could be too sensitive especially for a larger sample (Brown, 2015; Kline, 2015; Little, 2013).

After determining that the model had an acceptable fit, sex differences in structural paths related to the research questions (i.e., paths from personality traits to health outcomes directly or through perceived control as well as interactions of age for these paths on their endogenous variables) were tested by adding equality constraints to the structural paths between the two sex groups (i.e., the female and male groups would have the same coefficient for each path). It was determined with a set of chi-square difference tests (Kline, 2015) whether each of the constraints should be kept. Detailed procedures for this assessment of sex differences are described together with obtained statistical data in the subsequent Results section.

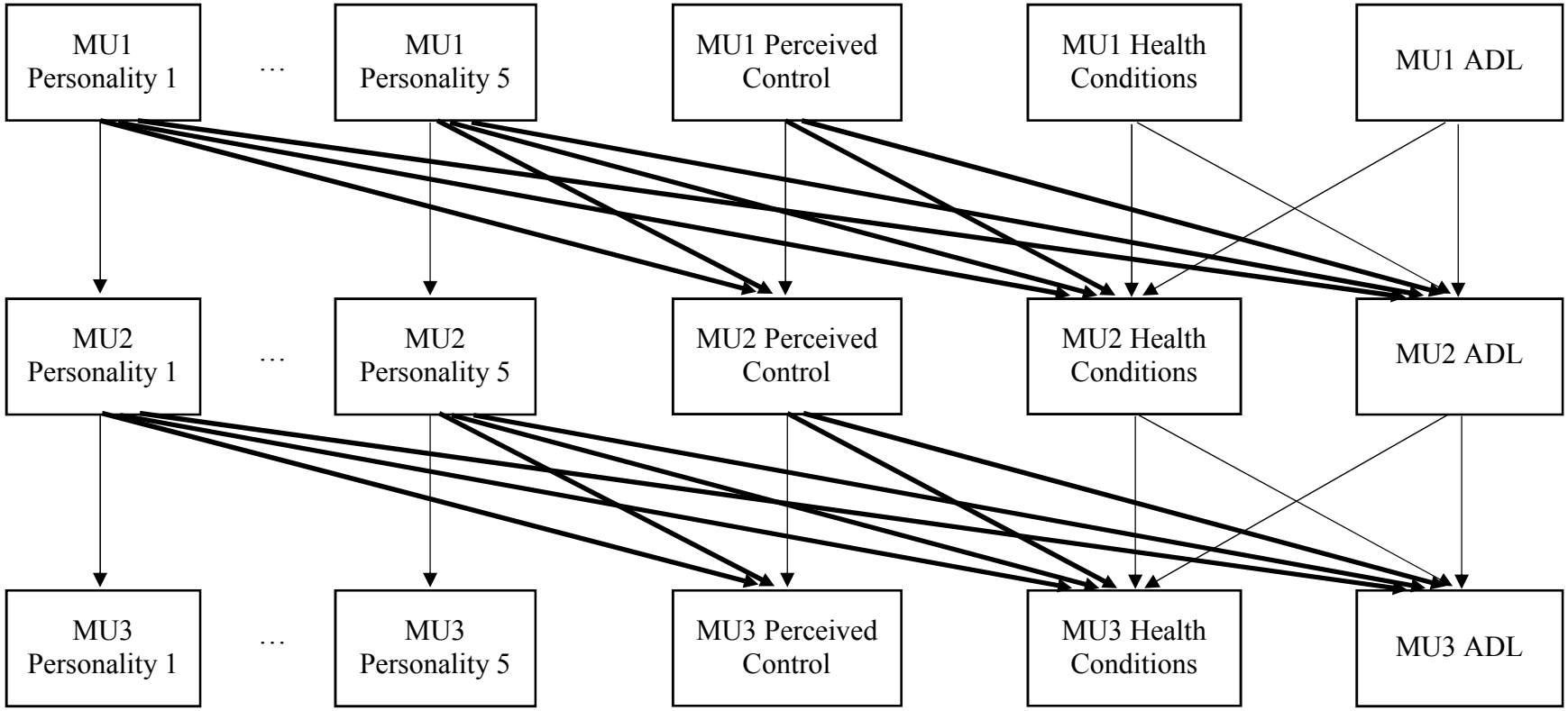

Figure 5. Study 2 path model for multigroup analysis (with female and male groups) with three waves of MIDUS (MU) data. Personality 1 to 5, Health Conditions, and ADL in the figure correspond to the measures of Big Five personality traits, number of chronic health conditions, and functional limitations, respectively; for all paths, age and educational level (i.e., high school graduate, college graduate) at MU1 are controlled for; in addition to correlated exogenous variables at MU1, error terms of endogenous variables at MU2/MU3 are allowed to correlate with each other concurrently within the same wave; for each path from personality or perceived control to its outcome (i.e., bolded paths in the figure), an interaction of baseline age with the predictor was added.

4.2.3.2. Additional analysis

Similar to Study 1, models including quadratic effects were also tested to examine the potential for non-linear relationships. Due to its complexity, the analysis for the quadratic effects of the predictors included two models: one focusing only on main effects of quadratic (as well as linear) terms of the predictors and the other including both the main effects and interactions of the age with the linear and quadratic terms of the predictors. If any of these main effects and interactions were significant for at least one of the female and male groups (while adding no equality constraints between the groups to any structural paths), possible sex differences in those effects would be assessed with the chi-square difference test.

4.3. Results

Correlations among the measures included in Study 2 are summarized for women and men in Table 6. (Descriptive statistics are shown in Table 1.)

4.3.1. Main Analysis

The model fit statistics for the models evaluated are summarized in Table 7. All the models indicate acceptable levels of model fit.

4.3.1.1. Age differences in the effects of the predictors

In the multigroup model (examining female and male groups at the same time) with the interactions of age with the predictors (i.e., 'Initial Model' in Table 7), all the interactions were non-significant for both sex groups, which indicates no age differences in all the effects of personality traits on perceived control and health outcomes and those of perceived control on health outcomes for women or men. Thus, all the interactions with age were removed, and the modified model was considered the 'base model'.

Table 6

Correlation Matrix for Three Waves of Measures for American Women and Men

	Age	HS	Col.	M1Agr.	M2Agr.	M3Agr.	M1Ext.	M2Ext.	M3Ext.	M1Neu.	M2Neu.	M3Neu.	M1Cons.	M2Cons.	M3Cons.
Age	-	-.122	-.139	.058	(.016)	-.101	(.037)	(.016)	-.073	-.145	-.143	(-.058)	(-.020)	-.097	-.192
HS	-.112	-	.209	(-.033)	(-.021)	(.016)	(-.016)	(-.024)	(.012)	-.067	-.062	-.070	.115	.100	.135
Col.	-.053	.253	-	(-.039)	-.053	(.003)	(.023)	(.018)	(.043)	-.072	-.068	-105	.109	.089	.127
M1Agr.	.075	-.060	-.098	-	.585	.534	.530	.359	.364	-.085	-.077	-.089	.300	.190	.174
M2Agr.	.054	(-.036)	-.098	.656	-	.593	.353	.503	.355	-.085	-.149	-.101	.232	.308	.200
M3Agr.	(-.026)	(-.002)	(-.048)	.613	.624	-	.347	.347	.496	(-.044)	-.110	-.108	.232	.251	.335
M1Ext.	(.018)	(-.025)	-.075	.585	.409	.413	-	.707	.679	-.193	-.155	-.175	.300	.216	.201
M2Ext.	(-.010)	(-.008)	-.059	.411	.549	.411	.707	-	.717	-.178	-.238	-.211	.247	.308	.217
M3Ext.	-.087	(.013)	(-.021)	.405	.379	.555	.681	.719	-	-.151	-.178	-.219	.247	.250	.314
M1Neu.	-.100	-.050	-.086	-.072	-.081	(-.043)	-.149	-.144	-.105	-	.658	.587	-.241	-.215	-.173
M2Neu.	-.106	(-.047)	-.096	-.063	-.142	-.101	-.114	-.203	-.131	.628	-	.636	-.211	-.268	-.187
M3Neu.	(-.035)	-.073	-.124	-.083	-.091	-.120	-.133	-.183	-.182	.546	.613	-	-.176	-.211	-.201
M1Cons.	(.026)	(.020)	.054	.289	.202	.224	.295	.239	.241	-.223	-.184	-.180	-	.623	.569
M2Cons.	-.052	.054	.053	.176	.284	.218	.190	.297	.230	-.180	-.237	-.199	.623	-	.624
M3Cons.	-.139	.094	.114	.151	.165	.297	.185	.208	.313	-.152	-.181	-.240	.569	.621	-
M1Open	-.083	.148	.138	.403	.257	.272	.506	.375	.382	-.169	-.124	-.148	.300	.235	.241
M2Open	-.118	.144	.141	.260	.373	.282	.374	.526	.390	-.169	-.195	-.177	.229	.327	.255
M3Open	-.151	.134	.146	.283	.241	.413	.375	.392	.541	-.114	-.132	-.191	.243	.267	.368
M1Cont.	(-.018)	.111	.117	.179	.153	.165	.316	.308	.285	-.406	-.298	-.329	.390	.320	.303
M2Cont.	-.116	.120	.127	.109	.199	.190	.235	.376	.319	-.296	-.386	-.333	.336	.425	.371
M3Cont.	-.234	.166	.191	.103	.114	.211	.213	.272	.369	-.256	-.286	-.422	.335	.378	.442
M1Chron.	.142	-.136	-.098	(.002)	(-.013)	(-.049)	-.110	-.121	-.132	.255	.211	.221	-.167	-.188	-.161
M2Chron.	.172	-.115	-.126	(.047)	(.008)	(-.026)	(-.036)	-.111	-.111	.185	.209	.184	-.115	-.188	-.173
M3Chron.	.204	-.133	-.140	.054	(.009)	(-.032)	(-.050)	-.114	-.127	.223	.205	.239	-.130	-.210	-.204
M1ADL	.200	-.180	-.149	(.037)	(-.002)	-.066	-.077	-.122	-.163	.122	.110	.125	-.150	-.207	-.223
M2ADL	.305	-.194	-.200	.058	(.021)	(-.050)	(-.035)	-.133	-.159	.129	.146	.128	-.135	-.212	-.219
M3ADL	.395	-.185	-.209	.067	(.047)	(-.045)	(-.019)	-.082	-.181	.108	.099	.158	-.117	-.184	-.261

Notes: Correlation coefficients above the diagonal refer to women, below the diagonal to men; the above abbreviations stand for: M1 = MIDUS1, M2 = MIDUS2, M3 = MIDUS3, HS = high school graduate, Col. = college graduate, Agr. = agreeableness, Ext. = extraversion, Neu. = neuroticism, Cons. = conscientiousness, Open = openness to experience, Cont. = perceived control, Chron. = chronic health conditions, ADL = functional limitations; the statistics in parentheses indicated non-significant correlations ($p > .05$).

Table 6

Correlation Matrix for Three Waves of Measures for American Women and Men (continued)

	M1Open	M2Open	M3Open	M1Ctrl	M2Ctrl	M3Ctrl	M1Chron	M2Chron	M3Chron	M1ADL	M2ADL	M3ADL
Age	(-.013)	-.058	-.111	-.094	-.140	-.265	.080	.131	.142	.244	.303	.402
HS	.136	.140	.135	.155	.136	.175	-.122	-.140	-.111	-.187	-.176	-.187
Col.	.215	.207	.213	.155	.162	.206	-.091	-.115	-.117	-.150	-.167	-.192
M1Agr.	.372	.237	.245	.169	.112	.124	(.014)	(.018)	(.019)	(-.007)	(.020)	(.038)
M2Agr.	.226	.351	.228	.153	.208	.150	(-.011)	(-.037)	(-.020)	-.049	(-.029)	(.008)
M3Agr.	.222	.254	.363	.151	.188	.235	(-.023)	-.055	(-.048)	-.099	-.092	-.079
M1Ext.	.535	.409	.390	.311	.250	.224	-.095	-.075	-.095	-.121	-.087	-.069
M2Ext.	.399	.538	.401	.291	.372	.277	-.109	-.129	-.129	-.148	-.175	-.109
M3Ext.	.398	.411	.534	.275	.318	.370	-.104	-.140	-.156	-.179	-.192	-.197
M1Neu.	-.198	-.199	-.119	-.458	-.356	-.298	.304	.231	.239	.179	.153	.129
M2Neu.	-.159	-.238	-.151	-.344	-.428	-.319	.255	.257	.224	.159	.172	.120
M3Neu.	-.156	-.192	-.171	-.359	-.340	-.432	.237	.195	.222	.160	.148	.158
M1Cons.	.317	.284	.264	.319	.294	.288	-.157	-.136	-.146	-.171	-.164	-.151
M2Cons.	.242	.323	.264	.278	.383	.353	-.192	-.233	-.226	-.224	-.256	-.227
M3Cons.	.247	.283	.351	.283	.331	.407	-.142	-.201	-.216	-.236	-.241	-.276
M1Open	-	.718	.660	.321	.282	.280	-.048	-.065	-.069	-.105	-.119	-.106
M2Open	.694	-	.719	.292	.385	.313	-.051	-.110	-.109	-.117	-.181	-.141
M3Open	.653	.695	-	.263	.323	.363	(-.034)	-.089	-.112	-.104	-.166	-.169
M1Cont.	.317	.293	.277	-	.623	.596	-.296	-.288	-.238	-.277	-.266	-.246
M2Cont.	.265	.357	.316	.626	-	.679	-.267	-.322	-.288	-.329	-.360	-.325
M3Cont.	.279	.310	.397	.592	.672	-	-.277	-.335	-.361	-.347	-.369	-.413
M1Chron.	-.070	-.075	-.064	-.307	-.252	-.296	-	.571	.578	.436	.422	.359
M2Chron.	-.065	-.096	-.075	-.242	-.285	-.310	.527	-	.601	.414	.499	.410
M3Chron.	-.079	-.120	-.122	-.241	-.295	-.351	.554	.618	-	.425	.493	.503
M1ADL	-.092	-.134	-.120	-.269	-.324	-.334	.436	.407	.421	-	.656	.582
M2ADL	-.116	-.161	-.171	-.247	-.343	-.358	.400	.477	.463	.661	-	.711
M3ADL	-.122	-.148	-.195	-.210	-.306	-.399	.339	.389	.477	.552	.696	-

Notes: Correlation coefficients above the diagonal refer to women, below the diagonal to men; the above abbreviations stand for: M1 = MIDUS1, M2 = MIDUS2, M3 = MIDUS3, HS = high school graduate, Col. = college graduate, Agr. = agreeableness, Ext. = extraversion, Neu. = neuroticism, Cons. = conscientiousness, Open = openness to experience, Cont. = perceived control, Chron. = chronic health conditions, ADL = functional limitations; the statistics in parentheses indicated non-significant correlations ($p > .05$).

Table 7

Summary of Model Fit for Path Analysis Models for American Adults (Study 2)

No.	Model	RMSEA	CFI	SRMR	Chi-Square	df	Notes
1	Initial Model	.035	.937	.056	2,529.694	652	No significant interactions of age with the predictors found (i.e., no age differences in the effects of personality traits or perceived control)
2	Base Model	.047	.938	.067	2,065.887	336	All (non-significant) interactions of age with personality traits and perceived control removed
3	Fully Constrained Model	.045	.937	.068	2,127.938	370	Significant difference in model fit (chi-square statistics) from the base model ($\Delta\chi^2 = 62.051$, $\Delta df = 34$, $p < .01$)
4	Final Model	.044	.937	.068	2,159.660	392	As the result of a set of chi-square tests for the individual paths (unconstrained versus constrained between sexes), all the paths of interest constrained as invariant between sexes (as done in the fully constrained model); non-significant paths among them constrained to 0; no difference in model fit (chi-square statistics) from the fully constrained model ($\Delta\chi^2 = 31.722$, $\Delta df = 22$, $p > .10$).

4.3.1.2. Base model versus fully constrained model

In order to assess whether the effects of interest in the base model were overall invariant between sexes, the fully constrained model was constructed and run by adding equality constraints to all structural paths related to the research questions between the two sex groups. Chi-square difference statistics between the base model and fully constrained model showed a significant difference ($\Delta\chi^2 = 62.051$, $\Delta df = 34$, $p < .01$). As this result indicates that at least one of the paths might differ between the female and male groups (Kline, 2015), chi-square difference tests were conducted for individual structural paths separately as reported as follows.

4.3.1.3. Chi-square difference tests for sex differences

In order to identify specific structural paths that differed between sexes, a set of chi-square difference tests were conducted for each individual structural path related to the research questions. After all the equality constraints were removed (i.e., unconstrained) from the fully constrained model (which was equivalent to the base model), an equality constraint was added to each path separately and it was determined with a chi-square difference test whether the difference statistic was non-significant indicating the coefficient for the path was invariant between women and men. The set of chi-square difference tests for the individual paths indicated that there were no sex differences in the magnitude of any of the paths while the difference in the path from MIDUS1 neuroticism to MIDUS2 perceived control was marginal ($p < .10$; the effect of this path was $\beta = -.089$ for women and $\beta = -.048$ for men in the base model that had no constraints). Due to the non-significance of chi-square difference statistics, all the paths (including the marginal path) were kept constrained as invariant between female and male groups (which became equivalent to the fully constrained model again). Among these paths, non-significant paths were constrained to 0 in the final model. Chi-square difference statistics

between the fully constrained model and final model showed no significant difference ($\Delta\chi^2$ = 31.722, Δdf = 22, p > 05), which supported the selection of the parsimonious model with the constraints at 0 (i.e., the final model). The effects of the final model are summarized in Table 8. Older age predicted lower perceived control and greater functional limitations at the later two waves for both sexes, while predicting more chronic health conditions only for men. While completion of a high school degree only predicted higher MIDUS3 perceived control for both women and men, completion of a four-year college degree predicted the same outcome as well as lower MIDUS2 and MIDUS3 functional limitations for both sexes and fewer chronic health conditions only for men at MIDUS2.

Related to the research question of mediation, over the first decade (from MIDUS1 to MIDUS2), all five personality traits predicted later perceived control (with positive effects of extraversion, conscientiousness, and openness and negative effects of agreeableness and neuroticism) and perceived control predicted fewer chronic health conditions and lower functional limitations over time for women and men (as the effects were constrained as invariant between sexes). Over the second decade (from MIDUS2 to MIDUS3), only lower neuroticism and higher conscientiousness predicted higher perceived control and fewer chronic health conditions while higher perceived control predicted lower functional limitations, not chronic health conditions for women and men (with the effects invariant between sexes). Though these results indicate some inconsistencies in the effects of specific paths between the earlier and later periods (i.e., from MIDUS1 to MIDUS2 and from MIDUS2 to MIDUS3), the longitudinal effects of neuroticism and conscientiousness on perceived control (i.e., lower neuroticism and higher conscientiousness predicting higher perceived control) and those of perceived control on

functional limitations (i.e., higher perceived control predicting lower functional limitations) remained significant in both of the two periods.

4.3.1.4. Longitudinal mediation of perceived control

Specific indirect effects related to the research question on the mediational relationships (i.e., paths from MIDUS1 personality traits to MIDUS3 health outcomes through MIDUS2 perceived control) were assessed by obtaining the estimates of the indirect effects with Mplus (Muthén & Muthén, 2017). The results with the final model (with invariant paths of personality traits and perceived control between sexes) indicated significant indirect effects from MIDUS1 neuroticism to MIDUS3 functional limitations through MIDUS2 perceived control ($p < .05$) and from MIDUS1 conscientiousness to MIDUS3 functional limitations through MIDUS2 perceived control ($p < .05$) and these paths are depicted in Figure 6. These results suggest that perceived control longitudinally mediated the links of neuroticism and conscientiousness to functional limitations. The indirect effects of the other personality traits on functional limitations through perceived control were not significant. In addition, as the effect of the paths from perceived control to chronic health conditions were constrained to 0, there were no indirect effects from any personality traits to chronic health conditions through perceived control. The indirect effects in the model without constraining the non-significant effects to 0 also indicated the basically same results: only the indirect effects from MIDUS1 neuroticism and conscientiousness to MIDUS3 functional limitations through MIDUS2 perceived control were significant.

Table 8

Standardized Effects in the Final Model for American Women and Men (Study 2)

Paths from MIDUS1 (MU1) to MIDUS2 (MU2) (see the next page for the paths from MIDUS2 to MIDUS3)

Predictors	Outcomes					
	MU2 Perceived Control		MU2 Chronic Health Conditions		MU2 Functional Limitations	
	Women	Men	Women	Men	Women	Men
Age (per 10 years)	-.089 (.019)*** / -.100 (.019)***		.040 (0.022) / .077 (.025)**		.150 (.019)*** / .174 (.019)***	
High School Graduate	.012 (.018) / .021 (.020)		-.031 (0.021) / .001 (.024)		-.027 (.020) / -.037 (.019)	
College Graduate	.034 (.019) / .029 (.020)		-.021 (0.02) / -.046 (.022)*		-.037 (.018)* / -.086 (.017)***	
MU1 Agreeableness	-.035(.016)* (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU1 Extraversion	.043 (.019)* (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU1 Neuroticism	-.065 (.016)*** (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU1 Conscientiousness	.084 (.016)*** (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU1 Openness	.038 (.017)* (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU1 Perceived Control	.505 (.017)*** / .510 (.018)***		-.069 (.018)*** (inv.)		-.039 (.013)** (inv.)	
MU1 Chronic Health Conditions	-	-	.463 (.020)*** / .407 (.023)***		.155 (.023)*** / .109 (.023)***	
MU1 Functional Limitations	-	-	.154 (.024)*** / .172 (.025)***		.515 (.020)*** / .536 (.020)***	

Notes: *** p< .001, ** p<.01, * p< .05; the above estimates are standardized coefficients (β) (with standard errors in parentheses); for the estimates with "(inv.)", the unstandardized coefficients were constrained as invariant between sexes (as some of their standardized coefficients slightly varied between sexes with the unstandardized constraints, the average values between sexes are shown in the table for the effects invariant between women and men); non-significant paths that were invariant between sexes were constrained to 0.

Table 8

Standardized Effects in the Final Model for American Women and Men (Study 2) (continued)

Paths from MIDUS2 (MU2) to MIDUS3 (MU3)

Predictors	Outcomes					
	MU3 Perceived Control		MU3 Chronic Health Conditions		MU3 Functional Limitations	
	Women	Men	Women	Men	Women	Men
Age (per 10 years)	-.146 (.023)*** / -.137 (.024)***		.010 (.025) /. 064 (.028)*		.195 (.020)*** / .192 (.020)***	
High School Graduate	.042 (.018)* / .044 (.021)*		.011 (.023) / -.020 (.023)		-.033 (.020) / -.021 (.019)	
College Graduate	.046 (.017)** / .067 (.021)**		-.011 (.021) / -.018 (.024)		-.040 (.018)* / -.059 (.020)**	
MU2 Agreeableness	.000 (.000) (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU2 Extraversion	.000 (.000) (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU2 Neuroticism	-.072 (.016)*** (inv.)		.064 (.018)*** (inv.)		.000 (.000) (inv.)	
MU2 Conscientiousness	.096 (.019)*** (inv.)		-.045 (.018)* (inv.)		.000 (.000) (inv.)	
MU2 Openness	.000 (.000) (inv.)		.000 (.000) (inv.)		.000 (.000) (inv.)	
MU2 Perceived Control	.551 (.021)*** / .538 (.023)***		.000 (.000) (inv.)		-.044 (.018)* (inv.)	
MU2 Chronic Health Conditions	-	-	.445 (.023)*** / .489 (.025)***		.055 (.021)** / .047 (.023)*	
MU2 Functional Limitations	-	-	.235 (.030)*** / .176 (.029)***		.585 (.020)*** / .572 (.020)***	

Notes: *** p< .001, ** p<.01, * p< .05; the above estimates are standardized coefficients (β) (with standard errors in parentheses); for the estimates with "(inv.)", the unstandardized coefficients were constrained as invariant between sexes (as some of their standardized coefficients slightly varied between sexes with the unstandardized constraints, the average values between sexes are shown in the table for the effects invariant between women and men); non-significant paths that were invariant between sexes were constrained to 0.

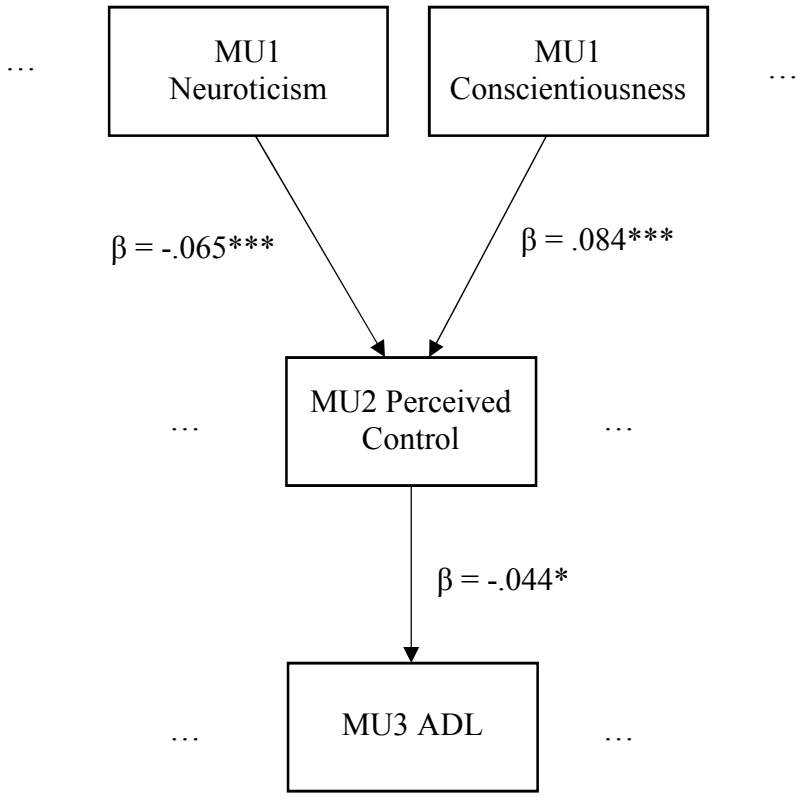

Figure 6. Mediational paths form neuroticism and conscientiousness to functional limitations (ADL) through perceived control with standardized coefficients. The other predictors as well as demographic measures which were controlled for in estimating the effects are omitted from this figure (i.e., the above paths are a part of the path analysis model shown in Figure 5); the unstandardized coefficients were constrained as invariant between sexes, and as their standardized coefficients slightly varied between sexes, the average values across the sexes are shown here; *** p< .001, * p< .05.

4.3.2. Results of Additional Analysis

For the quadratic effects of personality traits and perceived control on their outcomes, their main effects and interactions were assessed separately due to the complexity of their models.

4.3.2.1. Main effects

Among the paths from personality traits and perceived control to their outcomes, all quadratic effects except that of MIDUS1 agreeableness on MIDUS2 functional limitations were non-significant for both sexes. The quadratic effect of MIDUS1 agreeableness on MIDUS2

functional limitations was significant only for women ($\beta = .041$; $p < .05$) though the sex difference remained marginal ($p < .10$). The curvilinear difference in the effect of this path for women is depicted in Figure 7, which indicates that a higher level of agreeableness had an accelerating effect on functional limitations.

4.3.2.2. Age and sex differences in quadratic effects of personality and perceived control

None of the interactions of age with quadratic terms of personality traits and perceived control were significant for the two sex groups. These results indicate that there were no age differences in the quadratic effects of personality traits and perceived control on their outcomes regardless of sex.

4.4. Discussion

4.4.1. Main Findings

The present study examined longitudinal associations among personality traits, perceived control, and health outcomes and their possible age and gender differences among a middle-aged to older adult sample. This study was unique in that it addressed the mediational role of perceived control for associations between personality and health, whereas previous research focused on investigating links of personality and perceived control to health separately. The present study intended to identify nuanced relationships among personality, perceived control, and health with the goal of identifying real-life implications such as for suggesting approaches (e.g., helping aging adults maintain perceived control) to promoting health by taking personality characteristics into consideration. By examining age and gender differences in the relationships, this study also aimed to help improve the understanding of whether approaches to enhancing perceived control and health should be age- or gender-specific for those with different personality characteristics.

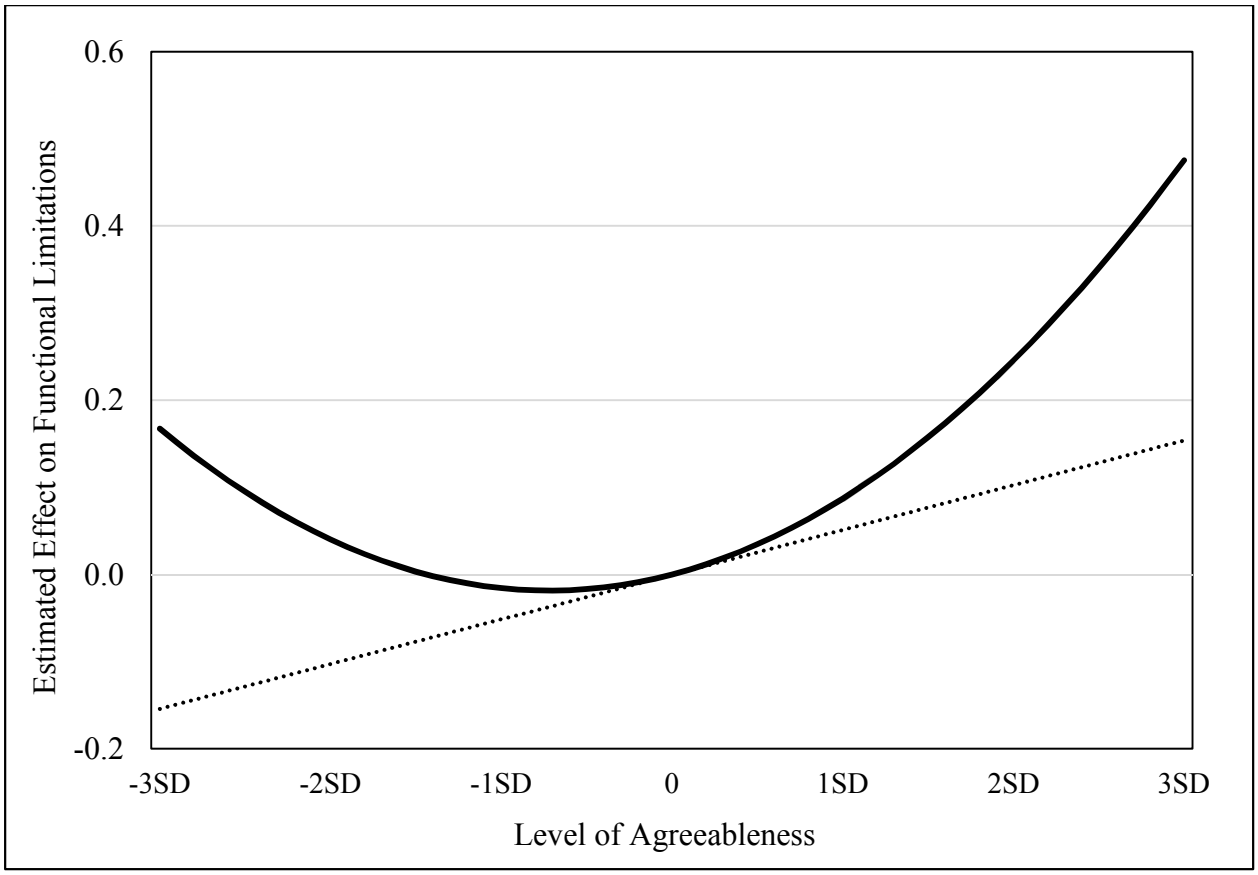

Figure 7. Estimated effects by different levels of MIDUS1 agreeableness for MIDUS2 functional limitations for women. The solid line is for the estimated effects. The dashed line indicates the straight line that is tangent to the curvilinear line of the effect at the point of the average level (i.e., zero in x-axis) of MIDUS1 agreeableness; the scale of MIDUS2 functional limitations is unstandardized.

4.4.2. Longitudinal Associations of Perceived Control with Functional and Physical Health

Some discrepancy was found for the associations of perceived control with functional and physical health outcomes.

4.4.2.1. Association of perceived control with functional health

Higher perceived control predicted better functional health (i.e., lower functional limitations) over time consistently across both the first and second decades of the MIDUS study. This link between perceived control and functional health may be explained by self-efficacy (i.e., beliefs in one's abilities to achieve his or her goals) (Bandura, 1997), which is closely related to

perceived control (Lachman et al., 2011). Research suggests that better self-efficacy is associated with lower functional limitations and better activities of daily living (Feltz & Payment, 2005; Hellström, Lindmark, Vahlberg, Wahlberg, & Fugl-Meyer, 2003; Rejeski, Miller, Foy, Messier, & Rapp, 2001; Seeman, Unger, Mcavay, & Mendes De Leon, 1999), which means that functional limitations may involve not only actual physical abilities but also one's perception of his or her physical abilities. Perceived control is one's subjective evaluation of control over his or her life circumstances and outcomes (which could include his or her physical abilities), which may promote self-efficacy and affect functional health.

4.4.2.2. Association of perceived control with physical health

Perceived control may not be a consistent predictor for physical health as perceived control predicted better physical health (i.e., fewer chronic health conditions) only across the first decade. The different results between the first and second decades warrant further investigation as the associations of perceived control with physical health was assessed for the same individuals (i.e., same sample size) with the same conditions (controlling for the same baseline conditions). Some differences between the two periods include age (i.e., all individuals becoming nearly 10 years older during the second period than during the first period) and historical or social circumstances. However, as no age differences were found for the association of perceived control with chronic health conditions, age (or age-related factors) does not seem to account for this difference by time. Yet, at this point, there is insufficient knowledge to speculate as to the role of such historical or social circumstances without conducting additional studies specifically examining such factors. Replication studies are needed to reassess whether perceived control can affect chronic health conditions over time. Possibly, chronic health conditions, even when self-reported, concern a more objective aspect of physical health as they are typically diagnosed by a

physician. Thus, perceived control, or subjective or psychological evaluation of control, may affect (self-reported) chronic health conditions less consistently than one's own perception of functional limitations (i.e., more subjective aspect of functional health). Psychological factors such as perceived control and self-efficacy may be less influential for such objective physical health outcomes than behavioral factors (e.g., exercising) or contextual factors (e.g., access to medicine). While perceived control is associated with health-related behaviors (Lachman et al., 2011), the impact of perceived control on objective physical health outcomes through such behaviors may be limited though this remains a speculation. Further investigations are needed to assess whether, and if so, how, perceived control can affect subjective and objective health outcomes differently.

4.4.2.3. Age and the associations of perceived control with health

Unexpectedly, no age differences were found for the longitudinal associations of perceived control with functional limitations nor chronic health conditions for middle-aged and older adults (aged 40 to 75 at MIDUS1). The lack of age effects suggest that the role of perceived control for health outcomes remain similar, in particular, consistently important for functional health, through late adulthood; however, this seems to contradict previous findings (Infurna, Gerstorf, & Zarit, 2011; Kempen et al., 2005). Specifically, these previous studies investigated change in similar health outcomes to those of the present study, which were overall disability (assessing basic and instrumental activities of daily living) examined over eight years in Kempen et al. (2005) and the number of health conditions assessed over 15.5 years in Infurna, Gerstorf, and Zarit (2011). Both of these studies indicated that perceived control had a greater impact on the relevant health outcome over years for older adults as compared to their younger counterparts. The findings of the present study contradict these previous findings, highlighting

the necessity of further investigations (i.e., replication studies) to confirm or negate age differences. However, some difference in demographics in the samples used in the present study and these previous studies is important to note. As discussed in Study 1, the MIDUS respondents analyzed in the present study were predominantly European Americans. In contrast, the sample used in Kempen et al. (2005) included participants from Netherlands and Infurna, Gerstorf, and Zarit (2011) analyzed data from the Americans' Changing Lives study which used stratified probability sampling and included an oversample of African Americans. The demographic or cultural variations of these sample may explain the differences in the findings for age differences. As discussed in the subsequent study of the present dissertation (Study 3), the role of perceived control (as well as personality characteristics) for functional and physical health may differ across cultures. Thus, the associations of perceived control and personality traits with health may need to be examined by culture and future research should incorporate demographic and cultural comparisons in examining associations among personality, perceived control, and health.

4.4.2.4. Gender and the associations of perceived control with health

The findings of the present study suggest that perceived control predicts functional and physical health similarly for women and men, which means that perceived control may be important particularly for functional health regardless of gender. Considering the health benefit of perceived control for both genders, since women tend to report lower perceived control (Lachman et al., 2011), it may be especially important to enhance their perceived control, which may lead to helping them maintain their functional health. Still, while the positive implications of perceived control for functional health may be similar for women and men, an important question to be addressed is whether effective approaches to enhancing perceived control may

also be similar between genders. For instance, different approaches for genders might include some remediation of gender disparities associated with perceived control (e.g., education, income; Lachman et al., 2011), possibly requiring societal-level interventions to improve women's circumstances. Future research should explore how to enhance perceived control, aiming to promote functional health, for women and men effectively while accumulating evidence for the importance of perceived control for functional health regardless of gender.

4.4.3. Longitudinal Mediation of Perceived Control for Longitudinal Associations of Neuroticism and Conscientiousness with Functional Health

Due to the lack of association of perceived control with chronic health conditions, the mediation of perceived control was found only for the associations with functional limitations. The findings suggest that perceived control could account for longitudinal associations of neuroticism and conscientiousness with functional health. While previous research (e.g., Jaconelli, Stephan, Canada, & Chapman, 2013) indicated associations of conscientiousness and neuroticism with functional health, this study shows that these two personality traits may be associated with functional health because they are associated with perceived control over time, which may in turn affect functional health later on. Considering these findings, high neuroticism and low conscientiousness are risk factors not simply because they may lead to decreased perceived control but also because the decline in perceived control (affected by these personality characteristics) has negative implications for their functional health. Thus, it would be important to teach those with high neuroticism and low conscientiousness effective strategies to maintain their perceived control as a way to promote their functional health. Another possible approach to promoting functional health considering these mediational relationships is to explore interventions to increase conscientiousness or reduce neuroticism since such changes in the

personality traits may lead to increasing perceived control, which then has positive implications for later functional health. As discussed in Study 1, the malleability of personality traits should continue to be investigated in future research. In any case, enhancing perceived control would be the key to promoting functional health as it may be able to counteract the expected negative (indirect) effects of high neuroticism and low conscientiousness on functional health while directly promoting functional health.

These implications seem to be applicable regardless of age and gender considering the findings of no age nor gender differences in the mediation of perceived control for longitudinal associations of neuroticism and conscientiousness with functional health (which can be explained by the lack of age and gender differences in the individual associations between the personality traits and perceived control and between perceived control and functional health).

4.4.4. Longitudinal Associations of Agreeableness, Extraversion, and Openness with Perceived Control and Health

Unlike the findings for neuroticism and conscientiousness, no mediation of perceived control was found for longitudinal associations of agreeableness, extraversion, or openness with functional health (nor physical health as perceived control did not predict chronic health conditions across the second decade). While these three personality traits may affect perceived control over time to some extent (as they predicted later perceived control across the first decade), their impact on perceived control may be too small or trivial to make a difference in affecting later functional health through perceived control. This suggests that potential interventions involving some modification of agreeableness, extraversion, and openness may be beneficial for promoting perceived control, yet, such interventions may not necessarily lead to better functional health, thus may not be warranted. Moreover, as no age nor gender differences

were found for the paths from agreeableness, extraversion, and openness to functional or physical health through perceived control, perceived control does not seem to mediate associations of these personality traits with health for any specific age or gender groups.

4.4.5. Discrepancy between the Findings of Study 1 and Study 2

In the present study (Study 2), no gender differences were found for longitudinal associations of personality traits with perceived control. These findings seem to contradict those of Study 1 suggesting that the effect of neuroticism on perceived control was stronger for women than men and that of conscientiousness was stronger for men. This difference in findings between Study 1 and Study 2 may be due to whether the associations assessed were concurrent or longitudinal. These findings suggest that the associations of neuroticism and conscientiousness with concurrent levels of perceived control may be different between women and men (as found in Study 1), yet there may be no gender differences in longitudinal associations of these personality traits with perceived control a decade later taking the baseline, earlier levels of the personality traits into consideration (as found in Study 2).

This variation of gender differences in concurrent versus long-term associations of personality traits (particularly neuroticism and conscientiousness) with perceived control warrants further investigation. Possibly, neuroticism and conscientiousness may affect (immediate) behaviors to cope with difficulties or attempt to control life circumstances differently for women and men as discussed in Study 1, and their impact on perceived control may be temporarily different between genders. However, in the long run, neuroticism and conscientiousness may have similar, persistent influence on coping strategies or other behaviors associated with perceived control regardless of gender. As there is a dearth of research examining such nuanced gender differences in concurrent and long-term associations between

personality and perceived control, future studies should address this unestablished area of research.

4.4.6. Limitations

As Study 2 used the same data as Study 1, it also had the limitations discussed in Study 1 such as lower internal consistency of the four-item conscientiousness scale. In addition, the findings of the present study, which used a sample with a very high proportion (higher than 90%) of White Americans, may not be generalizable to populations which consist of more racially diverse people or those in different cultures or countries. Also, the frequency of data collection of MIDUS study may be another limitation in examining both short- and long-term effects. MIDUS had an advantage in its data collection duration spanning nearly two decades, which was suitable to investigating long-term effects. However, more frequent measurements (e.g., every five or fewer years) may have been preferable to address the questions at hand, especially for tracking changes of health outcomes in order to identify the shorter-term impacts of personality and perceived control on health. Moreover, while the present study focused only on chronic health conditions and functional limitations as health outcomes in order to avoid making the analyses too complex, the restricted inclusion of health measures in this study may be another limitation. As the present study showed varying implications of personality and perceived control for these different health outcomes, it is possible that personality traits and perceived control affect other aspects of health differently. In addition, the specific measures used for chronic health conditions and functional limitations in the present study were both self-reported. Even for relatively objective health outcomes such as chronic health conditions, self-reported measures may not completely correspond to objectively measured health status, though still they remain useful as indicators of health (Baker, Stabile, & Deri, 2004). In addition to self-reported

measures, including objectively measured health outcomes (i.e., biomarkers) could provide more robust findings. Moreover, perceived control and personality may be more influential for health-related behaviors (e.g., exercising, medication adherence) rather than (less directly controllable) health outcomes. Examining the implications of perceived control and personality for such behaviors as well as health outcomes may be warranted to better understand how perceived control and personality characteristics can be associated with behaviors that potentially influence health. Considering these limitations, future research should address health more comprehensively by addressing various aspects of health-related behaviors and outcomes and adopting multiple data collection methods (e.g., including biomarkers as well as both self- and physician-reported measures).

4.4.7. Conclusions

Despite these limitations, the present study contributes to the literature by better explaining the nuanced role of perceived control for health including its mediation of the longitudinal associations between personality (specifically neuroticism and conscientiousness) and functional limitations. This study also indicated no age nor gender differences in these mediational relationships suggesting that perceived control plays an important role for the personality-health links regardless of age and gender. Future research should investigate the mechanisms of such mediational associations while addressing multiple aspects of health so that effective interventions to promote health by enhancing perceived control as well as (positive) personality traits can be developed. Moreover, the research should be expanded cross-culturally in order to examine how culture can affect associations among personality, perceived control, and health. The subsequent study (Study 3) incorporates such a cross-cultural component by

investigating the longitudinal associations for Japanese as well as American aging adults. These directions of future research are also discussed in detail in the Final Conclusions chapter.

5. STUDY 3: IMPLICATIONS OF CULTURE FOR ASSOCIATIONS AMONG PERSONALITY, PERCEIVED CONTROL, AND HEALTH

Study 3 addresses cultural differences in associations among personality traits, perceived control, and health by contrasting Japanese and American aging adults. While cultural values may be related to personality and perceived control as well as their implications for health (Cheng et al., 2013; Oyserman et al., 2002), cross-cultural research that address the mediation of perceived control for longitudinal personality-health relationships is lacking. Due to this lack of research, cultural implications for age and gender differences in these associations are not well understood. The present study addresses such cultural as well as age and gender differences between the distinct cultures.

5.1. Background

5.1.1. Implications of Culture

Culture is a key concept in the study of human development and may be defined as a set of various dynamic contextual factors shared and handed down from one generation to another in a given society (Bornstein & Cheah, 2006; Cole, 1999). As a macro-level environmental context, culture can shape people's beliefs and values and continue influencing individuals and their interactions with environments throughout their lives (Bronfenbrenner & Morris, 2006; Elder & Rockwell, 1979; Lerner, Lewin-Bizan, & Warren, 2011) as well as have great implications for their psychological characteristics (e.g., personality traits, perceived control) and well-being across adulthood (Cheng et al., 2013; Heine & Buchtel, 2009; Karasawa et al., 2011; Lachman et al., 2011; Oyserman et al., 2002; Schmitt et al., 2007). Thus, the potential for cultural differences should be taken into consideration in investigating personality traits and perceived control and their potential influences on health outcomes throughout life.

Culture consists of different scales of context, such as ethnic groups, organizational contexts, and countries, but the present study focuses on examining possible cultural influence at the macro level by examining differences between two country-level contexts. Different countries can have distinct value systems that are deeply rooted in the experiences and behaviors of their citizens and thus have varying implications for their development, health, and well-being (Cheng et al., 2013; Heine & Buchtel, 2009; Hofstede, 2001; Lachman et al., 2011; Oyserman et al., 2002). The present study specifically aims to examine Japanese adults, in contrast to Americans, while examining the associations among personality traits, perceived control, and health outcomes. Although American and Japanese people have historically been thought to have different beliefs and values distinguished in terms of Western versus Eastern cultures (Markus & Kitayama, 1991), cultures may be more variable and heterogeneous than the Western-Eastern distinction and other bipolar, unidimensional distinctions suggest. Thus, the present study does not attempt to generalize its findings for cultural differences across the world. Instead, it aims to address cultural implications in two specific countries that are geographically far away, have different philosophical, linguistic, and customary traditions as well as distinct societal structures and histories, which is expected to form a basis for follow-up studies for those in other countries that examine possibly distinct associations among personality traits, perceived control, and health outcomes.

There are some advantages to investigating and contrasting aging adults in these two countries. For example, the United States and Japan are both considered wealthy countries (The World Bank, 2018) and wealth may affect psychological and health outcomes of individuals (Oyserman et al., 2002; Swift, 2011). The similarity of wealth between the two countries would allow for the focus primarily on addressing differences due to their cultural characteristics (e.g.,

beliefs, values, attitude) reducing the effects of the potential confound of national wealth for the outcomes. In addition, Japan has the longest lives in the world (World Health Organization, 2019) while the American population is also rapidly aging (Centers for Disease Control and Prevention, 2019), which makes the cross-cultural research of the two countries suitable to studying aging adults. Furthermore, large-scale, multi-wave datasets comparable for American and Japanese adults with a broad age range (i.e., MIDUS and Midlife in Japan [MIDJA]) are available publicly which allows thorough longitudinal cross-national analyses. Considering these advantages, the present study focuses on studying Japanese middle-aged and older adults and then contrasting them with Americans.

Historically, individuals in these two countries have had distinct philosophical traditions, and American (primarily Christian) and Japanese (primarily Buddhist and Confucian) traditions have differently influenced their values and psychological experiences as well as their conceptions of aging (e.g., more benign attitude toward aging with clearer recognition for older people's social roles in Japan) (Cheng et al., 2013; Karasawa et al., 2011). Such cultural differences have often been discussed in previous research using the individualism-collectivism (Hofstede, 2001) or independence-interdependence (Markus & Kitayama, 1991) framework (Cheng et al., 2013; Karasawa et al., 2011; Oyserman et al., 2002; Taras et al., 2014).

The individualism-collectivism framework proposed by Hofstede (1980, 2001) has been widely referred to in the literature (Cheng et al., 2013; Markus & Kitayama, 1991; Oyserman et al., 2002; Singelis, Triandis, Dharm, & Gelfand, 1995; Taras et al., 2014) while Hofstede also addressed five other dimensions (i.e., power distance, uncertainty avoidance, masculinity-femininity, long-short term orientation, and indulgence-restraint) in explaining national-level cultural differences. Hofstede (2001) defined the individualism-collectivism dimension as the

extent to which individuals are integrated into their in-groups in a society wherein individualism and collectivism are seen as two opposite sides of a continuum. Individualism is considered focusing more on oneself and one's immediate family as opposed to other individuals with looser ties, and collectivism is defined as emphasizing the integration of the self into strong and cohesive in-groups. Although this conceptualization suggests that more individualistic cultures would necessarily be less collectivistic, previous research provides evidence against the unidimensionality of individualism-collectivism dimension. For example, studies reviewed by Oyserman et al. (2002) and Taras et al. (2014) indicated that individualism and collectivism might not represent a bipolar, unidimensional continuum but independent constructs (which means that some cultures can be both individualistic and collectivistic, for example). Related to the constructs of individualism and collectivism, Markus and Kitayama (1991) proposed that those from different cultures have varying construals of the self, which include independent and interdependent self-construals. While adopting the bidimensional view using these two separate constructs, the authors suggested that while those from Western (primarily individualistic) cultures (e.g., American culture) tend to have an independent self-construal or "conception of the self as an autonomous, independent person" (p. 226), those from Asian (e.g., Japanese) cultures as well as other non-Western (primarily collectivistic) cultures tend to have an interdependent self-construal conception of the self as "more connected and less differentiated from others" (p. 227).

However, the individualism-collectivism and independence-interdependence frameworks may be too simplistic to account for cultural differences between adults in the United States and Japan. For example, while Americans are usually considered more individualistic/independent and less collectivistic/interdependent than those in other countries in general, the meta-analysis

of Oyserman et al. (2002) showed more nuanced cultural differences. Specifically, Americans were found to be not necessarily less collectivistic but actually higher than those in many non-Western countries (who are considered collectivistic) in some aspects of collectivism (e.g., sense of belonging to in-groups and seeking others' advice) which might not contradict their individualistic values. In addition, Oyserman et al. (2002) and other studies (Matsumoto, 1999; Takano & Osaka, 1999) have suggested that Japanese people may be no more collectivistic or interdependent than Americans. On the other hand, Oyserman et al. (2002) supported the common view that Americans are more individualistic than people in non-Western countries including Japan. These findings demonstrated that individualism and collectivism appear to be two separate constructs rather than opposite sides of one continuum. Kagitcibasi (2005) also suggested that Americans value both autonomy (i.e., independence from others) and relatedness, particularly close ties to their family, which could represent individualism and collectivism, respectively, and these two can coexist as basic human needs.

Despite the simplicity of the individualism-collectivism framework, previous research (Cheng et al., 2013; Heine & Buchtel, 2009; Oyserman et al., 2002) tends to have used this framework to address psychological constructs such as personality traits and perceived control. While the implications of these studies (which are reviewed later) need to be interpreted with caution because of the limitations of using the unidimensional framework, they may be useful at least to some extent as differences in individualism and collectivism have been suggested to be associated with personality traits, perceived control, and other psychosocial constructs and outcomes (Cheng et al., 2013; Heine & Buchtel, 2009; Oyserman et al., 2002). Some specific beliefs or values of individualism or collectivism may be particularly important for such psychological characteristics. For instance, Americans were found to put a greater emphasis on

autonomy or independence (which is considered a value of individualistic cultures) than Japanese adults throughout adulthood (Karasawa et al., 2011). Such cultural emphases may also influence the attributional style of individuals as previous research suggested that compared to those in other countries, Americans, who had more independent views, would tend to focus more on dispositions rather than situational factors in reasoning social behavior (Oyserman et al., 2002). Their emphasis on autonomy may lead them to believe that they have control over their circumstances or outcomes (i.e., perceived control) (Cheng et al., 2013). In addition, while psychological constructs such as perceived control and personality traits are associated with health, those associations may vary among those from different cultures who have distinct beliefs and values (Cheng et al., 2013; Oyserman et al., 2002). Specifically, the implications of these individual psychological differences for health outcomes may be greater for those who emphasize cultural values such as autonomy and agency (i.e., volitional, goal-directed act with a sense of efficacy; Kagitcibasi, 2005) (Cheng et al., 2013; Heine & Buchtel, 2009).

In addition, the implications of aging and gender may differ between those in distinct cultures. Different societies may have varying (positive or negative) views and behaviors toward aging or older people, which may affect their experience and well-being within the social or cultural context (Löckenhoff et al., 2009). Even though age is a key factor that may account for varying psychological and other developmental outcomes during adulthood in different countries, findings from cross-cultural research, as well as other areas of research, have often been limited due to the (over)use of student samples (Oyserman et al., 2002; Taras et al., 2014). This limitation in representativeness can be critical especially in addressing age-related changes in psychological factors (i.e., personality traits, perceived control) and health outcomes. With regard to gender, societal expectations may affect cultural orientation and values (Hofstede,

2001; Taras et al., 2014). In his model of national cultures, Hofstede (2001) included the masculinity-femininity dimension as a societal characteristic referring to the distribution of masculine values (e.g., assertiveness, competitiveness) and feminine values (e.g., caring, modesty) in a given cultural context. Although this differentiation seems stereotypical, it could address different focuses on masculine or agentic goals (e.g., seeking autonomy, competence, and achievement of personal success and potential) versus feminine or communal goals (e.g., seeking relatedness and maintaining harmony) (Cheng et al., 2013). Hofstede (2011) suggested that compared to the United States and some other Western countries, Japan is a country in which masculine values are generally emphasized, yet there is a great difference in values between genders. This view on the gender difference was supported by Karasawa et al. (2011) indicating that Japanese men put a greater emphasis on autonomy among multiple dimensions of psychological well-being than Japanese women while such a gender difference was not observed for American adults.

Thus, culture should be taken into account in addressing psychological constructs, their health consequences, and any potential age and gender differences. The present study specifically addresses age, gender, and cultural differences in associations among personality traits, perceived control, and health outcomes for Japanese and American adults.

5.1.2. Cultural Differences in Perceived Control

Cross-cultural research has indicated general tendencies showing that people from Western, individualistic cultures are prone to focus on self-reliance and internal locus of control (i.e., control of themselves over life outcomes by confronting or changing their circumstances) while those from Asian cultures (who put a less emphasis on autonomy and agency) are more likely to rely on external locus of control (i.e., control of powerful others, chance, or fate)

(Cheng et al., 2013; Lachman et al., 2011). People from Asian and many other non-Western cultures tend to emphasize interpersonal harmony and acceptance of and adaptation to their circumstances by changing themselves (Cheng et al., 2013). Related to these tendencies, previous research indicates that those in Asian countries (i.e., South Korea, India, China, and Japan) reported lower perceived control than those in other (European and North and South American) countries (Sastry & Ross, 1998), and within the United States, the perceived control of those from racial minority groups were generally lower than that of European Americans (Lachman et al., 2011). Those cultural differences may be due to distinct belief systems or ways of thinking, such as Asian holistic thinking (valuing adaptation to the environment and appreciating environmental influence on the individual) versus European analytical thinking (focusing on causal explanations on the intention and control of the individual for the behavior or outcome while emphasizing autonomy and agency), which may account for Asians' tendency to attribute external factors as the cause of the outcome (Cheng et al., 2013).

As the emphasis on control over life circumstances seems to vary across cultures, it may also differ how greatly individual characteristics such as personality traits can influence their perceived control. For instance, given that individuals in non-Western, less individualistic countries focus more on situational influences rather than the impact of individual characteristics such as personality traits in accounting for their behaviors and outcomes (Heine & Buchtel, 2009), personality traits may not have great implications for their beliefs that they have control over their life circumstances. However, little research if any has been conducted on cultural differences in associations between personality traits and perceived control, and the present study intends to explore and contrast those associations for Japanese and American adults.

5.1.3. Cultural Differences in Personality Traits

The FFM of personality was originally developed for English-speaking populations; similar five-dimensional structures emerged in varying languages across countries and major geographic areas (Heine & Buchtel, 2009; McCrae & Costa, 1997). Cross-cultural studies that included samples from non-Western countries including Japan have also indicated similar tendencies in levels of personality traits among those of different ages, particularly higher levels of neuroticism and extraversion and lower levels of conscientiousness for younger adults compared to older people (Chopik & Kitayama, 2018; McCrae et al., 1999). Gender comparisons have also been conducted in cross-cultural research. Schmitt et al. (2008) indicated that women scored higher on neuroticism, extraversion, agreeableness, and conscientiousness than men in most of the 55 countries they studied though their Japanese sample had smaller (or negligible) gender differences in these personality traits compared to their American sample.

Despite the apparent cross-cultural similarities in structures and tendencies of the Big Five traits between women and men of different ages (with some cultural variations in the magnitude of the gender differences), the implications of personality traits may vary across countries. In particular, the associations of personality traits with perceived control and health outcomes may be weaker for those in non-Western countries who emphasize the powerful influence of the situation or circumstance on their behavior and consider individual characteristics less influential for outcomes (Heine & Buchtel, 2009). Examination of this potential cultural difference is warranted, specifically cross-cultural research that compares associations of personality traits with perceived control and health outcomes for those in culturally distinct countries.

5.1.4. Links of Personality Traits and Perceived Control to Health

Given that research on the associations of personality traits and perceived control with health and well-being outcomes is limited, it is not surprising that cross-cultural research on this area is sparse. However, some studies have addressed cultural differences in (a part of) associations among personality, perceived control, and health.

The implications of personality traits for health and well-being may vary across cultures. For instance, some studies have addressed links between personality traits and subjective well-being across countries. Reviewing previous studies that addressed between-nation differences among multiple nationalities, Diener, Oishi, and Lucas (2003) suggested that culture was a significant predictor for subjective well-being (e.g., positive emotions, life satisfaction) though its effect size for subjective well-being might be smaller than that of individual characteristics such as personality traits. In addition, a study of college students from the United States, Germany, Japan, Mexico, and Ghana (Schimmack, Radhakrishnan, Oishi, Dzokoto, & Metritech, 2002) indicated that while the effects of neuroticism and extraversion appeared universal for an emotional aspect of subjective well-being (i.e., hedonic balance or the balance between positive and negative affect), the effects of the personality traits on a cognitive aspect of subjective well-being (i.e., life satisfaction) were stronger for those from the individualistic countries (i.e., United States and Germany) than others (i.e., Japan, Mexico, and Ghana). Another cross-cultural study (Shin et al., 2009) showed that neuroticism predicted anxiety and stress for college students in both Singapore and Australia. These studies were limited in their focus on subjective well-being or mental health as outcomes as well as their cross-sectional designs and the lack of representativeness of their samples (focusing primarily on college students) to the general adult population. In contrast, Rhodes and Smith (2006) conducted a meta-analysis on previous studies

across countries that examined the effects of personality traits on physical activity behavior for adults. They found that extraversion positively and neuroticism negatively predicted physical activity behavior among some of the U.S. studies, one Japanese study, and some studies from other countries. Their meta-analysis also indicated that conscientiousness predicted physical activities in some studies from Western countries but not in the Japanese study. While this study draws interesting conclusions, few studies have addressed the effects of personality traits for physical or functional health comparing adults from different cultures.

Cross-cultural research on the associations between perceived control and health outcomes is also limited, though some studies have addressed these links among different cultures. For example, using the individualism-collectivism framework, Cheng et al. (2013) conducted a meta-analysis indicating that associations of locus of control or perceived control with anxiety were stronger for samples from individualistic cultures while the cultural difference did not account for variance in the associations of perceived control with depression. The authors addressed the possibility that the meaning of perceived control differed between cultures, that is, greater emphasis is placed on perceived control among those in more individualistic cultures, which might have resulted in greater implications of perceived control for their mental health outcomes. However, few studies have examined potential differences in the associations between perceived control and physical or functional health outcomes. One such cross-cultural study (Kitayama, Karasawa, Curhan, Ryff, & Markus, 2010) examined the effects of perceived control for both psychological and physical health. The authors contrasted the emphasis of American and Japanese people on independence (perceived control) and interdependence (relational harmony), respectively, and showed that the effects of perceived control (controlling for personality traits) were stronger for subjective and psychological well-being among American adults than Japanese

adults. Their results for physical health indicated the same direction of cultural difference (i.e., stronger effect of perceived control on physical health among Americans) though the difference remained marginal. These findings suggested that perceived control had greater implications for health and well-being outcomes for Americans compared to Japanese adults; however this and other studies did not address possible age and gender differences in the associations between perceived control and the outcomes.

Thus, the literature lacks longitudinal cross-cultural research on the associations among personality traits, perceived control, and health outcomes. Moreover, while distinct cultural values may lead to varying implications of age (or aging) and gender for psychological experiences and well-being as discussed earlier, there is a dearth of research specifically addressing age and gender differences in longitudinal effects of personality and perceived control for health between cultures. The investigation of such possible differences by culture as well as by age and gender has the potential to provide practical implications by helping develop approaches to promoting health for specific groups taking their demographic and cultural contexts into account.

5.1.5. Study 3 Objectives

The objective of Study 3 was to investigate longitudinal associations among personality traits, perceived control, and health outcomes for Japanese aging adults and contrast their results with those of Americans. Whereas culture may have great implications for these associations as discussed earlier, the prior literature has focused on studying those from Western cultures, and research for non-Western nationalities is particularly lacking. By contrasting the effects of personality traits and perceived control between Japanese women and men of varying ages and between Japanese and American adults, the present longitudinal and cross-cultural study aimed

to contribute to improving the understanding of how the role of personality and perceived control for health could differ between those in distinct cultures.

Specifically, Study 3 examined two research questions: (1) whether perceived control mediated longitudinal associations between personality traits and health outcomes for Japanese aging adults and how the associations among these variables differed among Japanese women and men of different ages; (2) how the associations among personality traits, perceived control, and health outcomes (and age and gender differences in these associations) varied between Japanese and American adults.

The lack of cross-cultural research addressing such associations for non-Western populations made it difficult to make specific hypotheses. For the first research question, referring to the limited literature, it was hypothesized that whereas perceived control would mediate the longitudinal personality-health links in general, the mediational relationships might not be observed for certain age or gender groups. With regard to gender differences, Hofstede (2001) proposed a masculinity-femininity dimension of cultural difference and suggested that there is a larger gap between men's and women's values in Japan than the United States and other English speaking countries (Hofstede, 2011). As Japanese men may focus more on "masculine" or agentic goals (emphasizing autonomy, competence, and achievement) rather than "feminine" or communal goals (Cheng et al., 2013), the implications of perceived control for health outcomes may be greater for Japanese men compared to their female counterparts. With regard to age differences, whereas previous research suggested that the role of perceived control may increase with age for American adults (Infurna, Gerstorf, & Zarit, 2011; Kempen et al., 2005), it was unclear whether there would be such age differences for Japanese adults, who focus more on external or situational influences, rather than the significance of the individual's internal

characteristics and experiences (e.g., personality, perceived control), for consequences. While no specific hypothesis was made for age differences in the effects of personality traits and perceived control on health, the effect of perceived control may be too weak to mediate the personality-health links particularly for women (for whom the implications of perceived control may be smaller) depending on their age. For the second research question, it was hypothesized that associations among personality traits, perceived control, and health outcomes would be weaker for Japanese adults than Americans. As the role of individual characteristics over life outcomes are less emphasized in Asian countries including Japan (Cheng et al., 2013; Karasawa et al., 2011; Kitayama et al., 2010), personality traits and perceived control may have a smaller impact on their health outcomes for Japanese adults.

Thus, it was expected that associations among personality traits, perceived control, and health outcomes would be weaker for women as compared to men in Japan as well as for Japanese as compared to American adults.

5.2. Method

5.2.1. Data

For Study 3, data from the Midlife in Japan (MIDJA) study were used in addition to the MIDUS data. MIDJA is a survey of Japanese adults, conducted in the Tokyo metropolitan area, having common measures to those of to the MIDUS survey (University of Wisconsin - Madison Institute on Aging, 2018). Two waves of the MIDJA survey were conducted in 2008 (MIDJA1; N = 1,027 aged 30 to 79) and in 2012 (MIDJA2; N = 657). For the present study, data from those aged 40 or older at MIDJA1 were selected and the same procedure of multiple imputation as that for Study 1 was conducted using all measures of interest for two waves of MIDJA. The selected

participants consisted of 422 women (with an average age of 58.6 (SD = 11.2) at MIDJA1) and 405 men (with an average age of 59.7; SD = 11.5).

In addition, in order to compare the effects between Japanese and American adults, two waves of MIDUS data (i.e., MIDUS2 and MIDUS3) were also used. These later two waves were chosen as their survey dates were closer to those of the two waves of MIDJA and they had the five-item conscientiousness scale with better internal consistency. Data from 2,363 women (with an average age of 57.7 (SD = 11.4) at MIDUS2) and 2,092 men (with an average age of 57.4 (SD = 11.1) at MIDUS2) were analyzed after conducting the multiple imputation for these two waves of MIDUS data.

5.2.2. Measures

MIDJA included Japanese-translated versions of all measures described in Study 1 and Study 2: age, sex, education, Big Five personality traits, perceived control, number of chronic health conditions, and functional limitations (Ryff et al., 2018a, 2018b). While generally the variables used in Study 3 were consistent with the first two studies, there were some changes in measures used for Study 3. In particular, for conscientiousness, a five-item scale (see Appendix A) was available at MIDJA1/MIDJA2 as well as MIDUS2/MIDUS3 and was used instead due to its higher internal consistency than the four-item version used in Study 1 and 2. Other changes to the measures are described below.

5.2.2.1. Centering

For Study 3, baseline age was centered at 60 (close to the average age of the participants at the first wave). The other predictor variables were treated in similar ways to those in Study 1. Sex (i.e., male = 0 or female = 1) and education (i.e., completion of high school: yes= 1, no = 0; completion of a four-year college: yes = 1, no = 0) were coded as dichotomous variables.

Personality traits and perceived control were centered at their overall mean of Japanese adults (before multiple imputation) across two waves. (The same centered values were used also for the two waves of measures for American adults.)

5.2.2.2. Cronbach's alphas of the scales

The alphas for the personality traits and perceived control at MIDJA1 and MIDJA2 were: .87 and .86 for the five-item agreeableness scale; .85 and .84 for the five-item extraversion scale; .48 and .42 for the four-item neuroticism scale; .65 and .64 for the five-item conscientiousness scale; .85 and .86 for the seven-item openness to scale; .80 and .81 for the 12-item perceived control scale. The alphas of the five-item version of conscientiousness at MIDUS2 and MIDUS3 were .68 and .67. (See the Method section of Study 1 (on pages 19 to 20) for the alphas of the other personality traits and perceived control of MIDUS.)

5.2.2.3. Neuroticism scale

Due to the low alphas for the neuroticism scale in MIDJA, the original scale of neuroticism (see Appendix A) was not used for the present study. Reliability analysis of this scale was conducted and revealed that the alpha improved by including only two items of 'worrying' and 'nervous' while removing the other two of 'moody' and 'calm' (and the alpha of scales with any three of the four items were worse than that of this two-item scale). Thus, a two-item scale with 'worrying' and 'nervous' was adopted for neuroticism for Study 3. The alphas of the two-item scale were .64 at the two waves of MIDJA. The same two-item scale was created for MIDUS2 and MIDUS3, and its alphas were .76 and .73, respectively, for the two waves.

5.2.3. Analysis Strategy

A longitudinal path analysis model similar to that in Study 2 was constructed in Figure 8. Because of the limitation of the two-wave data, concurrent paths from personality traits to

perceived control were added. Exogenous variables at MIDJA1 (and MIDUS2) were allowed to correlate with each other, and error terms of endogenous variables at MIDJA2 (and MIDUS3) were correlated with each other concurrently within the wave. The analyses were conducted first comparing Japanese women and men and then comparing Japanese and American adults as described as follows.

5.2.3.1. Analysis for Japanese women and men

In order to assess possible age and sex differences in the effects of personality traits and perceived control, multigroup analysis for female and male groups were conducted while adding interaction terms of age with the predictors into the model shown in Figure 8. The model fit was assessed using the same criteria as Study 2 (i.e., RMSEA < .08, CFI > .90, and SRMR < .08) while removing non-significant interactions of age (indicating no age differences in the effect) for both sex groups. After determining that the model had an acceptable fit, sex differences in structural paths related to the research questions were tested by adding equality constraints to the structural paths between the two sex groups. It was determined with a set of chi-square difference tests (Kline, 2015) whether each of the constraints should be kept. Detailed procedures for this assessment of sex differences are described together with obtained statistical data in the subsequent results section.

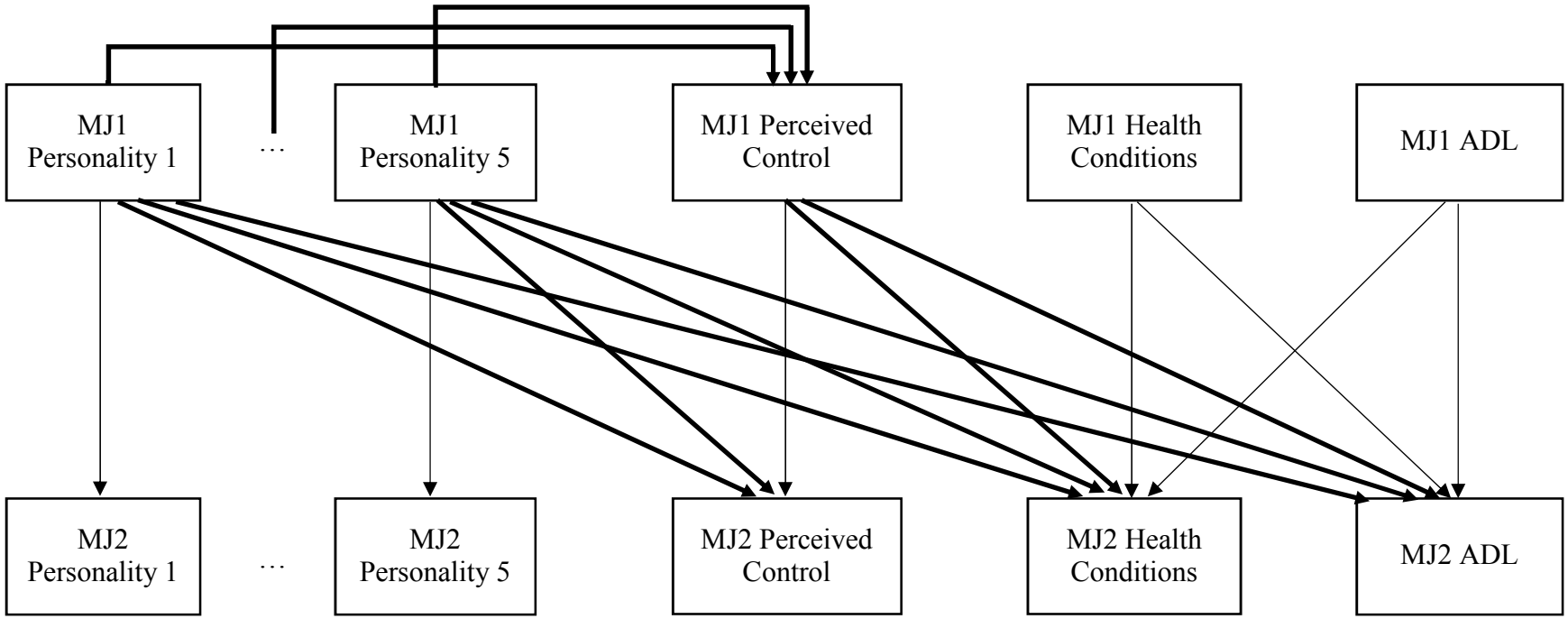

Figure 8. Study 3 path model for multigroup analysis (with female and male groups) with the MIDJA (MJ) data from Japanese adults. Personality 1 to 5, Health Conditions, and ADL (activities of daily living) in the figure correspond to the measures of Big Five personality traits, number of chronic health conditions, and functional limitations, respectively; for all paths, age and educational level at MJ1 were controlled for; in addition to correlated exogenous variables at MJ1, error terms of endogenous variables at MJ2 were correlated with each other concurrently within the same wave; for each path from personality or perceived control to its outcome (i.e., bolded paths in the figure), an interaction of baseline age with the predictor was added. The multigroup analysis with Japanese and American adults was also conducted.

5.2.3.2. Analysis for Japanese versus American adults

While the sample sizes of Japanese and American adults in the present study differed, multigroup analysis allowed statistical comparisons for specific parameters (e.g., magnitude of the effect of a specific structural path) among multiple groups by assessing difference in model fit statistics between models with and without constraints added to the parameters (Kline, 2015; Muthén & Muthén, 2017). Thus, an additional multigroup analysis model was constructed for Japanese and American adults in order to assess differences by nationality. The linear and quadratic effects of personality traits and perceived control on their outcomes were assessed separately considering the complexity for the analysis for the quadratic effects.

Analysis for linear effects. The same procedure of multigroup analysis was adopted as described for the analysis only for Japanese women and men (by instead having Japanese and American groups). As reported in detail later, it was determined with a set of chi-square difference tests whether structural paths related to the research questions were invariant between two nationalities.

Analysis for quadratic effects. Due to its complexity, the analysis for the quadratic effects of the predictors included two models: one focusing only on main effects of quadratic (as well as linear) terms of the predictors and the other including both the main effects and interactions of the age with the linear and quadratic terms of the predictors.

A remark on the analysis for Japanese versus American adults. Whereas statistical comparisons were conducted for Japanese and American adults as described above, the time elapsed between two waves differed for MIDJA (four years) and MIDUS (approximately nine years). Thus, the results from the present study should be interpreted with caution considering

the difference in time (which could affect the magnitude of the effects of the predictors) as discussed later as a limitation of this study.

5.3. Results

5.3.1. Analysis for Japanese Women and Men

Descriptive statistics for Japanese women and men are shown in Table 9 and their correlation matrix is shown in Table 10. The model fit statistics for the models evaluated are summarized in Table 11. All the models indicate acceptable levels of model fit.Age differences in the effects of the predictors

In the multigroup model with the interactions of age with the predictors (i.e., 'Initial Model' in Table 11), all of the interactions were non-significant for both female and male groups, which indicates no age differences in the effects of any personality traits on perceived control and health outcomes and those of perceived control on health outcomes for either women or men. Thus, all of the age interactions were removed, and the modified model was considered the 'base model'.

5.3.1.1. Base model versus fully constrained model

In order to assess whether the effects of interest in the base model were overall invariant between sexes, the fully constrained model was constructed and run by adding equality constraints to all structural paths related to the research questions between the two sex groups. Chi-square difference statistics between the base model and fully constrained model showed no significant difference ($\Delta\chi^2 = 15.739$, $\Delta df = 22$). This result suggests that overall there were no sex differences in the effects of the paths. Additional analyses for the individual paths also revealed no sex differences in any of the paths while marginal sex differences ($p < .10$) were found for the paths from MIDJA1 extraversion to MIDJA1 perceived control ($\beta = .294$ for

women and β = .115 for men in the base model that had no constraints) and from MIDJA1 neuroticism to MIDJA1 perceived control (β = -.264 for women and β = -.175 for men in the base model). Thus, equality constraints between sexes were added to all the paths (including those with the marginal sex differences), and non-significant paths were constrained to 0 in the final model, which did not differ from the fully constrained model ($\Delta\chi^2 = 21.988$, $\Delta df = 16$) supporting the selection of the parsimonious model with the constraints to 0 (i.e., the final model).

The effects of the final model are summarized in Table 12. Due to the non-significant paths from MIDJA1 perceived control to MIDJA2 health outcomes (constrained to 0 in the final model), no significant indirect effects from MIDJA1 personality traits to MIDJA2 health outcomes through MIDJA1 perceived control were found in the final model. (All indirect effects in the model without constraining the non-significant effects to 0 also indicated non-significant results.)

Thus, perceived control did not mediate any links between personality and health among Japanese adults (whether men or women).

Table 9

Descriptive Statistics for Japanese Adults (422 Women and 405 Men) (Study 3)

Variables	Sex	MIDJA1		MIDJA2		Differences between Waves (Sex Differences)
		Mean	(SD)	Mean	(SD)	
Age (in years)	Women	58.7	(11.2)	-		
	Men	59.7	(11.5)	-		
High School Graduate	Women	87%		-		
	Men	84%		-		
Four-Year College Graduate	Women	14%		-		(Sex difference)
	Men	46%		-		
Agreeableness	Women	2.65	(0.61)	2.61	(0.61)	No differences between waves
	Men	2.66	(0.63)	2.58	(0.61)	
Extraversion	Women	2.45	(0.67)	2.40	(0.69)	No differences between waves
	Men	2.39	(0.68)	2.35	(0.67)	
Neuroticism	Women	1.91	(0.74)	1.89	(0.70)	No differences between waves
	Men	2.02	(0.77)	1.97	(0.68)	
Conscientiousness	Women	2.60	(0.52)	2.58	(0.50)	No differences between waves
	Men	2.67	(0.56)	2.63	(0.54)	
Openness to Experience	Women	2.09	(0.60)	2.05	(0.59)	No differences between waves
	Men	2.25	(0.63)	2.18	(0.59)	(Sex differences at both waves)
Perceived Control	Women	4.69	(0.79)	4.70	(0.75)	No differences between waves
	Men	4.57	(0.79)	4.52	(0.78)	(Sex differences at both waves)
Chronic Health Conditions	Women	2.47	(1.96)	2.40	(1.94)	No differences between waves
	Men	2.27	(2.05)	2.07	(1.68)	(Sex differences at MIDUS2)
Functional Limitations	Women	1.52	(0.75)	1.66	(0.78)	Difference between waves for women (no sex differences)
	Men	1.51	(0.75)	1.61	(0.74)	

Table 10

Correlation Matrix for Japanese Women and Men (Study 3)

Variables	Age	HS	Col.	J1Agr.	J2Agr.	J1Ext.	J2Ext.	J1Neu.	J2Neu.
Age	-	-.345	-.187	(-.027)	(-.068)	-.157	-.136	-.140	(-.097)
HS	-.227	-	.156	(.005)	(.035)	(.089)	(.099)	(.014)	(-.032)
Col.	-.150	.403	-	(-.033)	(-.011)	(.070)	(.040)	(.027)	(.011)
J1Agr.	(.059)	.114	.121	-	.660	.668	.506	.130	(.032)
J2Agr.	(-.030)	(.040)	(.062)	.627	-	.506	.693	(.092)	.156
J1Ext.	(-.011)	.142	(.086)	.699	.501	-	.760	(-.012)	(-.090)
J2Ext.	(-.037)	(.083)	(.016)	.489	.704	.741	-	(-.063)	(-.034)
J1Neu.	-.132	(.055)	(.009)	(.066)	(.038)	(-.035)	(-.064)	-	.645
J2Neu.	-.139	(-.038)	(.009)	(-.017)	.167	(-.087)	(-.020)	.601	-
J1Cons.	.175	.101	.135	.608	.379	.450	.271	(.066)	(-.052)
J2Cons.	.152	(.074)	(.065)	.440	.595	.340	.450	(.017)	(.070)
J1Open	(-.050)	.206	.254	.665	.460	.688	.507	.109	(.025)
J2Open	(-.086)	.147	.166	.446	.662	.483	.659	(.071)	.179
J1Cont.	-.108	.161	.185	.271	.259	.314	.285	-.131	-.193
J2Cont.	(-.110)	.124	.122	.295	.339	.313	.363	-.190	-.252
J1Chron.	.128	(-.013)	(-.044)	(-.052)	(-.100)	(-.095)	-.161	.155	.150
J2Chron.	.118	(-.029)	(-.008)	(-.058)	(-.089)	(-.086)	-.165	.187	.172
J1ADL	.425	-.224	-.163	(-.037)	(.017)	(-.051)	(-.010)	(-.015)	(.062)
J2ADL	.340	-.188	-.214	(-.008)	-.119	(-.037)	(-.106)	(-.019)	(-.025)

Notes: Correlation coefficients above the diagonal refer to women, below the diagonal to men; the above abbreviations stand for: J1 = MIDJA1, J2 = MIDJA2, HS = high school graduate, Col. = college graduate, Agr. = agreeableness, Ext. = extraversion, Neu. = neuroticism, Cons. = conscientiousness, Open = openness to experience, Cont. = perceived control, Chron. = chronic health conditions, ADL = functional limitations; the statistics in parentheses indicated non-significant correlations ($p > .05$).

Table 10

Correlation Matrix for Japanese Women and Men (Study 3) (continued)

Variables	J1Cons.	J2Cons.	J1Open	J2Open	J1Ctrl	J2Ctrl	J1Chron.	J2Chron.	J1ADL	J2ADL
Age	.150	(.103)	-.119	-.135	-.187	-.162	(.071)	(.077)	.402	.409
HS	(-.093)	(.010)	.112	.127	.132	(.107)	(-.067)	(-.040)	-.217	-.248
Col.	(-.022)	(-.002)	.180	.140	(.069)	.134	(-.044)	(-.025)	-.178	-.159
J1Agr.	.534	.372	.569	.431	.260	.218	(-.020)	(.011)	(-.079)	(-.067)
J2Agr.	.328	.525	.383	.567	.189	.239	(-.060)	(-.057)	(.003)	(-.052)
J1Ext.	.341	.263	.655	.524	.399	.330	(-.031)	(-.073)	-.143	-.156
J2Ext.	.223	.408	.514	.702	.301	.346	-.121	-.189	(-.080)	-.170
J1Neu.	.161	(.074)	(.076)	(.025)	-.219	-.203	.271	.260	(.035)	(.055)
J2Neu.	(.083)	.141	(-.011)	(.092)	-.222	-.203	.162	.198	(.095)	(.052)
J1Cons.	-	.658	.390	.264	.170	.131	(.039)	(.058)	(.015)	(-.008)
J2Cons.	.666	-	.257	.422	.160	.196	(-.100)	(-.090)	(.080)	(-.069)
J1Open	.497	.355	-	.734	.287	.224	(.027)	(-.015)	-.127	-.126
J2Open	.329	.504	.692	-	.234	.280	(-.048)	(-.099)	(-.059)	-.153
J1Cont.	.264	.260	.335	.286	-	.596	-.199	-.158	-.161	-.216
J2Cont.	.256	.270	.304	.307	.639	-	-.193	-.216	(-.109)	-.179
J1Chron.	(-.082)	-.115	(-.083)	(-.096)	-.195	-.209	-	.532	(.086)	.130
J2Chron.	(-.059)	(-.097)	(-.058)	(-.102)	-.147	-.191	.551	-	.116	.159
J1ADL	(-.022)	(.074)	(-.053)	(.014)	-.172	-.139	.175	.185	-	.497
J2ADL	(-.015)	(-.089)	-.113	-.126	-.165	-.229	.167	.215	.412	-

Notes: Correlation coefficients above the diagonal refer to women, below the diagonal to men; the above abbreviations stand for: J1 = MIDJA1, J2 = MIDJA2, HS = high school graduate, Col. = college graduate, Agr. = agreeableness, Ext. = extraversion, Neu. = neuroticism, Cons. = conscientiousness, Open = openness to experience, Cont. = perceived control, Chron. = chronic health conditions, ADL = functional limitations; the statistics in parentheses indicated non-significant correlations ($p > .05$).

Table 11

Summary of Model Fit for Path Analysis Models for Study 3 (Multigroup Analysis for Japanese Women and Men)

No.	Model	RMSEA	CFI	SRMR	Chi-Square	df	Notes
1	Initial Model	0.016	0.995	0.038	188.656	170	No significant interactions of age with the predictors found (i.e., no age differences in the effects of personality traits or perceived control)
2	Base Model	0.019	0.996	0.038	123.869	108	All (non-significant) interactions of age with personality traits and perceived control removed
3	Fully Constrained Model	0.013	0.997	0.039	139.608	130	No significant difference in model fit (chi-square statistics) from the base model ($\Delta\chi^2 = 15.739$, $\Delta df = 22$, $p > .10$)
4	Final Model	0.016	0.996	0.048	161.596	146	Non-significant paths among those of interest (invariant between sexes) constrained with 0; no difference in model fit (chi-square statistics) from the fully constrained model ($\Delta\chi^2 = 21.988$, $\Delta df = 16$, $p > .10$).

5.3.2. Analysis for Japanese versus American Adults

Descriptive statistics for two waves of data from Japanese and American adults are summarized in Table 13. Japanese adults were on average nearly two years older than Americans while the composition of sexes did not differ between the two datasets. American adults reported higher education levels (with higher completion rates of high school and four-year college degrees) than Japanese adults. Personality traits, perceived control, and health outcomes at both waves all significantly differed between the two nationalities.

In the aforementioned analyses of the Japanese sample, no sex or age differences were found for the effects of personality traits on perceived control and health nor for those of perceived control on health outcomes. In addition, preliminary analyses for the two waves of MIDUS (using the same procedures as those for the Japanese data) indicated that there were no significant age or sex differences in these associations among personality, perceived control, and health for American adults (while the concurrent association between conscientiousness and perceived control within the first wave was marginally stronger for men than women). This lack of significant age and gender differences was consistent with the three-wave longitudinal findings of Study 2. Thus, due to the lack of age and gender differences for both nationalities, in order to address research question 2, a simplified model was employed to examine just the cultural differences in the effects of the predictors: the two nationality groups were compared in multigroup analysis without dividing them into sex groups nor adding interactions of age with the predictors.

5.3.2.1. Analysis for linear effects

In order to assess whether the effects of interest in the base model (without any constraints) were overall invariant between nationalities, the fully constrained model was

constructed and run by adding equality constraints to all structural paths related to the research questions between the two nationality groups. Chi-square difference statistics between the base model and fully constrained model showed a significant difference ($\Delta\chi^2 = 67.47$, $\Delta df = 22$, $p < .001$). As this result indicates that at least one of the paths might differ between the Japanese and American groups, chi-square difference tests were conducted for individual structural paths related to the research questions. The results of the set of chi-square difference tests as well as the effects in the base model (without any constraints to any structural paths) were summarized in Table 14. The concurrent effects of neuroticism, conscientiousness, and openness (as well as extraversion though its cultural difference was marginal) on perceived control at the first wave ('Wave 1': MIDJA1 and MIDUS2) were stronger for Americans than Japanese adults. For the other paths including those from perceived control to health outcomes over time, there was no significant differences in their effects between Japanese and American adults. However, while the difference remained marginal, the effect of Wave 1 conscientiousness on Wave 2 chronic health conditions was stronger for Americans ($\beta = -.058$, $p < .01$ in the base model) than Japanese adults ($\beta = -.007$, $p > .10$ in the base model).

Table 12

Standardized Effects in the Final Model for Japanese Women and Men (Study 3)

Predictors	Outcomes	
	MIDJA1 (MJ1) Perceived Control	MIDJA2 (MJ2) Perceived Control
	Women / Men	Women / Men
Age (per 10 years)	-.175 (.047)*** / -.128 (.046)**	-.054 (.060) / -.053 (.051)
High School Graduate	.059 (.047) / .042 (.049)	-.013 (.053) / .016 (.051)
College Graduate	.005 (.045) / .086 (.049)	.091 (.043)* / .011 (.050)
MJ1 Agreeableness	.000 (.000) (inv.)	.000 (.000) (inv.)
MJ1 Extraversion	.213 (.044)*** (inv.)	.000 (.000) (inv.)
MJ1 Neuroticism	-.219 (.033)*** (inv.)	-.102 (.035)** (inv.)
MJ1 Conscientiousness	.134 (.037)*** (inv.)	.000 (.000) (inv.)
MJ1 Openness	.095 (.046)* (inv.)	.000 (.000) (inv.)
MJ1 Perceived Control	- / -	.539 (.039)*** / .596 (.038)***

Predictors	Outcomes	
	MJ2 Chronic Health Conditions	MJ2 Functional Limitations
	Women / Men	Women / Men
Age (per 10 years)	.047 (.055) / .039 (.053)	.222 (.053)*** / .172 (.056)**
High School Graduate	.034 (.056) / -.008 (.057)	-.065 (.052) / -.030 (.057)
College Graduate	.006 (.045) / .030 (.051)	-.035 (.043) / -.131 (.054)*
MJ1 Agreeableness	.000 (.000) (inv.)	.000 (.000) (inv.)
MJ1 Extraversion	.000 (.000) (inv.)	.000 (.000) (inv.)
MJ1 Neuroticism	.116 (.039)** (inv.)	.000 (.000) (inv.)
MJ1 Conscientiousness	.000 (.000) (inv.)	.000 (.000) (inv.)
MJ1 Openness	.000 (.000) (inv.)	.000 (.000) (inv.)
MJ1 Perceived Control	.000 (.000) (inv.)	.000 (.000) (inv.)
MJ1 Chronic Health Conditions	.474 (.048)*** / .501 (.047)***	.048 (.050) / .057 (.051)
MJ1 Functional Limitations	.065 (.057) / .088 (.052)	.388 (.057)*** / .312 (.056)***

Notes: *** p< .001, ** p<.01, * p< .05; the above estimates are standardized coefficients (β) (with standard errors in parentheses); for the estimates with "(inv.)", the unstandardized coefficients were constrained as invariant between sexes (as some of their standardized coefficients varied between sexes with the unstandardized constraints, the average values between sexes are shown for the constrained effects in the table).

Table 13

Descriptive Statistics for Two Waves of Data from Japanese versus American Adults (Study 3)

Variables	Nationality	Wave 1		Wave 2		Differences by Nationality
		Mean	(SD)	Mean	(SD)	
Age (in years)	Japanese	59.2	(11.3)	-		Significant difference
	American	57.6	(11.3)	-		
Sex (Female)	Japanese	51%		-		No difference
	American	53%		-		
High School Graduate	Japanese	85%		-		Significant difference
	American	93%		-		
Four-Year College Graduate	Japanese	30%		-		Significant difference
	American	36%		-		
Agreeableness	Japanese	2.66	(0.62)	2.60	(0.61)	Significant differences at both waves
	American	3.45	(0.49)	3.42	(0.48)	
Extraversion	Japanese	2.42	(0.68)	2.38	(0.68)	Significant differences at both waves
	American	3.10	(0.57)	3.06	(0.58)	
Neuroticism	Japanese	1.97	(0.76)	1.93	(0.69)	Significant differences at both waves
	American	2.12	(0.77)	2.17	(0.78)	
Conscientiousness	Japanese	2.63	(0.54)	2.60	(0.52)	Significant differences at both waves
	American	3.39	(0.45)	3.36	(0.47)	
Openness to Experience	Japanese	2.17	(0.62)	2.11	(0.60)	Significant differences at both waves
	American	2.90	(0.54)	2.87	(0.55)	
Perceived Control	Japanese	4.63	(0.80)	4.61	(0.77)	Significant differences at both waves
	American	5.51	(1.00)	5.35	(1.04)	
Chronic Health Conditions	Japanese	2.38	(2.01)	2.24	(1.82)	Significant differences at both waves
	American	2.57	(2.58)	3.61	(3.16)	
Functional Limitations	Japanese	1.52	(0.75)	1.64	(0.76)	Significant differences at both waves
	American	1.84	(0.87)	2.12	(0.95)	

Note. ‘Wave 1’ corresponds to MIDJA1 for Japanese adults and MIDJA2 for American adults and ‘Wave 2’ corresponds to MIDJA2 for Japanese adults and MIDUS3 for American adults

Table 14

Standardized Effects for Japanese and American Adults and Results of Chi-Square Difference Tests (Study 3)

Paths from Predictors to Perceived Control at Each Wave

Predictors	Outcomes					
	Wave 1 Perceived Control			Wave 2 Perceived Control		
	Japanese	American	Chi-Square Diff. Test (Difference by Nationality)	Japanese	American	Chi-Square Diff. Test (Difference by Nationality)
Age (per 10 years)	-.149 (.033)***	/-.076 (.014)***	-	-.073 (.041)	/-.126 (.014)***	-
Female	.081 (.034)*	/-.057 (.014)***	-	.082 (.040)*	/ .008 (.017)	-
High School Graduate	.056 (.034)	/ .045 (.014)**	-	-.007 (.035)	/ .023 (.014)	-
College Graduate	.053 (.036)	/ .063 (.014)***	-	.047 (.034)	/ .058 (.013)***	-
Wave 1 Agreeableness	.006 (.049)	/-.021 (.016)	n.s.	.066 (.054)	/-.011 (.016)	n.s.
Wave 1 Extraversion	.208 (.048)***	/ .214 (.017)***	Marginal ($p < .10$)	.042 (.050)	/ .023 (.017)	n.s.
Wave 1 Neuroticism	-.218 (.032)***	/-.280 (.014)***	$p < .01$	-.121 (.035)***	/-.082 (.019)***	n.s.
Wave 1 Conscientiousness	.134 (.039)**	/ .229 (.015)***	$p < .001$	.054 (.039)	/ .088 (.020)***	n.s.
Wave 1 Openness	.096 (.046)*	/ .132 (.017)***	$p < .01$	-.004 (.053)	/ .005 (.017)	n.s.
Wave 1 Perceived Control	-	-	-	.519 (.032)***	/ .558 (.017)***	-

Notes: *** p< .001, ** p<.01, * p< .05; 'Wave 1' corresponds to MIDJA1 for Japanese adults and MIDJA2 for American adults and 'Wave 2' corresponds to MIDJA2 for Japanese adults and MIDUS3 for American adults; the above estimates are standardized coefficients (β) (with standard errors in parentheses).

Table 14

Standardized Effects for Japanese and American Adults and Results of Chi-Square Difference Tests (Study 3) (continued)

Paths from Predictors to Health Outcomes at MIDJA2/MIDUS3

Predictors	Outcomes					
	Wave 2 Chronic Health Conditions			Wave 2 Functional Limitations		
	Japanese	American	Chi-Square Diff. Test (Difference by Nationality)	Japanese	American	Chi-Square Diff. Test (Difference by Nationality)
Age (per 10 years)	.039 (.040) / .014 (.017)		-	.203 (.041)*** / .180 (.016)***		-
Female	.083 (.042) / .026 (.019)		-	.008 (.039) / .023 (.013)		-
High School Graduate	.015 (.041) /-.014 (.015)		-	-.045 (.038) /-.018 (.013)		-
College Graduate	.017 (.038) /-.016 (.015)		-	-.071 (.039) /-.061 (.013)***		-
Wave 1 Agreeableness	.032 (.052) / .022 (.021)		n.s.	.055 (.057) / .043 (.017)*		n.s.
Wave 1 Extraversion	-.042 (.060) /-.031 (.022)		n.s.	.003 (.051) /-.008 (.018)		n.s.
Wave 1 Neuroticism	.115 (.042)** / .057 (.018)**		n.s.	.022 (.037) / .008 (.015)		n.s.
Wave 1 Conscientiousness	-.007 (.047) /-.058 (.020)**		Marginal ($p < .10$)	-.046 (.044) /-.043 (.015)**		n.s.
Wave 1 Openness	-.008 (.049) / .023 (.020)		n.s.	-.044 (.050) / .002 (.019)		n.s.
Wave 1 Perceived Control	.000 (.041) /-.022 (.023)		n.s.	-.059 (.037) /-.038 (.017)*		n.s.
Wave 1 Chronic Health Conditions	.481 (.037)*** / .474 (.017)***		-	.037 (.037) / .071 (.015)***		-
Wave 1 Functional Limitations	.072 (.040) / .182 (.019)***		-	.348 (.042)*** / .553 (.015)***		-

Notes: *** p< .001, ** p<.01, * p< .05; 'Wave 1' corresponds to MIDJA1 for Japanese adults and MIDJA2 for American adults and 'Wave 2' corresponds to MIDJA2 for Japanese adults and MIDUS3 for American adults; the above estimates are standardized coefficients (β) (with standard errors in parentheses).

Specific indirect effects were assessed by obtaining their estimates with Mplus (Muthén & Muthén, 2017), which indicated that for Americans, there were significant indirect effects ($p < .05$) of all Wave 1 personality traits except agreeableness on Wave 2 functional limitations through Wave 1 perceived control; whereas, no significant indirect effects were found for the path from each personality trait to functional limitations through perceived control for Japanese adults. For both nationalities, no indirect effects were found of Wave 1 personality traits on Wave 2 chronic health conditions through W1 perceived control. When comparing the coefficients of these indirect effects between the two nationality groups, the results indicated no differences in the magnitude of any of the indirect effects for Japanese and American adults.

5.3.2.2. Analysis for quadratic effects

In the analysis for the main effects of quadratic terms of personality traits on perceived control and health outcomes and perceived control on health outcomes, only the concurrent quadratic effect of extraversion on perceived control at the first wave was significant for Americans ($\beta = -.103$, $p < .001$), but not for Japanese adults ($\beta = -.026$, $p > .10$). The curvilinear difference in the effect of this path for Americans is depicted in Figure 9, which indicates that as the level of extraversion increased, its effect on perceived control overall increased; however, the rate of increase in the effect was smaller (i.e., less steepening slope in Figure 9) for higher extraversion. The results of the analysis for interactions of age with the linear and quadratic terms of the predictors (in addition to the main effects of the predictors) indicated that there were no age differences in the quadratic effects for American or Japanese adults.

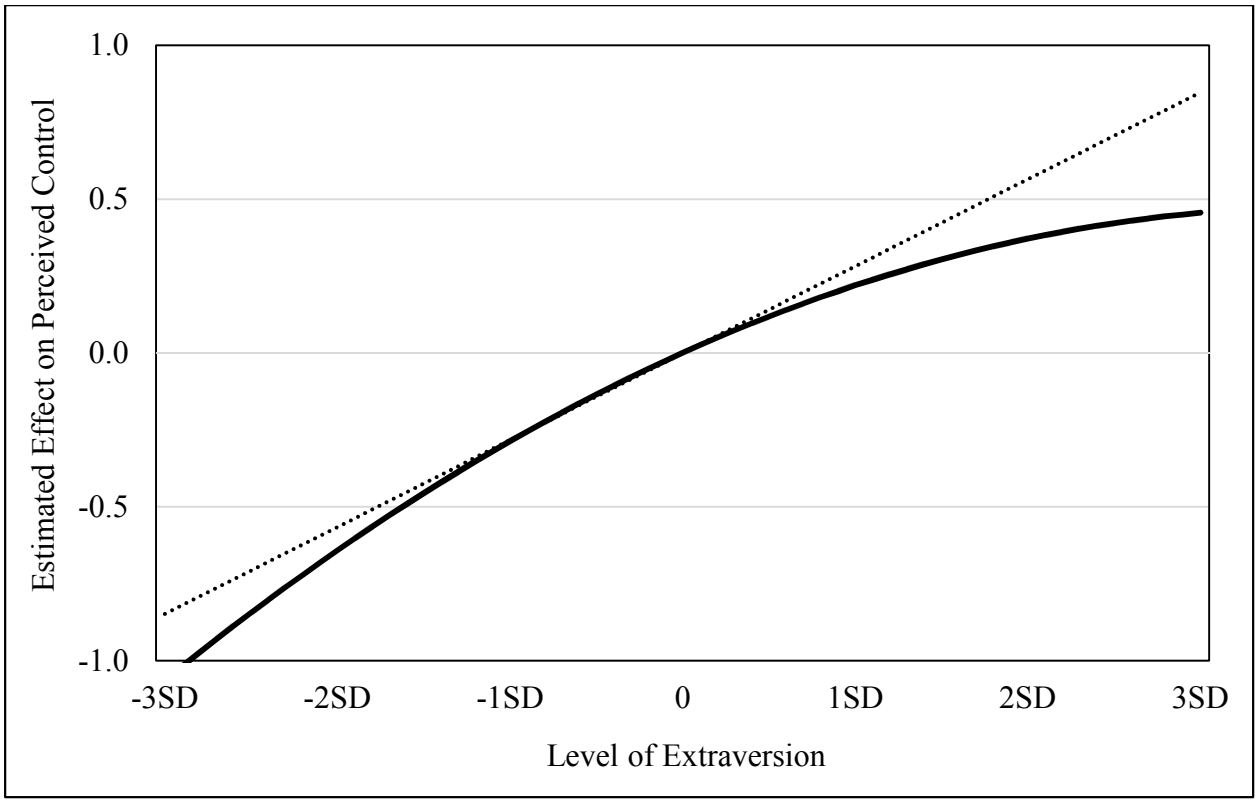

Figure 9. Estimated effects by different levels of MIDUS2 extraversion for MIDUS2 perceived control. The solid line is for the estimated effects. The dashed line indicates the straight line that is tangent to the curvilinear line of the effect at the point of the average level (i.e., zero in x-axis) of MIDUS2 extraversion; the scale of MIDUS2 perceived control is unstandardized.

5.3.3. Results with the Longer Conscientiousness Scale for American Adults

The five-item conscientiousness scale with higher internal consistency (rather than the four-item scale used in Study 1 and Study 2) was used for American as well as Japanese adults in Study 3. The findings of Study 3 on the associations of conscientiousness with perceived control and health were overall consistent with those of Study 1 and Study 2. Conscientiousness significantly predicted higher perceived control concurrently and longitudinally and fewer chronic health conditions longitudinally for American adults while it also predicted functional limitations longitudinally in Study 3. However, as the (marginal) gender difference in the association between conscientiousness and perceived control found in Study 1 was not observed

in Study 3, this association should be reassessed using the conscientiousness scale with higher reliability when additional waves of MIDUS data are available.

5.4. Discussion

5.4.1. Main Findings

The present study examined associations among personality traits, perceived control, and health by addressing their age and gender differences for Japanese middle-aged and older adults. Moreover, cultural differences were examined by contrasting Japanese and American adults. This study specifically examined whether perceived control mediated the longitudinal personality-health associations for the two nationalities with the goal of contributing to improving the understanding of the role of perceived control for the health of aging women and men in distinct cultures. The use of large-scale, comparable data from American and Japanese middle-aged and older adults was a strength of the present study, which made it possible to conduct longitudinal cross-cultural analyses that examined associations for American and Japanese adults together. While the findings of the present study did not fully support the hypotheses, the resulting implications could inform cross-cultural research on relationships among personality, perceived control, and health.

5.4.1.1. The Minimal Role of Perceived Control for Japanese Adults

Contrary to expectations, perceived control did not mediate the longitudinal effects of any personality traits on the health outcomes for Japanese adults. While the hypothesis was that perceived control would help explain the personality-health link among Japanese aging adults, the current findings did not support this hypothesis. Instead, these findings indicated that among the Japanese sample, perceived control was neither linked to physical or functional health over time, and thus did not play a mediating role in the personality-health link. This means that

Japanese adults with certain personality characteristics may be inclined to have higher or lower perceived control, yet enhanced or reduced perceived control may not necessarily in turn influence their health. As Japanese and other Asian people tend to place less emphasis on personal control over life outcomes than situational influences (Cheng et al., 2013), perceived control may not have a clear effect on their health. While neuroticism predicted poorer physical health (i.e., greater chronic health conditions) for Japanese adults, this personality-health link is apparently explained by other factors than perceived control. Instead, behavioral factors associated with neuroticism, such as coping strategies (Carver & Connor-Smith, 2010; Narumoto et al., 2008), may have an important role for health for Japanese adults while such behavioral strategies may also be influential for health among American adults (Shoji, Harrigan, Woll, & Miller, 2010; Tsenkova, Dienberg Love, Singer, & Ryff, 2008).

Though no specific hypotheses were made for age differences in associations of personality traits with perceived control and health and perceived control with health, no age differences were found for Japanese middle-aged and older adults (aged 40 to 79 at MIDJA1). This suggests that, regardless of age, perceived control was not associated with health outcomes directly or did not mediate the associations between personality traits and health outcomes. While Japanese older adults may become more aware of limitations in influencing their circumstances similar to older individuals in the United States and other countries (Cheng et al., 2013), the impact of their decreased sense of control on health seems to remain similarly minimal to that of younger individuals in Japan.

Although perceived control was expected to be associated with health more strongly for Japanese men, who may put a greater emphasis on individualistic values such as autonomy and agency than Japanese women (Cheng et al., 2013; Hofstede, 2011), no gender differences were

found for those effects. Gender differences in such values seem not to affect the importance of perceived control for health as the overall health benefits of perceived control remain minimal or negligible for both Japanese women and men.

5.4.1.2. Japanese versus American Adults

Though no age or gender differences emerged for the Japanese as well as American samples in this study, the findings of the present study partially supported the hypothesis that there would be cultural differences in the associations between perceived control, personality traits, and health outcomes (i.e., weaker associations for Japanese adults than Americans).

Associations between personality traits and perceived control. Though both concurrent and longitudinal associations of personality traits and perceived control were examined in this study, cultural differences were found only for the concurrent associations. Concurrent associations between personality traits (except agreeableness) and perceived control were found to be weaker for Japanese adults. While the results for the concurrent associations should be interpreted with caution due to the inability to infer causality, these cultural differences in the association at least imply some variations in the underlying mechanisms of the relationships between personality traits and perceived control between Japanese and American adults. Non-Western individuals (such as Japanese adults) typically have less individualistic values and because of this tend to put a greater emphasis on the influence of situations or external forces instead of individual characteristics (e.g., personality traits) explaining their outcomes (Heine & Buchtel, 2009). Thus, personality may have less influence on their behaviors associated with perceived control (e.g., coping strategies; Kaiseler et al., 2012; Lachman et al., 2011; Swickert, Hittner, & Foster, 2010) as compared to Western populations.

In contrast, no cultural differences were found for the longitudinal effects of personality traits on perceived control over time between Japanese and American adults. The role of culture in the implications of personality for perceived control may become less pronounced longitudinally due to overall decline in perceived control over the span of years resulting in an inability to observe such cultural differences longitudinally. In particular, high neuroticism could be similarly detrimental for perceived control over time regardless of nationality as it longitudinally predicted lower perceived control for both Japanese and American adults. The negative impact of neuroticism on perceived control (e.g., emotional instability preventing people from coping with stressful experiences successfully and maintaining perceived control) seems to be similar between cultures. Future research should further investigate and contrast concurrent and longitudinal associations between personality traits and perceived control for Japanese and American aging adults and identify their underlying mechanisms (e.g., involvement of coping strategies) for short- and long-term effects of personality traits on perceived control.

Associations between perceived control and health outcomes. The longitudinal associations between perceived control and health outcomes did not differ between the two nationalities. Although perceived control significantly predicted lower functional limitations over time for Americans but not for Japanese adults, the multigroup analyses indicated that the magnitude itself of the effect of perceived control on functional limitations did not differ between the two nationalities. Thus, these apparently different results seem to be due to difference in the likelihood of obtaining significant results with varying sample sizes (i.e., larger sample size of Americans than Japanese adults). This finding does not support previous research that suggests smaller implications of perceived control for health outcomes among Asian and non-Western individuals than Western individuals (who emphasize individualistic values)

(Cheng et al., 2013), however, this area of research has been limited. One possibility may be that the effects of perceived control for health outcomes were not large enough for notable cultural differences to be observed. An alternative explanation may be that though perceptions of control over life circumstances may differ between the two nationalities, the role of perceived control for physical and functional health may be similar for both American and Japanese adults though that role may remain small. Related to Taoist philosophies, Asians tend to be encouraged to accept external control, and that acceptance may actually enhance their perceived control while following the environmental force and making the most of their circumstances (Cheng et al., 2013). In contrast, Americans and others in individualistic countries may put a greater emphasis on controlling their circumstances on their own (Cheng et al., 2013), which may promote behaviors that help enhance their health. Perceived control obtained in these different ways between Japanese and American adults may be similarly influential for health-related behaviors and outcomes while leading them to do what they can do to improve their circumstances. This possible cultural difference in the nature of perceived control may be explained by the distinction between primary and secondary control (Schulz & Heckhausen, 1999), which was not the focus of these current studies. In order to control or deal with their circumstances, American adults may tend to use primary control (attempting to change their external world) while Japanese adults may prefer secondary control (aiming to change their internal world while accepting the external force). The present study focused on examining the implications of perceived control, or an overall sense of control over life circumstances, for the two nationalities. However, addressing different aspects of control including primary control and secondary control in addition to perceived control by using relevant measures may be advantageous in examining

such nuanced cultural differences related to perceived control, which future research should address.

Perceived control as a mediator of personality-health links. Significant mediation of perceived control for associations between personality traits (except agreeableness) and functional limitations were found only for American adults, but not for Japanese adults. However, as the multigroup analyses indicated that the magnitude of the mediation did not differ between the two nationalities, it is plausible that their different sample sizes led to the varying results in terms of significance levels. Although there were differences between the two nationalities for concurrent associations between personality traits and perceived control as discussed earlier, the small or negligible effect of perceived control on functional limitations may have made the differences between nationalities obscure.

Before making conclusions for differences in the mediation of perceived control for personality-health links for Japanese and American adults, the nuanced associations among personality, perceived control, and health outcomes (particularly, functional health) and their underlying mechanisms should be further examined. As research on cultural differences in such associations is limited, much more cross-cultural studies are needed to investigate these associations comprehensively. The future studies will help researchers identify whether perceived control is a universally protective factor for health and how we can promote perceived control, which may require targeting specific demographic and cultural groups of aging adults with different personality characteristics.

5.4.2. Limitations

There were several limitations specific to Study 3. First, as mentioned earlier, the time elapsed between two waves varied in the analyzed data for Japanese adults (four years) and

Americans (approximately nine years). It is possible that the effects for perceived control and personality on health continued to change during the additional five years that were not captured for Japanese adults, for example, different results may have been found if the longitudinal effects for the Japanese were assessed over the longer, nine-year period used for the American sample. For instance, if personality traits and perceived control continued affecting their outcomes over the additional years, it might have resulted in their effects becoming large enough that the mediation of perceived control for personality-health links were observed also for Japanese adults. Longitudinal research should be continued particularly for Japanese aging adults so that analyses for the effects over the same period for both nationalities can be conducted. In addition, due to having only two waves of data for Japanese adults, a complete longitudinal mediation model (such as the one in Study 2 for American adults) could not be constructed, so instead a part of the mediational relationship examined needed to be cross-sectional. It is hoped that MIDJA will conduct an additional wave of survey so that such complete longitudinal mediation analyses will be feasible in the future.

In addition, the present study addressed potential differences between two nationalities, yet it is likely that varying cultures within each nation may put differential emphasis on individualistic values and then affect perceived control and personality and their role for health differently. This study focused on examining differences by nationality by analyzing all American respondents as members of one nationality group to compare them with another nationality group of Japanese adults. This lack of investigations on cultural differences within each nation is a limitation especially when studying adults living in countries with culturally diverse populations such as the United States. In order to examine such cultural differences within the nation, future research may need to use other datasets for American adults as a great

majority of MIDUS respondents were White as discussed in Study 1 so the data may not be culturally representative. While Japan is more racially homogeneous, addressing specific cultural groups (e.g., immigrants, foreign workers) may be one direction of future research to address cultural implications for perceived control, personality, and health within Japan (as well as within the United States). The importance of addressing both cultural differences between and within nations is readdressed in the subsequent Final Conclusions chapter.

Another limitation concerns the neuroticism scale. For Study 3, the original neuroticism scale of MIDJA (and MIDUS) was not used due to low internal consistency (only for Japanese adults). Instead, a modified, two-item version with improved reliability was adopted, yet it was unclear whether this scale could cover the very construct of neuroticism or even whether neuroticism means similarly across cultures. Interestingly, in the preliminary analysis, the alpha considerably improved when removing the item of 'calmness' (reverse-coded) from the scale for MIDJA data. Calmness is a trait highly valued in Asian cultures (Cheng et al., 2013), and being calm may not be simply a characteristic of low neuroticism (i.e., emotional stability). The difference in internal consistency of the scale, or possibly structural difference of neuroticism, for the two nationalities warrants further investigation on the construct of neuroticism across cultures.

Furthermore, the use of self-rated scales for personality traits and perceived control may not be appropriate for cross-cultural comparisons as people in different cultures may respond to the scales in disparate ways. In the present study, Americans reported higher perceived control as suggested in previous research (Cheng et al., 2013; Lachman et al., 2011) and higher levels of all personality traits compared to Japanese adults as seen in Table 13. While such differences in mean levels of the five personality traits across cultures were also found in the literature (Heine

& Buchtel, 2009; McCrae & Costa, 1997; Schmitt et al., 2007), these results should be interpreted with caution. For example, Schmitt et al. (2007) reported that individuals in Japan and South Korea scored the lowest in conscientiousness among those in 56 nations, which seemed counterintuitive as people in these East Asian countries tend to be considered industrious. Actually, direct comparisons of the mean levels may involve confounds related to cultural differences such as using different reference groups (as the respondent would tend to compare themselves with similar others in the same culture, rather than "average" people across cultures, when responding to a personality scale) and varying response styles (Schmitt et al., 2007) across those in different countries. In addition to Japanese people's comparison of themselves with similarly industrious peers, they also emphasize the value of modesty, which could lead to tendencies toward underrating their self-evaluated characteristics and health outcomes (Karasawa et al., 2011). Thus, it may not be appropriate to directly compare the mean levels of self-rated measures between those in two cultures/countries. In addition, the multigroup analyses of the present study compared unstandardized coefficients (i.e., change in the raw score of the outcome measure by one-unit increase of the predictor measure) for each path. This means that even if the coefficients were invariant for two groups, the degree of one-unit change of the predictor and its effect for the outcome *relative to* the mean scores of the measures could differ between the two nationalities due to the differences in their mean levels of the measures. The simple comparisons of coefficients may not necessarily have revealed actual differences (or non-differences) in the relative degree of impacts of personality traits and perceived control on their outcomes for the two nationalities. Thus, it should be acknowledged that the results with self-reported measures could be limited in interpreting cross-cultural differences. Particularly for psychological constructs such as personality and perceived control, it seems difficult to find

alternatives to self-reported measures. One such alternative may be informant-reported measures (i.e., those assessed by others close to the target person or physicians), but this type of measure also has limitations (e.g., even the target's spouse or significant other has limited knowledge of his or her prior experiences before they met and could not access his or her private thoughts and feelings) (Olino & Klein, 2015). In addition, as the informant may respond to such a measure while comparing the target with others within the same culture, it may not be possible to completely overcome the limitation of cross-cultural comparisons by using informant-reported measures. Future research should develop and evaluate more cross-culturally valid measures that can be used to compare personality traits and perceived control between people in different cultures.

5.4.3. Conclusions

Despite these limitations, the cross-national focus of the present study was unique as cross-cultural research addressing longitudinal associations among personality, perceived control, and health has been limited. The present study can inform research by contributing to improving the understanding of such associations for American and Japanese adults, which helps identify potential ways to promote perceived control for aging adults in distinct cultures. Specifically, as individual characteristics (i.e., personality traits) seem less influential for the perceived control of Japanese adults compared to Americans, more environmental or situational factors may need to be considered in examining approaches to enhancing their perceived control. Due to the lack of research on longitudinal associations among personality, perceived control, and health across cultures, further research should be conducted to investigate these associations and identify their underlying mechanisms for aging adults in distinct cultures.

6. FINAL CONCLUSIONS

The three studies of the present dissertation addressed longitudinal associations among personality, perceived control, and health for American and Japanese middle-aged and older adults as well as age, gender, and cultural differences in these associations. Whereas (parts of) these associations have been examined in previous research (Bates et al., 2010; Lachman et al., 2011), these three studies make new contributions to the literature and have multiple strengths. First, while previous research tends to have examined the effects of perceived control on health (e.g., Gerstorf et al., 2011; Infurna & Gerstorf, 2014; Kempen et al., 2005) and personality traits on health (e.g., Terracciano et al., 2008; Turiano et al., 2012; Weston et al., 2015) separately, the present dissertation (Study 2 and Study 3) addressed how perceived control might mediate longitudinal associations between personality traits and physical and functional health for aging adults. Second, prior research addressing age and gender differences in such longitudinal associations had been limited, but this dissertation specifically addressed age and gender while focusing on associations between personality traits and perceived control in Study 1 and among personality, perceived control, and health in Study 2 for American aging adults. Third, this area of cross-cultural research has been lacking, and this dissertation (Study 3) attempted to begin to fill in the gap in the literature by addressing such associations for Japanese adults in contrast to those of Americans. Fourth, the complex longitudinal and cross-national datasets used is a unique strength of this study. Particularly for American adults, the use of the large-scale, national sample from the MIDUS study whose data were collected at three waves over nearly two decades allowed for thorough and complete longitudinal analyses. Specifically, the multiple waves of data enabled the studies of this dissertation to examine effects of personality traits on levels and trajectories of perceived control while assessing the curvilinearity of trajectories of

perceived control, and construct and analyze complete longitudinal mediation models among personality, perceived control, and health. In addition, the data of MIDJA for Japanese adults, comparable to MIDUS, made it possible to conduct multigroup analyses between American and Japanese adults using the same measures of interest; and to the best of the author's knowledge, this is the first study that directly compared associations among personality, perceived control, and health all together between the two nationalities. With these unique research focuses and analyses, the present dissertation contributes to improving the understanding of the nuanced longitudinal relationships among personality, perceived control, and health for aging women and men in culturally distinct countries.

6.1. Future Directions

Despite the multiple strengths and unique contributions of the present dissertation, longitudinal associations among personality, perceived control, and health need to be further investigated and better understood especially for identifying optimal approaches to enhancing perceived control and health among middle-aged and older adults. While there are various potential avenues of study that can contribute to this area of research, some avenues for future studies (in addition to those discussed in previous chapters) are proposed here. These future directions include ones that build upon the contributions of the present dissertation and aim to expand its findings as well as ones that seek to address its limitations.

6.1.1. Addressing Various Dimensions of Personality

The present dissertation identified two of the Big Five personality traits, conscientiousness and neuroticism, as consistent predictors for perceived control that are also indirectly associated with functional health through perceived control over time. However, it is possible that there are other important personality characteristics beyond the framework of the

Big Five traits that are associated with perceived control and health. As discussed in Chapter 2, the Big Five traits may not necessarily represent the complete and complex structure of human personality (Block, 1995; Boyle, 2008). While it needs to be further examined which personality characteristics should be specifically addressed, such characteristics as optimism (Ferguson & Goodwin, 2010) and hardiness (Ong, Bergeman, & Boker, 2009) have been found to be associated with well-being outcomes for aging adults. Future research should address longitudinal associations of these and other personality characteristics in addition to the Big Five traits with perceived control and health in order to understand the implications of personality more comprehensively.

6.1.2. Further Investigations of Age Differences

One quite interesting finding of the present dissertation is that perceived control changed over time in a curvilinear manner, and varied between adults of different ages. Specifically, perceived control appeared to remain higher and more stable in middle adulthood; it started declining in later life and the rate of its decline was increasing over time. This finding corresponds to previous findings (Lachman et al., 2011) suggesting that middle-aged adults tend to maintain higher perceived control likely due to having more opportunities to control life situations compared to older adults. The decline of perceived control for older adults was considerable: those aged 65 experienced decline in perceived control by more than one-third of its standard deviation over two decades (see Figure 1). This highlights the importance of promoting perceived control for older adults, particularly the old-old who may experience even further increasing decline in perceived control with age. On the other hand, the present dissertation did not find any age differences in the longitudinal associations among personality, perceived control, and health. As discussed in Study 2, these findings seem to contradict

previous findings suggesting stronger effects of perceived control on health for older adults than younger counterparts (Infurna, Gerstorf, & Zarit, 2011; Kempen et al., 2005), thus further investigations are warranted to untangle these contradictory results. Common limitations of the three studies of the present dissertation were that while these studies focused on studying middle-aged and older adults, MIDUS and MIDJA datasets did not include old-old or oldest-old people (aged 80 or older at baseline) and that age differences were not assessed among specific age cohorts as the interactions of age included in these studies could address differences by age only in a linear manner. One possible direction of this line of research is contrasting the health implications of perceived control and personality traits among late-life populations (i.e., the old-old or oldest-old) with those for midlife populations (i.e., middle-aged and young-old adults) or compare healthy aging adults and frail individuals including those who are experiencing terminal decline (i.e., rapid decline in functioning and well-being close to the end of life; Gerstorf et al., 2014). Research on the health benefits of perceived control and related constructs targeting such very old populations or those who are facing death is still limited. Among those few studies, Gerstorf et al. (2014) indicated that perceived control predicted higher life satisfaction, less steeper decline in life satisfaction, and a later onset of terminal decline for those whose average age of death was 74. These findings suggested that perceived control might alleviate end-of-death decline in life satisfaction and help slow the onset of terminal decline. While this study as well as the aforementioned previous studies (Infurna, Gerstorf, & Zarit, 2011; Kempen et al., 2005) and the present dissertation suggested that perceived control may be important for health and well-being through late adulthood (likely until death), it is possible that the importance of perceived control may change in a non-linear fashion. Examining specific age groups (e.g., old-old and oldest-old populations) in contrast to other age groups will help identify such non-linear

change, if any, in the health benefits of perceived control as well as associations of personality traits with perceived control and health.

Moreover, the use of only one single variable of chronological age as an indicator of aging may be a limitation in assessing differences in longitudinal associations among personality, perceived control, and health. Chronological age itself is unlikely to influence perceived control and health, and aging involves unique experiences associated with perceived control (e.g., retirement, declining physical abilities and health, bereavement, widowhood; Lachman et al., 2011). As these experiences may vary even among individuals of the same age, including multiple age-related factors in addition to a variable of chronological age in analyses could be more advantageous in attempting to explain differences in these associations. Future research should examine the potential effects of specific age-related factors for personality, perceived control, and health and their longitudinal relationships.

6.1.3. Explanations of Gender Differences

The present dissertation identified some gender differences. First, aligning with previous research (Lachman et al., 2011), women reported lower perceived control than men. Although women's education had been suggested to explain their lower perceived control (Lachman et al., 2011; Slagsvold & Sørensen, 2008; Specht et al., 2013), this dissertation indicated that education alone did not fully account for the gender difference in perceived control. This finding suggests the need of further investigations into whether other factors related to gender could explain this difference. Such factors may include other socioeconomic conditions than education (e.g., income), societal factors (e.g., sexism or gender discrimination), health conditions (e.g., relatively poor health of women compared to men of the same age; Alberts, Archie, Gesquiere, Altmann, & Christensen, 2014; Crimmins, Kim, & Solé-Auró, 2010), and values and attitudes

toward life circumstances (e.g., men's tendency to have more individualistic values such as autonomy and agency than women; Cheng et al., 2013). Future research should identify such factors that can account for the gender difference in perceived control.

In addition, the present dissertation found gender differences in the associations of neuroticism and conscientiousness with perceived control. In particular, the finding suggests that women with high neuroticism and men with low conscientiousness may be at even higher risk for experiencing lower perceived control than the counterparts of their opposite gender with similar personality characteristics. As their lower perceived control could be associated with poorer functional health over time, it may be especially important to help women and men with such personality characteristics enhance their perceived control. Future research should address why women and men differ in these associations. Possibly, such differences may be related to gender variation in coping strategies (as discussed in Study 1) or other attitudes and behaviors associated with neuroticism and conscientiousness. Moreover, while the present dissertation did not find any gender differences in associations between perceived control and health outcomes nor mediation of perceived control for personality-health links, the findings should be replicated in future research to confirm that such gender differences do not exist. Since research on these gender differences or similarities has been lacking, more investigations need to be conducted in order to make firmer conclusions.

6.1.4. Cross-Cultural Research

Due to the lack of cross-cultural research on longitudinal associations among personality, perceived control, and health, further replication of Study 3 should be conducted. In addition to direct replication, cross-cultural research should be extended by studying aging adults from more countries and cultures.

One possible explanation as to why fewer cultural differences than expected were found for American and Japanese adults in the present dissertation is that specific cultural values closely related to perceived control and individual personality characteristics may not be so distinct between the two nationalities. Although previous research (Cheng et al., 2013) addressed cultural differences in perceived control by adopting the individualism-collectivism framework, individualism and collectivism are not necessarily two opposite sides of a continuum, but rather independent constructs (Oyserman et al., 2002) as discussed in Study 3. While Japanese people were found to be less individualistic than Americans, Oyserman et al. (2002) suggested that they might be no more collectivistic than Americans. Although previous research on perceived control tends to have focused on implications of individualistic values such as autonomy and agency (Cheng et al., 2013), it may be possible that collectivism (i.e., prioritizing common fate, goals, and values of groups with diffuse and mutual obligations of individuals bound by their group; Oyserman et al., 2002) is a cultural orientation more influential for perceived control and its impact on health than individualism. Future research should study aging adults from multiple countries with differing levels of individualism and collectivism so that it can be identified specifically which cultural orientation may be more closely related to perceived control as well as the implications of personality traits for perceived control. Moreover, other culturally varying values and characteristics could be examined beyond individualism/collectivism in future research. For instance, Hofstede (1980, 2001) proposed other dimensions of cultural values than individualism and collectivism, such as power distance (i.e., degree of acceptance and expectance for unequally distributed power) and uncertainty avoidance (i.e., tolerance or intolerance for ambiguous or unstructured situations or circumstances), and these cultural characteristics may be related to constructs of control.

Whereas the present dissertation focused on cross-national comparison, differences within each country should be addressed especially for countries like the United States, which have diverse populations who have culturally distinct values. If individualism, collectivism, or other cultural values could influence associations among personality, perceived control, and health, differences in these associations would be observed among people with different cultural values within the same country. When examining such cultural differences, it is important to take into consideration their socioeconomic status which may play a role in determining these differences (Lachman et al., 2011) rather than their cultural values and associated behaviors. Future research should use nationally representative samples that include culturally diverse people or study specific cultural groups in order to assess cultural differences in longitudinal associations among personality, perceived control, and health.

6.1.5. Mechanisms of Associations among Personality, Perceived Control, and Health

One of the most important areas of research that emerges as a result of the findings of the present dissertation is the impetus on investigating the mechanisms behind these longitudinal associations. Specifically, these findings beg the questions of why personality traits, particularly neuroticism and conscientiousness, are associated with perceived control, why perceived control is associated with functional health or other aspects of health, and how the mediation of perceived control for personality-health associations actually works distinctly for aging women and men in different cultures. Some potential factors such as coping strategies and social support were discussed in Study 1 as ones possibly explaining the associations between personality traits and perceived control, and these factors may also account for the association between perceived control and health. For example, those with high perceived control may be more likely to seek social support and adopt constructive strategies when coping with stressful experiences and

attempting to maintain health-related behaviors (Lachman et al., 2011). Thus, social support and coping strategies may function as mediators for both of the associations between personality traits and perceived control and between perceived control and health. Moreover, the associations between perceived control and health outcomes are likely to involve behavioral factors (i.e., health-related behaviors such as exercising, healthy or unhealthy diet, smoking, drinking; Lachman et al., 2011) in addition to psychological factors such as self-efficacy (Bandura, 1997; Feltz & Payment, 2005; Hellström et al., 2003; Lachman et al., 2011) discussed in Study 2. Thus, the mediational relationship of personality, perceived control, and health potentially involves these (and probably, other) additional mediators. Identifying these potential mediators is important as it can further the understanding of the underlying mechanisms that can help determine ways to promote perceived control and health. Furthermore, these mechanisms may vary by age, gender and culture, so these sociodemographic contexts should be explored.

Future investigations of the mechanisms underlying these questions would help identify potential avenues for promoting health by enhancing perceived control and related protective factors.

6.1.6. Interventions to Promote Health

In addition to furthering the understanding of potential mechanisms explaining the associations among personality, perceived control, and health, future research should develop and evaluate effective interventions to promote health. The findings of the present dissertation particularly for American aging adults are informative in exploring such interventions. Specifically, while the body of research suggests that lower conscientiousness and higher neuroticism are associated with poorer health (Terracciano et al., 2008; Turiano, Pitzer, et al., 2012; Weston et al., 2015), this dissertation suggests that perceived control may mediate or

explain such associations. For example, those with low conscientiousness and high neuroticism may experience declined health because they tend to experience decreased perceived control, which was associated with poor functional health later on. Considering these findings, two main avenues should be explored: (1) altering personality traits, which is expected to affect functional health indirectly through promoting perceived control; (2) enhancing perceived control, which is expected to directly promote functional health.

To approach altering personality characteristics in order to promote perceived control, interventions that include increasing conscientiousness and reducing neuroticisms could be explored. Further investigations on the modifiability of these personality traits are needed as discussed in previous chapters in order to identify effective interventions, if any, to promote conscientiousness, emotional stability (i.e., low neuroticism), and other personality characteristics associated with perceived control (which could lead to enhancing later functional health) for aging adults. Some potential interventions may include helping to acquire habits characterized by conscientiousness (e.g., planning, organization) and nurture emotional regulation, using strategies such as mindfulness and other relaxation techniques (Koole, 2009), to help maintain emotional stability.

For the second approach to promoting functional health by enhancing perceived control, the potential impact of personality traits on perceived control should still be taken into consideration. It may be especially important to enhance those with low conscientiousness and high neuroticism since they are at higher risk for experiencing decreased perceived control, which may lead to poorer functional health later on. Enhancing their perceived control is expected to in turn help them maintain their functional health. In addition, the gender difference in the associations of neuroticism and conscientiousness with perceived control should also be

considered. As neuroticism and conscientiousness may be more influential for the perceived control of women and men, respectively, additional efforts should be made to help women with low neuroticism and men with low conscientiousness enhance their perceived control, which would help promote their functional health.

Due to the positive association of perceived control with functional health regardless of age and gender, enhancing perceived control seems to be beneficial for promoting functional health among any middle-aged and older adults. Helping them develop their social networks and learn effective coping strategies may be potential approaches as increased social support and improved self-regulation and coping skills have been found to be associated with increased perceived control (Lachman et al., 2011). In addition, the present dissertation highlights the importance of helping older adults and women maintain their perceived control. Older adults may experience greater limitations over their physical abilities and circumstances, which may lead to increasing their dependence on others. Even for those who need to depend on others on a daily basis, such as nursing home residents, giving them some responsibility and control within their environment (e.g., taking care of a plant) has been found to be associated with better well-being and longevity (Langer & Rodin, 1976; Mallers et al., 2014). Thus, providing some opportunities for older adults to have control over meaningful activities may be a possible approach to enhancing their sense of control and health. Women also tend to report lower perceived control, and enhancing their perceived control may require societal-level interventions to overcome gender disparities in education, income, and other social circumstances as discussed in Study 2. The future research discussed earlier on potential factors that can account for the gender differences in perceived control will help identify what specific interventions would be needed to particularly promote women's perceived control.

Thus, future research should develop and evaluate effective interventions to promote functional health as well as other aspects of health by improving personality traits and perceived control.

6.2. Conclusions

While addressing longitudinal associations among personality, perceived control, and health for American and Japanese middle-aged and older women and men, the present dissertation has partially supported the hypothesis that perceived control mediates associations between personality and health indicating the mediation of perceived control for longitudinal associations of neuroticism and conscientiousness with functional health for American adults. However, no age differences in associations among personality, perceived control, and health were found contrary to the hypotheses while there were some limited gender and cultural differences identified. This dissertation contributes to the literature by suggesting potential avenues to promoting health through perceived control. The future research proposed by the present dissertation is anticipated to further the understanding of longitudinal associations of personality, perceived control, and health, help identify their underlying mechanisms, and lead to the development of effective interventions to promote perceived control and health for aging adults in distinct cultures taking their personality characteristics into consideration.

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APPENDIX A. SCALES FOR BIG FIVE PERSONALITY TRAITS (ROSSI, 2001)

The scales using multiple self-descriptive adjectives related to the five personality traits were used in MIDUS and MIDJA, with which the participants were asked how much these adjectives described themselves (Brim et al., 2017; Ryff, Almeida, Ayanian, Binkley, et al., 2017; Ryff, Almeida, Ayanian, Carr, et al., 2017; Ryff et al., 2018a, 2018b). The following adjectives were included for each personality trait:

1. Neuroticism (four items): moody, worrying, nervous, calm (negatively worded)
2. Extraversion (five items): outgoing, friendly, lively, active, talkative
3. Openness to experience (seven items): creative, imaginative, intelligent, curious, broad-minded, sophisticated, adventurous
4. Conscientiousness (five items): organized, responsible, hardworking, careless (negatively worded), thorough (Notes. The scale for conscientiousness had only four items at MIDUS1 and the additional adjective of 'thorough' was added at MIDUS2; MIDJA survey included the five items from its first wave)
5. Agreeableness (communion) (five items): helpful, warm, caring, softhearted, sympathetic

Response options: a lot (1), some (2), a little (3), not at all (4)

All items except negatively worded items were reverse-coded so that higher scores would indicate higher levels of each personality traits, and the set of the items for the personality trait were averaged as its overall score.

APPENDIX B. PERCEIVED CONTROL SCALE (LACHMAN & WEAVER, 1998)

The 12-item scale was used in MIDUS and MIDJA to assess perceived control (Brim et al., 2017; Ryff, Almeida, Ayanian, Binkley, et al., 2017; Ryff, Almeida, Ayanian, Carr, et al., 2017; Ryff et al., 2018a, 2018b). This scale consists of four personal mastery items and eight perceived constraints items.

Personal mastery items:

1. I can do just about anything I really set my mind to.
2. When I really want to do something, I usually find a way to succeed at it.
3. Whether or not I am able to get what I want is in my own hands.
4. What happens to me in the future mostly depends on me.

Perceived constraints items:

5. There is little I can do to change the important things in my life.
6. I often feel helpless in dealing with the problems of life.
7. Other people determine most of what I can and cannot do.
8. What happens in my life is often beyond my control.
9. There are many things that interfere with what I want to do.
10. I have little control over the things that happen to me.
11. There is really no way I can solve the problems I have.
12. I sometimes feel I am being pushed around in my life.

Response options: strongly agree (1), somewhat agree (2), a little agree (3), neither agree or disagree (4), a little disagree (5), somewhat disagree (6), strongly disagree (7)

The personal mastery items were reverse-coded so that higher scores would indicate higher levels of perceived control, and the 12 items were averaged as an overall score of perceived control.