2012

The relationship between personality, life events and healthy longevity: A comparison of U.S. and Japanese centenarians

Grace Dorea da Rosa

Iowa State University

Follow this and additional works at: http://lib.dr.iastate.edu/etd

Part of the Family, Life Course, and Society Commons

Recommended Citation

http://lib.dr.iastate.edu/etd/12865

This Dissertation is brought to you for free and open access by the Graduate College at Iowa State University Digital Repository. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
The relationship between personality, life events and healthy longevity: A comparison of U.S. and Japanese centenarians

by

Grace Dorea da Rosa

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Human Development and Family Studies

Program of Study Committee:
Peter Martin, Major Professor
Christine Cook
Jennifer Margrett
Susan Maude
Daniel Russell

Iowa State University
Ames, Iowa
2012
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>x</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xi</td>
</tr>
<tr>
<td>CHAPTER 1. GENERAL INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Literature Review</td>
<td>4</td>
</tr>
<tr>
<td>Conceptual Framework</td>
<td>4</td>
</tr>
<tr>
<td>The life-span perspective</td>
<td>4</td>
</tr>
<tr>
<td>Personality trait theories</td>
<td>9</td>
</tr>
<tr>
<td>Life Experiences</td>
<td>14</td>
</tr>
<tr>
<td>Personality Characteristics</td>
<td>17</td>
</tr>
<tr>
<td>Mental Health in Centenarians</td>
<td>21</td>
</tr>
<tr>
<td>Cognitive Health in Centenarians</td>
<td>24</td>
</tr>
<tr>
<td>Dissertation Organization</td>
<td>27</td>
</tr>
<tr>
<td>References</td>
<td>27</td>
</tr>
<tr>
<td>Abstract</td>
<td>39</td>
</tr>
<tr>
<td>Introduction</td>
<td>40</td>
</tr>
</tbody>
</table>
CHAPTER 3. A CULTURAL COMPARISON OF PERSONALITY PROFILES
OF U.S. AND JAPANESE CENTENARIANS

Abstract
Introduction
Method
Participants and Procedures
Georgia Centenarian Study (Phase 3)
Tokyo Centenarian Study
Measures
CHAPTER 4. PERSONALITY AND LIFE EVENTS AS PREDICTORS OF MENTAL AND COGNITIVE HEALTH OF U.S. AND JAPANESE CENTENARIANS

Abstract 114

Introduction 115

Mental Health of Centenarians 116

Cognitive Health of Centenarians 119

Method 122

Participants and Procedures 122
<table>
<thead>
<tr>
<th>Measures</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic variables</td>
<td>125</td>
</tr>
<tr>
<td>Personality</td>
<td>125</td>
</tr>
<tr>
<td>Life events</td>
<td>126</td>
</tr>
<tr>
<td>Mental health self-reports</td>
<td>128</td>
</tr>
<tr>
<td>Cognitive health</td>
<td>129</td>
</tr>
<tr>
<td>Statistical Analyses</td>
<td>130</td>
</tr>
<tr>
<td>Results</td>
<td>131</td>
</tr>
<tr>
<td>Mean Group Differences on Mental Health and Cognitive Health</td>
<td>132</td>
</tr>
<tr>
<td>Personality and Life Events as Predictors of Mental and Cognitive Health</td>
<td>134</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discussion</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Mean Group Differences in Mental Health of Centenarians</td>
<td>136</td>
</tr>
<tr>
<td>Structural Models</td>
<td>139</td>
</tr>
<tr>
<td>Limitations and Future Directions</td>
<td>142</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acknowledgements</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>References</td>
<td>146</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER 5. GENERAL CONCLUSIONS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Important Life Events for U.S. and Japanese Centenarians</td>
<td>158</td>
</tr>
<tr>
<td>Personality Profiles of U.S. and Japanese Centenarians</td>
<td>160</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Predictors of Mental and Cognitive Health in U.S. and Japanese Centenarians</td>
<td>162</td>
</tr>
<tr>
<td>Limitations and Future Directions</td>
<td>164</td>
</tr>
<tr>
<td>References</td>
<td>167</td>
</tr>
<tr>
<td>APPENDIX. IRB APPROVAL LETTER</td>
<td>169</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

CHAPTER 1:
Figure 1. Conceptual model 5

CHAPTER 3:
Figure 1. Mean personality profiles for U.S. and Japanese centenarians for two-class solution. 113

CHAPTER 4:
Figure 1. Structural model for mental and cognitive health of U.S. centenarians 156
Figure 2. Structural model for mental and cognitive health of Japanese centenarians 157
LIST OF TABLES

CHAPTER 2:

Table 1. Demographic Characteristics of Complete Sample and High Mental Status Centenarians (MMSE ≥ 17) 76
Table 2. Most Important Life Events and Experiences Perceived by U.S. and Japanese Centenarians 77
Table 3. Life Events Open-Ended Responses from U.S. and Japanese Centenarians 78
Table 4. Gender Differences by Culture on the Most Important Life Event Experienced by Centenarians 79
Table 5. Configurations of Culture, Marriage Life Event and Personality (Neuroticism and Extraversion) 80
Table 6. Configurations of Culture, Historical Life Event and Personality (Neuroticism and Extraversion) 81

CHAPTER 3:

Table 1. Demographic Characteristics of Complete Sample and High Mental Status Centenarians (MMSE ≥ 17) 108
Table 2. Cultural Differences on the Big-Five Personality Traits 109
Table 3. Comparisons of Model Fit Indices of Personality Traits for U.S. and Japanese Centenarians 110
Table 4. Demographic Differences in Two Group Class Personality Profiles in U.S. and Japanese Centenarians

CHAPTER 4:

Table 1. Demographic Characteristics of Complete Sample and High Mental Status (MMSE ≥ 17)

Table 2. Correlation Matrix for Variables in the Study
ACKNOWLEDGEMENTS

This dissertation would not have been possible without the precious support of many people. First, I am grateful to God for being my source of strength, motivation, and perseverance. I would especially like to thank my advisor, Peter Martin, for his outstanding mentoring, dedication and commitment over the past several years. He challenges and creates opportunities for academic growth and sets high standards for his students. I am also grateful to my committee members, Drs. Cook, Margrett, Maude, and Russell for the support and input to help me complete my dissertation work and build a research career. I also want to thank Drs. Poon, Martin, Gondo, and Hirose for allowing me to use the data from the Georgia Centenarian Study and the Tokyo Centenarian Study. In addition, I want to thank Yoshiko Ishioka for diligently helping me with the Japanese data. I also would never have been able to finish my dissertation without the help from my family. I would like to acknowledge my husband; his consistent support, love, and encouragement were critical components providing me the strength and persistence necessary to complete this work. I could not have completed this journey without Aguimar by my side. In addition, I would like to mention my daughter, Isabella; she has been my inspiration since she was born. Of course, no acknowledgements would be complete without giving thanks to my parents who taught me the value of education, dedication, persistence, and for their encouragement and advice. A special thanks to all my special ISU friends: Joan Baenziger, Melinda Heinz, Wen-Hua Hsieh, Aradhana Aneja, Jinmyoung Cho, etc. for the support, the fun and the times working together. Finally, I would like to dedicate this thesis to my grandmother, Gilda, for being an important part in my life and having inspired my interest in studying lives of older adults.
ABSTRACT

This dissertation comprises of three manuscripts and compares a population-based sample of 239 U.S. centenarians from the Georgia Centenarians Study to 304 Japanese centenarians from the Tokyo Centenarian Study. The first study compared the most important life events reported by U.S. and Japanese centenarians. Two open-ended life events questions were categorized and grouped into different life event domains. Several cross-tabulations were computed to investigate culture and gender differences in most important life event domains. The main results suggest that events related to marriage were the most frequent event domains mentioned by U.S. centenarians. The Japanese sample was more likely to report historical events. Men from the U.S. were more likely to report events related to work and retirement compared to U.S. women, and U.S. women reported events related to family as the most important life events when compared to U.S. men. Japanese women considered events related to marriage, death and grief as the most important life events when compared to Japanese men. In addition, Japanese men reported events related to work and retirement as the most important life events. A cross-cultural difference was found in life events. U.S. centenarians were more likely to mention positive experiences related to marriage and children, whereas Japanese centenarians reported mostly negative and traumatic experiences such as historical events, death/grief, and work/retirement events. The second study investigated demographic and cultural mean differences among five NEO personality traits. In addition, it identified and compared across culture centenarians’ personality trait profiles in U.S. and Japanese centenarians. Several one-way analyses of variance were performed and latent profile analyses were conducted to identify personality trait profiles in
centenarians from the United States and Japan. Two personality profiles were identified in both samples: the “resilient group” (higher scores on Agreeableness and Extraversion, and lower mean scores on Neuroticism, Conscientiousness, and Openness compared to the population means) and the “non-resilient group” (higher scores on Neuroticism and lower scores on Extraversion, Openness, Agreeableness and Conscientiousness compared to the population means). No cultural differences in personality profiles were found. The third study investigated the effect of personality and life events on mental and cognitive health and the mediating and moderating effects of personality and life events on mental and cognitive health. Several structural equation models were computed for each culture to test the relationship of personality, life events (i.e., marriage and historical events), and mental and cognitive health. Results from structural equation modeling indicated that centenarians with a resilient personality had better mental health in both samples. No significant mediating and moderating effects of personality were found in either sample. Japanese centenarians who reported marriage as the most important event had better mental health compared to Japanese centenarians who did not report marriage as the most important event. Japanese centenarians reporting historical events had poor mental health compared to Japanese centenarians not mentioning an historical event. In conclusion, the results indicate that Japanese centenarians mentioning historical events were more at risk for mental health problems than U.S. centenarians.
CHAPTER 1: GENERAL INTRODUCTION

The world is rapidly aging, and the United Nations (2003) expect that developed countries on average will have more than one quarter of their population aged 65 and over by 2025. The centenarian population is also increasing rapidly and will be reaching 160,000 people by 2050 (United Nations, 2007). This demographic change seen in most countries around the world is a result of declines in fertility and mortality rates at old ages. According to the United Nations (2009), by 2050 the proportion of centenarians around the world is projected to increase to 4.1 million, and currently the majority of centenarians (69 %) live in more developed countries. This dissertation has several goals. First, to examine the most important life events experienced by centenarians. Second, to identify personality profiles in U.S. and Japanese centenarians. Lastly, to investigate the effects of life events and personality profiles on centenarians’ mental and cognitive health.

The United States now has the highest number of centenarians around the world, and the U. S. Census Bureau reported that in 2011 there were 53,364 U.S. centenarians. Japan has the second largest number of centenarians. There were 40,399 Japanese centenarians in 2009 (Robine & Saito, 2009). According to a United Nations report (United Nations, 2009), 23% of the Japanese population is 65 years and older, and Japan is projected to have the world’s largest number and proportion of centenarians in the world by 2050. Japan currently also has the highest life expectancy in the world. In addition, Japan also has the highest healthy (disability-free) life expectancy with 77.7 years for women and 72.3 years for men (WHO, 2010).
The literature suggests that Japanese older adults seem to enjoy more years of life and more years in good health compared to other persons in countries including the United States. What we do not know is whether there are cultural differences on the most important life events experienced by centenarians from each country. Second, we also do not know whether Japanese personality profiles differ from U.S. centenarians. In addition, it is important to investigate whether there are significant differences in mental and cognitive health between Japanese and U.S. centenarians. It is unknown whether Japanese and U.S. centenarians’ personality profiles protect or put them at risk of vulnerabilities in mental and cognitive health and if there are cultural differences between these groups.

A long life is desirable for most individuals, but living a long life without quality of life may not be desirable. Are longer lives accompanied by worse health at very old age? When studying health among older adults, it is important to observe individual differences and variability in health across the life span. Some individuals become severely disabled and impaired early in life, whereas others live until 100 or older and seem to age successfully and have great quality of life in very good mental, physical, and cognitive health. Variability increases with age and great variability is found among centenarians (Poon, Martin, & Margrett, 2010). Why are there individual differences and disparities among centenarians? What are the risk and protective factors and resources that explain such variability in these outcomes across individuals? Because there is great variability among centenarians, we may wonder whether the influence of personality characteristics and life events can explain the differences in mental and cognitive health status of centenarians.
Very few cross-cultural studies on centenarians have been conducted and none of them have focused on classifying centenarians by personality profiles across cultures. The first cross-cultural study on centenarians (Martin, Hagberg, & Poon, 1997) investigated predictors of loneliness in U.S. and Swedish centenarians. This study concluded that personality (Neuroticism) and lower cognitive functioning in U.S. centenarians predicted loneliness, whereas lower cognition and higher social support predicted loneliness in Swedish centenarians (Martin et al., 1997). Another cross-cultural study (Hagberg, Alfredson, Poon, & Homma, 2001) compared cognitive functioning in Japanese, Swedish, and U.S. centenarians. One important finding was that the estimated prevalence of dementia for the Swedish and Japanese study was found to be between 40% and 63%. In addition, the prevalence of dementia was found to be higher among women in the Japanese and Swedish study. The authors suggested that Japanese centenarians had a much higher prevalence rate of dementia compared to Sweden and to other countries and this could be attributed to selectivity because the Japanese study had a participation rate of 43%. In the U.S. study, participants with dementia were excluded from the study. All the three studies had centenarians with low cognitive performance compared with younger control groups.

This dissertation contains three papers that will be submitted for publication: The first paper identifies life experiences that are reported to be the most important events for U.S. and Japanese centenarians and investigates the similarities and differences in life event domains obtained for each centenarian sample. The second paper identifies personality typology profiles for U.S. and Japanese centenarians and also investigates the similarities and differences in typologies obtained in each centenarian sample. The third paper examines the
influences of life events and personality profiles on mental and cognitive health of centenarians.

LITERATURE REVIEW

In this section, I will first present my overall conceptual model with the association between predictors and outcomes (Figure 1). Part “A” in the model refers to paper 1 (Chapter 2) which focuses on the identification and comparison of most important life events. Part “B” in this model refers to paper 2 (Chapter 3) and examines personality profiles of U.S. and Japanese centenarians. Part “C” in this model refers to paper 3 (Chapter 4) of this dissertation and examines whether the identified life events and personality profiles are risk or protective factors for mental and cognitive health in very late life. Chapter 4 also examines the mediating and moderating effects of personality profiles and life events on mental and cognitive health. Chapter 5 summarizes and discusses the research findings from Chapters 2, 3, and 4.

Conceptual Framework

The conceptual model on Figure 1 is based on two theoretical perspectives: the life-span developmental approach and trait theories of personality (the Five-Factor theory). In the following section, I will review and discuss the literature related to these theories.

The life-span perspective. In order to understand the importance of life events and their effects on well-being among older adults it is important to consider the life-span approach. The life-span approach made a significant contribution to the understanding and study of human development. Baltes, Reese, and Lipsitt (1980) suggested that the life-span approach is not a theory, but a general orientation to development. Development is a lifelong
Figure 1. Conceptual model
process, continuously modified across the life span, and no age period dominates development (Baltes, 1987). Baltes defined the life-span approach as “the study of constancy and change in behavior throughout the life course (ontogenesis), from conception to death” (Baltes, 1987, p. 611). Development is seen as multidimensional (i.e., biological, cognitive, socioemotional, and spiritual dimensions) and multidirectional (some dimensions improve and others decline) that is affected by different contexts and influences (such as family structure, culture, socioeconomic status, and ethnicity/race). Baltes and Baltes (1990) pointed out that all development involves the combination of gains (growth) and losses (decline). Baltes and colleagues (1998) suggested that successful development is described as maximization of gains and minimization of losses. The balance between these two components is not consistent across the life span (Baltes, 1987). The losses may become more dominant to gains as individuals age because of decreases in biological and/or mental resources that are commonly experienced in later life (Baltes & Baltes, 1990).

Individuals develop within several contexts, circumstances or conditions. Development is culturally and historically embedded and it occurs as the result of the interaction between individual and environment (Baltes, 1987). Consequently, individuals influence and are influenced by their historical and cultural context. Culture has several definitions and can be defined as “a shared meaning system, found among those who speak a particular language dialect, during a specific historical period, and in a definable geographical region” (Triandis, 2000; p.146).

Baltes and colleagues (1999) also suggested that life-span research and theory investigates: 1) interindividual commonalities in development; 2) interindividual differences
in development referring to differences between individuals at a given point in time; 3) intraindividual (within-person) changes, plasticity (malleability) in development, which concerns individuals’ potential and the changes within individuals over time. This study will examine the influences of individual differences in life experiences and personality in explaining the variability in mental and cognitive health in centenarians.

Baltes (1980; 1987) suggested that there are three influences that impact individuals’ life-span development. These influences interfere with development, are responsible for how individuals develop, their effect is cumulative over time, and they explain individual variation. These influences are: normative age-graded, normative history-graded and nonnormative life events. The relationship between these influences is reciprocal and they are in constant change. According to Baltes and colleagues (1998), these three influences “create the contexts within which individuals act, react, organize their own development, and contribute to the development of others…” (Baltes et al., 1998, p. 1050). Individual differences observed in later life are the result of the influences of these dynamic events that interact and shape individual developmental outcome. Normative age-graded (biological and environmental determinants that are associated with chronological age and tend to be experienced by most individuals) include getting married during young adulthood, retirement, and widowhood at late life. Normative history-graded influences are events that are experienced by most members of a cohort and culture, and they can be either positive or negative. These influences are historical or cohort-specific events such as wars (World War II), epidemics, natural disasters, and periods of economic depression (Great Depression in the U.S.) or prosperity. Nonnormative influences are events that most people do not experience
and these events are not age-related events. Examples of non-normative events include the
death of a parent during childhood, losing a house, experiencing the death of a child, or a job
promotion.

Past research suggests that historical events might affect individuals differently
depending on their age. For example, Baltes and colleagues (Baltes, 1979; Baltes et al., 1980)
suggested that there is variation of the impact and the influences of age-graded, history-
graded, and non-normative events across the life-span. Normative age-graded influences
have a higher impact during childhood with a second, but smaller influence during late life
(Baltes et al., 1980). In addition, history-graded influences are seen to more influential during
the adolescence/early adulthood period which is a period of transition to adulthood (Baltes et
al., 1980). Non-normative life events seem to have a stronger impact on older adults and tend
to increase over time. Therefore, older adults seem to be more vulnerable to the effects and
influences of non-normative life events.

Stewart and Healy (1989) also examined how historical events affect individuals
differently depending on their stages in development. The authors suggested that historical
events occurring during childhood influence a person’s assumptions about life and the world.
Social historical events occurring during late adolescence influence an individual’s identity.
In contrast, historical events occurring during an individual’s adult years have less impact on
the person’s identity, but it should influence the opportunities that are available to this age
group (Stewart & Healy, 1989). Martin and Smyer (1990) investigated how three cohorts
(born between 1898-1905; 1906-1913; and 1914-1923) of older adults and one younger-adult
cohort (1957-1964) perceived the experience of micro- and macroevents to affect their
overall development. No significant differences were found among the four cohorts with regard to the number of personal life events, and some of the most commonly found personal events were marriage and first job. In addition, no significant differences in the perceived important historical events were found among the four cohorts. Among the highest ranked historical events were events related to World War II. Finally, significant results were found within-cohorts suggesting that more life events were remembered during the young-adult years and those experiences were also perceived as the most important (Martin & Smyer, 1990). This study will take a life-span approach to understand the influences of personal and historical events on developmental outcomes of centenarians from the United States and Japan. In the next section, I will discuss the five-factor theory.

**Personality trait theories.** In order to understand and explain variability in mental and cognitive health in centenarians, it is significant to study the importance and influences of individual personality characteristics on these outcomes. The five-factor theory (FFT; McCrae & Costa, 1996) of personality was used as an example of trait theories and as an approach to examine personality characteristics within individuals. A trait can be described as “a disposition to behave expressing itself in consistent patterns of functions across a range of situations” (Pervin, 1994; p. 108). McCrae and Costa (1990) defined traits as “dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings and actions” (p. 25). The five-factor model of personality (Digman, 1990) defined the five dimensions of personality as Neuroticism, Extraversion, Openness to Experience or intellect, Agreeableness or pleasantness, and Conscientiousness. Digman (1990) described Neuroticism as nervousness, moodiness, and being temperamental. Extraversion was
described as a trait characterizing individuals as talkative and assertive, whereas surgency (the opposite) was described as being silent and passive (Digman, 1990). Openness to Experience or intellect related to imagination, curiosity, and creativity (Goldberg, 1993). Agreeableness or pleasantness was described as kindness, trust, and warmth (Digman, 1990). Finally, Conscientiousness was described as organization and diligence.

Boyle, Matthews, and Saklofske (2008) summarized the most important assumptions and principles of trait theories. The first assumption is that traits are considerably stable and continuous. The second is the principle of a genetic basic for the major traits suggesting that traits are heritable, and because of their genetic basis the traits are considered to be universal (McCrae & Costa, 1997) and found in all cultures. The third principle is the generality of trait expression, which suggests that traits have similar responses to different situations. The fourth principle is the interactionism which suggests that traits might switch on and off by situational factors. For example, individuals may only show neurotic characteristics when they are under stressful situations (Boyle et al., 2008).

The five-factor theory of personality has several key components (McCrae & Costa, 1984). The central elements for the personality systems are the basic tendencies and characteristic adaptations. The basic tendencies composed by the personality traits are seen as endogenous basic tendencies directly influenced by the environment (McCrae & Costa, 1996). Characteristic adaptations are produced and attained from the interaction between the individual’s “basic tendencies” and the environment (McCrae & Costa, 1996). Traits and the environment cooperatively determine the characteristic adaptations (McCrae, 2004). For example, culture could dictate behaviors as the proper way individuals express their traits.
The FFT supports the stability of personality traits over time in high mental status individuals (McCrae & Costa, 1996; 2003). Studies suggest that all the five factors, self-reports, and observer ratings are equally stable (Costa & McCrae, 1992; Terracciano et al., 2006). Traits are biologically based and at the age 30 would remain mostly the same into old age (McCrae & Costa, 2003). These observed changes are attributed to maturation and not to the influences of life experiences (McCrae & Costa, 2003). McCrae and Costa (2003) criticized studies that support the direct influence of the environment on personality for not being robust enough and replicable and that these results really are not supporting changes in basic tendencies.

There is not necessary an agreement whether personality is stable or changes over time. Other studies suggest that personality traits can change over time. For example, Mroczek and Spiro III (2003) assessed change in personality traits among men aged 43 to 91 years and older over 12 years and found individual differences in changes on Extraversion and Neuroticism. The authors reported that the oldest age group (born between 1897 and 1919) showed stability or slight decline on Extraversion and slowest decline on Neuroticism. Life events was found to be one of the factors that influenced changes in personality traits trajectories. Mroczek and Spiro III (2003) recognized the importance of historical events on influencing changes in personality traits.

When studying personality characteristics across cultures, one would question whether personality characteristics are universal with the same domains and traits across cultures or there are important variations on personality traits. McCrae (2000) suggested that individuals from the same culture are more inclined to have similar personality
characteristics compared to individuals from other countries and this is because people from the same culture tend to be genetically more similar. Studies demonstrated that the five dimensions of the Big Five structure are generalizable and can be found across languages and cultures. A study by McCrae and Costa (1997) investigated cross-cultural generalizability of the five-factor model and suggested that the personality traits structure seems to be universal across seven societies (i.e., U.S., German, Israeliite, Portuguese, Chinese, Korean, and Japanese). In another study (McCrae, 2000) of 26 cultures, results showed the same factor structure supporting the generalizability of the FFT and the cross-cultural similarities in individual traits.

In this dissertation, the main goal is to examine two most important life events experienced by centenarians, identify personality profiles, and investigate whether these factors are risk or protective of centenarians’ mental and cognitive health. What distinguishes centenarians in good mental and cognitive health from those in poor mental and cognitive health? What factors explains these outcomes?

Personality is a very important individual resource that can influence late life outcomes. Studies suggest the existence of a “robust” or “resilient” personality (Martin, 2007) especially among centenarians. Does having a “robust” or “resilient” personality make centenarians more likely to possess better mental and cognitive health? For example, Martin, MacDonald, and Margrett (2010) investigated three important resilience domains among centenarians and one of them was personal resilience. The authors first presented a definition of resilience used by Masten (2001) which suggested that resilience is “a class of phenomena characterized as good outcome in spite of serious threats to adaptations or development”
In addition, the authors suggested the existence of a combination of patterns of resilient personality such as a combination of low Neuroticism, high scores in Conscientiousness and Extraversion (Martin et al., 2010). Martin and colleagues (2010) also examined whether competence (a facet of Conscientiousness) mediated or moderated the relationship between negative life events and negative affect in centenarians. The results indicated that competence significantly mediated the relationship between negative life events and negative affect (Martin et al., 2010), suggesting that competence reduced the impact of negative life events on centenarians’ mental health. Therefore, the authors pointed out the importance of personality as a resilience component that significantly changed the impact of negative life events on mental health. Taken together, these studies suggest that personality is an important resource that can help individuals obtain successful outcomes in later life.

To summarize, in this dissertation the life-span perspective and the personality trait theory (five-factor theory) were used as the theoretical foundation for my research. The life-span perspective provides a basis for my investigation on the importance and the influences of life events on mental and cognitive health. Life events experienced across the life span influence individuals’ mental and cognitive health. The life-span approach suggests that age-graded, history-graded, and non-normative events influence human development. In this study, important events were examined on how they impacted and influenced centenarians’ mental and cognitive health. When conducting cross-cultural studies, it is important to be culturally sensitive and that individuals may differ because of the influences of their culture.
and historical period that they are living in. Therefore, I will investigate and compare the effects of life events on mental and cognitive health of U.S. and Japanese centenarians.

In order to understand the importance and impact of individual differences on centenarians’ mental and cognitive health, it is important to understand the influences of personality characteristics. The five-factor theory will provide the basis for understanding how individuals’ personality profiles may affect each outcome. Perhaps, centenarians with positive combinations of personality traits are more likely to possess better mental and cognitive health. The following section will review and discuss recent studies in life events, personality, mental health, and cognitive health in centenarians.

**Life Experiences**

Life events and transitions are turning points that give “shape and direction to the various aspects of a person’s life” (Danish, Smyer, & Nowak, 1980, p. 342). Life events can also be described as a process with “antecedents, durations, contexts and outcomes” (Reese & Smyer, 1983, p.2). Centenarians are a very unique age group that has experienced numerous positive and negative events over their life span. Some of these events were important historical events such as the Great Kanto earthquake and fire destruction in Japan (1923), the Vietnam War (1959), World War I (1914), the Great Depression (1929), World War II (1939), and the bombing of Hiroshima and Nagasaki (1945). Recent results from the Georgia Centenarian Study examined events mentioned by centenarians as most important in their lives. Martin, da Rosa, and Poon (2011) reported that the most often and the most important events mentioned by U.S. centenarians were marriage, children, work and retirement (Martin et al., 2011). Several centenarians mentioned nonnormative life events
such as surviving an automobile accident, falling in the water and almost drowning, getting shot, husband’s alcohol problem, and historical events such as the Great Depression, and a hurricane. Martin and colleagues (2011) also assessed 23 domain-specific life events, how often each event had occurred, and the individual’s own evaluation of the event experienced. Some of the events included death of a father, mother, close friend, and children, birth of children, retirement, personal and spouse institutionalization. The results suggested that family events were the most common experience by centenarians. Marriage was the most common life event domain experienced by centenarians, followed by death of siblings and spouse. Martin and colleagues (2011) also found that cumulative negative life events was associated with negative affect and cumulative positive life experiences was associated with lower negative affect in centenarians. Finally, the authors concluded that proximal negative life events was associated with higher levels of negative affect and declines in positive affect, and distal events (positive or negative) was associated with higher levels of positive affect in centenarians.

Differences and disparities in centenarians’ mental health may also be associated with life events and experiences, especially the influence of positive and negative life events on mental health. Centenarians are unique individuals that have lived for ten decades and have experienced cumulative positive and negative events over their lifetime. Some centenarians experienced the death of loved ones (including their children), institutionalization, declining health, retirement, financial difficulties, raising grandchildren, and noted several accomplishments over time. All these events may have affected their mental health. Kraaij, Arensman, and Spinhoven (2002) in a meta-analysis examined 25 studies on the relationship
between negative life events and the total number of life events and depression in older adults. The results suggested that total number of negative life events and total number of daily hassles had a significant positive relationship with depression. In addition, when examining life events experienced in late adolescence and adulthood, severe illness of a significant other, negative experiences with relationships, and total life events were associated with depression. Kraaij and colleagues (2002) also found that experiencing negative socioeconomic difficulties during childhood was associated with higher depression scores among older adults. Unexpected negative life events were not found to be associated with depression. Jeon and Dunkle (2009) suggested that decrease in positive life events and increase in daily hassles was associated with increase in depressive symptoms among the oldest-old adults. Negative life events were not associated with depressive symptoms.

Life events also seem to play an important role in explaining variability in cognitive status among older adults. Studies suggest that stressful events significantly influence memory loss in older adults and the effects of stressful events can differently affect individuals with high and low mental status. For example, a study by Peavy and colleagues (2009) investigated the effects of chronic stress on memory performance of older adults with high and mildly low mental status. The authors found that stress influenced memory decline on older adults with mildly low mental status, but not those with high mental status. Therefore, high stress was associated with faster memory decline among individuals with poor mental status, but not among better mental status older adults. In this dissertation, I will examine centenarians’ cognitive health and investigate whether life events are risk and protective factors for centenarians’ cognitive health.
Not all individuals who experience negative and stressful life events develop serious mental and cognitive health problems. Perhaps this can be explained by different levels of resilience. The literature on resilience has investigated resiliency in children exposed to various adversities in life and risk factors such as being exposed to maltreatment or violence. These studies focus on how children overcome adversity and accomplish good developmental outcomes (Masten & Coatsworth, 1998). Masten (2001) defined resilience as “phenomena characterized by good outcomes in spite of serious threats to adaptation or development” (pp. 228). A study by Seery, Holman, and Silver (2010) investigated whether adverse life events promote resilience and affect mental health and well-being and concluded that individuals with some history of lifetime adversity were more likely to report higher levels of mental health and well-being compared to individuals with no history and high levels of historical adversity. In addition, those with prior lifetime adversities were less likely to be affected by current adverse life events (Seery et al., 2010). The authors concluded, “in moderation, whatever does not kill us may indeed make us stronger” (Seery et al., 2010, p. 1038).

**Personality Characteristics**

The literature suggests significant variability among individuals as they age, and research on individual differences has focused on investigating the influences of different personality characteristics in late life outcomes. Personality is a very important internal resource that can help individuals to adapt successfully to challenges across the life span. Perls, Silver, and Lauerman (1999) suggested, “personality is one of the most important factors in survival” (p.63).
A study investigating centenarians’ personality (Martin et al., 1992) suggested that centenarians were more dominant, suspicious, practical, and relaxed compared to sexagenarians and octogenarians. Other studies have been conducted assessing personality trait characteristics of centenarians, but not many have classified centenarians by personality types, and no cross-cultural studies have been conducted to identify and compare personality profiles of centenarians. Two exceptions include studies conducted by Martin and colleagues. First, Martin and colleagues (2006) investigated specific personality traits and configurations of traits among U.S. centenarians from the Georgia Centenarian Study. Self- and proxy reports suggested that centenarians overall had low levels of Neuroticism and higher levels of Extraversion, competence, and trust.

A Japanese study (Masui, Gondo, Inagaki, & Hirose, 2006) identified higher Openness in both male and female centenarians and higher Conscientiousness in centenarian women compared to older adults from 60 to 84 years. Another Japanese study (Shimonaka, Nakazato, & Homma, 1996) investigated whether androgyne and Type B behavior (which can be described as lack of antagonism) were associated with longevity in centenarians and concluded that Type-B personality was found to be associated with longevity and living to 100 years.

There are also several studies that associated personality characteristics with several important outcomes. For example, a study by Terracinno and colleagues (2008) found that individuals high in Conscientiousness, low in Neuroticism (emotionally stable), and high in activities (a facet of Extraversion) had higher longevity. There are also a substantial number of studies linking personality to different health outcomes. For example, high Neuroticism
and low Conscientiousness were significant predictors of poor health outcomes, such as mental and physical disorders (Goodwin & Friedman, 2006), physical health, and mortality. Neuroticism was also found to be related to increased levels of depressive symptoms among centenarians (Margrett et al., 2010).

Differences found on centenarians’ mental health may be due to individual differences found among this age group; researchers should focus on the influence of personality characteristics in predicting disparities in health and survivorship in centenarians. Studies suggest that there is a significant relationship between personality and mental health. For example, Adkins and colleagues (1996) studied older adults from the Georgia Centenarian Study and investigated the effect of personality traits and states on subjective well-being in centenarians, octogenarians, and sexagenarians. The authors found that lower scores on tension and higher scores in Extraversion were significant predictors of morale in centenarians. No gender differences were found. Another study (Martin, Rott, Kerns, Poon, & Johnson, 2000) obtained similar results reporting a significant association between anxiety (tension) and depressive symptoms. Depression was higher in centenarians compared to sexagenarians and octogenarians (Martin et al., 2000). Friedman, Kern, and Reynolds (2010) studied 1,312 Terman participants and investigated the relationship of personality and health, subjective well-being and longevity. Some of the important results obtained were that Neuroticism strongly predicted poor subjective well-being in late life and predicted mortality in women, whereas Neuroticism decreased the risk of mortality among men. Extraversion predicted old-age competence for both men and women, and Conscientiousness predicted productivity in men (Friedman et al., 2010).
When studying cognitive health and differences in cognitive performance in late life, individual differences do seem to play a role in explaining disparities and differences in cognitive outcomes. There are several important factors that significantly influence cognitive health in later life, and personality is an important individual component that may positively or negatively influence cognitive outcomes in very late life. For example, Martin and colleagues (2009) identified underlying types of centenarians that fall in either high and low categories of mental status functioning by using configural frequency analysis (CFA; Von Eye, 2000). The results suggest that centenarians with high levels of Emotional Stability, Extraversion, Openness, and Conscientiousness, and centenarians highly engaged in life were more likely to report better mental status. In addition, lower levels of Emotional Stability, Extraversion, Openness, Agreeableness, and Conscientiousness, and low levels of engagement in life were more commonly found among centenarians with poorer mental status.

There are studies suggesting an association between Neuroticism and dementia. For example, Wilson and colleagues (2003) investigated the association between proneness to psychological distress (by using Neuroticism from the NEO FFI; Costa & McCrae, 1992) and the risk of Alzheimer’s disease (AD) using data from the Religious Orders Study of 800 older Catholic clergy. The authors assessed proneness to psychological distress at the baseline and observed the relationship to risk of AD and the incidence of cognitive decline. The results suggested that distress proneness was related to the incident of AD and to decline in episodic memory. Wilson and colleagues (2003) suggested that older adults with high proneness to psychological distress (90th percentile) had two times the risk of developing AD
compared to individuals with low proneness to distress (10th percentile). The authors did not find an association between stress proneness and AD pathology (assessed through brain autopsy).

**Mental Health in Centenarians**

The high proportion of the older population and the increase in longevity may cause a great demand for mental health services with a larger financial cost for societies. Mental health is a very important component of overall well-being that helps older adults deal and cope with life stressors. Studies reveal that mental illness in older adults often remains under-recognized and under-treated (U. S. Department of Health and Human Services, 1999). Rabins (1996) concluded that unmet needs for mental health services tend to increase with age, and the oldest old are the group that has the greatest unmet needs.

Mental health is defined by the World Health Organization (WHO) as “…a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (WHO 2003, p.7). According to the Surgeon General’s Report (U.S. Department of Health and Human Services, 1999) mental health is defined as “…a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with people, and the ability to adapt to change and to cope with adversity” (p.4). Vaillant (2003) pointed out that “mental health must always be broadly defined in terms that are culturally sensitive and inclusive” (p.1382). Mental health is more than the opposite of mental illness. Mental illness seems to be very common in all countries and is the cause of
immense distress and social costs (WHO, 2003). Mental illness can be a burden for individuals, family, and society.

Centenarians have not been studied comprehensively and there are not many studies investigating the mental health of oldest-old adults (MacDonald, 2007). Martin and colleagues (2000) investigated rates of depression, compared centenarians’ depressive symptoms to younger age groups, and also examined predictors of depression. The researchers concluded that the rate of depressive symptoms was found to be high among centenarians, and centenarians reported higher levels of depressive symptoms compared to younger age groups. Several factors were found to be significant predictors of depressive symptoms in centenarians such as school performance, tension, hearing impairment, and health appraisal. Personality characteristics (such as anxiety) were shown to be positively related to depressive symptoms.

Morale is another important mental health domain. Lawton (1975) defined morale as the basic sense of self-satisfaction, including the notion that there is a place in the environment and recognition of what cannot be modified. When studying morale and factors associated with morale among oldest-old adults in Sweden, Wågert and colleagues (2005) concluded that a large number of oldest-old adults had high levels of morale and some factors associated high morale were low depressive symptoms, previously had a stroke, living at home, and low levels of loneliness. Smith, Gerstorf, and Li (2008) using the Chinese Longitudinal Healthy Longevity Study investigated psychological resources for well-being among octogenarians, nonagenarians, and centenarians and found small differences in the three age groups in well-being. In general, centenarians scored lower on self-worth, higher on
loneliness, and lower on perceived control compared to the two younger age groups. The authors concluded that individual differences were mainly due to engagement in life, cognitive functioning, and health.

Two additional important mental health components are positive affect and negative affect. Positive and negative affect are two independent dimensions of affect and are moderately correlated (Bradburn, 1969). Well-being is described as the balance between positive and negative affect (Mroczek & Kolarz, 1998). A meta-analysis study (Pinquart, 2001) summarized 125 studies and investigated age differences in positive affect, negative affect, and affect balance in middle-aged and in older adults. The results suggested that positive affect decreased in the oldest group. Negative affect decreased in the youngest group, but increased in the oldest age group. The authors suggested that these age differences are mainly because older individuals are lowest on high arousal emotions, and highest on low-arousal emotions. Pinquart (2001) suggested that these age differences in emotions may be attributed to declines in energy and emotion reactivity and age-related losses, and the increased time passively or alone. A longitudinal study (Charles, Reynolds, & Gatz, 2001) examined changes in positive and negative affect in four generations and investigated the effects of Neuroticism and Extraversion on changes in affect. The results suggested that negative affect decreased over time for all age groups, but older adults had slower rates of decrease in negative affect. The authors provided a similar explanation for their findings as Pinquart (2001) associating negative affect with levels of energy. Charles and colleagues (2001) suggested that decreases in negative affect may be attributed to lower physiological arousal in response to emotional experiences often found in older adults. In addition, Charles
and colleagues (2001) suggested that older adults seem to avoid negative relationships. The authors also found that positive affect was more stable compared to negative affect. The results suggested a small, but significant decline in positive affect among the older age groups. In addition, baseline high Neuroticism levels were associated with lower levels of positive affect at baseline. Furthermore, individuals high in Neuroticism were more likely to have higher decreases in positive affect. In contrast, individuals with high levels of Extraversion at the baseline were more likely to have higher initial levels of positive affect and to retain their levels of positive affect (Charles et al., 2001).

**Cognitive Health in Centenarians**

The increased number of older adults in our society will bring several societal challenges, and one of the most important challenges is to conserve optimal levels of mental and cognitive functioning for over a long period of time. The NIH Cognitive and Emotional Health Project (CEHP) defined cognitive health as “the development and preservation of the multidimensional cognitive structure that allows older adults to maintain social connectedness, an ongoing sense of purpose, and the abilities to function independently, to permit functional recovery from illness or injury, and to cope with residual functional deficits” (Hendrie et al. 2006, p. 13).

Contrary to the stereotypical idea that cognitive decline is a common and inevitable experience that older adults will face as they age, and a good number of older adults are cognitively healthy. The prevalence of dementia in centenarians has been estimated by several studies. A meta-analysis (Ritchie & Kildea, 1995) investigated nine epidemiological studies of dementia and found that the prevalence rate of dementia was about 40% among
individuals 95 years old. Results from the Georgia Centenarian Study (Poon et al., 1992) revealed the importance of cognitive resources for centenarians’ independence. Centenarians showed a similar performance on practical problem solving compared to sexagenarians and octogenarians. However, centenarians had a lower performance on intelligence and memory tests (Poon et al., 1992). A multidisciplinary Swedish centenarian study (Samuelsson et al., 1997) found that 27% of the centenarians were demented and centenarians performed poorly on cognitive tests (i.e., word-list, digit span, learning, and memory) compared to younger age groups. A meta-analysis study (Calvert, Hollander-Rodriguez, Kaye, & Leahy, 2006) examined studies about the dementia-free prevalence in centenarians. The authors identified a considerable variation among studies, and the prevalence of dementia-free survival after 100 years ranged from 0 to 50 percent. Gondo and Poon (2007) reviewed several studies on dementia prevalence rates for centenarians and concluded that the dementia prevalence ranged from 27% (Swedish study) to 100% (Dutch study). The authors suggested that educational attainment influenced cognitive ability (Gondo & Poon, 2007).

Calvert and colleagues (2006) pointed out that the prevalence of dementia among centenarians may be underestimated because of high mortality rates among centenarians, especially among demented individuals. The idea of sample selectivity leading to problems with misleading results was also discussed by researchers from the Berlin Aging Studies. For example, Baltes, Mayer, Helmchen, and Steinhagen-Thiessen (1999) suggested that one of the major problems faced by studies that include older adults is problems with selective survival (mortality). They suggested that when studying older adults, it is more likely that the findings will not be generalized to all individuals from the same birth cohort because it is
more likely that a large number of the same birth cohort have already died even before the study began. They suggested that individuals that are longer survivors function better in certain domains than the ones from the same cohort that had already died or were closer to death (Baltes et al., 1999).

Another centenarian study (Miller et al., 2010) evaluated cognitive performance of centenarians and the oldest old from the Georgia Centenarian Study and assessed participants’ performance on the Mini-Mental Status Examination, the Severe Impairment Battery, and the Behavioral Dyscontrol Scale. The authors concluded that centenarians had higher variation and dispersion on scores related to their cognitive performance compared to octogenarians, and the older the centenarian, the lower their scores in all the three measures of cognitive performance. Another study by the Georgia team (Poon et al., 2010) compared MMSE (Mini Mental Status Examination; Folstein, Folstein, & McHugh, 1975) performance scores of octogenarians and centenarians and reported that 85% of octogenarians obtained a score of 23 or higher, whereas 32% of centenarians scored 23 or higher on the MMSE. Poon and colleagues (2010) suggested that 68% of the centenarians would be considered impaired if the commonly used cutoff scores of 23 or higher was used. The authors pointed out that using the traditional cutoff score in the MMSE in studies with centenarians can be problematic because a good number of them experience problems with sensory impairment or disability and also tend to have lower levels of education compared to other age groups (Poon et al., 2010).
Dissertation Organization

This dissertation has several goals: the first study (Chapter 2) will separately identify the most important life event experiences in U.S. and Japanese centenarians. This study also will investigate the cultural similarities and differences in life experiences obtained. The second study (Chapter 3) will identify personality typology profiles in U.S. and Japanese centenarians and will investigate the cultural similarities and differences in typologies obtained. The third study (Chapter 4) will investigate the relationship of several potential risk and protective factors (i.e., life events, and identified personality profiles) on mental and cognitive health of U.S. and Japanese centenarians. Specific hypotheses will not be posed in papers 1 and 2 because the first and second study will be exploratory and will identify centenarians’ most important life events and personality profiles. I will answer several research questions in study 3 (Chapter 4) by examining the effects of life events and personality profiles in predicting mental and cognitive health. In addition, I will investigate the mediating and moderating effects of personality on the relationship between life events and the two health outcomes.

References


perspective (2nd ed.). New York: Guilford.


Poon, L. W., Martin, P., Clayton, G. M., Messner, S., Noble, C. A., & Johnson, M. A.


A paper to be submitted to the Journal of Cross-Cultural Gerontology

1Grace da Rosa, 1 Peter Martin, 2 Yasuyuki Gondo, 3 Nobuyoshi Hirose, 2 Yoshiko Ishioka, 4 Leonard W. Poon, and 5 for the Georgia Centenarian Study

1Iowa State University, Ames, U.S.A, 2 Osaka University, Osaka, Japan, 3 Division of Geriatric Medicine, Department of Internal Medicine, School of Medicine, Keio University, Tokyo, Japan, 4 University of Georgia, Georgia, U.S.A.

Abstract

The purpose of this study was to compare the most important life events reported by U.S. and Japanese centenarians. This study included a population-based sample of 239 U.S. centenarians from the Georgia Centenarian Study and 304 Japanese centenarians from the Tokyo Centenarian Study. Two open-ended life events questions were categorized and grouped into different life event domains. Several cross-tabulations were computed to investigate culture and gender differences in most important life event domains. Next, four configural frequency analyses were conducted using Neuroticism, Extraversion, and the first most often mentioned life event domain for each sample (i.e., marriage and historical life events). Results suggest that events related to marriage were the most frequent important event domains mentioned by U.S. centenarians. The Japanese sample was more likely to report historical events. Men from the U.S. were more likely to report events related to work and retirement compared to U.S. women, and U.S. women reported events related to family as the most important life events when compared to U.S. men. Japanese women considered events related to marriage, death and grief as the most important life events when compared to Japanese men. In addition, Japanese men reported events related to work and retirement as the most important life events. A cross-cultural difference was found in life events: U.S. centenarians were more likely to mention positive experiences related to marriage and children, whereas Japanese centenarians reported mostly negative and traumatic experiences such as historical, death/grief, and work/retirement events.
Key Words: Life Events, Centenarians, Configural Frequency Analysis, Cross-Cultural Research.

Introduction

It is part of the human existence to experience life events during the course of the human life span. Life events shape and bring enrichment to life and make individuals more resilient to challenges as people age. However, events can also be a source of stress, disrupting lives and leading individuals to discouragement and depression. Life events and transitions are turning points that give “shape and direction to the various aspects of a person’s life” (Danish, Smyer, & Nowak, 1980, p. 342). Events can also signify a process with “antecedents, durations, contexts and outcomes” (Reese & Smyer, 1983, p.2). Life events are experiences that have an effect (positive, neutral, or negative) on an individual’s life span and may require some level of adjustment.

The purpose of this study is threefold. First, to identify the most important perceived life events experienced by U.S. and Japanese centenarians and to investigate whether these events are similar across cultures. Second, to investigate gender differences in life event domains within each culture. Lastly, to identify patterns of life events and personality (i.e., Extraversion and Neuroticism) that are more or less likely to occur among centenarians.

Individuals encounter traumatic events at some point in their lives and these experiences can be personal or experiences reflecting an entire cohort. In the study of life events, centenarians constitute the age group with the greatest potential to have experienced numerous events across the life span. Centenarians represent a very unique age group that has lived ten decades of a rich, full life experiencing positive and negative events. U.S. and
Japanese centenarians witnessed important historical events, such as the World War I (1914-1918), the Great Kanto earthquake and fire destruction in Japan (1923), the Great Depression (1929-1940), World War II (1939-1945), the bombing of Hiroshima and Nagasaki (1945), and the Vietnam War (1959-1975).

The U.S. Census reported 53,364 centenarians in 2009 (US Census Bureau, 2011), and in Japan there were 40,399 centenarians during the same time period (Robine & Saito, 2009). Centenarians also have been through major normative age-graded and non-normative turning points such as marriage, having children, career changes and development, divorce, retirement, loss of a spouse, friends and sometimes even their children, institutionalization, health decline, often loss of independence, receiving awards, or converting to a religion, etc. Studies on significant events experienced by centenarians suggest that loss is more commonly experienced in centenarians than by sexagenarians and octogenarians. For example, a study by Martin, Raiser and Poon (1999) reported that 90% of centenarians experienced the loss of a spouse compared to sexagenarians and octogenarians. Centenarians were also more likely to experience the death of a child or friend compared to sexagenarians and octogenarians. Even though the loss of a spouse and/or friend may not be an unexpected event, losing a loved one can be a very traumatic personal experience having a strong impact on individual well-being.

Most studies on life events among older adults have focused on the effects and association of life events with important life outcomes. There is no current cross-cultural study investigating life events experienced by centenarians from different countries, and very few studies have focused on questions assessing the most important life events experienced
by this age group. This study employs a unique approach to assess the most important experiences and events in people’s lives, rather than assessing life events as a single summary score variable that combines all life experiences, as commonly used. One of the benefits of disaggregating life events is the clear identification of event types associated with important outcomes (Ensel, 1991).

The Georgia Centenarian Study examined events mentioned by centenarians as being the most important events in their lives. Martin, da Rosa, and Poon (2011) reported that the most frequent and most important events mentioned by U.S. centenarians were marriage, children, work, and retirement (Martin et al., 2011). Several centenarians mentioned nonnormative life events, such as falling in the water and almost drowning, getting shot, husband’s alcohol problem, and historical events such as the Great Depression, and a hurricane, as the most important. Martin and colleagues also assessed 23 domain-specific life events, how often each event had occurred, and the individual’s own evaluation of the event. Some of the events included death of a father, mother, close friend, and children, birth of children, retirement, and personal and spouse institutionalization. The results suggested that family events were the most important occasions commonly experienced by centenarians. Marriage was the most common salient life event domain experienced by centenarians, followed by death of siblings and spouse.

An earlier study (Merriam, Martin, Adkins, & Poon, 1995) using participants from the first Georgia Centenarians Study (Poon et al., 1992) tried to replicate a study by Costa and Kastenbaum (1967) which had assessed centenarians’ ways of organizing and incorporating past and present life experiences with their future. The authors assessed
centenarians’ early event recall, most important historical event witnessed, and most exciting event. Merriam and colleagues (1995) reported additional results for earliest recalls, historical events, and most exciting events. The earliest events recalled were experiences such as “playing with brother” to “death of sister.” Some of the events mentioned by centenarians were “seeing first airplane” and “almost drowning.” Among the most important historical events were “World War I” and “Titanic sinking.” Finally, some examples of the centenarians’ responses reflecting ambitions were “finish quilts” and “get married again.”

Studies suggest there are gender differences in life experiences. Kendler, Thornton, and Prescott (2001) investigated whether gender differences in the occurrence of depression could be explained by exposure and/or sensitivity to the influences of most life events and concluded that women tended to report more interpersonal event problems, such as housing problems, crises, and getting along with others in their network, and illness, whereas men tended to report more problems with job loss, legal problems, robbery, and work-related stress (Kendler et al., 2001). The authors reported they found gender differences associated with sensitivity to stressful life events. Men were more sensitive to problems and events related to divorce or separation and work, whereas women tended to be more sensitive to problems and events related to getting along with others. Studies revealed that women tend to be more sensitive to stressful events related to home and family life (Oman & King, 2000).

It should be noted that one important aspect to consider in studies of life events is that individual differences (i.e., personality traits) may explain why some events tend to impact some individuals and not others. It is not clear whether personality traits influence how individuals perceive their life events or whether there are certain personality traits that could
be associated with few or many experiences. In addition, more research is needed to assess whether personality traits influence how people perceive events.

In this study, we focused on two important life events (i.e., marriage and historical events) mentioned by U.S. and Japanese centenarians. There are many studies assessing the relationship between personality traits and marriage, focusing on personality and marital selection, personality and marital outcomes, personality traits and marital satisfaction, and similarity or dissimilarity of personality traits between spouses. For example, Eysenck (1980) investigated married and divorced men and women and concluded that divorce was more common among individuals with high levels of Psychoticism and Neuroticism. In addition, Extraversion was also associated with divorce among men (Eysenck, 1980). Watson and colleagues (2004) investigated approximately 300 newly married couples for whom self- and spousal reports were obtained on several domains (Watson et al., 2004). One important finding was that each spouse’s personality was associated with marital satisfaction. Watson and colleagues (2004) concluded that for husbands and wives marital satisfaction was related to their own levels of Agreeableness and Emotional Stability, but not the other Big Five factors. The results suggest that agreeable and emotionally stable partners tend to be more satisfied with their marriage and have spouses that are more satisfied with their marriage than disagreeable and unstable spouses.

This study used configural frequency analysis (CFA; von Eye, 1990, 2002; von Eye & Gutiérrez Peña, 2004) to identify configuration patterns of most important life events (i.e., marriage and historical events) and two personality traits (i.e., Neuroticism and Extraversion) in centenarians. The same procedure was used in three previous studies conducted by
researchers of the Georgia Centenarian Study. The first study (Martin et al., 2006) investigated configuration of personality traits among centenarians. The personality configuration pattern found most often in centenarians was low Neuroticism, high Competence (a facet of Conscientiousness), and high Extraversion (Martin et al., 2006). A second study (Martin, Baenziger, MacDonald, Siegler, & Poon, 2009) also used CFA and assessed configuration types of five personality traits, engaged lifestyle, and mental status in centenarians that occur more or less often than expected by chance. The third study (Martin, MacDonald, Margrett, & Poon, 2010) investigated resilience in centenarians. One significant finding was that one group, “the fortunate” (centenarians with small numbers of negative life events and low levels of negative affect) was more often observed among centenarians than would be expected by chance (Martin et al., 2010).

Triandis (1994) suggested that the distinction between individualism and collectivism is “the most important world view that differentiates cultures” (p. 286). According to Hofstede (1980), the United States is a more individualistic culture, whereas Japan is more collectivistic. Triandis (2001) suggested that in collectivist societies, individuals are expected to fit into the group and are concerned about relationships with others rather than personal needs (Triandis, 2001). In contrast, individualistic cultures expect members to see themselves as independent and autonomous from their in-group and give priority to their own personal goals and interests (Triandis, 2001). Therefore, in this study we expected U.S. centenarians to be more likely to endorse items that would reflect their individualistic perspective, whereas Japanese centenarians would be more likely to mention events related to their collectivist culture.
This study addresses three main research questions: 1) What are the most important life events mentioned by centenarians in the U.S. and Japan? Are there differences or similarities across cultures? We predicted that U.S. centenarians would be more likely to report events related to individualism such as marriage, child/children, social activities, work/retirement, and religion/spirituality whereas Japanese centenarians would be more likely to report events related to collectivism such as child/children and family events. 2) Are there gender differences in life event domains in each country? We predicted that women from both countries would be more likely to report events related to children, marriage, and family as the most important events compared to men who would be more likely to report events related to job/retirement and finances as the most important life events. 3) Finally, we explored configuration patterns that are more likely to be found among centenarians in each country. What are the combination patterns of culture (i.e., U.S. or Japanese), personality (i.e., Extraversion or Neuroticism) and life event domains that are more or less likely to occur?

Method

Participants and Procedures

The study included centenarians from Phase 3 of Georgia Centenarian Study (Poon et al., 2007) and from the Tokyo Centenarian Study (Hirose, et al., 2004; Homma, Ishida, Hirose, & Nakamura, 1994).

Georgia Centenarian Study (Phase 3). The participants from this study were from a population-based sample of Georgia (GCS; Poon et al., 2007). This study included 239 community-dwelling and institutionalized centenarians and near-centenarians (98 to 109
years), mean age of 99.7 years (SD=1.63) and 242 proxies from northern Georgia. U.S. participants were born between 1895 and 1907. The main purpose of this study was to investigate components related to survival and optimal functioning in centenarians. The sampling frame included 44 counties in Northeast Georgia within a 2-hour drive from Athens, Georgia. Participants’ names were obtained from voter registration rolls from the area and from contacts with a random subset of care facilities. Centenarians were first recruited by telephone and mail, and subsequent face-to-face interviews were conducted.

Table 1 displays detailed information about the participants in the study. Of the 239 centenarians included in the study, 137 centenarians had moderately high mental status scores (Mini Mental Status Examination, Folstein, Folstein, & McHugh, 1975; MMSE >16). The U.S. sample also included 242 proxies. Only proxies with high mental status scores (MMSE >22, N=234) were included in this study.

Table 1 indicates that U.S. centenarians were more likely to be women (82%), White/Caucasian (75%), and lived in private homes (45%). Proxy information about the centenarians was obtained for all the personality measures. In addition, proxy reports on most important life events were obtained only for centenarians with low mental status (MMSE < 17). Proxies were more likely to be daughters (40%), sons (15%), granddaughters (8%), nieces (8%) and wives (6%).

**Tokyo Centenarian Study.** This study included 304 Japanese centenarians (65 men and 239 women) living in 23 wards of Tokyo’s metropolitan area and their 304 proxies. Centenarians’ mean age was 101 years (SD=1.3) with an age range from 100 to 106 years. The Japanese participants were born between 1884 and 1902. The Tokyo Centenarian Study
(TCS; Hirose et al., 2004; Homma et al., 1994) was initiated in 1992, and a random number of centenarians were recruited from residential lists. In this study, 272 Japanese centenarians were included, and thirty-two centenarians out of 304 participants were not included because they were not able to conduct a MMSE. The Japanese study included 304 proxies that provided information about centenarians’ personality. Table 1 displays detailed information about the Tokyo Centenarian Study participants. In the TCS, the majority of the centenarians lived in private homes (68%), 26% lived in skilled care facilities, and 7% lived in hospitals. Among proxies, 54% were the centenarians’ child, 19% the spouse of their child, 13% facility staff, and 4% a grandchild. Participants in the study were asked to participate in a survey conducted in their home. During the visit, the TCS team, including a geriatrician, psychologist, and practical nurse, tested centenarians’ physical status, ADL, and cognitive function.

Table 1 also compares some of the demographic variables across cultures for the complete sample and for centenarians with high MMSE. The $\chi^2$ results for the complete sample suggest that significant cultural differences were found for education and marital status, $\chi^2(2, N= 473) = 8.56, p < .05; \chi^2(4, N= 514) = 21.30, p < .001$, respectively. The cross-cultural comparison indicates that a higher number of U.S. centenarians (29%) had college/post college education compared to Japanese centenarians (19%), whereas a higher number of Japanese centenarians (40%) completed high school compared to U.S. centenarians (30%). Our findings indicate that a higher number of U.S. centenarians (5%) never married compared to only 1% of Japanese centenarians. A higher percentage of U.S. centenarians (4.2%) were currently married compared to 1.4% of Japanese centenarians.
There were higher number of divorced U.S. centenarians (4%) compared to Japanese centenarians (0%).

In addition, we found that 99% of Japanese centenarians had been married at some point in time compared to 95.4% of U.S. centenarians. Results comparing only centenarians with high MMSE indicate that there was a higher number of women (79%) in the U.S., whereas 66% of Japanese centenarians were women, $\chi^2(1, N=235) = 4.60, p < .05$.

The age at which participants in both countries experienced specific historical events was similar. For example, U.S. centenarians experienced WWI at age 11 to 19, the Great Depression at the age 22 to 45, WWII at the age 32 to 50, and the Vietnam War at the age 52 to 80 years. Japanese centenarians experienced WWI at the ages of 16 to 20, the Great Kanto Earthquake at the ages of 21 to 29, and WWII with the bombing of Hiroshima and Nagasaki at the ages 32 to 51 years of age.

**Measures**

**Demographic variables.** In this study, demographic variables included age, gender (0=male, and 1=female), ethnicity/race (0=Caucasian, 1=African American; only assessed in the U.S. sample), culture (0=U.S. American, 1=Japanese), education (1=less than high school, 2=high school completed, 3=college/post college) residential status (0=private home, 1=personal care home, 2=hospital, and 3=long-term care facility), and marital status (1=currently married, 2=living with a partner, 3=separated, 4=divorced, 5=widowed, and 6=never married).

**Life events.** In both studies, two open-ended questions were included to assess the most important life events experienced by centenarians. The questions asked were, “What
was the most important experience that you had in your life?” and “What was another important experience that you had in your life?” In the U.S. study, some of the centenarians’ responses were replaced by their proxy responses. Centenarians with a MMSE score lower than 17 had their two life events responses given by their proxies. The proxies’ questions asked were: “What was the most important experience that s/he had in her/his life?” and “How about another important experience?” The Japanese study also included proxy reports for some centenarians on most important life events, but the criteria for replacing centenarians responses was not based on MMSE scores. Japanese centenarians’ responses were replaced based on the interviewer’s judgment whether centenarians were able to respond to questions on life events. One advantage of using proxy reports is that proxies can provide useful information in situations where participants have poor mental status and are not able to provide reliable information.

This study employed the classifications of life event domains used by Dohrenwend, Krasnoff, Askenasy, and Dohrenwend (1978). In their study, a list of 102 events was developed based on events experienced by a diverse population, and these life events included domains such as school, work, love and marriage, having children, family, residence, crime and legal matters, finances, social activities, and miscellaneous. We included most of the life event domains from the PERI Life Events Scale (Dohrenwend et al., 1978). In this study, domain-specific variables were created and included marriage, child/children, family (parents/relatives), work/retirement, historical events, health, residence, school/education, social activities, finances, religion/spirituality, death/grief, and miscellaneous events. We included three additional life event domains (i.e., historical,
religion/spirituality, and death/grief life events) that were different from the PERI Life Events Scale because of high-level endorsements by participants. We excluded the life domain “crime and legal matters” from the PERI Life Events Scale because this domain was not endorsed by any participant.

The Japanese life events data set was translated by one of the three raters who was fluent in Japanese. The raters were from three different cultures. One was from the United States, one from an Asian country, and the third rater was from South America. Initially, several domain-specific categories (i.e., marriage, child/children, family, work/retirement, historical event, health, residence, school/education, social activities, finances, religion/spirituality, and miscellaneous events) were created, and each open response was classified according to these life event domains. For responses with more than one life event domain, each rater was expected to rank the events based on cause (first event) and effect (second event). The three raters designated events as “miscellaneous” if the response did not fit in any of the predetermined life event categories. In order to establish validity of the open-ended life events responses and to obtain reliable interpretations, 25% of each data set was randomly selected and coded by three raters. Each rater was trained separately prior to coding. In this study, Cohen’s Kappa was assessed using Landis and Koch (1977) interpretation criteria. A conference meeting was scheduled and each discrepancy and disagreement between raters was discussed among the team until each discrepancy was either resolved or confirmed. The level of agreement between raters for the U.S. responses before the conference meeting had Kappa that ranged from .82 to .87, $p < .01$, suggesting a high agreement between raters. The agreement level between raters for the U.S. responses
improved after the conference meeting, with Kappa coefficients ranging from .93 to 97, \( p < .01 \), indicating a very high agreement between raters (Landis & Koch, 1977). For the Japanese life events responses, the agreement level between raters had Kappa values ranging from .61 to .85, \( p < .01 \), suggesting moderate to high levels of agreement between raters (Landis & Koch, 1977). The agreement between raters improved substantially after the conference meeting, with Kappa coefficients ranging from .96 to .98, \( p < .01 \), indicating very high levels of agreement between the raters (Landis & Koch, 1977).

Even though interrater reliability was high, there were inconsistencies between raters, especially for the Japanese responses. Raters’ judgments on cause and effect and interpreting responses beyond what was reported contributed to inconsistencies. Therefore, it was decided that all open-ended responses would be dichotomized into 0=no, the life event domain was not endorsed as the most important, or 1=yes, the life event domain was endorsed as the most important. All data were then coded by one of the raters and placed into one of the twelve life event domains as appropriate.

**Personality reported by proxies.** In the U.S. study, the NEO Personality Inventory (NEO PI-R) was used to obtain information relative to the centenarians’ personality. The NEO PI-R has 240 items and contains five broad personality domains, or factors, with six specific traits. The Japanese version (Shimonaka et al., 1999) of the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) was used to obtain personality traits by Japanese caregiver proxies. The Japanese version of the NEO-FFI demonstrated good reliability and validity (Shimonaka, Nakazato, Gondo, & Takayama, 1999). The NEO-FFI contains 60 statements and is a shortened version of the NEO PI-R. For a direct comparison
between both samples, the NEO PI-R scale used in the U.S. sample was reduced to be comparable with items from the NEO-FFI used in the Japanese study. The NEO FFI has five factors, including Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness, and each factor contains 12 questions. This measure contains questions on a five-point scale that ranged from SD=strongly disagree (=0), D=disagree (=1), N=neutral (=2), A=agree (=3), and SA=strongly agree (=4). A higher score on the NEO-FFI suggested higher levels of the personality domain. In order to obtain a larger number of responses, proxy reports were used to assess centenarians’ personality traits.

Studies have demonstrated the importance and high level agreement between individuals’ self-reports and their proxy reports. For example, a study by McCrae (1982) with participants from the Baltimore Longitudinal Study concluded there was a significant level of agreement between raters, and the highest level of agreement was found between self-reports and spouse ratings (McCrae, 1982). Riemann, Angleitner, and Strelau (1997) also found in a study of twins strong agreement between self-reports and peer ratings.

Reliabilities in the U.S. study for each personality dimension was .82, for Neuroticism, .78 for Extraversion, .72 for Openness (after deleting the item, “she/he believes we should look to our religious authorities for decisions on moral issues”), .87 for Agreeableness, and .83 for Conscientiousness. In the Japanese study the reliability for Neuroticism was $\alpha=.77$, for Extraversion .80, for Openness (after deleting the item, “she/he believes we should look to our religious authorities for decisions on moral issues”) .61, for Agreeableness .89, and for Conscientiousness .86. In this study, we used proxy reports of centenarians’ personality. The
items were added and a summary score for each personality domain was obtained, ranging from 0 to 48.

**Statistical Analyses**

In order to investigate the frequency distribution of life events experiences, several cross-tabulations were computed to investigate culture and gender differences in most important life event domains. Next, to identify longevity patterns in each country (two life event domains and two personality traits) occurring significantly more often (Types) or less often (Antitypes) than expected by chance, four configural frequency analyses (von Eye, 1990) were conducted using Neuroticism, Extraversion, and the first most often mentioned life event domain for each sample (i.e., marriage and historical life events). The goal was to identify combinations of types of life events and personality factors more likely and less likely to exist in the U.S. and Japanese samples.

Configural frequency analysis (CFA) is an exploratory data analysis that identifies profile patterns in the data set occurring significantly more (Type) or less (Antitype) often than expected by chance. CFA (von Eye, 2002) is a method of classification and exploratory tool. CFA investigates cross-classification frequencies to identify cells that significantly diverge from what is expected by using probability models (von Eye & Gutiérrez, 2004). In this study, Extraversion and Neuroticism summary scores were dichotomized by the scale midpoint (24), and two individual domain-specific life event variables (i.e., marriage and historical events) most often reported by each sample were included in this study.
Results

Results are presented in three sections: first, we report crosstabulation results on the most important and second most important life event experienced by U.S. and Japanese centenarians. Next, we present gender differences on most important life events experienced by centenarians from the United States and Japan. We also report results from the configural frequency analyses of the most important life event domains reported (i.e., marriage and historical event) by each culture and two of the five NEO personality factors (i.e., Neuroticism and Extraversion).

Table 2 displays crosstabulation results for the responses to the most important life event, and another additional important life event perceived by U.S. and Japanese centenarians. The U.S. results suggest that events related to marriage (39%), $\chi^2 (1, N=200) = 12.27, p < .01$, followed by events related to children (25%), $\chi^2 (1, N=200) = 9.60, p < .01$, religion/spirituality (8%), $\chi^2 (1, N=200) = 8.01, p = .01$, and school/education (5%) $\chi^2 (1, N=200) = 7.30, p = .01$ were the most frequent event domains mentioned in the U.S. sample, compared to the Japanese sample. Some of the life events reported in the U.S. sample were non-normative events such as “lost mother when 10,” “fell in water and almost drowned,” “Accident – fell down two floors,” and “brother got electrocuted.” A proxy reported “Her mother passed away when she was 6 years old and she was placed in an orphanage.” There were some unique immigrant experiences, such as “working in US for the first time” and “learning to communicate with people in US.” A few life events mentioned by the U.S. sample related to historical events such as “surviving the Hoover days.” Two proxies mentioned “hurricane in Florida, year 1926, lost everything,” and “her son was killed in
There were also special accomplishments that were mentioned by U.S. centenarians such as “completing a book on Trilliums (flower). He published it himself” and “purchasing of her first new house.” Table 3 shows examples of some of the qualitative responses by the three most often mentioned life event mentioned by centenarians from each culture.

The Japanese sample was more likely to report historical events (49%), $\chi^2 (1, N=194) = 116.99, p < .01$, events related to death/grief (25%) $\chi^2 (1, N=194) = 29.78, p < .01$, work/retirement (13%) $\chi^2 (1, N=200) = 4.43, p = .04$, and finances (4%) $\chi^2 (1, N=194) = 4.78, p = .03$ as the most important life event domains compared to U.S. centenarians (Table 2). There were two statistical trends, suggesting that the Japanese were more likely to report events related to residence and health as the most important, $\chi^2 (1, N=194) = 3.52, p = .06; \chi^2 (1, N=194) = 3.24, p = .07$, respectively. Most of the events mentioned by the Japanese sample were historical events associated with death of a family member or consequences of the war and Great Kanto earthquake (1923). Table 3 displays a few examples of the three most often mentioned life event domain by Japanese centenarians. Examples of historical events included: “My second oldest son died in action at the age 20,” “the bereavement of my husband – killed in action,” “my house burned down by bombing Tokyo in WWII,” and “Earthquake. Tiles from the roof fell on my head.” Several Japanese mentioned food shortages as a consequence of WWII, for example “World War II, many suffered from food shortages, especially children,” and “post-war food shortage.” There were also unique traumatic life experiences mentioned by the Japanese sample such as “my children burnt to death…,” “my father committed suicide jumping into a pond,” “children died before me,” “daughter died (leaving one son),” or events such as losing the entire family, “my husband
(at age 50) and children (70-80 years) passed away before me.” Japanese centenarians also mentioned unique positive experiences and accomplishments such as “received a government medal because of hard work as probation officer…,”“the happiest thing is that my grandchildren gathered at the celebration of my 100th birthday,” and “I donate a large sum of money to my hometown.”

Table 2 also displays crosstabulation results for question 2, which assessed the participants’ responses to “another important life event.” U.S. centenarians were more likely to report events related to child/children (33%) $\chi^2 (1, N=177) = 6.72, p = .01$, and marriage (32%) $\chi^2 (1, N=177) = 11.75, p < .01$, as the most important life events when compared to Japanese centenarians. Table 2 suggests that U.S. centenarians reported social activities more often as the second most important life events (question 2) $\chi^2 (1, N=177) = 4.54, p = .03$ compared to the Japanese sample. For the Japanese sample, historical events (38%) $\chi^2 (1, N=133) = 75.75, p < .01$ and events related to death and grief (19%) $\chi^2 (1, N=133) = 11.84, p < .01$ were also listed more often as “the most important event” in question 2 when compared to U.S. centenarians. Residency events (14%) $\chi^2 (1, N=133) = 5.66, p = .02$, and events related to health (11%) $\chi^2 (1, N=133) = 7.83, p = .01$ were the last two more often mentioned important life events perceived by the Japanese sample compared to the U.S. sample on question 2. There was a marginally significant cultural differences in the work/retirement life domain for question 2, suggesting the Japanese sample was more likely to report events related to work (14%) $\chi^2 (1, N=133) = 3.96, p = .05$ as the most important life experience when compared to the U.S. sample.
Table 4 displays results based on separate analyses on gender differences for U.S. and Japanese centenarians on the most important life experiences. For the U.S. sample, significant gender differences were obtained for events related to child/children $\chi^2 (1, N=164) = 8.52, p < .01$, and finances $\chi^2 (1, N=36) = 4.58, p = .03$, suggesting that women reported more child-related events and men reported more financial events, respectively. There were marginally significant gender differences for events related to family, and work/retirement in the U.S. sample. The results suggest that U.S. men, $\chi^2 (1, N=36) = 3.20, p = .07$, were more likely to report events related to work and retirement compared to U.S. women, and U.S. women, $\chi^2 (1, N=164) = 3.03, p = .08$, reported events related to family as the most important life events when compared to U.S. men.

Table 4 also displays results for gender comparisons on responses to the most important life events experienced by Japanese centenarians. The results suggest there were gender differences on marriage, work/retirement, and death and grief; Japanese women considered events related to marriage, $\chi^2 (1, N=154) = 6.62, p = .01$, and to death and grief, $\chi^2 (1, N=154) = 8.42, p < .01$, as the most important life events when compared to Japanese men. In addition, Japanese men reported events related to work and retirement as the most important life events compared to Japanese women, $\chi^2 (1, N=40) = 11.96, p < .01$. There were marginally significant gender differences in events related to school/education and health, suggesting that Japanese men reported events related to school and education as most important compared to Japanese women, $\chi^2 (1, N=40) = 3.87, p = .05$. On the other hand, Japanese women reported events related to health as important life events compared to Japanese men, $\chi^2 (1, N=154) = 3.32, p = .07$ (Table 2).
We assessed whether there were mental status differences on reporting the most important life events for questions 1 and 2. For the U.S. sample, proxy information was obtained on most important life events experienced by centenarians with poor mental status scores. The reason for this procedure was to collect life event information from centenarians with low mental status. A \( \chi^2 \) test was performed in the U.S. sample to compare proxy responses for low mental status centenarians with self reports of centenarians with high mental status scores. A significant difference was found for family events, \( \chi^2 (1, N=63) = 6.86, p = .01 \). This result indicates that proxies were more likely to mention family events as the most important life event in the life of centenarians with low MMSE scores compared to self-reports by high MMSE centenarians. A statistical trend was found for child/children events and mental status, \( \chi^2 (1, N=40) = 3.71, p = .05 \). The results indicate that proxies were more likely to mention child/children events as the most important experience for centenarian with relatively low MMSE scores compared to reports by centenarians with high MMSE scores.

Several chi-square tests were performed for the Japanese sample comparing reports of centenarians with low and high MMSE scores. Significant differences were obtained for marriage events and mental status, \( \chi^2 (1, N=194) = 4.37, p = .04 \); and death/grief events and mental status, \( \chi^2 (1, N=194) = 4.61, p = .03 \). These results indicate that Japanese centenarians with low MMSE scores were more likely to mention marriage (28.7%) and death/grief events (31.7%) as the most important life event they had experienced compared to Japanese centenarians with high MMSE scores (16.1% and 18.3%, respectively). It would have been meaningful to find out whether proxy information from centenarians with poor mental status
differed or not from proxy information from centenarians with better mental status. In this study, life events responses from U.S. proxies of centenarians with better mental status were not coded.

Table 5 shows results from the configural frequency analyses for U.S. and Japanese centenarians with high and low scores on the marriage domain and personality (i.e., Neuroticism and Extraversion). The comparison across cultures suggest that two specific types emerged for Neuroticism: first, there were more U.S. centenarians reporting marriage as the most important life events, with lower scores on Neuroticism than would have been expected by chance. The second type was found in the Japanese sample and included centenarians that had high levels of Neuroticism and did not report marriage as the most important event. Table 5 also displays results from the CFA for U.S. and Japanese centenarians with high and low scores on the marriage life event domain, and low and high Extraversion. Two types emerged from this analysis. First, there were more U.S. centenarians with low levels of Extraversion reporting marriage as the most important event. A second type emerged suggesting that Japanese centenarians with high levels of Extraversion were less likely to report marriage as the most important event.

Table 6 shows results from the configural frequency analysis for U.S. and Japanese centenarians on configurations of culture, high and low scores on domains related to historical events and personality (i.e., Neuroticism and Extraversion). Three types emerged for Neuroticism. First, there were more U.S. centenarians with lower levels of Neuroticism that did not report historical events as the most important. Two additional types emerged in the Japanese sample: there were more Japanese centenarians with either low and high levels
of Neuroticism reporting historical life events as the most important life event -- more often than would be expected by chance.

Table 6 also displays results from the configural frequency analysis for U.S. and Japanese centenarians on configurations of culture, high and low scores on events related to historical events, and high and low levels of Extraversion. Two types emerged for Extraversion. First, there were more U.S. centenarians low in Extraversion not reporting historical events as the most important events, than would be expected by chance. A second type was obtained in the Japanese sample suggesting that centenarians with high levels of Extraversion were more likely to mention historical events as most important.

Discussion

This study had three major goals: 1) to examine the two most important life events reported by U.S. and Japanese centenarians, and to investigate cultural differences and similarities between samples; 2) to assess gender differences among the most important life event domains observed in each country; and 3) to investigate the combination of two cultures’ (i.e., U.S. or Japanese) most important life event domains (i.e., marriage and historical event) and personality traits (i.e., Neuroticism or Extraversion) more or less likely to occur. Several important findings emerged from our analyses. First, events related to marriage, child/children, religion/spirituality, and school/education were the most frequently mentioned important life events reported by the U.S. sample. In the Japanese sample, historical events (i.e., WWII and the Great Kanto Earthquake) related to death/grief, work/retirement, residence, and health were the most frequently reported important life event domains. Japanese centenarians also mentioned events related to marriage and children as the
most important events, but several of these responses were related to the death of loved ones in WWII.

Several unique life events mentioned by the U.S. sample related to religion and spirituality, school and education, and social activities. U.S. centenarians were more likely to mention events related to their own spirituality and relationship with God, being socially engaged, and events related to school/education as the most important events compared to the Japanese sample. Several unique life events mentioned by the Japanese sample related to historical events and its consequences, such as death and grief of loved ones, work and retirement, and financial issues. Japanese centenarians also mentioned other unique life events such as residence- and health-related events as the most important life experience.

One possible way to understand these cultural differences in how individuals appraise events is to consider Hofstede’s (1980, 2001) cultural dimensions of individualism and collectivism often used in cross-cultural research. Japan was classified as collectivist and the United States was classified as the most individualistic culture. Triandis (2001) described collectivist societies as ones in which individuals tend to be interdependent and give priority to their in-groups. In collectivist societies, individuals are expected to fit into the group and are concerned about relationships with others rather than personal needs (Triandis, 2001). In contrast, individualistic cultures expect members to see themselves as independent and autonomous from their in-group (Triandis, 2001) and give priority to their own personal goals and interests. In addition, people are more inclined to change the environment to fit their own characteristic in individualistic societies (Triandis, 2001). As we expected, the event domains more often mentioned by U.S. centenarians were related to marriage,
school/education, and religion/spirituality events. U.S. centenarians also mentioned child/children as the most important life event compared to Japanese centenarians. None of our predictions were confirmed for the Japanese sample and we conclude that Japanese centenarians were not more likely to report child/children and family domains as the most important events compared to U.S. centenarians. Japanese centenarians were more likely to mention historical, death/grief, work/retirement, and finances life event domains. The results from the cultural differences on responses to the most important life events mostly represent domains associated with positive and non-stressful life events (e.g., marriage, child/children, their spirituality/religion, school/education, and social activities) on them individually. Japanese centenarians’ responses were, in general, related to the negative effects of historical events (i.e., WWII and the Great Kanto earthquake) on their spouses, child/children, family members, and the Japanese society.

Another possible explanation for cultural differences noted in reports on the most important life events could be attributed to events that affected an entire culture, and the life altering effects that followed (i.e., Japan). It is important to highlight that these cultural differences on reports may be attributed to the different influence of history in each country. Unlike in the U.S., Japanese centenarians experienced most historical events on their own soil, and this could have contributed to Japanese life experiences being perceived as more traumatic and stressful. It is also important to highlight that our results represent responses from a selective group of survivors that are likely to possess advantages compared to individuals of the same cohort that had already died.
The second major purpose of this study was to investigate gender differences in U.S. and Japanese centenarians on reports of the most important life events. The findings suggest that U.S. women were more likely to report events related to child/children as the most important life events compared to U.S. men. In contrast, U.S. men more often reported events related to finances as the most important life events compared to U.S. women. Gender comparisons for the Japanese study suggested that women were more likely to report events related to death, grief and marriage as the most important life events compared to Japanese men. In contrast, Japanese men were more likely to report events related to work and retirement as the most important events.

It comes as no surprise that domains related to children, marriage and family were more endorsed by women, whereas male centenarians more often mentioned events related to work/retirement and finances. These findings support our expectations. These results suggest that women seemed to be more sensitive to interpersonal events and loss of loved ones, whereas men tended to be more sensitive to issues related to work and finances. It is important to recognize that these centenarians grew up during the early 20th century when women were expected to marry and take care of their family, whereas men were breadwinners and expected to support their families. Our findings support previous studies on gender differences in life events. Kendler and colleagues (2001), for example, concluded in their study that men were more sensitive to work-related stressful events compared to women.

Previous studies have investigated whether there are differences in recalling traumatic events and other autobiographical memories. The findings of these studies are inconclusive.
For example, some studies indicate that memory related to posttraumatic stress disorder (PTSD) do not have coherence (Barclay, 1995), tend to be fragmented and are not well organized (Ehlers & Clark, 2000). According to Ehlers and Clark (2000), individuals “…often have difficulties in intentionally retrieving a complete memory of the traumatic event. Their intentional recall is fragmented and poorly organized, details may be missing and they have difficulties recalling the exact temporal order of the events” (p.324). In contrast, other studies have suggested that no difference can be found between traumatic memories and other autobiographical memories (Berntsen, Willert, & Rubin, 2003; Porter & Birt, 2001).

Our final goal was to explore configuration patterns of life events (i.e., marriage and historical events) and two personality traits (i.e., Neuroticism and Extraversion) in U.S. and Japanese samples. The analysis of statistical configurations for marriage as the most important life event suggested that U.S. centenarians reporting marriage as the most important life event tended to be introverted and showed low levels of Neuroticism. Perhaps for introverted centenarians spouses were the most important source of social support and means of interacting with others. In addition, individuals with low levels of Neuroticism were more likely to value marriage and intimate relationships than neurotic individuals. In contrast, neurotic and extraverted Japanese centenarians were less likely to report marriage as the most important life event. These patterns may have occurred because few Japanese centenarians reported marriage as the most important life event.

The configuration results for historical events for each study seemed to confirm the patterns. The results indicated that Japanese centenarians who reported historical events as
the most important events in their life were also more neurotic and extraverted. Again, this could be because war and the Great Kanto Earthquake strongly impacted these Japanese centenarians. In contrast, this pattern was not found in the U.S. sample, which is understandable; the U.S. sample was subjected to far fewer traumatic historical events during their lifetime.

This study, like others, has a number of limitations. The results can only be generalized to a very old population, and they may not be the same for other age groups. Perhaps each event would have produced different results if participants had been either much younger or had lived in a different time period. Another important aspect to highlight is that the findings from this study may represent events that were important only for centenarians living in the state of Georgia and in the Tokyo area and may not represent all centenarians from the United States and Japan. Each study was not designed to be compared cross-culturally; therefore, the procedures used in every study were not the same. For example, in this study, we used proxy responses on life events for U.S. centenarians with low MMSE scores, but the same procedure was not used in the Japanese study. The Japanese study used different criteria to replace centenarians’ answers with their proxies’ responses and their criteria were based on their evaluations of the centenarians’ abilities to respond.

Another potential limitation is the use of free recall to assess centenarians’ most important life events. Our results may not represent the most meaningful life event that centenarians experienced, but it may reflect the first life event experience that they spontaneously recalled. In addition, our study used proxy ratings of centenarians’ personality traits and some of the most important life events experienced by centenarians. Proxy reports
may not accurately reflect centenarians’ responses on important life events and their personality traits. In our analyses, we found that U.S. proxies were more likely to report child/children and family events as the most important life experience for centenarians with low MMSE. Perhaps U.S. centenarians with low MMSE would have reported very different life events. We do not know if U.S. proxies’ answers on life events were influenced by the nature of the relationship with centenarians and whether it was a reporter bias. Furthermore, in studies with very old populations, one important issue is the survivorship bias, and our results may represent events that are more important for a selected group in which only few centenarians have a greater likelihood of survivorship. Another limitation is that responses to the life events questions were retrospective, relying on participants’ ability to accurately remember events from the past.

Regardless of these limitations, our study was the first to assess the most important life events experienced by centenarians across cultures. The findings from this study have important implications for interventions. Our data suggest that older Japanese centenarians were significantly impacted by the effects of historical events which could have put them more at risk for poor mental health and quality of life. More work is needed to examine the effects of these events on important life outcomes. In our study, one of the benefits of using open-ended questions is that it allows the participant to freely decide the event that he/she considers the most important event in their lives and not having to select events from a checklist. The results can be helpful in enlightening cultural differences on events considered important for centenarians in the United States and Japan. In addition, such results provide us with insights on gender differences across cultures, as related to events considered important.
for a very old age group that has lived the longest. Finally, we also gained a better understanding of the importance of personality in reporting life events as the most important life experience. Our hope is that the findings reported here will be replicated and expand investigations on life events with centenarians from other nations.
Acknowledgements

The Georgia Centenarian Study (Leonard W. Poon PI) was funded by 1P01AG17553 from the National Institute on Aging, a collaboration among The University of Georgia, Tulane University Health Sciences Center, Boston University, University of Kentucky, Emory University, Duke University, Wayne State University, Iowa State University, Temple University, and University of Michigan. Additional authors include S. M. Jazwinski, R. C. Green, M. MacDonald, M. Gearing, W. R. Markesbery (deceased), J. L. Woodard, M. A. Johnson, J. S. Tenover, I. C. Siegler, W. L. Rodgers, D. B. Hausman, C. Rott, A. Davey, and J. Arnold. Authors acknowledge the valuable recruitment and data acquisition effort from M. Burgess, K. Grier, E. Jackson, E. McCarthy, K. Shaw, L. Strong and S. Reynolds, data acquisition team manager; S. Anderson, E. Cassidy, M. Janke, and J. Savla, data management; M. Poon for project fiscal management.

The Tokyo Centenarian Study was supported in part by a grant from the Japanese Ministry of Health and Welfare for the Scientific Research Project on Longevity, a grant for studying the multidisciplinary approach to centenarians and its international comparison (Principal Investigator, Nobuyoshi Hirose); a grant from the Japanese Ministry of Education, Science and Culture (No.15730346); and aid for research from the Keio Health Consulting Center.
References


doi:10.1080/00221325.1967.10533711


doi: 10.1037/0278-6133.19.6.605


Table 1

Demographic Characteristics of Complete Sample and High Mental Status Centenarians (MMSE ≥ 17)

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>United States (GCS)</th>
<th>Japan (TCS)</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of centenarians</td>
<td>N=239 (n=137)(^1)</td>
<td>N=304 (n=98)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Age in years M (SD)</td>
<td>99.7 (1.63)</td>
<td>100.8 (1.32)</td>
<td>--</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>1.23 (4.60*)(^1)</td>
</tr>
<tr>
<td>Women</td>
<td>82% (79%)(^1)</td>
<td>79% (66%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Men</td>
<td>18% (21%)(^1)</td>
<td>21% (34%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>74.5% (83%)(^1)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Black/African-American</td>
<td>25.5% (17%)(^1)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Asian</td>
<td>--</td>
<td>100%</td>
<td>--</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>8.56*(4.74*)(^1)</td>
</tr>
<tr>
<td>Less than High School</td>
<td>41% (18%)(^1)</td>
<td>41% (31%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>High School Completed</td>
<td>30% (42%)(^1)</td>
<td>40% (36%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>College/Post Graduate</td>
<td>29% (40%)(^1)</td>
<td>19% (33%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Residential Status</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Private Home</td>
<td>45% (56%)(^1)</td>
<td>68% (88%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Personal Care Home</td>
<td>18% (20%)(^1)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>37% (23%)(^1)</td>
<td>26% (2%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Hospital</td>
<td>--</td>
<td>7% (10%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Marital Status</td>
<td>00% (00%)(^1)</td>
<td>21.30***(5.51)(^1)</td>
<td>21.30***(5.51)(^1)</td>
</tr>
<tr>
<td>Married</td>
<td>4% (5%)(^1)</td>
<td>1% (4%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Separated</td>
<td>0% (0%)(^1)</td>
<td>1% (0%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Divorced</td>
<td>4% (4%)(^1)</td>
<td>0% (1%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Widowed</td>
<td>87% (85%)(^1)</td>
<td>96% (93%)(^1)</td>
<td>--</td>
</tr>
<tr>
<td>Never Married</td>
<td>5% (7%)(^1)</td>
<td>1% (1%)(^1)</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. Because of rounding, percentages may not add to 100. GCS= Georgia Centenarian Study; and TCS= Tokyo Centenarian Study. \(^1\)=Values inside the parenthesis are values for High Mental Status centenarians. \(^*\)p < .10. \(\ast\)p < .05. \(\ast\ast\)p < .01. \(\ast\ast\ast\)p < .001.
### Table 2
*Most Important Life Events and Experiences Perceived by U.S. and Japanese Centenarians*

<table>
<thead>
<tr>
<th>Life Event Domain</th>
<th>Question 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Question 2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S. Study</td>
<td>Japanese Study</td>
<td>Chi-Square</td>
<td></td>
<td></td>
<td>U.S. Study</td>
<td>Japanese Study</td>
<td>Chi-Square</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>Frequency</td>
<td>%</td>
<td></td>
<td></td>
<td>Frequency</td>
<td>Frequency</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Marriage</td>
<td>78</td>
<td>44</td>
<td>22.7</td>
<td>12.27</td>
<td>.00</td>
<td>57</td>
<td>20</td>
<td>15.2</td>
<td>11.75</td>
</tr>
<tr>
<td>Child/Children</td>
<td>49</td>
<td>24</td>
<td>12.4</td>
<td>9.60</td>
<td>.00</td>
<td>58</td>
<td>26</td>
<td>19.5</td>
<td>6.72</td>
</tr>
<tr>
<td>Family*</td>
<td>22</td>
<td>17</td>
<td>8.8</td>
<td>0.55</td>
<td>.46</td>
<td>14</td>
<td>8</td>
<td>6.0</td>
<td>0.41</td>
</tr>
<tr>
<td>Work/Retirement</td>
<td>14</td>
<td>26</td>
<td>13.4</td>
<td>4.43</td>
<td>.04</td>
<td>12</td>
<td>18</td>
<td>13.5</td>
<td>3.96</td>
</tr>
<tr>
<td>Historical Event</td>
<td>3</td>
<td>94</td>
<td>48.5</td>
<td>116.99</td>
<td>.00</td>
<td>1</td>
<td>50</td>
<td>37.6</td>
<td>75.75</td>
</tr>
<tr>
<td>Health</td>
<td>5</td>
<td>12</td>
<td>6.2</td>
<td>3.24</td>
<td>.07</td>
<td>5</td>
<td>14</td>
<td>10.5</td>
<td>7.83</td>
</tr>
<tr>
<td>Residence</td>
<td>9</td>
<td>18</td>
<td>9.3</td>
<td>3.52</td>
<td>.06</td>
<td>11</td>
<td>19</td>
<td>14.3</td>
<td>5.66</td>
</tr>
<tr>
<td>School/Education</td>
<td>10</td>
<td>1</td>
<td>0.5</td>
<td>7.30</td>
<td>.01</td>
<td>4</td>
<td>3</td>
<td>2.3</td>
<td>0.00</td>
</tr>
<tr>
<td>Social Activities</td>
<td>14</td>
<td>7</td>
<td>3.6</td>
<td>2.25</td>
<td>.13</td>
<td>18</td>
<td>5</td>
<td>3.8</td>
<td>4.54</td>
</tr>
<tr>
<td>Finances</td>
<td>1</td>
<td>7</td>
<td>3.6</td>
<td>4.78</td>
<td>.03</td>
<td>1</td>
<td>3</td>
<td>2.3</td>
<td>1.70</td>
</tr>
<tr>
<td>Religion/Spirituality</td>
<td>15</td>
<td>3</td>
<td>1.5</td>
<td>8.01</td>
<td>.01</td>
<td>11</td>
<td>3</td>
<td>2.3</td>
<td>2.73</td>
</tr>
<tr>
<td>Death/Grief</td>
<td>11</td>
<td>49</td>
<td>25.3</td>
<td>29.78</td>
<td>.00</td>
<td>11</td>
<td>25</td>
<td>18.8</td>
<td>11.84</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>18</td>
<td>14</td>
<td>7.2</td>
<td>0.42</td>
<td>.52</td>
<td>12</td>
<td>22</td>
<td>16.5</td>
<td>7.51</td>
</tr>
</tbody>
</table>

*Note.* * = Family - Parents, Siblings, and/or Relatives. *p < .10. *p < .05. **p < .01. ***p < .001.
Table 3

Life Events Open-Ended Responses from U.S. and Japanese Centenarians

<table>
<thead>
<tr>
<th>U.S. Life Event Domain</th>
<th>U.S. Centenarians</th>
<th>Japan Life Event Domain</th>
<th>Japanese Centenarians</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Marriage</td>
<td>“Marring first husband”</td>
<td>1) Historical Events</td>
<td>“The Great Kanto Earthquake”</td>
</tr>
<tr>
<td></td>
<td>“Second marriage”</td>
<td></td>
<td>“My house was burned down by bombing of Tokyo in WWII. All my clothes were stolen”¹</td>
</tr>
<tr>
<td></td>
<td>“Marriage”</td>
<td></td>
<td>“World War II”</td>
</tr>
<tr>
<td>2) Child/Children</td>
<td>“Having children”</td>
<td>2) Death/Grief</td>
<td>“My second son died in action at the age 20”²,³</td>
</tr>
<tr>
<td></td>
<td>“Birth of sons”</td>
<td></td>
<td>“When my baby was born”</td>
</tr>
<tr>
<td></td>
<td>“Adopt twin sons”</td>
<td></td>
<td>“The death of my oldest son”³</td>
</tr>
<tr>
<td>3) Religion/Spirituality</td>
<td>“Preacher saying I am blessed by the Lord”</td>
<td>3) Marriage</td>
<td>“The bereavement of my husband, killed in action”²,⁴</td>
</tr>
<tr>
<td></td>
<td>“Saved by Christ”</td>
<td></td>
<td>“Sudden death of my husband”⁴</td>
</tr>
<tr>
<td></td>
<td>“Trusted the Lord”</td>
<td></td>
<td>“Marriage”</td>
</tr>
</tbody>
</table>

Note. ¹ = Response was also categorized as residence domain. ² = Also categorized as historical domain. ³ = Also categorized as child/children domain. ⁴ = Also categorized as death/grief domain.
<table>
<thead>
<tr>
<th>Life Event Domain</th>
<th>US Sample</th>
<th></th>
<th>Japanese Sample</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td></td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>Marriage</td>
<td>18</td>
<td>50.0</td>
<td>60</td>
<td>36.6</td>
</tr>
<tr>
<td></td>
<td>2.23</td>
<td>.14</td>
<td>8.52</td>
<td>.00</td>
</tr>
<tr>
<td>Child/Children</td>
<td>2</td>
<td>5.6</td>
<td>47</td>
<td>28.7</td>
</tr>
<tr>
<td></td>
<td>8.52</td>
<td>.00</td>
<td>2.23</td>
<td>.14</td>
</tr>
<tr>
<td>Family*</td>
<td>1</td>
<td>2.8</td>
<td>21</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>3.03</td>
<td>.08</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Work/Retirement</td>
<td>5</td>
<td>13.9</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>3.20</td>
<td>.07</td>
<td>17</td>
<td>42.5</td>
</tr>
<tr>
<td>Historical Event</td>
<td>1</td>
<td>2.8</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>0.49</td>
<td>.49</td>
<td>17</td>
<td>42.5</td>
</tr>
<tr>
<td>Health</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>1.13</td>
<td>.29</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Residence</td>
<td>0</td>
<td>0.0</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>2.07</td>
<td>.15</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>School/Education</td>
<td>2</td>
<td>5.6</td>
<td>8</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
<td>.87</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Social Activities</td>
<td>2</td>
<td>5.6</td>
<td>12</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>.71</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Finances</td>
<td>1</td>
<td>2.8</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>4.58</td>
<td>.03</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Religion/Spirituality</td>
<td>3</td>
<td>8.3</td>
<td>12</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
<td>.83</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Death/Grief</td>
<td>1</td>
<td>2.8</td>
<td>10</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>0.63</td>
<td>.43</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>3</td>
<td>8.3</td>
<td>15</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>0.02</td>
<td>.88</td>
<td>5</td>
<td>12.5</td>
</tr>
</tbody>
</table>

*Note.* *Family =* parents, siblings, and/or relatives. *p < .10. **p < .05. ***p < .01. ****p < .001.
Table 5

Configurations of Culture, Marriage Life Event and Personality (Neuroticism and Extraversion)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>FO</th>
<th>FE</th>
<th>p</th>
<th>Type/Antitype</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neuroticism</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S., No M.¹, Low N² (111)</td>
<td>97</td>
<td>95.51</td>
<td>.88</td>
<td></td>
<td>1.02</td>
</tr>
<tr>
<td>U.S., No M.¹, High N² (112)</td>
<td>16</td>
<td>32.51</td>
<td>.00</td>
<td>Antitype</td>
<td>.49</td>
</tr>
<tr>
<td>U.S., Marriage, Low N² (121)</td>
<td>60</td>
<td>41.76</td>
<td>.00</td>
<td>Type</td>
<td>1.44</td>
</tr>
<tr>
<td>U.S., Marriage, High N² (122)</td>
<td>11</td>
<td>14.22</td>
<td>.39</td>
<td></td>
<td>.77</td>
</tr>
<tr>
<td>Japan, No M.¹, Low N² (211)</td>
<td>95</td>
<td>100.70</td>
<td>.57</td>
<td></td>
<td>.94</td>
</tr>
<tr>
<td>Japan, No M.¹, High N² (212)</td>
<td>55</td>
<td>34.28</td>
<td>.00</td>
<td>Type</td>
<td>1.60</td>
</tr>
<tr>
<td>Japan, Marriage, Low N² (221)</td>
<td>30</td>
<td>44.03</td>
<td>.03</td>
<td></td>
<td>.68</td>
</tr>
<tr>
<td>Japan, Marriage, High N² (222)</td>
<td>14</td>
<td>14.99</td>
<td>.80</td>
<td></td>
<td>.93</td>
</tr>
<tr>
<td><strong>Extraversion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S., No M.¹, Low E³ (111)</td>
<td>56</td>
<td>44.19</td>
<td>.08</td>
<td></td>
<td>1.27</td>
</tr>
<tr>
<td>U.S., No M.¹, High E³ (112)</td>
<td>56</td>
<td>82.99</td>
<td>.00</td>
<td>Antitype</td>
<td>.68</td>
</tr>
<tr>
<td>U.S., Marriage, Low E³ (121)</td>
<td>39</td>
<td>19.40</td>
<td>.00</td>
<td>Type</td>
<td>2.01</td>
</tr>
<tr>
<td>U.S., Marriage, High E (122)</td>
<td>32</td>
<td>36.43</td>
<td>.46</td>
<td></td>
<td>.88</td>
</tr>
<tr>
<td>Japan, No M.¹, Low E³ (211)</td>
<td>28</td>
<td>46.85</td>
<td>.01</td>
<td>Antitype</td>
<td>.60</td>
</tr>
<tr>
<td>Japan, No M.¹, High E³ (212)</td>
<td>122</td>
<td>87.97</td>
<td>.00</td>
<td>Type</td>
<td>1.39</td>
</tr>
<tr>
<td>Japan, Marriage, Low E³ (221)</td>
<td>8</td>
<td>20.56</td>
<td>.01</td>
<td>Antitype</td>
<td>.39</td>
</tr>
<tr>
<td>Japan, Marriage, High E³ (222)</td>
<td>36</td>
<td>38.62</td>
<td>.67</td>
<td></td>
<td>.93</td>
</tr>
</tbody>
</table>

*Note.*¹ No M. = Marriage was not an important life event. ²=Neuroticism; ³=Extraversion.
Table 6

*Configurations of Culture, Historical Life Event and Personality (Neuroticism and Extraversion)*

<table>
<thead>
<tr>
<th>Configuration</th>
<th>FO</th>
<th>FE</th>
<th>p</th>
<th>Type/Antitype</th>
<th>RR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neuroticism</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S., No Hist.¹, Low N³ (111)</td>
<td>154</td>
<td>102.05</td>
<td>.00</td>
<td>Type</td>
<td>1.51</td>
</tr>
<tr>
<td>U.S., No Hist.¹, High N³ (112)</td>
<td>27</td>
<td>34.74</td>
<td>.19</td>
<td></td>
<td>.77</td>
</tr>
<tr>
<td>U.S., Hist.¹, Low N³ (121)</td>
<td>3</td>
<td>35.23</td>
<td>.00</td>
<td>Antitype</td>
<td>.09</td>
</tr>
<tr>
<td>U.S., Hist.¹, High N³ (122)</td>
<td>0</td>
<td>11.99</td>
<td>.00</td>
<td>Antitype</td>
<td>.00</td>
</tr>
<tr>
<td>Japan, No Hist.¹, Low N³ (211)</td>
<td>62</td>
<td>107.59</td>
<td>.00</td>
<td>Antitype</td>
<td>.58</td>
</tr>
<tr>
<td>Japan, No Hist.¹, High N³ (212)</td>
<td>38</td>
<td>36.63</td>
<td>.82</td>
<td></td>
<td>1.04</td>
</tr>
<tr>
<td>Japan, Hist.², Low N³ (221)</td>
<td>63</td>
<td>37.14</td>
<td>.00</td>
<td>Type</td>
<td>1.70</td>
</tr>
<tr>
<td>Japan, Hist.², High N³ (222)</td>
<td>31</td>
<td>12.64</td>
<td>.00</td>
<td>Type</td>
<td>2.45</td>
</tr>
<tr>
<td><strong>Extraversion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S., No Hist.¹, Low E⁴ (111)</td>
<td>93</td>
<td>47.40</td>
<td>.00</td>
<td>Type</td>
<td>1.96</td>
</tr>
<tr>
<td>U.S., No Hist.¹, High E⁴ (112)</td>
<td>88</td>
<td>89.00</td>
<td>.92</td>
<td></td>
<td>.99</td>
</tr>
<tr>
<td>U.S., Hist.², Low E⁴ (121)</td>
<td>2</td>
<td>16.19</td>
<td>.00</td>
<td>Antitype</td>
<td>.12</td>
</tr>
<tr>
<td>U.S., Hist.², High E⁴ (122)</td>
<td>0</td>
<td>30.41</td>
<td>.00</td>
<td>Antitype</td>
<td>.00</td>
</tr>
<tr>
<td>Japan, No Hist.¹, Low E⁴ (211)</td>
<td>15</td>
<td>50.25</td>
<td>.00</td>
<td>Antitype</td>
<td>.30</td>
</tr>
<tr>
<td>Japan, No Hist.¹, High E⁴ (212)</td>
<td>85</td>
<td>94.35</td>
<td>.34</td>
<td></td>
<td>.90</td>
</tr>
<tr>
<td>Japan, Hist.², Low E⁴ (221)</td>
<td>21</td>
<td>17.17</td>
<td>.35</td>
<td></td>
<td>1.22</td>
</tr>
<tr>
<td>Japan, Hist.², High E⁴ (222)</td>
<td>73</td>
<td>32.24</td>
<td>.00</td>
<td>Type</td>
<td>2.27</td>
</tr>
</tbody>
</table>

*Note.* ¹= historical event was not important event; ²=historical event was an important event; ³=Neuroticism; ⁴=Extraversion.
CHAPTER 3: A CULTURAL COMPARISON OF PERSONALITY PROFILES OF U.S. AND JAPANESE CENTENARIANS

A paper to be submitted to The Journals of Gerontology, Series B: Psychological Sciences

1Grace D. da Rosa, 1Peter Martin, 1Daniel Russell, 1William T. Abraham, 2Yasuyuki Gondo, 2Nobuyoshi Hirose, 3Yukie Masui, & 5Leonard W. Poon, and 5for the Georgia Centenarian Study

1Iowa State University, Ames, U.S.A, 2Osaka University, Osaka, Japan, 3Department of Geriatric Medicine, Keio University School of Medicine, Tokyo, Japan, 4Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan, 5University of Georgia, Georgia, U.S.A.

Abstract

Objectives. This study investigated demographic and cultural mean differences among five NEO personality traits in U.S. and Japanese centenarians. Centenarians’ personality trait profiles were identified and compared, and demographic and cultural differences in the best identified personality trait profiles were investigated.

Method. This study included proxy reports of 239 U.S. centenarians from the Georgia Centenarians Study and of 272 Japanese centenarians from the Tokyo Centenarian Study. Several one-way analyses of variance were performed to investigate demographic and cultural differences among the five personality traits. Latent profile analyses were conducted to identify personality trait profiles in centenarians from the United States and Japan. Crosstabulation analyses were performed to investigate demographic differences among identified latent personality profiles for each country.

Results. We identified two personality profiles in both samples: the “resilient group” (higher scores on Agreeableness, and Extraversion, and lower mean scores on Neuroticism, Conscientiousness, and Openness compared to the population means) and the “non-resilient group” (higher scores on Neuroticism and lower scores on Extraversion, Openness,
Agreeableness and Conscientiousness compared to the population means). No cultural differences in personality profiles were found.

**Discussion.** A resilient personality group was found in the U.S. and Japanese samples consisting of centenarians with higher levels of positive personality traits.

*Keywords:* centenarians, personality profiles, NEO FFI, United States, Japan, cross-cultural research.

**Introduction**

Centenarians comprise a unique and select group, having lived a full life over ten decades. It is not clear whether these exceptional individuals possess a unique combination of personality traits that have contributed to their exceptional longevity, nor do we know if this specific combination of personality traits is found among centenarians in other countries or is specific to one culture. Studying and examining personality profiles in centenarians may help elucidate and identify the most commonly found personality profiles potentially associated with exceptional longevity.

According to the Five-Factor Model (FFM), personality structure has five broad personality traits: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Costa & McCrae, 1992). An innovative approach to studying personality is *person-centered*, in which the individual is the focus of personality typologies and prototypes analysis. The methodology of a person-centered approach is to group individuals according to shared personality trait characteristics and similar personality structure—subsequently differentiating groups not sharing the same personality structure. Three personality typologies using the Big-Five personality traits have been proposed and tested primarily with children: resilient, overcontrolled, and undercontrolled types (Caspi, 1998;
Robins, John, & Caspi, 1996). Resilient individuals have low average scores on Neuroticism and high mean scores on Extraversion, Openness, Agreeableness, and Conscientiousness. Overcontrollers are described as having higher mean levels of Neuroticism and lower levels of Extraversion, and Undercontrollers are characterized by having low average scores in Conscientiousness and Agreeableness (Asendorpf et al., 2001; Robins et al., 1998).

Only a few studies have classified centenarians by personality types. For example, Martin and colleagues (2006) investigated configurations of personality traits among U.S. centenarians. Self- and proxy reports indicated that centenarians had low levels of Neuroticism, higher levels of Extraversion, Competence (a facet of Conscientiousness), and Trust (a facet of Agreeableness). Martin and colleagues concluded that centenarians and their proxies agreed on personality reports, but centenarians were more likely to report higher levels on the personality traits compared to proxy reports. In a second study, Martin and colleagues (2009) concluded that centenarians with low levels of Neuroticism, and high scores on Extraversion, Openness, and Conscientiousness, and centenarians highly engaged in life were more likely to report better mental status. In addition, lower levels of Emotional Stability, Extraversion, Openness, Agreeableness and Conscientiousness, and lower levels of engagement in life were more commonly found among centenarians with poor mental status. Martin (2007) noted the most common personality traits reported in centenarian studies were low levels of Neuroticism (i.e., high Emotional Stability), and high levels of Extraversion and Conscientiousness (Martin, 2007).

In summary, the study of personality typologies of centenarians is still in its infancy; no study has been conducted across cultures to investigate whether there are universal personality trait combinations in long-lived individuals. Moreover, we do not know whether
there are combinations of personality traits unique to a specific culture. Our study addresses these questions using a person-centered approach identifying combinations of personality traits in U.S. and Japanese centenarians.

This study poses several research questions: 1) Are there demographic (i.e., gender, ethnic, residential status, education, and mental status) and cultural differences in the Big-Five personality traits? 2) Which personality profiles can be identified in centenarians? Are the personality profiles similar or different across cultures? 3) Are there demographic (i.e., gender, ethnic, residential status, education, and mental status) differences in personality profiles?

**Method**

**Participants and Procedures**

The study included centenarians from Phase 3 of the Georgia Centenarian Study (GCS; Poon et al., 2007) and from the Tokyo Centenarian Study (Hirose et al., 2004; Homma, Ishida, Hirose, & Nakamura, 1994).

**Georgia Centenarian Study (Phase 3).** This study included 239 U.S. community-dwelling and institutionalized centenarians and near centenarians (98 to 109 years of age) and their proxies, who are part of a population-based study. The names of the participants were obtained from voter registration rolls for the State of Georgia and from calls to a random subset of long-term care facilities. Centenarians were first contacted by telephone and mail, and follow-up face-to-face interviews were conducted. Table 1 indicates that U.S. participants were more likely to be women (82%), White/Caucasian (75%), and to live independently in private homes (45%). The majority of proxies (40%) were daughters, sons
(15%), granddaughters (8%), nieces (8%) and wives (6%). Proxy information about the centenarians was obtained for all personality measures.

**Tokyo Centenarian Study.** The study included 304 proxies of Japanese centenarians and their proxies from the Tokyo metropolitan area. The Centenarians’ mean age was 101 years ($SD=1.3$), with an age range from 100 to 106 years. The Tokyo Centenarian Study (TCS; Hirose et al., 2004; Homma et al., 1994) was initiated in 1992, and a random number of centenarians were recruited from residential lists. In the TCS, Japanese centenarians were more likely to be women (79%), had lower levels of education (41%), and living in a private home (68%). Among the Japanese proxies, 54% were the centenarians’ child, 19% the spouse of their child, 13% facility staff, and 4% a grandchild.

Table 1 also compares some of the demographic variables across cultures for the complete sample and for centenarians with high MMSE. The $\chi^2$ results for the complete sample suggest the significant cultural differences for education and marital status, $\chi^2(2, N=473) = 8.56, \ p < .05; \chi^2(4, N=514) = 21.30, \ p < .001$, respectively. The cross-cultural comparison indicate that more U.S. centenarians (29%) had a college/post college education compared to Japanese centenarians (19%), whereas more Japanese centenarians (40%) completed high school compared to U.S. centenarians (30%). Our findings indicate that a more U.S. centenarians (5%) never married compared to only 1% of Japanese centenarians. More U.S. centenarians (4.2%) were current married compared to 1.4% of Japanese centenarians. There were higher number of divorced U.S. centenarians (4%) compared to Japanese centenarians (0%).

In addition, we found that 99% of Japanese centenarians had been married at some point in time compared to 95.4% of U.S. centenarians. Results comparing only centenarians
with high MMSE indicate that there were more women (79%) in the U.S. sample compared to the Japanese sample (66%), \( \chi^2(1, N= 235) = 4.60, p < .05. \)

**Measures**

**Demographic variables.** In this study, demographic variables included age, gender (0=male, and 1=female), ethnicity/race (0=Caucasian, 1=African American; only assessed in the U.S. sample), culture (0=U.S. American, 1=Japanese), education (1=less than high school, 2=high school completed, 3=college/post college) residential status (0=private home, 1=personal care home, 2=hospital, and 3=long-term care facility), and marital status (1=currently married, 2=living with a partner, 3=separated, 4=divorced, 5=widowed, and 6=never married).

**Personality reported by proxies.** Proxy information about the centenarians was obtained for the personality measure. In the U.S. study, the NEO Personality Inventory (NEO-PI-R) was used to obtain proxy information concerning the centenarians’ personality. The NEO-PI-R has 240 items and has five broad personality domains or factors with six specific traits. The Japanese version (Shimonaka et al., 1999) of the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) was used to obtain personality traits scored by their Japanese caregiver proxies. The NEO-FFI contained 60 statements and was a shortened version of the NEO PI-R. Both NEO personality inventories had questions on a five-point scale: SD=strongly disagree (=0), D=disagree (=1), N=neutral (=2), A=agree (=3), and SA=strongly agree (=4). In the NEO-FFI, a higher score suggested a higher level of the personality domain measured. In order to obtain a larger number of responses, proxy reports were used to assess centenarians’ personality traits.
Studies using individual self- and proxy reports have demonstrated the importance of high-level agreement between both types of reports. For example, a study by McCrae (1982) found a significant level of agreement between raters, with the highest level of agreement between self-reports and spouse ratings (McCrae, 1982). Riemann, Angleitner, and Strelau (1997) also found strong agreement between self-reports and peer ratings, with a correlation of .55 for the NEO FFI. Martin (2007) compared centenarians’ reports and their proxy reports on centenarians’ personality traits, and concluded that centenarians were more likely to report their personality traits as extreme. In addition, both reports had the same direction of agreement on personality traits (Martin, 2007).

For a direct comparison between both samples, the NEO PI-R scale used in the U.S. sample was reduced to be comparable with items from the NEO-FFI used in the Japanese study. The NEO FFI has five factors--Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness--and each factor has 12 questions. The items were added and a summary score for each personality domain was obtained, ranging from 0 to 48. The U.S. study’s proxy reliability scores for each personality dimension were as follows: .82, for Neuroticism, .78 for Extraversion, .72 for Openness (after deleting the item, “she/he believes we should look to our religious authorities for decisions on moral issues”), .87 for Agreeableness, and .83 for Conscientiousness. The proxy reliability scores for the Japanese study were: Neuroticism α=.77, Extraversion .80, Openness (after deleting the item, “she/he believes we should look to our religious authorities for decisions on moral issues”) .61, Agreeableness .89, and Conscientiousness .86.

**Cognitive health.** The Mini-Mental Status Examination (MMSE; Folstein, Folstein, & McHugh, 1975) screened for cognitive health. The MMSE has 11 items with scores
ranging from 0 to 30. A higher score indicates better cognitive health. The MMSE is a well-known and frequently used screening device for mental status functioning. In this study, a summary score will be used to assess mental status in older adults. The questions were rated on a dichotomous scale, coded 1=no, and 2=yes. An example of a cognitively related statement is, “What is the (year) (season) (date) (day) (month)?” In this study, we used a lower MMSE cutoff because of the high prevalence of centenarians with sensorimotor limitations, placing them at a disadvantage (Holtsberg et al., 1995). Centenarians with MMSE < 17 were considered in poor cognitive health and MMSE scores of 17 and above were considered high cognitive health. Cronbach’s alpha for total MMSE was .71 for the U.S. sample and .84 for the Japanese.

**Statistical Analyses**

Analyzing the present study involved several steps. First, two one-way analyses of variance (ANOVA) and t-tests were performed to test for demographic differences (i.e., gender, ethnicity, residential status, education status, mental status, and culture) for each of the five personality factors of U.S. and Japanese centenarians. To identify personality patterns in centenarians, two latent profile analyses were performed using Mplus 5.0 (Muthén & Muthén, 2007). Latent profile analysis (LPA) classifies individuals into groups based on their shared characteristics. The LPA uses continuous outcomes to classify and cluster individuals into group categories. We examined classification accuracy of the best final solution obtained in our LPA. The number of classes was determined by considering statistical indicators such as Lo-Mendell-Rubin (LMR; Lo et al., 2001) and Vung-Lo-Mendell-Rubin (VLMR). Muthén and Muthén (2000) presented four criteria to decide the optimal number of latent classes in mixture models, including Bayesian information criteria.
(BIC) and a sample-size adjusted version of the BIC (Adj. BIC), entropy, and the bootstrapped likelihood ratio test (BLRT). In LPA, the goodness-of-fit indices are not “sample size free;” values are influenced by the number of participants. Therefore, it is important to consider other indicators of fit that are “sample size free.” We evaluated the fit statistics, interpretability of the classes, and sample size for each personality subgroup before deciding on the best number of classes for each sample. Other analyses were conducted using SPSS 20.0.

After obtaining latent profiles, we performed two crosstabulation analyses to investigate gender, ethnicity, residential status, education, and mental status differences in selected latent classes. A crosstabulation analysis was performed to examine cultural differences on the identified personality latent profiles.

Results

Results are presented in three sections: first, we report demographic and cultural mean differences on the Big-Five personality traits for U.S. and Japanese centenarians, second, results for latent personality profiles are identified and cultural differences on the latent personality profiles are examined, and finally, we report crosstabulation results for gender, ethnicity, residential status, education, and mental status differences in the two-class personality solution for U.S. and Japanese centenarians.

Demographic and Cultural Differences on the Big-Five Personality Traits

Demographic mean differences for the Big-Five personality traits for U.S. and Japanese centenarians were conducted. Results for demographic mean differences in personality traits for U.S. centenarians suggest a significant gender difference in Neuroticism, indicating that women ($M = 17.70$, $SD = 7.98$) had significantly higher levels of
Neuroticism than men ($M=14.70$, $SD=6.79$), $F(1,295) = 7.26$, $p < .01$. No significant gender differences were found for Extraversion, Openness, Agreeableness, and Conscientiousness in U.S. centenarians. No significant ethnic differences were found among the U.S. centenarians’ personality traits.

Results for residential status suggest differences in Neuroticism, $F(2,293) = 3.62$, $p < .05$, and Conscientiousness, $F(2,293) = 8.55$, $p < .001$. Post-hoc analysis using the Scheffé test indicated the mean for U.S. centenarians living in a skilled care facility ($M=18.95$, $SD=7.83$) was significantly higher on Neuroticism than for U.S. centenarians living in a private home ($M=16.23$, $SD=8.05$). U.S. centenarians living in skilled care facilities ($M=28.62$, $SD=6.19$) had significantly lower scores in Conscientiousness compared to centenarians living in personal care ($M=31.96$, $SD=6.74$) and private homes ($M=31.94$, $SD=6.21$).

Educational mean differences for U.S. centenarians were obtained for Neuroticism, $F(2,237) = 3.14$, $p < .05$, Extraversion, $F(2,238) = 6.06$, $p < .01$, Openness $F(2,236) = 6.28$, $p < .01$, and Conscientiousness, $F(2,237) = 7.80$, $p < .01$. Post-hoc Scheffé tests suggest that U.S. centenarians with lower levels of education had significantly higher scores on Neuroticism ($M=18.38$, $SD=7.21$) than centenarians with the highest levels of education (College/Post college degree), $M=15.36$, $SD=7.94$. U.S. centenarians with minimal education had the lowest levels of Extraversion ($M=24.68$, $SD=6.26$) and Conscientiousness ($M=28.77$, $SD=6.25$) compared to centenarians with a high school ($M=16.96$, $SD=8.35$; $M=32.07$, $SD=5.79$, respectively) and college/post college education ($M=15.36$, $SD=7.94$; $M=32.26$, $SD=6.66$, respectively). Post-hoc Scheffé tests indicated that highly educated U.S. centenarians had higher scores on Openness to Experience ($M=21.93$, $SD=6.01$) compared to poorly educated centenarians ($M=20.16$, $SD=5.40$; $M=21.93$, $SD=6.01$, respectively).
Differences in mental status for U.S. centenarians were obtained for Neuroticism, $F(1,293) = 6.92, p < .01$, Extraversion, $F(1,293) = 7.62, p < .01$, Openness, $F(1,292) = 8.86, p < .01$, and Conscientiousness, $F(1,293) = 14.26, p < .001$. Results suggest that U.S. centenarians with poor mental status had significantly higher scores on Neuroticism ($M= 18.72$, $SD= 7.38$) than better mental status centenarians ($M= 16.26$, $SD= 7.91$). Centenarians with higher mental status scores were more likely to be classified as having significantly higher scores on Extraversion ($M= 27.49$, $SD= 6.36$), Openness ($M= 21.04$, $SD= 5.74$), and Conscientiousness ($M= 31.99$, $SD= 6.02$) compared to low mental status centenarians ($M= 25.33$, $SD= 6.62$; $M= 19.08$, $SD= 4.82$; $M= 29.10$, $SD= 6.81$, respectively).

Results for demographic mean in personality traits for Japanese centenarians indicated significant gender differences for Neuroticism, $F(1,242) = 7.80, p < .01$, suggesting that women ($M= 19.53$, $SD= 6.01$) had significantly higher scores on Neuroticism than men ($M= 16.68$, $SD= 7.33$). No significant gender differences were found for Extraversion, Openness, Agreeableness, and Conscientiousness for Japanese centenarians. No significant residential differences were found among the Japanese centenarians for the five personality traits. Educational mean differences were obtained for Openness to Experience, $F(1,229) = 3.60, p < .05$, but no specific educational status subgroup differences in personality traits emerged from the post-hoc Scheffé tests for Japanese centenarians. Mean differences in mental status groups were found for Openness $F(1,219) = 5.31, p < .05$, suggesting that Japanese centenarians with high mental status scores had higher levels of Openness to Experience ($M= 23.47$, $SD= 5.36$) than centenarians with poor mental status ($M= 21.87$, $SD=4.69$). No significant mean differences for the two mental status Japanese groups were found for Neuroticism, Extraversion, Agreeableness, and Conscientiousness.
Table 2 shows cultural mean differences for the Big-Five personality traits of U.S. and Japanese centenarians. Results suggest that Japanese centenarians had significantly higher scores on Neuroticism, \( F(1,470) = 10.25, p < .001 \), Extraversion, \( F(1,476) = 5.97, p < .05 \), Openness, \( F(1,468) = 21.50, p < .001 \), and Conscientiousness, \( F(1,476) = 4.76, p < .05 \) compared to U.S. centenarians. In contrast, U.S. centenarians had significantly higher levels of Agreeableness, \( F(1,473) = 5.01, p < .05 \), compared to Japanese centenarians.

**Latent Profile Analyses**

We performed a series of latent personality profile analyses for each culture. Table 3 displays the model fit indices for the two-, three-, and four-class model solutions for the personality LPA of U.S. and Japanese centenarians. In the LPA, we evaluated changes in goodness-of-fit statistics for each new model as we added and tested for more class groups. The LPA results for the U.S. sample indicated the four-class model appears to fit better than the three-class solution because of the lower values for AIC, BIC, adjusted BIC, and higher Entropy. The Vung-Lo-Mendell-Rubin and Lo-Mendell-Rubin (LMR) do not support the four-class solution, but suggest that the 2-group personality solution is the best fit for the U.S. data. The \( p \)-values for the BLRT\(_p\) were all statistically significant, supporting all three models.

When analyzing the sample size of each personality subgroups for the four-class solution, one subgroup included only a few U.S. centenarians (i.e., 3% of the sample), indicating the four-class solution did not represent the U.S. sample well. When analyzing the plots for the three-class solution (not shown), two groups in the U.S. sample did not appear to differ, and little variability was added across groups. After considering inconsistencies and
variation in some of the goodness-of-fit for this model on the best number of groups, we selected the two-group solution as the best solution for the U.S. sample.

Table 3 also shows the goodness-of-fit for the Japanese model for two-, three-, and four-class latent profile analyses for Japanese centenarians. Several statistics fit indices were obtained from the LPA and examined to determine the best number of classes. The lower values for BLRT, BIC, LMR, and VLMR clearly indicate the two-class solution model is better than the one-class solution for the Japanese sample. Values of the BLRT slightly increased from the three- to four-class solution, but the BLRT values were all statistically significant, supporting all three models. These values did not provide a clear direction for the best number of Japanese centenarian classes. The lower values on the AIC, Adjusted BIC, and higher Entropy values indicate the four-class group solution model is better than the three-class solution. However, the BLRT, VLMR, and LMR were statistically significant and support the two-personality class solution. We also examined the sample distribution of each subgroup for all three personality profiles to determine whether there were enough centenarians in each subgroup. The four-class solution includes one subgroup with only a few centenarians (i.e., 4% of the sample). For the three-class solution, the plots (not shown) suggest that two groups display similar personality profiles and do not seem to differ. After considering inconsistencies and variations in some of the goodness-of-fit on the best number of groups, we selected the two-group solution for the Japanese sample.

Figure 1 displays estimated means for the two personality group profiles obtained for U.S. and Japanese centenarians and comparisons with the population means for the five personality factors. Results for the US sample suggest that Class 1 and Class 2 subgroups had
the same number of U.S. centenarians. Class 1 \((n=114, 50\%)\) consisted of U.S. centenarians with high mean scores for Neuroticism and low mean levels for Extraversion, Openness, Agreeableness, and Conscientiousness compared to the population means (Costa & McCrae, 1992). Class 2 \((n=114, 50\%)\) consisted of centenarians with low scores on Neuroticism and Openness, and higher mean scores for Extraversion, and Agreeableness compared to the population means (Costa & McCrae, 1992). When examining differences between the two-group personality profiles for the U.S. sample, results (not shown) suggest the two-personality groups differ significantly on levels of Neuroticism \(t(226)=7.96, p < .01\), Agreeableness \(t(226)=7.02, p < .01\), and Conscientiousness \(t(226)=9.31, p < .01\). These results indicate that U.S. in Class 2 had significant lower levels of Neuroticism and higher levels of Agreeableness and Conscientiousness compared to U.S. in Class 1. Centenarians in Class 1 can be labeled the “non-resilient group,” characterized by U.S. centenarians with higher mean levels of Neuroticism, and lower levels of Extraversion, Openness, Agreeableness and Conscientiousness, compared to U.S. population means. U.S. centenarians in Class 2 can be labeled the “resilient group” because centenarians from this group had significantly lower levels of Neuroticism, Openness, and Conscientiousness, and higher scores on Extraversion, and Agreeableness compared to the U.S. population means (Costa & McCrae, 1992).” The “resilient group” had a high average score on Extraversion and lower scores on Neuroticism and Agreeableness compared to centenarians in the “non-resilient group,” and both groups had low mean scores on Openness and Conscientiousness compared to the population means.

Figure 1 also shows estimated means for the two-class group personality profiles for Japanese centenarians. Class 1 \((n=98, 35\%)\) was the smaller centenarian personality
subgroup identified (non-resilient group), and consisted of Japanese centenarians with high mean levels of Neuroticism, and low average scores on Extraversion, Openness, Agreeableness, and Conscientiousness compared to the population means (Costa & McCrae, 1992). Class 2 (n=166, 65%) was the larger personality profile subgroup (resilient group) and included Japanese centenarians with higher mean scores on Extraversion, Agreeableness, and lower scores on Neuroticism, Openness, and Conscientiousness compared to the population means (Costa & McCrae, 1992). When testing differences between the two-group personality profiles in the Japanese sample, no significant differences were found (data not shown). Therefore, the results for the Japanese sample indicated that neither personality group profile differed significantly.

**Demographic and Cultural Differences in Personality Profiles**

Table 4 shows crosstabulation results for gender, ethnicity, residential status, education, and mental status differences in two personality group profiles for U.S. and Japanese centenarians. Results for the U.S. sample indicate significant residential $\chi^2(2, 228) = 6.21, p = .045$, educational $\chi^2(2, 177) = 9.60, p = .008$, and cognitive health $\chi^2(1, 226) = 7.28, p = .007$ differences between the two group personality class solution. These results suggest that only 27% of U.S. resilient centenarians lived in long-term care facilities, compared to 42% of non-resilient centenarians. U.S. centenarians with lower levels of education were more likely (51.7%) to be in Class 1 (the “non-resilient group”), whereas U.S. centenarians with either high school (35.6%) or college/post college degrees (35.6%) were more likely to be classified in the “resilient group.” In addition, results for cognitive health suggest that 52.6% of U.S. centenarians in poor cognitive health were in Class 1, the “non-resilient group,” and 34.8% of U.S. centenarians in poor cognitive health were in Class
2, the “resilient group.” No significant gender and ethnic differences were found between the “non-resilient group” and the “resilient group” for U.S. centenarians.

Table 4 also displays crosstabulation results for gender, residential status, education, and cognitive status differences in the two-class personality profiles solution for Japanese centenarians. No statistically significant demographic differences were found between the two personality profile groups. In addition, when examining cultural differences in the two-class personality profiles, the crosstabulation analysis (not shown) suggested that the percentage of centenarians in each of the 2-class personality profiles did not significantly differ across cultures, $\chi^2(1, 494) = 1.18, p = .278$.

**Discussion**

This study had several major goals: first, to investigate demographic and cultural differences on five personality traits; second, to determine whether personality profiles were similar across U.S. and Japanese cultures, and finally, to assess demographic differences on two-class personality profiles.

Demographic mean differences for the five personality traits indicate that women had higher scores on Neuroticism than men in both countries. This finding is consistent with previous studies (Costa et al., 2001; Schmitt et al., 2008; Weiss, Costa, Karuza, Duberstein, Friedman, & McCrae, 2005) that identified women as having higher levels of Neuroticism than men. In addition, centenarians from both countries with higher levels of education and higher levels of cognitive health had higher levels of Openness. This finding is consistent with results reported by Goldberg and colleagues (1998). They found that highly educated individuals rated themselves as more intellectual (Openness) than less educated individuals.
Additional results from the U.S. sample indicate centenarians living in long-term care facilities had higher scores on Neuroticism. It is not clear why institutionalized centenarians are more likely to be neurotic. Perhaps neurotic centenarians are more likely to be institutionalized and do not have family members to support them. U.S. centenarians with higher levels of education and better mental status had higher scores on Extraversion. Perhaps obtaining a higher degree influences personality traits leading individuals to be more sociable. It is not clear why centenarians in better cognitive health are more likely to be extraverted. Perhaps, centenarians in better cognitive health feel they can engage themselves more in social interactions. Finally, proxy reports for Conscientiousness suggest that U.S. centenarians living in long-term care facilities had lower scores on Conscientiousness. Perhaps being institutionalized leads to less responsibility by the residents in being in charge and actively involved in their own health care.

This study identified personality typologies of U.S. and Japanese centenarians. Results from the LPA revealed that a two-profile solution best described the personality structure of U.S. and Japanese samples. Results suggest that class 2, labeled the “resilient group,” is characterized by lower scores on Neuroticism and higher scores on Extraversion, Agreeableness, and Conscientiousness, compared to U.S. centenarians in class 1. Our findings from the resilient group partially support the findings by Martin and colleagues (2009) who reported that centenarians had lower mean scores on Neuroticism and Openness, but had higher scores on Extraversion, Agreeableness, and Conscientiousness. The resilient group from both samples reported lower levels of Conscientiousness compared to the population means.
The second identified profile group was class 1, the “non-resilient group,” consisting of half the U.S. centenarians and characterized as individuals with higher scores on Neuroticism and lower scores on Extraversion, Openness, Agreeableness and Conscientiousness, when compared to population means (Costa & McCrae, 1992). Our results suggest these two U.S. personality profile groups significantly differed—indicating that U.S. centenarians in the “resilient group” had significantly lower levels of Neuroticism, and higher levels of Agreeableness and Conscientiousness, when compared to U.S. centenarians in the “non-resilient group.”

LPA results for Japanese centenarians indicate the best fit was for the two-personality profiles solution. A larger number of Japanese centenarians were in the “resilient group,” which characterizes individuals with high mean levels of Extraversion, Agreeableness, and Conscientiousness and lower levels of Neuroticism and Openness compared to the population means. The second personality profile group labeled the “non-resilient group” included Japanese centenarians with high mean levels of Neuroticism and lower levels of Extraversion, Openness, Conscientiousness and Agreeableness compared to the population means.

When comparing LPA results across both cultures, it is interesting to note that we found similar personality patterns across the two cultures. In addition, the results seem to support a common personality structure in centenarians from both countries and indicate that the “resilient group” was found in both studies—comprised of centenarians with high mean levels of Extraversion, and Agreeableness, and low levels of Neuroticism, Openness, and Conscientiousness compared to the population means. In the U.S. sample, the two personality profiles significantly differed in personality configurations. The personality configurations of
Japanese centenarians from the “resilient group” did not differ from personality configurations of centenarians in the “non-resilient group.” It is not clear why the two identified personality profiles significantly differed in the U.S. sample, but not in the Japanese. Perhaps Japanese centenarians belong to a more homogeneous group, whereas U.S. centenarians may be more diverse. The U.S. sample comprised of Caucasians and African-Americans and this could have contributed to a result with more distinct personality profiles. The two personality profile groups in the Japanese study were not different, suggesting a higher number of Japanese centenarians with a higher number of positive personality traits. In contrast, the significant difference between resilient and non-resilient groups in the U.S. sample suggests a clear difference between the two personality groups and may suggest a resilient personality is not necessary for longevity.

The results suggest there are no significant cultural differences in personality profiles between U.S. and Japanese centenarians when examining cultural differences between the “non-resilient group” and “resilient group.” One study (Vollrath & Torgersen, 2000) concluded the combination of low Neuroticism and high Conscientiousness was the most positive personality profile helping students manage stress and coping. Perhaps a resilient personality equipped the “resilient group” to persevere, survive and enjoy positive outcomes in life. One important aspect to consider and be sensitive about when conducting cross-cultural research is the possibility of the existence of other personality characteristics important for these groups. We used a well-established measure to assess personality traits in centenarians; the fact that we did find the five NEO personality traits does not mean that other possible personality traits may exist within each culture. Studies should consider other forms of understanding personality structure such as the six foci of personality approach.
(Hooker & McAdams, 2003) that include traits, states, personal action constructs (PACs), life story, self-narration and self-regulation.

Results from the demographic mean comparisons between the two-personality profiles for U.S. centenarians suggest significant residential status, education, and mental status differences in the two-personality profiles. U.S. centenarians in the “resilient group” were more likely to live in private homes or personal care homes than in long-term care facilities, had attended high school or achieved higher academic degrees, and had higher mental status compared to U.S. centenarians from the “non-resilient group;” U.S. centenarians in the “non-resilient group” were more likely to live in long-term care facilities, had less education, and lower levels of mental status. These results seem to clearly differentiate the two personality profile groups; the “resilient group” appears to be better off in terms of some of the demographic characteristics. No demographic differences were found between the two-personality profile groups for the Japanese sample probably because both profile groups were similar in their configurations.

This study, like others, has limitations. The results can only be generalized to a very old population; the findings may not be the same for other age groups and may not represent all U.S. and Japanese centenarians. Results for the U.S. sample represent personality profiles of centenarians living in Georgia, and results obtained for the Japanese sample may only represent the personality characteristics of centenarians from the Tokyo area. In addition, our findings may represent the personality profiles of selective survivors that may be much better off compared to individuals that had already died. Perhaps, the two personality profiles found in both samples may have influenced U.S. and Japanese centenarians’ longevity. Future studies are needed to investigate the relationship between personality traits and mortality.
This study used proxy reports on centenarians’ personality traits, which may not accurately reflect centenarians’ personality profiles. We could have found different personality profiles if centenarians’ reports were used to assess their personality.

The most important finding from this study is the two common personality profiles (i.e., the resilient and non-resilient) in long-lived older adults from a Western and an Eastern culture. A positive combination of personality traits is not the only prerequisite for a long life; it is possible to be a centenarian with a non-resilient personality. Our results suggest that individuals do not need to possess a resilient personality to become a centenarian. Future studies should replicate our findings in other culturally diverse samples and should investigate the link between personality profiles and important life outcomes.
Acknowledgements

The Georgia Centenarian Study (Leonard W. Poon, PI) was funded by 1P01AG17553 from the National Institute on Aging, a collaboration among The University of Georgia, Tulane University Health Sciences Center, Boston University, University of Kentucky, Emory University, Duke University, Wayne State University, Iowa State University, Temple University, and University of Michigan. Additional authors include S. M. Jazwinski, R. C. Green, M. MacDonald, M. Gearing, W. R. Markesbery (deceased), J. L. Woodard, M. A. Johnson, J. S. Tenover, I. C. Siegler, W. L. Rodgers, D. B. Hausman, C. Rott, A. Davey, and J. Arnold. Authors acknowledge the valuable recruitment and data acquisition effort from M. Burgess, K. Grier, E. Jackson, E. McCarthy, K. Shaw, L. Strong and S. Reynolds, data acquisition team manager; S. Anderson, E. Cassidy, M. Janke, and J. Savla, data management; M. Poon for project fiscal management.

The Tokyo Centenarian Study was supported in part by a grant from the Japanese Ministry of Health and Welfare for the Scientific Research Project on Longevity, a grant for studying the multidisciplinary approach to centenarians and its international comparison (Principal Investigator, Nobuyoshi Hirose); a grant from the Japanese Ministry of Education, Science and Culture (No.15730346); and aid for research from the Keio Health Consulting Center.
References


Table 1

**Demographic Characteristics of Complete Sample and High Mental Status Centenarians (MMSE ≥ 17)**

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>United States (GCS)</th>
<th>Japan (TCS)</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of centenarians</td>
<td>N=239 (n=137)¹</td>
<td>N=304 (n=98)¹</td>
<td>--</td>
</tr>
<tr>
<td>Age in years M (SD)</td>
<td>99.7 (1.63)</td>
<td>100.8 (1.32)</td>
<td>--</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>1.23 (4.60*)¹</td>
</tr>
<tr>
<td>Women</td>
<td>82% (79%)¹</td>
<td>79% (66%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Men</td>
<td>18% (21%)¹</td>
<td>21% (34%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>74.5% (83%)¹</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Black/African-American</td>
<td>25.5% (17%)¹</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Asian</td>
<td>--</td>
<td>100%</td>
<td>--</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>8.56*(4.74*)¹</td>
</tr>
<tr>
<td>Less than High School</td>
<td>41% (18%)¹</td>
<td>41% (31%)¹</td>
<td>--</td>
</tr>
<tr>
<td>High School Completed</td>
<td>30% (42%)¹</td>
<td>40% (36%)¹</td>
<td>--</td>
</tr>
<tr>
<td>College/Post Graduate</td>
<td>29% (40%)¹</td>
<td>19% (33%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Residential Status</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Private Home</td>
<td>45% (56%)¹</td>
<td>68% (88%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Personal Care Home</td>
<td>18% (20%)¹</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>37% (23%)¹</td>
<td>26% (2%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Hospital</td>
<td>--</td>
<td>7% (10%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Marital Status</td>
<td>00% (00%)¹</td>
<td></td>
<td>21.30***(5.51)¹</td>
</tr>
<tr>
<td>Married</td>
<td>4% (5%)¹</td>
<td>1% (4%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Separated</td>
<td>0% (0%)¹</td>
<td>1% (0%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Divorced</td>
<td>4% (4%)¹</td>
<td>0% (1%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Widowed</td>
<td>87% (85%)¹</td>
<td>96% (93%)¹</td>
<td>--</td>
</tr>
<tr>
<td>Never Married</td>
<td>5% (7%)¹</td>
<td>1% (1%)¹</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note.* Because of rounding, percentages may not add to 100. GCS= Georgia Centenarian Study; and TCS= Tokyo Centenarian Study. ¹=Values inside the parenthesis are values for centenarians with high levels of cognitive health. *p < .10. *p < .05. **p < .01. ***p < .001.
### Table 2

*Cultural Differences on the Big-Five Personality Traits*

<table>
<thead>
<tr>
<th>Personality Traits</th>
<th>U.S. Sample</th>
<th>Japanese Sample</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>N</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>228</td>
<td>16.91</td>
<td>244</td>
</tr>
<tr>
<td>Extraversion</td>
<td>227</td>
<td>26.54</td>
<td>251</td>
</tr>
<tr>
<td>Openness</td>
<td>227</td>
<td>20.13</td>
<td>243</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>228</td>
<td>32.83</td>
<td>247</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>228</td>
<td>30.70</td>
<td>250</td>
</tr>
</tbody>
</table>

*p < .10. *p < .05. **p < .01. ***p < .001.
Table 3

Comparisons of Model Fit Indices of Personality Traits for U.S. and Japanese Centenarians

<table>
<thead>
<tr>
<th></th>
<th>Akaike (AIC)</th>
<th>BIC</th>
<th>Adjusted BIC</th>
<th>Entropy</th>
<th>VLMR&lt;sub&gt;p&lt;/sub&gt;</th>
<th>LMR&lt;sub&gt;p&lt;/sub&gt;</th>
<th>BLRT&lt;sub&gt;p&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U.S. Sample</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Groups</td>
<td>7396.520</td>
<td>7451.389</td>
<td>7400.680</td>
<td>0.687</td>
<td>0.0020</td>
<td>0.0023</td>
<td>0.0000</td>
</tr>
<tr>
<td>3 Groups</td>
<td>7345.502</td>
<td>7420.948</td>
<td>7351.222</td>
<td>0.749</td>
<td>0.0860</td>
<td>0.0909</td>
<td>0.0000</td>
</tr>
<tr>
<td>4 Groups</td>
<td>7321.121</td>
<td>7417.143</td>
<td>7328.402</td>
<td>0.806</td>
<td>0.2132</td>
<td>0.2218</td>
<td>0.0000</td>
</tr>
<tr>
<td><strong>Japanese Sample</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Groups</td>
<td>8491.889</td>
<td>8549.225</td>
<td>8498.496</td>
<td>0.694</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>3 Groups</td>
<td>8471.651</td>
<td>8550.488</td>
<td>8480.736</td>
<td>0.721</td>
<td>0.4131</td>
<td>0.4220</td>
<td>0.0000</td>
</tr>
<tr>
<td>4 Groups</td>
<td>8457.534</td>
<td>8557.872</td>
<td>8469.096</td>
<td>0.744</td>
<td>1.0000</td>
<td>1.0000</td>
<td>0.0128</td>
</tr>
</tbody>
</table>

*Note.* BIC= Bayesian Information Criterion; VLMR= Vung-Lo-Mendell-Rubin; LMR= Lo-Mendell-Rubin; BLRT= Bootstrap Likelihood Ratio Test.
Table 4

Demographic Differences in Two Group Class Personality Profiles in U.S. and Japanese Centenarians

<table>
<thead>
<tr>
<th>Demographics</th>
<th>U.S. Centenarians</th>
<th></th>
<th>Japanese Centenarians</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LC(1)</td>
<td>LC(2)</td>
<td>LC(1)</td>
<td>LC(2)</td>
</tr>
<tr>
<td></td>
<td>Freq.  %</td>
<td>Freq.  %</td>
<td>χ²</td>
<td>Freq.  %</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>19  16.7</td>
<td>21  18.4</td>
<td>18  19.6</td>
<td>38  21.8</td>
</tr>
<tr>
<td>Women</td>
<td>95  83.3</td>
<td>93  81.6</td>
<td>74  80.4</td>
<td>136  78.2</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whites</td>
<td>88  77.2</td>
<td>87  76.3</td>
<td>-- --</td>
<td>-- --</td>
</tr>
<tr>
<td>Blacks</td>
<td>26  22.8</td>
<td>27  23.7</td>
<td>-- --</td>
<td>-- --</td>
</tr>
<tr>
<td>Residential Status</td>
<td></td>
<td></td>
<td>6.21*</td>
<td>1.44</td>
</tr>
<tr>
<td>Private Home</td>
<td>48  42.5</td>
<td>54  47.4</td>
<td>61  66.3</td>
<td>126  72.4</td>
</tr>
<tr>
<td>Personal Care Home</td>
<td>18  15.9</td>
<td>29  25.4</td>
<td>-- --</td>
<td>-- --</td>
</tr>
<tr>
<td>Long Term Care</td>
<td>47  41.6</td>
<td>31  27.2</td>
<td>25  27.2</td>
<td>36  20.7</td>
</tr>
<tr>
<td>Hospital</td>
<td>-- --</td>
<td>-- --</td>
<td>6  6.5</td>
<td>12  6.9</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 4 (continued)

<table>
<thead>
<tr>
<th>Demographics</th>
<th>U.S. Centenarians</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Japanese Centenarians</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LC(1)</td>
<td>LC(2)</td>
<td></td>
<td></td>
<td></td>
<td>LC(1)</td>
<td>LC(2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
<td>χ²</td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
<td>χ²</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower High School</td>
<td>45</td>
<td>51.7</td>
<td>26</td>
<td>28.9</td>
<td>9.60**</td>
<td>36</td>
<td>41.4</td>
<td>66</td>
<td>39.5</td>
<td>2.36</td>
</tr>
<tr>
<td>High School</td>
<td>21</td>
<td>24.1</td>
<td>32</td>
<td>35.6</td>
<td>2.36</td>
<td>39</td>
<td>44.8</td>
<td>65</td>
<td>38.9</td>
<td>1.78</td>
</tr>
<tr>
<td>College/Post College</td>
<td>21</td>
<td>24.1</td>
<td>32</td>
<td>35.6</td>
<td>2.36</td>
<td>12</td>
<td>13.8</td>
<td>36</td>
<td>21.6</td>
<td>1.78</td>
</tr>
<tr>
<td>MMSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor Cognitive Health</td>
<td>60</td>
<td>52.6</td>
<td>39</td>
<td>34.8</td>
<td>7.28**</td>
<td>61</td>
<td>70.9</td>
<td>98</td>
<td>62.4</td>
<td>1.78</td>
</tr>
<tr>
<td>High Cognitive Health</td>
<td>54</td>
<td>47.4</td>
<td>73</td>
<td>65.2</td>
<td>7.28**</td>
<td>25</td>
<td>29.1</td>
<td>59</td>
<td>37.6</td>
<td>1.78</td>
</tr>
</tbody>
</table>

Note. LC: Latent Class. *p < .05. **p < .01. ***p < .001.
Figure 1. Mean personality profiles for U.S. and Japanese centenarians for two-class solution. \(^1\) = Costa and McCrae, 1992.
CHAPTER 4: PERSONALITY AND LIFE EVENTS AS PREDICTORS OF MENTAL AND COGNITIVE HEALTH OF U.S. AND JAPANESE CENTENARIANS

A paper to be submitted to Psychology and Aging

Grace D. da Rosa, Peter Martin, Yasuyuki Gondo, Nobuyoshi Hirose, Hiroki Inagaki, Leonard W. Poon, and for the Georgia Centenarian Study

1Iowa State University, Ames, U.S.A; 2Osaka University, Osaka, Japan; 3Department of Geriatric Medicine, Keio University School of Medicine, Tokyo, Japan; 4Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan; 5University of Georgia, Georgia, U.S.A.

Abstract

This study investigates the effect of personality and life events on mental and cognitive health. A population-based sample of 239 U.S. centenarians from the Georgia Centenarians Study and 304 Japanese centenarians from the Tokyo Centenarian Study were included in this study. We assessed demographic mean differences between mental and cognitive health in U.S. and Japanese centenarians. Several structural equation models were computed for each culture to test for effects of personality and life events (i.e., marriage and historical events) on mental and cognitive health. Results from structural equation modeling indicated that centenarians with a resilient personality had better mental health in both samples. No significant mediating and moderating effects of personality were found in either sample. Japanese centenarians who reported marriage as the most important event had better mental health and those reporting historical events had poor mental health. It is important to further investigate the role that resilient personality has in affecting important life outcomes.

Keywords: centenarians, mental health, cognitive health, personality profiles, life events, mental health.
Introduction

Mental health and cognitive health are necessary for the maintenance of independence and quality of life. Mental health was defined by the World Health Organization (WHO) as “…a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (WHO 2003, p.7). The definition alludes to health-related domains that equip individuals to successfully cope with challenges in life and contribute to their independence and daily functioning. As people age, they may experience several life changes, such as deterioration and decline of health and cognition, change in functional capacity, loss of independence and loved ones. These events may put very old individuals at risk for poor mental and cognitive health.

Centenarians comprise a unique and select group who has lived a full ten-decade. Experiencing many events and changes in life may increase centenarians’ risk of developing mental and cognitive health problems. To better understand mental and cognitive health in very late life, it is important to investigate the effects of individual differences (i.e., personality traits and life experiences), and the role they play in differentiating those with better or poor mental and cognitive health.

The main purpose of the present study was to investigate the overall mental and cognitive health of centenarians in the U.S. and Japan. We also investigated group mean differences (i.e., gender, ethnicity, education, residential status, personality, and life events) in mental and cognitive health in U.S. and Japanese centenarians. A final objective of this study was to assess the effects of personality and life events on mental and cognitive health
including mediating and moderating effects of personality in the relationship between life events and two health outcomes.

**Mental Health of Centenarians**

An individual’s mental health can be critical for adaptation, everyday functioning, and well-being. Some mental health studies suggest the oldest old have lower levels of mental health compared to younger old-age groups. For example, Martin and da Rosa (2006) found significant age differences in depression and morale between centenarians and nonagenarians, suggesting that centenarians had higher levels of depression and lower levels of morale compared to nonagenarians. The results also suggested centenarians had higher levels of agitation and feelings of loneliness (Martin & da Rosa, 2006). No residential differences in depression and morale were found between older adults living independently and those living in long-term care settings. In the most recent Georgia Centenarian Study, centenarians reported higher levels of depressive symptoms compared to octogenarians (Arnold et al., 2010). Pinquart (2001), conducting a meta-analysis, reported a higher decline of positive affect, and higher increase of negative affect among the oldest group. Teachman (2006) found a similar result for negative affect in later life; individuals aged 18 to 93 years had increased negative affect after the age of 70 (Teachman, 2006). When investigating mental health in centenarians, the influences of individual characteristics (i.e., personality) and the impact of life events on overall health becomes an important consideration.

Studies assessing centenarians suggest that personality influences mental health in later life. For example, Adkins, Martin, and Poon (1996) investigated the effects of personality traits and morale states in sexagenarians, octogenarians, and centenarians. The
results for the centenarian group showed that personality traits explained 18% of the variance in morale, and low levels of Tension and high levels of Extraversion were associated with high morale (Adkins et al., 1996). MacDonald, Martin, Margrett, and Poon (2009) assessed centenarians’ mental health and compared centenarian self-reports to proxy and interviewer reports. The results suggested all three ratings had significant levels of agreement on centenarians’ overall mental health, and that high Extraversion was associated with mental health as reported by centenarians and interviewer. The authors reported that high levels of Neuroticism predicted poor mental health. Jopp and Rott (2006) confirmed the importance of personality for mental health; Extraversion predicted happiness in German centenarians. Poon and colleagues (2010) assessed the influence of four psychosocial domains on health and quality-of-life of U.S. oldest old from the Georgia Centenarian Study. The authors investigated the influence of the five personality traits on mental health of centenarians, concluding that individuals with low levels of Neuroticism and Conscientiousness and high levels of Openness to Experience had better mental health (Poon et al., 2010). Margrett and colleagues (2010) investigated the effects of two personality traits (i.e., Extraversion and Neuroticism) and cognition on depressive symptoms of U.S. centenarians, and one of the results suggested that higher levels of Neuroticism, living in nursing or personal care homes were factors associated with higher levels of depressive symptoms (Margrett et al., 2010). Masui, Gondo, Inagaki, and Hirose (2006) found that Conscientiousness, Extraversion, and Openness were strongly associated with longevity in Japanese centenarians from the Tokyo Centenarian Study. In the present study, we assessed the mediating and moderating effect of personality on the relationship between life events and mental and cognitive health. We
investigated whether possessing a resilient personality trait protects centenarians from the effects of life events on mental and cognitive health of centenarians.

Centenarians have lived a long, full life and would have experienced many events in their life, which may have affected mental health. Poon and colleagues (2010) reported that 87% of centenarians had lost a spouse, 32.1% had lost children, 89.9% had experienced a decline in activity, and 97.8% had been hospitalized in their lifetime. Assessing centenarians’ most important life events can be useful in examining events that strongly influenced them and which they considered important. A U.S. pilot study (Aldwin, 1990) on stress found that the most stressful event for older adults were the death and institutionalization of family members (Aldwin, 1990). A Brazilian study (de Paula Couto, Koller, & Novo, 2011) found that divorce /marital separation, parent institutionalization, and child, spouse or parent death were very stressful events for older adults. Losing a spouse can be a stressful event that is found to strongly impact subjective well-being of German younger adults (Lucas et al., 2003) and was found to specifically affect cognitive well-being of individuals. In addition, Lucas and colleagues (2003) found a “long-lasting” effect of widowhood on well-being suggesting that individuals after losing a spouse did not adapt to their previous baseline levels of well-being. Lucas and colleagues (2003) suggested that overall adaptation does seem to occur to individuals after experiencing positive or negative life events.

Luhmann, Hofmann, Eid, and Lucas (2012) in a meta-analysis examined the effects of several life events on affective (presence of positive and lack of negative affect) and cognitive (overall cognitive evaluation of life) well-being and found that bereavement had a negative effect on affective and cognitive well-being, but the effect was stronger for
cognitive well-being. The authors suggested that it is not the nature of an event that seems to influence whether individuals adapt well to situations, but it may matter whether individuals find explanations and meaning to the events experienced (Luhmann et al., 2012).

**Cognitive Health of Centenarians**

Cognitive health is another component of overall health important for daily functioning and independence; it is essential for maintaining the ability to think, remember, and reason while dealing with everyday tasks and different and challenging situations. Dementia leads to dependency and is the main contributor to high-cost long-term care in the last years of life (U.S. Department of Health and Human Service, 1999).

Prevalence rates of dementia among centenarians seem to vary across studies. Poon and colleagues (2012) found 22.5% of U.S. centenarians had cognitive health, whereas 53.3% had some type of dementia. Poon and colleagues (2012) reported a higher incidence of dementia among African-American centenarians living in long-term care settings. In addition, highly educated centenarians were less likely to have dementia (Poon et al., 2012). A cross-cultural study (Hagberg, Alfredson, Poon, & Homma, 2001) assessed cognitive functioning of centenarians from Japan, Sweden, and the United States and reported that 63% of Japanese centenarians (43% men and 71% women) and 27-40% of Swedish centenarians (16% men and 30% women) had dementia. Centenarians from the three studies had lower cognitive performance compared to younger control groups (Hagberg et al., 2001). Asada and colleagues (1996) found a high prevalence of dementia in 47 Japanese centenarians: 70.2% had dementia and approximately 76% had Alzheimer’s disease. A population-based Danish study (Andersen-Ranberg, Vasegaard, & Jeune, 2001) suggested it is possible to live
long without dementia. They found that 51% of Danish centenarians had mild to severe dementia and 37% had no dementia signs (Andersen-Ranberg et al., 2001). Perls (2004) also concluded it is possible to be a centenarian with no signs of dementia. In contrast, a Dutch study (Blansjaar, Thomassen, & Van Schaick, 2000) assessed 15 centenarians and found an extremely high prevalence of dementia among all centenarians; the authors contended that individuals reaching extreme old age would eventually have dementia. In summary, there is notable variability in the prevalence of dementia among centenarians, but most studies contend it is possible to be a centenarian without dementia.

A population-based study (Davey et al., 2010) assessed gender, race, residential and educational status differences in cognitive functioning, physical performance, health, health behaviors, and diseases of centenarians and near centenarians. The results suggested that men, White, highly educated, and community-living centenarians had better cognitive functioning.

Personality may be an important predictor of cognitive health of centenarians, with the potential to influence the relationship between life events and cognitive health. Few studies have investigated the influence of personality traits on cognitive health of older adults. Wilson and colleagues (2007) investigated the association between Conscientiousness and the occurrence of Alzheimer’s disease and poor cognitive health among older U.S. Catholic clergy, suggest that individuals with high levels of Conscientiousness began the study at about the same level of cognition as those individuals low in Conscientiousness but declined substantially less during follow-up assessment (Wilson et al., 2007). Another study
investigated the association between personality and cognition, and Openness to Experience was associated with high cognitive performance (Schaie, Willis, & Caskie, 2004).

There are not many studies investigating the effects of life events on mental status of older adults, and existing studies report contradictory findings in supporting this relationship. Some studies indicate that life events have a significant negative effect on cognitive functioning among older adults (Comijs et al., 2011), whereas other studies did not find a significant relationship between negative life events and cognitive performance among older adults (Rosnick et al., 2007). Studies support the importance of using individual life events in predicting changes in cognitive performance instead of using cumulative negative events and aggregate measures of events (Comijs et al., 2011; Rosnick et al., 2007). These studies found no significant association between cumulative negative life events and cognitive decline, but a significant association between specific life events and cognitive performance was found. Studies seem to suggest that some events improve, whereas other events lead to decline in cognitive performance. Comijs and colleagues (2011) found that highly stressful life events (i.e., death of a child or grandchild) were associated with cognitive decline, whereas chronic stressors (i.e., illness of a partner or relative, or conflicts) were associated with better cognitive performance in Dutch individuals aged 55 to 85 years. Comijs and colleagues (2011) argued that events differed on the amount of stressful impact they generate. Illness of a partner is a stressful experience that occurs for an extended period and may have a severe impact on the individual and their cognitive performance (Comijs et al., 2011).

To our knowledge, there are not many cross-cultural studies on centenarians that include psychosocial variables, and many studies on life events and personality use summary
scores to represent a total number that participants experienced. Our study is unique because it focuses on a cross-cultural investigation on the effects of the most important event and combination of personality traits in predicting mental and cognitive health of U.S. and Japanese centenarians. In addition, centenarians have lived for a very long time and may have a unique combination of personality traits that may have contributed to their longevity. We also wanted to investigate whether centenarians possessing a resilient personality would report to be less mentally and cognitive affected by negative events. Maybe experiencing life events leads to resilience with influence on mental and cognitive health of centenarians.

The present study addressed several main research questions: 1) Are there demographic (i.e., gender, ethnic, residential status, education, and mental status) differences in mental health and cognitive health for U.S. and Japanese centenarians? 2) Are there cultural differences (i.e., U.S. and Japanese centenarians) in cognitive health? 3) Do personality and life events predict mental and cognitive health? 4) Does personality mediate or/and moderate the relationship between life events and mental and cognitive health?

Method

Participants and Procedures

This study used data from Phase 3 of the Georgia Centenarian Study (Poon et al., 2007) and from the Tokyo Centenarian Study (Hirose et al., 2004; Homma, Ishida, Hirose, & Nakamura, 1994).

**Georgia Centenarian Study (Phase 3).** The participants in this study were from a population-based sample in Georgia (GCS; Poon et al., 2007), including 239 centenarians and near centenarians (98 to 109 years) and their proxies. The names of the participants were
obtained from the state of Georgia voter registration lists and from calls to a random subset of nursing home facilities. Centenarians were recruited by telephone and mail, with subsequent face-to-face interviews. Proxies received questionnaires from the interviewer or by mail.

Table 1 displays detailed information describing the participants in the study. In the U.S. study, 82% of the centenarians were women, White/Caucasian (75%), and lived independently in private homes (45%). Proxy information about the centenarians was obtained for all the personality measures. In addition, proxy reports on most important life events and mental health variables were obtained only for centenarians with poor levels of cognitive health (MMSE < 17). The majority of proxies (40%) were daughters, sons (15%), granddaughters (8%), nieces (8%) and wives (6%).

**Tokyo Centenarian Study.** This study included 304 Japanese centenarians and their proxies from the Tokyo metropolitan area. The mean age was 101 years ($SD=1.3$) with an age range from 100 to 106 years. The Tokyo Centenarian Study (TCS; Hirose et al., 2004; Homma et al., 1994) was initiated in 1992 with a random number of centenarians recruited from residential lists. In the TCS, the majority of Japanese centenarians were women (79%) and lived independently in private homes (68%). Among proxies, 54% were the centenarian’s child, 19% the spouse of their child, 13% facility staff, and 4% a grandchild.

Table 1 also compares some of the demographic variables across cultures for the complete sample and for centenarians with higher MMSE. The $\chi^2$ results for the complete sample suggest that significant cultural differences were found for education and marital status, $\chi^2(2, N=473) = 8.56, \ p < .05$; $\chi^2(4, N=514) = 21.30, \ p < .001$, respectively. The
cross-cultural comparison indicate that higher number of U.S. centenarians (29%) had college/post college compared to Japanese centenarians (19%), whereas a high number of Japanese centenarians (40%) completed high school compared to U.S. centenarians (30%). Our findings indicate that a higher number of U.S. centenarians (5%) never married compared to only 1% of Japanese centenarians. A higher percentage of U.S. centenarians (4.2%) were currently married compared to 1.4% of Japanese centenarians. There were higher number of divorced U.S. centenarians (4%) compared to Japanese centenarians (0%).

In addition, we found that 99% of Japanese centenarians had been married at some point in time compared to 95.4% of U.S. centenarians. Results comparing only centenarians with higher MMSE indicate that there were more women (79%) in the U.S. sample compared to women in the Japanese sample (66%), \( \chi^2(1, N= 235) = 4.60, p < .05. \)

In this study, we used proxy reports to obtain centenarians’ personality traits. Poor health, mental status, and hearing and vision problems may prevent centenarians from participating--or may compromise their performance on questionnaires. The nonresponse rate is high among individuals 85 years and older (Herzog & Rodgers, 1992). Proxy reports provided information from centenarians unable to answer or provide accurate answers to questions. Studies demonstrate the benefit of using proxy reports when obtaining data from vulnerable populations. According to Herzog and Rodgers (1992), it is important to use proxies when studying the oldest old, and limiting a study to only healthy elderly individuals capable of self-reporting can bias the results. Gu (2009) examined the use of proxy reports in the Chinese Longitudinal Healthy Longevity Study and found that centenarians needing a
proxy tended to be older, more poorly educated, lived in rural areas, had poor cognitive
functioning, and had higher levels of disability.

Measures

Demographic variables. In this study, demographic variables included age, gender
(0=male, and 1=female), ethnicity/race (0=Caucasian, 1=African American; only assessed in
the U.S. sample), culture (0=U.S. American, 1=Japanese), education (1=less than high
school, 2=high school completed, 3=college/post college) residential status (0=private home,
1=personal care home, 2=hospital, and 3=long-term care facility), and marital status
(1=currently married, 2=living with a partner, 3=separated, 4=divorced, 5=widowed, and
6=never married).

Personality. Proxy reports were obtained to assess centenarians’ personality. We
used two personality profiles from a previous study (da Rosa et al., 2012b) to assess
centenarians’ personalities. Profiles were obtained after we performed latent profile analyses
for each sample. Da Rosa and colleagues (2012b) identified two personality profiles using
the same data for U.S. and Japanese centenarians that best fit the data, and we named the two
personality groups resilient (=2) and non-resilient (=1). The resilient personality group
consisted of centenarians with high levels of Extraversion and Agreeableness, and low levels
of Neuroticism, Openness, and Conscientiousness compared to the population means (Costa
& McCrae, 1992). The non-resilient group included centenarians with high scores on
Neuroticism and low scores on Extraversion, Openness, Agreeableness, and
Conscientiousness compared to the population means (Costa & McCrae, 1992). For the U.S.
sample, 114 centenarians were in the resilient group and 114 centenarians were in the non-
resilient group. Results for the Japanese sample (da Rosa et al., 2012b) demonstrated that 166 (65%) centenarians were in the resilient group and 98 (35%) were in the non-resilient group.

In the U.S. study, the NEO Personality Inventory (NEO PI-R) was used to obtain centenarians’ personality information by proxy. The NEO PI-R contains 240 items. The Japanese version (Shimonaka et al., 1999) of the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) ascertained centenarians’ personality profiles from Japanese proxies. The Japanese version of the NEO-FFI contains good reliability and validity (Shimonaka, Nakazato, Gondo, & Takayama, 1999). The questions on both NEO personality inventories had answers on a five-point scale, ranging from SD=strongly disagree (=0), D=disagree (=1), N=neutral (=2), A=agree (=3), to SA=strongly agree (=4).

To permit a direct comparison of the two samples, the NEO PI-R scale employed in the U.S. sample was reduced to be comparable with items from the NEO-FFI used in the Japanese study. The NEO FFI has five factors--each factor containing 12 questions. The reliabilities for the NEO used in the U.S. study for each personality dimension was .82 for Neuroticism, .78 for Extraversion, .72 for Openness, .87 for Agreeableness, and .83 for Conscientiousness. In the Japanese study, the reliability for Neuroticism was α=.77, for Extraversion .80, for Openness .61, for Agreeableness .89, and for Conscientiousness .86. In both samples, the same Openness personality question (“she/he believes we should look to our religious authorities for decisions on moral issues”) was deleted in order to improve the reliability of the Openness to Experience personality trait.

**Life events.** In both studies, a self-constructed, open-ended question was used to assess the most important life events experienced by centenarians. The question asked:
“What was the most important experience that you had in your life?” These variables were dichotomized according to the answer elicited by the question: “Was the life event domain mentioned as the most important?” (0=no and 1=yes). In this study, the two most cited life event domains (i.e., marriage and historical event) were used, because in a previous analyses (da Rosa et al., 2012a) marriage was the most often mentioned event by U.S. centenarians, and historical events were the most frequently mentioned events by Japanese centenarians. For the U.S. sample, 43 centenarians reported marriage as the most important event compared to 174 who did not mention marriage as the most important event. In addition, only 3 U.S. centenarians reported historical events compared to 183 U.S. centenarians who did not report historical events to be the most important. In the Japanese sample, 43 centenarians reported marriage as an important event compared to 150 Japanese centenarians who did not mention marriage as the most important life event. In addition, 100 Japanese centenarians mentioned historical events as the most important events compared to 93 Japanese centenarians who did not report historical events to be the most important events in their lives. In the U.S. study, life-event data from centenarians with low MMSE scores (i.e., MMSE < 17) were obtained from proxies.

In one of our previous studies (da Rosa et al., 2012a) we assessed whether there were mental status differences on reporting the most important life events. Proxies were more likely to mention family events as the most important life event in the life of centenarians with low MMSE scores compared to self-reports by high MMSE centenarians. In addition, Japanese centenarians with low MMSE were more likely to mention marriage and death/grief
events as the most important life event they had experienced compared to Japanese centenarians with high MMSE.

**Mental health self-reports.** Two distinct self-report measures were used to assess mental health in centenarians. The two studies (U.S. and Japanese) did not possess the same mental health measures. In the U.S. study, mental health was assessed by the Affect Balance Scale (Bradburn, 1969), consisting of a 10-item scale containing five statements reflecting positive feelings, and five statements reflecting negative feelings in order to assess the participant’s overall psychological well-being. Only U.S. centenarians with better mental status (MMSE >16) provided mental health data. The questions were constructed in a “yes or no” format. An example of a positive item was: “During the past weeks did you ever feel particularly excited or interested in something?” An example of a negative affect item was: “During the past few weeks did you ever feel very lonely or remote from other people?” The Bradburn Affect Balance Scale included questions requiring answers along a four-point scale ranging from 1=not at all, 2=once, 3=several times, to 4=often. Higher scores suggested higher levels of the affect domain. Cronbach’s alpha for the Bradburn Affect Balance Scale was .67 for positive affect, and .63 for negative affect.

The Philadelphia Geriatric Center Morale Scale - PGC (Lawton, 1975) was used in the Japanese sample. This scale assessed a centenarian’s sense of satisfaction with self, feelings-of-fit in the environment, and acceptance of what cannot be changed. The scale had 17 items with three dimensions of morale: agitation (6 items), attitude toward one’s own aging (5 items), and lonely dissatisfaction (6 items). The present study used the three morale sub-dimensions to assess the mental health of Japanese centenarians. The questions were
rated on a dichotomous scale, coded: 1=no, and 2=yes. The following questions exemplify those used to assess each emotional state: agitation, “I get upset easily;” attitude toward aging, “Things keep getting worse as I get older;” and lonely dissatisfaction, “I have a lot to be sad about.” A high score in each subscale indicated high morale. In the Japanese study, Cronbach’s alpha for the summary score of the PGC was $\alpha=.75$.

**Cognitive health.** In both samples, the Mini-Mental Status Examination (MMSE; Folstein, Fostein, & McHugh, 1975) and the Global Deterioration Scale (Reisberg et al., 1982) were included. The MMSE is a well-validated tool commonly used to screen for mental status functioning. It includes 11 items that produce a score ranging from 0 to 30, and is divided into six areas of cognitive functioning, assessing global cognitive function with items testing orientation, word recall, attention, calculation, language, and visuospatial abilities. A summary score was used to assess cognitive health of older adults. The questions were rated on a dichotomous scale, coded: 1=no, and 2=yes. An example of a cognition related statement was: “What is the (year) (season) (date) (day) (month)?” A high score indicated centenarians had high levels of cognitive health. In this study, Cronbach’s alpha for the total MMSE was .71 for the U.S. sample, and .84 for the Japanese study.

The Global Deterioration Rating Scale (GDRS; Reisberg et al., 1982) was also used to assess cognitive health of older adults in both studies. Centenarians were rated according to a seven-point scale by the interviewer. An individual is considered demented if he/she obtained a score from 4 to 7, and to have poor mental status if the score was 3 on the GDRS. The GDRS is a single score and in this study, higher scores indicated better cognitive health.
In the U.S. study, mental health data from centenarians with poor cognitive health scores were not obtained. Therefore, we used information provided by proxies to obtain mental health data from centenarians with low MMSE scores (MMSE < 17). The lower MMSE cutoff of 17 took into account that centenarians tend to have lower levels of education--and several displayed sensory problems. There was a strong correlation between the MMSE and GDRS summary scores for the U.S. sample, $r = .86$, $p < .001$, and for the Japanese sample, $r = .94$, $p < .001$.

**Statistical Analyses**

The analyses for this study involved several steps. First, two one-way analyses of variance (ANOVA) were performed to obtain group mean differences (i.e., gender, ethnicity, residential status, education status, personality, and life event domains) on mental and cognitive health for U.S. and Japanese centenarians. Next, two structural equation modeling analyses were performed separately by culture to test the mediating effects of personality on the relationship between life event domain (i.e., marriage and historical event) and mental and cognitive health using Mplus 5.0 (Muthén & Muthén, 2007). Next, two additional structural equation analyses were conducted in each sample to assess the moderating effects of personality on the relationship between life-events (i.e., marriage and historical events) and mental and cognitive health of centenarians. Full information maximum likelihood estimation was used to account for missing data. Several goodness-of-fit measures were assessed, such as the chi-square ($\chi^2$), comparative fit index (CFI), root mean square error of approximation (RMSEA), and root mean square residual (SRMR).
Results

Results are presented in several sections: first, we present and discuss the bivariate correlation between variables included in the study. Second, we report group mean differences on mental health and cognitive health for U.S. and Japanese centenarians. Third, cultural differences in cognitive health will be presented. Fourth, we will present results for personality and life event domains as predictors of mental and cognitive health of centenarians, and we will also report whether personality profiles mediate the relationship between life events and the two health outcomes. Finally, we will test whether personality profiles moderate the relationship between life event domain and mental and cognitive health for centenarians from each country.

Table 2 displays the correlation matrix with variables included in this study. In the lower diagonal, there are values for variables used in the U.S. study, and in the upper diagonal there are values for variables included in the Japanese study. Results for the U.S. sample indicate a significant correlation between positive and negative affect. A high significant correlation ($r = -.85$) was found for cognitive health variables. Mental health variables were correlated with the MMSE score but not the GDRS in the U.S. study. No significant correlation was found between predicting variables.

For the Japanese study, the three mental health subdomains indicate morale. Results suggest that mental health variables were correlated modestly ($r = .32$ to $.54$) and cognitive variables were highly correlated ($r = -.94$). No significant correlations were found between mental and cognitive health variables.
Mean Group Differences on Mental Health and Cognitive Health

Group mean differences in mental and cognitive health for U.S. centenarians (table not shown) indicate there were ethnic differences between the two cognitive measures (i.e., MMSE and GDRS). African American centenarians had lower scores on the MMSE, $F(1,230) = 11.82, p < .01$, and GDRS, $F(1,193) = 15.99, p < .001$, compared to White centenarians. Residential differences were found for positive affect, $F(2,228) = 4.84, p < .05$, MMSE, $F(2,229) = 34.82, p < .001$, and GDRS, $F(1,192) = 20.31, p < .001$. Post-hoc analysis using the Scheffé post-hoc test suggest that U.S. centenarians living in long-term care facilities had significantly lower levels of positive affect ($M= 9.73, SD= 3.73$), lower MMSE scores ($M= 11.72, SD= 7.90$), and lower ratings on the GDRS ($M= 3.20, SD= 1.44$) when compared to centenarians living independently. Results for educational differences in mental and cognitive health suggest that U.S. centenarians with lower levels of education had significantly higher scores on negative affect and lower levels of cognitive health than centenarians with higher education levels. Centenarians in the resilient personality group had significantly higher scores on positive affect, $F(1,224) = 38.54, p < .001$, the MMSE, $F(1,225) = 11.75, p < .01$, and the GDRS, $F(1,187) = 6.86, p < .05$. In addition, resilient centenarians also had lower levels of negative affect, $F(1,224) = 19.06, p < .001$, compared to centenarians in the non-resilient personality group. U.S. centenarians reporting marriage as the most important life event had significantly poorer scores on the GDRS than centenarians who did not mention marriage as the most important life event domain. No significant gender differences were found for mental and cognitive health of U.S. centenarians.
Group mean differences on mental and cognitive health for Japanese centenarians (table not shown) indicate there were gender differences for cognitive health, but not for mental health indicators. These results indicate men had significantly higher scores on the MMSE, $F(1,270) = 13.94, p < .001$, and on the GDRS, $F(1,300) = 16.27, p < .001$, compared to women in Japan. Residential differences were found for lonely dissatisfaction, $F(1,224) = 38.54, p < .001$, the MMSE, $F(2,269) = p < .001$, and the GDRS, $F(1,224) = 38.54, p < .001$. These results suggest that Japanese centenarians living in long-term care settings had higher levels of lonely dissatisfaction than Japanese centenarians living independently, and Japanese centenarians living in hospitals had poor mental status than Japanese centenarians living in private homes and long-term care settings. Japanese centenarians with higher education had significantly better mental status (i.e., MMSE), $F(2,257) = 9.85, p < .001$, and GDRS, $F(2,286) = 4.54, p < .05$. In addition, results for personality profile differences on mental and cognitive health suggest that Japanese centenarians in the resilient group had lower levels of lonely dissatisfaction (one of the three subscales of morale) compared to centenarians in the non-resilient group, $F(1,69) = 4.29, p < .05$. No significant historical life event domain differences were obtained for mental and cognitive health. Finally, there was a marginally significant life event domain (i.e., marriage event) difference on attitude toward one’s own aging, $F(1, 61) = 3.40, p < .10$, and the MMSE, $F(1,176) = 3.07, p < .10$, suggesting that Japanese centenarians mentioning marriage as the most important life event had better attitudes toward their own aging and lower MMSE scores compared to Japanese centenarians not mentioning marriage as the most important event in their lives.
Results on cultural mean comparisons on cognitive health among centenarians (table not shown) indicate that U.S. centenarians had significantly higher scores on the MMSE, $F(1,555) = 35.34, p < .001$, than Japanese centenarians. Mental health was not compared across cultures because the mental health instruments were different across samples.

**Personality and Life Events as Predictors of Mental and Cognitive Health**

Structural equation modeling was used to investigate the relationship paths, the mediating model and the moderating model for U.S. and Japanese centenarians. Figure 1 displays the model for U.S. centenarians (Figure 1) and contains a combination of proxy- and centenarians reports. Personality characteristics were obtained by using proxy reports, life events were reported either by proxy or centenarians, and mental and cognitive health included centenarians self-reports. The model for the U.S. sample had a satisfactory overall fit, $\chi^2 (df=12) = 37.59, p < .001$; CFI = .95; TLI = .89; RMSEA = .09, and SRMR=.08. Personality had a significant effect on mental health ($\beta = .80, p < .001$) and no significant effect on cognitive health ($\beta = .09, p < .01$) after controlling for the effects of age and education. The results suggest that U.S. centenarians with a resilient personality had better mental health compared to centenarians of the non-resilient personality group. The direct paths from life event domain to mental and cognitive health were not significant. Age had a marginal effect on mental health ($\gamma = -.24, p < .10$) and a significant effect on cognitive health ($\gamma = -.26, p < .001$) suggesting the older the participant was, the lower the levels of mental and cognitive health. The factor loadings for the mental health latent variable were both significant, but low: .38 (positive affect) and -.37 (negative affect). Loadings for cognitive health were highly significant: .95 for MMSE and .90 for the GDRS. There was no
significant moderating effect of personality on the relationship between the marriage life event domain and mental or cognitive health for the U.S. study.

Figure 2 displays the model for mental and cognitive health of Japanese centenarians and this model represent proxy and centenarian self-report. We assessed centenarians’ personality by obtaining proxy reports and life events, whereas mental and cognitive health were all based on centenarian self-reports. The model for the Japanese centenarians had an adequate fit, $\chi^2 (df = 19) = 33.25, p = .023$; CFI = 0.98; TLI = 0.96; RMSEA = .05, and SRMR=.11. A significant effect was found for personality on mental health ($\beta = .25, p < .05$), suggesting that Japanese centenarians with a resilient personality profile had significantly better mental health than Japanese centenarians in the non-resilient personality group. Life events had a significant effect on mental health ($\gamma = .75, p < .001$) for Japanese centenarians. These results indicate that Japanese centenarians who reported marriage as their most important life event domain had significantly better scores on mental health. Age and education had a significant effect on cognitive health ($\gamma = -.12, p < .05; \gamma = .12, p < .05$, respectively) indicating that higher age and lower education were associated with poor cognitive health among Japanese centenarians. The factor loadings for the mental health latent variable were all significant: .55 for agitation, .70 for attitude toward own aging, and .95 for lonely dissatisfaction. Loadings for the cognitive health variable were highly significant: .94 for MMSE and 1.00 for the GDRS. The interaction term was not a significant predictor. Therefore, a multiple group analysis was not performed.

The model (not shown) examining the effects of historical life events on the two health outcomes (i.e., mental and cognitive health) for the Japanese sample had an adequate
A significant effect was found for personality on mental health ($\gamma = .23, p < .05$), suggesting that Japanese centenarians with a resilient personality profile had significantly better mental health than non-resilient Japanese centenarians. Historical events negatively influenced mental health of Japanese centenarians ($\beta = -.70, p < .001$), indicating that centenarians who reported historical events as the most important events were more likely to have lower levels of mental health. Education had a positive effect on cognitive health ($\gamma = -.13, p < .05$).

**Discussion**

In this cross-cultural study, we assessed the mental and cognitive health of U.S. and Japanese centenarians. The main purpose was to investigate whether personality profiles and two important life events (i.e., marriage and historical event) would be risk or protective factors for mental and cognitive health in centenarians from the U.S. and Japan. In addition, we examined whether these factors had the same impact on centenarians across cultures. First, mean group differences in mental and cognitive health were investigated. Second, cultural differences in cognitive health were assessed. Third, we examined the path model in which personality and the most important life event domain influenced mental and cognitive health of centenarians from each country. Finally, we investigated whether personality mediated and moderated the relationship between life event domain and the two health outcomes (i.e., mental and cognitive health) for U.S. and Japanese centenarians.

**Demographic Mean Group Differences in Mental Health of Centenarians**

No gender differences were found in mental and cognitive health for U.S. centenarians, whereas gender differences were found in Japanese centenarians on cognitive
health. These results suggest that Japanese men had significantly better cognitive health scores than Japanese women. U.S. results for ethnic differences suggested that African Americans centenarians had worse cognitive health than White centenarians. Perhaps both findings may be attributed to the fact that Japanese men and Caucasians had more opportunities for education than Japanese women and African-American centenarians who may have been disadvantaged over their life span.

The results for both studies showed residential differences in mental and cognitive health. Overall, centenarians living in long-term care settings had lower scores on positive affect and higher scores on lonely dissatisfaction, and displayed poorer cognitive health compared to centenarians living independently. Perhaps, one of the reasons older adults move to an institutional setting is because of cognitive decline and the inability to age in their homes, and living in an institutional setting may not provide more positive and social opportunities for nursing home residents compared to those living independently.

Highly educated centenarians were more likely to have better cognitive health than less educated centenarians. This finding is consistent with the literature, in which education is positively associated with cognitive health (Gondo & Poon, 2007). In addition, U.S. centenarians with more education had lower levels of negative affect compared to U.S. centenarians with less education. This may be the result of the fact that individuals with higher education are more likely to have more opportunities in life and may be more engaged in life than individuals with less education.

Results for personality profile differences on mental and cognitive health suggest that U.S. resilient centenarians were more likely to report high levels of mental and cognitive
health, whereas resilient Japanese centenarians were more likely report low levels of lonely dissatisfaction (a dimension of the morale scale) compared to non-resilient Japanese centenarians. Resiliency may be a very important internal resource that has equipped resilient centenarians to maintain their quality of life.

Life domain (i.e., marriage and historical events) mean differences on mental and cognitive health for U.S. and Japanese centenarians were found for the marriage domain in the U.S. sample. U.S. centenarians mentioning marriage as the most important life event were more likely to have poorer GDRS scores than U.S. centenarians who did not mention marriage as the most important event. A similar trend was found in the Japanese study, but in a different cognitive health domain (i.e., MMSE)--indicating Japanese centenarians mentioning marriage as the most important life event had worse MMSE scores than Japanese centenarians not mentioning marriage as the most important life event. Perhaps, centenarians with poor mental status were more likely to recall events related to their loved ones and from those closer to them such as their spouse. There were no significant differences on the two health outcomes between centenarians who did and did not report historical events as the most important occasions in their lives for both samples. It is perhaps surprising that no mean differences in mental and cognitive health were found between Japanese centenarians that reported historical events to be the most important and those that did not mention historical events to be the most important events. This was surprising because Japanese centenarians reporting historical events as the most important event typically mentioned negative experiences during WWII or the Great Kanto Earthquake. Perhaps, Japanese centenarians
who were strongly impacted by these events adjusted well to the negative effects of these historical events.

Cultural differences in cognitive health suggest that Japanese centenarians had lower scores on the MMSE than U.S. centenarians. This finding may be attributable to Japanese centenarians being somewhat older and having less education than U.S. centenarians. Japanese centenarians may have experienced more disadvantages and challenges because of the consequences of an earthquake and WWII. Another possibility is consistent with the finding reported by Comijs and colleagues (2011) that highly stressful life events (i.e., death of child or grandchild) were associated with cognitive decline. Several of the Japanese centenarians from our sample experienced the death of their child during WWII and were exposed to other traumatic events that had occurred during the war. In our study, we did not test the impact of child/children events on the two health outcomes because historical events were the most often cited events by Japanese centenarians. This finding can be a result of the negative effects of traumatic events (such as the WWII) experienced by Japanese centenarians. Other factors may explain the differences found in MMSE scores of centenarians from both countries.

\textbf{Structural Models}

One of the most interesting finding was that personality emerged as an important predictor of mental health in both samples. Even though mental health was measured differently in each study, our results suggest that centenarians with a resilient personality reported better levels of mental health across both cultures. Personality had an effect on mental health of Japanese centenarians even after controlling for historical events. Japanese
centenarians possessing a resilient personality seem to report good mental health despite of their past traumatic historical experience. It is not surprising that possessing a positive combination of personality traits would contribute to better mental health among centenarians in both countries. Perhaps resilient centenarians are more equipped and resourceful and more likely to cope with adversities and challenges with a more positive perspective than non-resilient centenarians.

An unexpected finding was the cultural difference obtained for the effect of marriage event in predicting mental health of only Japanese centenarians. Marriage-related events did not significantly influence U.S. centenarians’ mental and cognitive health but they predicted better mental health in Japanese centenarians. It is not clear why these cross-cultural differences were obtained. We carefully examined the marriage event responses provided by centenarians from each country in order to investigate the nature of marital events and divided marriage responses into positive and negative marriage events. The results suggest that 96% of U.S. centenarians reporting marriage as the most important life event reported it as a positive experience, and 4% thought it was a negative experience (such as the death of a spouse). In the Japanese study, 76% of centenarians reporting marriage as the most important event evaluated the event as a negative experience (i.e., spouse’ death), whereas 24% reported the event as a positive experience. It is not clear why Japanese centenarians who reported for the most part a negative event related to marriage as the most important life event had better mental health. Perhaps these Japanese centenarians found meaning in life, had already coped with the loss of their loved one, which in turn lead them to better mental health. Shmotkin, Shrira, and Palgi (2011) studied Holocaust survivors to determine how
individuals survive trauma. One of their findings suggested that robust survivors try to find meaning after a traumatic life experiences and can still be happy after facing adversities in life. Most Japanese marriage events were associated with the death of a spouse or job loss during WWII. Perhaps, these centenarians had good mental health before the experience of trauma, which had made them more likely to focus on positive aspects leading them to better mental health. This finding is in line with results from Lucas and colleagues (2003) who suggested that individuals tended to react to events and adapt, and individuals who lost their spouses adapted, but not totally, to their former life satisfaction. Again, Japanese centenarians who were resilient still reported higher levels of mental health despite having had a negative experience of losing a spouse.

An interesting, but not a surprising finding was the cultural difference found for the effect of historical events in predicting mental health of centenarians. Historical events did not significantly influence U.S. centenarians’ mental health, but it significantly influenced the mental health of Japanese centenarians. We were not surprised by this cultural difference because Japanese centenarians were directly exposed to the effects and consequences of historical events especially the WWII and the Great Kanto Earthquake. Our data suggest that most of the historical events mentioned by Japanese centenarians were associated with the loss of children, spouse, place to live, job, and other negative consequences of the war. This result suggests that Japanese centenarians were affected by historical events and may not have adapted and adjusted to experiences that had occurred during WWII and the Great Kanto Earthquake. The cultural differences observed in our results may be due to historical period effect. Japanese centenarians were more negatively affected by historical events
compared to U.S. centenarians. Several Japanese lost their loved ones, houses, belongings, jobs, and possibly opportunities as consequences of these events. We did not assess other possible effects of historical events on other important outcomes.

Our study did not find indirect effects on mental and cognitive health of centenarians in both countries. Our findings suggest that possessing a resilient personality does not change the impact of life events on mental and cognitive health of U.S. and Japanese centenarians. Perhaps the reason why personality did not alter the impact of life events on mental and cognitive health can be attributed to a small sample size or perhaps the two personality groups were not so different from each other to yield the hypothesized effect.

**Limitations and Future Directions**

Our study has several limitations. First, both studies are cross-sectional and we were not able to assess the causal relationship of personality and life events on mental and cognitive health of U.S. and Japanese centenarians. Second, each study was designed as a single study, rendering it difficult to make direct comparisons of centenarians in both countries. In this study, we were unable to directly compare mental health across samples because mental health was measured differently, limiting cross-cultural comparison between the two studies. In addition, results for mental health should be viewed with some caution because in the U.S. sample only centenarians with better mental status (MMSE >16) provided mental health data, whereas the same procedure was not conducted in the Japanese study. No mental health data was collected from U.S. centenarians with poor mental status. Therefore, this limited the findings from the U.S. study because there was restricted variability in scores on mental status.
Another important aspect to consider is the possibility of bias in remembering certain life event domains. It would be useful to include a social cognition perspective in future work on life events (Hess & Blanchard-Fields, 1999). Life events and the two identified personality profiles represent the reality of a very selective group that survived and that have special and unique characteristics. According to Lewis and Carpendale (2004), social cognition consists of one area of cognition that contains the individual representations of the self, others, and their social world (Lewis & Carpendale, 2004). Fiske and colleagues (1998) suggested that individuals from different cultures react differently to similar situations. Therefore, findings from this study should be viewed with caution because the life events responses represent how centenarians perceived and evaluated events.

Another potential limitation is the use of free recall to assess centenarians’ most important life events. Maybe what centenarians recalled was not the most meaningful and important event they had experienced, but it reflects the first life event experience that they spontaneously recalled. In addition, the responses to the life events questions were retrospective, relying on participants’ ability to accurately remember events from the past.

To our knowledge, our study is the first cross-cultural study to investigate the effect of personality and life events on mental and cognitive health of centenarians. In addition, we assessed the mediating and moderating effects of personality on the relationship between life events and mental and cognitive health. In conclusion, resilient centenarians seem to have better mental health in both countries. In addition, resilience influences mental health of Japanese centenarians despite the negative and traumatic effects of historical events. Life events did not seem to influence mental and cognitive health of U.S. centenarians, but
Marriage events, mostly negative events, were associated with better mental health in Japanese centenarians. Traumatic historical life events do seem to affect Japanese mental health, but not cognitive health. Resilience provides centenarians with a better mental health perhaps because it better equips centenarians to face challenges through their life span.
Acknowledgements

The Georgia Centenarian Study (Leonard W. Poon, PI) was funded by 1P01AG17553 from the National Institute on Aging, a collaboration among The University of Georgia, Tulane University Health Sciences Center, Boston University, University of Kentucky, Emory University, Duke University, Wayne State University, Iowa State University, Temple University, and University of Michigan. Additional authors include S. M. Jazwinski, R. C. Green, M. MacDonald, M. Gearing, W. R. Markesbery (deceased), J. L. Woodard, M. A. Johnson, J. S. Tenover, I. C. Siegler, W. L. Rodgers, D. B. Hausman, C. Rott, A. Davey, and J. Arnold. Authors acknowledge the valuable recruitment and data acquisition effort from M. Burgess, K. Grier, E. Jackson, E. McCarthy, K. Shaw, L. Strong and S. Reynolds, data acquisition team manager; S. Anderson, E. Cassidy, M. Janke, and J. Savla, data management; M. Poon for project fiscal management.

The Tokyo Centenarian Study was supported in part by a grant from the Japanese Ministry of Health and Welfare for the Scientific Research Project on Longevity, a grant for studying the multidisciplinary approach to centenarians and its international comparison (Principal Investigator, Nobuyoshi Hirose); a grant from the Japanese Ministry of Education, Science and Culture (No.15730346); and aid for research from the Keio Health Consulting Center.
References


Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and
the set point model of happiness: Reactions to changes in marital status. *Journal of Personality and Social Psychology, 84*, 527-539. doi: 10.1037/0022-3514.84.3.527


Poon, L. W., Jazwinski, M., Green, R. C., Woodard, J. L., Martin, P., Rodgers, W. L., …


doi:10.1001/archpsyc.64.10.1204
Table 1

Demographic Characteristics of Complete Sample and High Mental Status Centenarians (MMSE ≥ 17)

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>United States (GCS)</th>
<th>Japan (TCS)</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of centenarians</td>
<td>N=239 (n=137)</td>
<td>N=304 (n=98)</td>
<td>--</td>
</tr>
<tr>
<td>Age in years M (SD)</td>
<td>99.7 (1.63)</td>
<td>100.8 (1.32)</td>
<td>--</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>1.23 (4.60*)</td>
</tr>
<tr>
<td>Women</td>
<td>82% (79%)</td>
<td>79% (66%)</td>
<td>--</td>
</tr>
<tr>
<td>Men</td>
<td>18% (21%)</td>
<td>21% (34%)</td>
<td>--</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>74.5% (83%)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Black/African-American</td>
<td>25.5% (17%)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Asian</td>
<td>--</td>
<td>100%</td>
<td>--</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>8.56*(4.74*)</td>
</tr>
<tr>
<td>Less than High School</td>
<td>41% (18%)</td>
<td>41% (31%)</td>
<td>--</td>
</tr>
<tr>
<td>High School Completed</td>
<td>30% (42%)</td>
<td>40% (36%)</td>
<td>--</td>
</tr>
<tr>
<td>College/Post Graduate</td>
<td>29% (40%)</td>
<td>19% (33%)</td>
<td>--</td>
</tr>
<tr>
<td>Residential Status</td>
<td></td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Private Home</td>
<td>45% (56%)</td>
<td>68% (88%)</td>
<td>--</td>
</tr>
<tr>
<td>Personal Care Home</td>
<td>18% (20%)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>37% (23%)</td>
<td>26% (2%)</td>
<td>--</td>
</tr>
<tr>
<td>Hospital</td>
<td>--</td>
<td>7% (10%)</td>
<td>--</td>
</tr>
<tr>
<td>Marital Status</td>
<td>00% (00%)</td>
<td></td>
<td>21.30***(5.51)</td>
</tr>
<tr>
<td>Married</td>
<td>4% (5%)</td>
<td>1% (4%)</td>
<td>--</td>
</tr>
<tr>
<td>Separated</td>
<td>0% (0%)</td>
<td>1% (0%)</td>
<td>--</td>
</tr>
<tr>
<td>Divorced</td>
<td>4% (4%)</td>
<td>0% (1%)</td>
<td>--</td>
</tr>
<tr>
<td>Widowed</td>
<td>87% (85%)</td>
<td>96% (93%)</td>
<td>--</td>
</tr>
<tr>
<td>Never Married</td>
<td>5% (7%)</td>
<td>1% (1%)</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. Because of rounding, percentages may not add to 100. GCS= Georgia Centenarian Study; and TCS= Tokyo Centenarian Study. *=Values inside the parenthesis are values for high mental status centenarians. *p < .10. *p < .05. **p < .01. ***p < .001.
Table 2

Correlation Matrix for Variables in the Study

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Resilient Personality</td>
<td>1.00</td>
<td>-0.04</td>
<td>0.05</td>
<td>--</td>
<td>--</td>
<td>0.08</td>
<td>0.24*</td>
<td>0.19</td>
<td>-0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td>Life Event Domain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Marriage</td>
<td>0.07</td>
<td>1.00</td>
<td>-0.23**</td>
<td>--</td>
<td>--</td>
<td>0.23</td>
<td>0.17</td>
<td>0.00</td>
<td>-0.15</td>
<td>-0.15*</td>
</tr>
<tr>
<td>3. Historical Event</td>
<td>-0.13</td>
<td>-0.10</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>-0.05</td>
<td>-0.03</td>
<td>0.08</td>
<td>0.10</td>
<td>0.01</td>
</tr>
<tr>
<td>Mental Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Positive Affect</td>
<td>0.25**</td>
<td>-0.04</td>
<td>-0.08</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5. Negative Affect</td>
<td>-0.16</td>
<td>0.10</td>
<td>-0.07</td>
<td>-0.27**</td>
<td>1.00</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6. Attitudes T.O.A. 1</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>0.54**</td>
<td>0.32**</td>
<td>-0.04</td>
<td>-0.16</td>
</tr>
<tr>
<td>7. Lonely Diss. 2</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>0.40**</td>
<td>-0.01</td>
<td>-0.08</td>
</tr>
<tr>
<td>8. Agitation 3</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>-0.01</td>
</tr>
<tr>
<td>Cognitive Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. MMSE</td>
<td>0.22**</td>
<td>0.07</td>
<td>-0.13</td>
<td>0.33**</td>
<td>-0.23*</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>-0.94**</td>
</tr>
<tr>
<td>10. GDRS</td>
<td>-0.19**</td>
<td>-0.21*</td>
<td>0.06</td>
<td>-0.14</td>
<td>0.18</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-0.85**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. Lower diagonal values are the U.S. study; upper diagonal are values for the Japanese study. T. O. A. = Attitudes Toward own Aging. Lonely Diss. = Lonely Dissatisfaction. \(^{1,2,3}\) Higher scores on each of the three domains of the morale scale indicates higher morale. * \(p < .05\). ** \(p < .01\).
Figure 1. Structural model for mental and cognitive health of U.S. centenarians. 1 = Proxy reports of centenarians personality. 2 = Mental health data were only obtained from U.S. centenarians with high mental status.
Figure 2. Structural model for mental and cognitive health of Japanese centenarians. 

1 = Proxy reports of centenarians’ personality.

2 = Higher scores on all the three morale domains mean higher morale.

*p < .10. **p < .05. ***p < .01. ****p < .001.
CHAPTER 5: GENERAL CONCLUSIONS

The focus of this dissertation was to develop a better understanding of four important areas (i.e., life events, personality, mental and cognitive health) in the lives of centenarians from two different cultures. Three research articles were presented and discussed. The first article examined the two most important life events reported by U.S. and Japanese centenarians and investigated cultural differences in life event domains. In addition, patterns of life event domains and personality traits that were more or less likely to occur were investigated. The second research article investigated personality traits and profiles of centenarians from the United States and Japan. Demographic and cultural differences in all the five NEO personality traits were assessed. Personality profiles were identified in each sample and cultural and demographic differences in personality profiles were investigated. The third paper assessed mental and cognitive health of centenarians from the United States and from Japan. We investigated the influence of marriage and historical events (the two most important life event domains that were most cited by the participants) and personality profiles (i.e., non-resilient and resilient group) on mental and cognitive health of centenarians from each culture. The next sections will discuss the main research findings from the three research papers.

Most Important Life Events for U.S. and Japanese Centenarians

In the first article, we reported that centenarians are a very heterogeneous group. These long-lived individuals possess rich life experiences including both positive and traumatic experiences. One of the main finding was that U.S. centenarians were more likely to report marriage, children, and family as the most important life event, whereas Japanese
The cross-cultural differences identified may be due to culture or may only reflect experiences of the war. Perhaps, U.S. centenarians would have reported similar historical events as the most important experience if they had been directly affected by historical events. We do not know if our findings were due to the influences of the period during which centenarians were living or were consequences of the impact on a specific cohort. Perhaps, younger cohorts of centenarians would have mentioned different life events as the most
important ones in their lives. In addition, if the Japanese people had not experienced trauma, perhaps the Japanese centenarians would have mentioned different life events as the most important experiences in their lives.

We also observed that women were more likely to mention children (U.S. centenarians) and marriage and death/grief of loved ones (Japanese centenarians) as the most important events in their lives compared to men. In contrast, men were more likely to mention events related to finances (U.S. centenarians) and work/retirement, and school/education (Japanese centenarians) as the most important life events. It is not a surprise that there were clear gender differences on several life event domains. Japanese women were strongly affected by the negative consequences of losing and grieving the death of their loved ones (especially their child/children) due to the consequences of the war. Several of these Japanese centenarians had lost their children and husbands during the war and some mentioned food shortage and not having food available during the time of the war. The age at which participants in both countries experienced historical events was similar. For example, Japanese centenarians experienced the Great Kanto Earthquake at the ages of 21 to 29, and WWII with the bombing of Hiroshima and Nagasaki at the ages 32 to 51 years of age. U.S. centenarians were 32 to 50 years of age during the WWII.

**Personality Profiles of U.S. and Japanese Centenarians**

The second research paper identified and examined personality profiles of centenarians from the U.S. and Japan. Our goal was to first identify personality profiles of centenarians from each country. We examined the number of personality profiles and whether these profiles were similar or different across cultures. Two personality profiles
emerged from each sample: a resilient and a non-resilient personality group. The resilient personality group consisted of centenarians with a combination of personality traits such as higher scores on Extraversion, and Agreeableness, and lower levels of Neuroticism, Openness, and Conscientiousness compared to the population means (Costa & McCrae, 1992). Our findings on the typologies observed in the resilient group partially supports the findings from Caspi and colleagues (Capi, 1998; Robins, John, & Caspi, 1996) on studies with children in which resiliency was characterized by low levels of Neuroticism, and high levels of Extraversion, Openness, Agreeableness, and Conscientiousness. The non-resilient group was not necessarily more vulnerable than the resilient group and consisted of centenarians with high levels of Neuroticism, and lower means scores on Extraversion, Openness, Agreeableness, and Conscientiousness compared to the population means (Costa & McCrae, 1992). One important aspect to highlight is that both identified personality profiles may represent the personality structure of a very selective group of survivors that possesses unique characteristics and may be very different from individuals that had already died.

In the U.S. study, the two personality profiles seem to be distinct and demographic characteristics were related to the personality profiles. For instance, U.S. centenarians in good cognitive health and those living independently (i.e., private homes) were more likely to be in the resilient personality group, whereas U.S. centenarians with poor cognitive health and those with lower education were more likely to be in the non-resilient personality group.

Results for the Japanese sample indicated that the two personality profiles did not significantly differ and no demographic differences were found between the two personality
profile groups, suggesting that both personality profile groups were very similar for the Japanese sample. No significant cultural differences in personality profiles of centenarians were found. Cross-cultural differences on the Big-Five personality traits suggested that Japanese centenarians had significantly higher scores on Neuroticism, Extraversion, Openness, and Conscientiousness, whereas U.S. centenarians had higher scores on Agreeableness compared to Japanese centenarians. In sum, the results suggest that centenarians in the resilient group had low Neuroticism, Openness, and Conscientiousness, and high Extraversion and Agreeableness. In contrast, centenarians in the non-resilient group had personality traits around the mean level. No significant cultural differences were found in personality profiles, suggesting that the two identified personality profiles did not differ across cultures. The two personality profiles were different in the U.S. sample, but no significant difference was found between the profiles in the Japanese sample. These results suggest that the Japanese sample seemed to be more homogenous than U.S. sample. Resilient U.S. centenarians were less likely to be institutionalized, had higher education and better cognitive health compared to U.S. centenarians with non-resilient personality profiles. In sum, a resilient personality is not a necessary condition for longevity. It is possible to reach such an extreme age without possessing a positive combination of personality traits. Our results suggest that there are resilient and non-resilient centenarians in the United States and Japan.

Predictors of Mental and Cognitive Health in U.S. and Japanese Centenarians

The third research paper built on the first two papers and assessed mental and cognitive health of U.S. and Japanese centenarians. It also examines the influences of
personality traits (i.e., resilient and non-resilient group) and the two most important life
events (i.e., marriage and historical events) on mental and cognitive health of centenarians
from each culture. In addition, we investigated whether personality traits mediated or/and
moderated the relationship between life event domain and the two health domains. First, we
found that U.S. centenarians had better scores on the MMSE compared to Japanese
centenarians. The cultural differences found in levels of mental status may be explained by
period effect or it may be unique to this cohort. We are not able to disentangle these
influences. Perhaps, U.S. centenarians had more educational opportunities in their country,
whereas Japanese centenarians had to deal with the consequences of the war. The results
suggest that resilient centenarians from both countries had better mental health levels than
non-resilient centenarians. Personality had no effect on cognitive health of U.S. and Japanese
centenarians. In addition, Japanese centenarians who mentioned marriage as the most
important event had better mental health and those that mentioned historical events had poor
mental health. Our data suggest that Japanese centenarians were strongly affected by the
effects of historical events that had occurred many years ago. Possessing a resilient
personality does seem to be very important for mental health of very older adults despite the
negative effect of historical events. Results for both studies suggest that personality did not
significantly mediate and moderate the relationship between life events and the two health
outcomes. This lack of significant findings may be due to problems with missing data (lack
of power), or the resilient and non-resilient personality group are very similar, so we were
not able to identify significant differences between the two groups.
In sum, centenarians from these two countries do seem to differ in what they mentioned to be the most important events in their lives. U.S. centenarians mentioned positive experiences related to their marriage, child/children, and family, whereas Japanese centenarians mostly mentioned the negative events related to historical events (i.e., WWII and The Great Kanto Earthquake) and its negative effect of the death of their spouses and child/children. Even though centenarians from both countries lived during the same time period, they had very distinct experiences. The results from our analyses suggested that Japanese centenarians experienced traumatic events that affected their entire country, whereas similar events were not mentioned by U.S. centenarians. Several Japanese centenarians remembered WWII and the negative and traumatic experiences associated with it, such as the loss of their loved ones, loss of their belongings, food shortages, and having to initiate and start a new life. Again, cultural differences observed in life events may be due to a period effect or to the experiences of a specific cohort.

Limitations and Future Research Directions

This dissertation has several limitations. All the three research papers used cross-sectional data sets, and consequently we are not able to test for causal relationships. Even though centenarians from both samples were from the same cohort, the findings of the three research papers may not be generalizable to centenarians living in other areas of the United States, Japan, and even other countries. In addition, our findings represent results from a very selective survival group with unique characteristics that we may not find in a younger, less selective group. Another limitation is that each study was designed separately and was not designed to be compared across cultures. For example, the mental health variables were not
the same across the two studies, which limited our direct comparisons. In both data sets, there is a high number of missing data from centenarians with low cognitive health scores creating less variability in the identified results. This is a common problem in studies with very old population. We took several procedures to handle missing data from centenarians with low mental status scores. For example, to obtain information on the most important life events for U.S. centenarians with low mental status, we used only proxy reports, whereas in the Japanese study the decision to use proxy information on centenarians’ life events was based on the investigators evaluation of the participant ability to respond adequately to the question.

Another important limitation is that mental health data were not obtained from U.S. centenarians with poor mental status. Therefore, our results should be interpreted with some caution. Proxy data from U.S. centenarians with low mental status scores were available, but no proxy data were available for the mental health of Japanese centenarians. Therefore, we only included U.S. proxy responses on centenarians with low mental status scores. Our goal was to represent the mental health of U.S. centenarians with high and low mental status. This procedure could have affected the findings of our study.

Regardless of these limitations, the findings of the three research papers expand the understanding and knowledge of what it is like to be a centenarian in the United States and Japan. This study has several important implications for service providers and policy makers. First, results suggest that Japanese centenarians mentioning historical events were more at risk for mental health problems than U.S. centenarians. Because of historical events, many Japanese centenarians had lost loved ones, their homes, jobs, and possessions. Japanese
centenarians had to start their life over again. They had to find strength and a new meaning in life. Perhaps some centenarians may not have been able to cope well with the negative effects of the war and these would have put them at great risk for depression, and other negative life outcomes. We learned that events have a long lasting impact on individuals’ quality of life. We also recognize the importance of internal resources (i.e., personality) for individuals in very late life. Perhaps resilient centenarians may be the ones more likely to find meaning in life, even after facing so many critical events. Again, our results suggest that the experience of the Great Kanto Earthquake and the WWII still affected the mental health of these survivors even several decades after the experience. It is necessary to provide treatment for survivors and help them effectively cope with their trauma, find meaning, so they can re-gain their quality of life. It is also necessary to examine the effects of resilient personality and other resources (i.e., social support) in helping survivors to better cope and adjust to the negative impact of events and how to predict important outcomes in very late life. By investigating stressful events, trauma, and resources that are important for adaptation, better interventions of treatment for survivors of the oldest old populations could be implemented.

Most studies on life events focus on summarizing the number of total events or the number of positive or negative life events during an individual lifetime. Our study is unique because it assessed the most important life events experienced by centenarians and allowed each centenarian to report which event they considered to be important. We also found two similar personality profiles in both countries. Our main goal was to examine across culture personality profiles most commonly found in long-lived individuals. Personality profiles did not mediate and moderate the relationship between life events and mental and cognitive
Marriage related events only influenced Japanese centenarians’ mental health. Marriage events were mostly related to the death of spouse experienced by Japanese centenarians. Historical events predicted poor mental health in Japanese centenarians. Why would marriage events lead people to good mental health, whereas historical events would not? One would wonder if in order to be able to overcome life adversities and challenges it is necessary to possess resilient and robust personality traits. We conclude that it is possible to reach very late life not possessing a resilient personality, but resilient centenarians do seem to have better years in good mental health. Our findings suggest that resilient centenarians had better mental health in both countries. In addition, traumatic events such as wars and disasters that had occurred several decades ago do seem still affect individuals’ mental health, but not cognitive health. Trauma does not seem to be erased from people’s mind, and it seems to strongly impact mental health despite having or not having a resilient personality. Life includes gains and losses (Baltes & Baltes, 1990) and for some there are more losses than gains. Resilient centenarians do possess a very important individual resource that helps and equips them to age successfully by maintaining good mental health until the very end of their life.

References


APPENDIX IRB APPROVAL LETTER

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Date: 10/9/2012
To: Dr. Peter Martin
1085 Elm Hall

From: Office for Responsible Research
Title: Resources and Adaptation in Centenarians
IRB Num: XX-026

Approval Date: 10/9/2012    Continuing Review Date: 10/12/2014
Submission Type: Continuing Review    Review Type: Expedited

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University. Please refer to the IRB ID number shown above in all correspondence regarding this study.

Based on the information you provided in Section II of the IRB application, we have coded this study in our database as being:

- [ ] Permanently closed to the enrollment of new subjects, where all subjects have completed all research-related activities, and the study remains open only for long-term follow-up of subjects.
- [X] Open only for data analysis.

Even though enrollment of subjects has ended, continuing review is required until human subjects are no longer involved and all data are completely de-identified. Check the website, http://www.compliance.iastate.edu, for further guidance on continuing review requirements.

Please also be sure to promptly report any of the following to the IRB: (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.

To re-open enrollment or initiate research-related interaction with subjects, you must submit a Modification Form and receive IRB approval prior to contacting subjects. Upon completion of this project, please submit a Project Closure Form to the Office for Responsible Research.

Please do not hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.
Please answer each question. If the question does not pertain to this study, please type not applicable (N/A).

SECTION I: KEY PERSONNEL

☑ Yes ☐ No  Have there been any personnel/staff changes since the last IRB approval was granted?
If yes, complete the following sections (Additions/Deletions) as appropriate.

<table>
<thead>
<tr>
<th>Add</th>
<th>Delete</th>
<th>Last Name</th>
<th>First Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑</td>
<td></td>
<td>Ku</td>
<td>Tsun-Yao</td>
</tr>
<tr>
<td>☑</td>
<td></td>
<td>Lee</td>
<td>Juyoung</td>
</tr>
</tbody>
</table>

Add New Row

List all members and relevant experiences of the project personnel. This information is intended to inform the committee of the training and background of the investigators and key personnel.

<table>
<thead>
<tr>
<th>NAME &amp; DEGREE(S)</th>
<th>POSITION AT ISU &amp; ROLE ON PROJECT</th>
<th>TRAINING &amp; DATE OF TRAINING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter Martin (Ph.D.)</td>
<td>Professor, PI</td>
<td>09/19/2000</td>
</tr>
<tr>
<td>Daniel Russell (Ph.D.)</td>
<td>Professor, Data Analyst</td>
<td>07/20/2000</td>
</tr>
<tr>
<td>Jennifer Margrett (Ph.D.)</td>
<td>Assistant Professor, Data Analyst</td>
<td>08/25/2006</td>
</tr>
<tr>
<td>Grace da Rosa (M.S.)</td>
<td>Graduate Student, Research Assistant</td>
<td>10/12/2004</td>
</tr>
<tr>
<td>Norene Kelly</td>
<td>Graduate Student, Research Assistant</td>
<td>04/22/2010</td>
</tr>
<tr>
<td>Melinda Heinz (M.S.)</td>
<td>Graduate Student, Research Assistant</td>
<td>09/07/2008</td>
</tr>
<tr>
<td>Wen-Hua Hsieh (M.S.)</td>
<td>Data Analyst</td>
<td>09/11/2007</td>
</tr>
<tr>
<td>Juyoung Lee</td>
<td>Data translator</td>
<td>04/02/2012</td>
</tr>
</tbody>
</table>

Add New Row

SECTION II: CONTINUING REVIEW

In addition to completing Section I: Key Personnel, please complete Section II if this is an application for Continuing Review. If this is an application for continuing review and you will be modifying your project in the future, please complete all sections of the form. If this application is only to request approval for a modification or change to your study, please complete Section I: Key Personnel and Section III: Proposed Modifications or Changes.

1. ☑ Yes ☐ No  Is the research permanently closed to the enrollment of new subjects?
2. ☑ Yes ☐ No  Have all subjects completed all research-related interventions?
3. ☑ Yes ☐ No  Does research remain active only for long-term follow-up of subjects?
4. ☑ Yes ☐ No  Are the remaining research activities limited to data analysis?
5. ☑ Yes ☐ No  Subject enrollment has not begun and no additional risks have been identified.

(Note: If the answer in questions 1 – 5 is "yes" the study qualifies for Expedited Review.)

Part A: Enrollment Status

HSVIR/RC 09/0303