Objective: Change versus stability of personality in late adulthood is an intriguing yet understudied issue. This cross-sectional study examined age and gender differences in Cloninger’s biosocial model of personality, as well as their relation to health in a Japanese community sample whose age exceeds 50 years.

Method: Participants (N = 330) completed the Temperament and Character Inventory and the General Health Questionnaire. MANOVA and hierarchical regression analyses were conducted.

Results: Age-related decreases in Reward Dependence, Self-Directedness, Cooperativeness, and an increase in Self-Transcendence were found. Health was significantly predicted by Harm Avoidance and Self-Directedness.

Conclusion: Personality change in late adulthood tends to occur in environmentally-based character, in a pattern of gradual social detachment and internal spiritual growth. Personality is a stronger predictor of health than demographic variables.

Keywords: personality; health; TCI; GHQ

Introduction

Japan has one of the highest life expectancy rates in the world, at 81.25 years of age as of 2006 (World fact book, 2006). In addition to a number of behavioural and lifestyle variables that may influence health and longevity, personality has been empirically supported to be an important predictor of physical health, functional limitations, and psychological well-being in older adults (Diener & Lucas, 1999; Duberstein et al., 2003). However, compared with other gerontology research such as cognition and dementia, personality variables and their association with health in older adults remain understudied in Japan. Therefore, the present study aims to examine differences in personality traits across age and gender, as well as the relation between personality and health, in a community sample of Japanese adults aged between 50 and 93 years.

Personality and adulthood development

In recent years, there has been increasing research into the question of whether personality is predominantly plastic, that is, changeable (Baltes, Staudinger, & Lindenberger, 1999; Helson, Kwan, & Kwan 2002; Helson, W. Kwan, O. P. Jones, & C. Jones, 2002; Helson & Soto, 2005; Roberts, Helson, & Klohnen, 2002), or rigid, that is, stable, (e.g., McCrae et al., 2000) throughout the lifespan. With regard to the Five-Factor Model (Digman, 1990), the taxonomic framework that classifies normal individual differences along five major orthogonal traits (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness), a growing body of evidence suggests that, although the structure of the ‘Big Five’ is largely invariant throughout the lifespan (Costa & McCrae, 1994), individual trait scores (norms) do vary with age. Specifically, Neuroticism decreases in adulthood (Mroczek & Spiro, 2003) and shows a subsequent increase later in life (Small, Hertzog, Hultsh & Dixon, 2003). Small declines have also been found for Openness to Experience and Extraversion (Field & Millsap, 1991), whereas Agreeableness and Conscientiousness have shown increase, albeit minor, throughout the lifespan (Helson et al., 2002). Similar patterns of changes have been observed across different cultures (McCrae et al., 2000), and replicated with other instruments and taxonomies. For instance, studies with the California Psychological Inventory (CPI; Gough & Bradley, 1996) reported substantial increases of Responsibility, Socialization, Self-control, and Good impression, as well as declines of Flexibility of behaviours (e.g., Helson et al., 2002a,b; Labouvie-Vief, Diehl, Tanowski, & Shen, 2000). However, studies on the Sixteen Personality Factor Questionnaire showed only minor changes in Suspiciousness and Sensitivity (Martin, Long, & Poon, 2002).

The present study is grounded on Cloninger’s biosocial model of personality (Cloninger, 1986; Cloninger, Svrakic, & Przybeck, 1993) due to its comprehensive encompassment of both genetic (temperament) and environmental (character) determinants of personality. Including the dimensions of Novelty Seeking, Harm Avoidance, Reward Dependence, and Persistence, temperament refers to individual differences in relatively spontaneous responses to experience that are ‘independently
Personality and health in older adults

Research has shown personality to be related to both causal and protective factors of disease, as well as health-related coping behaviours (Ozer & Benet-Martinez, 2006). Among the major personality traits, a high level of neuroticism is particularly verified to be associated with fatigue (Martin, Bishop, Poon, & Johnson, 2006), mortality (Wilson, de Leon, Bienias, Evans, & Bennett, 2004; Wilson et al., 2005), loneliness (Long & Martin, 2000), and depression (Cheung & Todd-Oldehaver, 2006) in old age. Closely associated with neuroticism, Harm Avoidance in the biosocial model of personality indicates a heritable bias for inhibition and cessation of behaviours (Cloninger et al., 1994). High level of Harm Avoidance is proven for inhibition and cessation of behaviours (Cloninger model of personality indicates a heritable bias that is referred to as ‘older group’.

Method

Participants

Participants were 330 (163 women) community dwellers from an urban area of central Japan, whose age ranged from 50 to 93 years (M = 66.48, SD = 9.28; mode age = 68). Participants were recruited either by directly contacting acquaintances of the authors whose age exceeds 50 years, or by asking permission from companies or public facilities (including companies, a local care house, a sports club, and a college for senior citizens) for the contact of target persons. Purpose of the study, sample questions, and ways to answer were explained both verbally and in written form attached to each package of questionnaires. Test battery was handed only to those who agreed to participate. Replies with more than 10% missing data were excluded to ensure the accuracy and reliability. Among the valid answers, 47% of the participants were in employment and 75% in cohabitation.

For the purpose of comparison, participants were divided into two groups at the age of 65, which is generally considered as the start point of old age in developmental psychology. Moreover, sociologically, 65 years is an age of retirement, and legislatively, a start age of pension and other welfare services in Japan. Hence, despite of individual differences, 65 years is deemed appropriate to categorize late middle age and old age. In the present study, age 50–64 is referred to as ‘younger group’, whereas over 65 years referred to as ‘older group’.

Instruments

Given the fact that the majority of the participants are over 60 years old and may find it burdensome to answer a large number of questions, only short versions of the instruments were used.

Temperament and character inventory

Personality traits were assessed with the shortened Japanese version of Cloninger’s TCI (Cloninger et al., 1994) (Kijima et al., 1996, 2000), which is a 125-item, self-report, true-false questionnaire with five questions relating to each subscale. The TCI comprises (a) Novelty Seeking, a measure of behavioural activation and excitement seeking that assesses exploratory excitability, impulsiveness, extravagance, and disorderliness; (b) Harm Avoidance, a measure of behavioural inhibition and fearfulness; it includes subscales of anticipatory worry and pessimism, fear of uncertainty, shyness, and fatigability; (c) Reward Dependence, a measure of social attachment that incorporates subscales related to sentimentality, warmth and emotional attachment; and (d) Persistence, which assesses eagerness, affinity for work, ambition and perfectionism. The Self-Directedness dimension contains five subscales, namely responsibility, purposefulness, resourcefulness, self-acceptance, and congruent

heritable, manifest early in life, and involve pre-conceptual biases in perceptual memory and habit formation’ (Cloninger et al., 1993, p. 975). In contrast, character refers to individual differences in self-concept, goals and values, which are hypothesized to mature in adulthood through conceptual or insight-based learning. Character comprises the dimensions of Self-Directedness, Cooperativeness, and Self-Transcendence. These dimensions can be assessed with the Temperament and Character Inventory (TCI; Cloninger, Przybeck, Svrakic, & Wetzel, 1994).

Theoretically, temperament is deemed moderately stable, whereas character is speculated to develop throughout life (Cloninger, 1998). Empirically, previous evidence suggests change of the TCI dimensions throughout adulthood results that Novelty Seeking is negatively, whereas Self-Directedness and Cooperativeness are positively, associated with age (Cloninger et al., 1994; Hansenne, Delhez, & Cloninger, 2005). Gender differences appear to be consistent where women score higher on Harm Avoidance, Reward Dependence, and Cooperativeness than men (Gutierrez-Zotes et al., 2004; Hansenne et al., 2005; Pelissolo & Lepin, 2000), whereas results on Self-Directedness vary.
second nature. The Cooperativeness dimension is also composed of five subscales, these being social acceptance, empathy, helpfulness, compassion, and pure-hearted. Finally, the Self-Transcendence dimension encompasses three subscales, namely self-forgetfulness, transpersonal identification, and spiritual acceptance. Psychometric studies yielded comparatively low reliability for the shortened Japanese version. The Cronbach’s alphas for the TCI-125 reported by Kijima et al. (1996) are: 0.69 for Novelty Seeking, 0.83 for Harm Avoidance, 0.66 for Reward Dependence, 0.48 for Persistence, 0.78 for Self-Directedness, 0.62 for Cooperativeness, and 0.75 for Self-Transcendence.

General Health Questionnaire
An abbreviated (28 items) Japanese version of the General Health Questionnaire (GHQ-28; Goldberg & Hillier, 1979) was used to assess the current health condition. This self-reported scale compasses four domains of psychiatric symptoms, namely Somatic Symptoms, Anxiety and Insomnia, Social Dysfunction, and Depressive Symptoms. Higher GHQ score indicates greater physical or mental problems and thus, less favorable health condition. The GHQ has been proven to be valid and reliable after extensive application in different settings and various cultures since its development (Goldberg & Williams, 1988). Validity and reliability of the Japanese version of GHQ-28 has been verified (Kitamura, 1991).

Statistical analysis
Descriptive statistics including means and SDs of the target variables were computed separately based on the age group and gender. Cronbach’s alphas and Pearson coefficients of the major variables were calculated. Next, age and gender mean level differences were tested by MANOVA and ANOVA models for the TCI and the GHQ, respectively. Variables that showed significant differences were further analyzed by MANOVA with their lower-order traits as dependent variables. Lastly, hierarchical regression analyses assessed the predictive validity of personality traits as predictors of the GHQ.

Results
Descriptive statistics
Age- and gender-specific data of means, SDs, and reliability coefficients (Cronbach’s α) of the target variables are displayed in Table 1. Cronbach’s α ranged from 0.55 to 0.79 for the TCI and to 0.89 for the GHQ, which revealed a poor internal consistency of a number of variables such as Novelty Seeking and Persistence.

Correlation analyses
Within the TCI, comparatively strong correlations were observed between Novelty Seeking and Harm Avoidance ($r = -0.40, p < 0.01$), Self-Directedness and Harm Avoidance ($r = -0.48, p < 0.01$), as well as Reward Dependence and Cooperativeness ($r = 0.44, p < 0.01$). The GHQ was positively correlated with Harm Avoidance ($r = 0.46, p < 0.01$), whereas negatively correlated with Self-Directedness ($r = -0.47, p < 0.01$). These findings are consistent with the hypothesis that high Harm Avoidance is related to poor health, and further indicated that high Self-Directedness is positively associated with health and well-being.

Age differences in personality and health
Results of MANOVA/ANOVA (with Bonferroni corrections) showed significant age-related decreases in Reward Dependence, Self-Directedness, Cooperativeness, as well as an increase in Self-Transcendence (Table 2). MANOVA tests were conducted to further examine the lower-order traits of these variables. Compared with the younger group,
substantial decline was found in ‘Dependence versus Independence’ \((F(1, 300) = 17.96, \ p < 0.001)\) of Reward Dependence, ‘Congruent second nature’ \((F(1, 294) = 4.54, \ p < 0.05)\) of Self-Directedness, ‘Social acceptance versus Social intolerance’ \((F(1, 295) = 19.95, \ p < 0.001)\) and ‘Helpfulness versus Unhelpfulness’ \((F(1, 295) = 6.39, \ p < 0.05)\) of Cooperativeness, as well as an increase in ‘Spiritual acceptance’ \((F(1, 299) = 6.39, \ p < 0.05)\) of Self-Transcendence, in the older group.

Furthermore, Pearson coefficients showed significant correlations at \(p < 0.01\) level between age and Reward Dependence \((r = -0.22)\), Self-Directedness \((r = -0.21)\), and Self-Transcendence \((r = 0.20)\).

**Gender differences in personality and health**

Main effect of gender showed significantly higher Harm Avoidance, Reward Dependence, Cooperativeness, and the GHQ score in women compared with men. MANOVA with the subscales of these variables as dependent variables revealed significant differences in ‘Fear of uncertainty’ \((F(1, 283) = 4.84, \ p < 0.05)\) and ‘Fatigability and Asthenia versus Vigor’ \((F(1, 283) = 5.12, \ p < 0.05)\) of Harm Avoidance, ‘Sentimentality versus Tough mindedness’ \((F(1, 300) = 5.52, \ p < 0.05)\) of Reward Dependence, ‘Empathy versus Social disinterest’ \((F(1, 295) = 5.77, \ p < 0.05)\), ‘Compassion versus Revengefulness’ \((F(1, 295) = 5.57, \ p < 0.05)\), and ‘Integrated conscience versus Self-serving advantage’ \((F(1, 295) = 5.93, \ p < 0.05)\) of Cooperativeness.

Age-gender interaction was found in Persistence, showing that it decreases in women but increases in men across age groups.

**Are gender, age, and personality predictive of health?**

A hierarchical multiple linear regression analysis with the GHQ as dependent variable was conducted with demographic information except age (gender, employment, and residence) in Step 1, demographic variable of age in Step 2, and the TCI personality variables in Step 3. The results showed that Harm Avoidance and Self-Directedness are significant predictors of health among all the measured variables (Table 3).

**Discussion**

Grounded on Cloninger’s biosocial model of personality, the present study examined age and gender differences in temperament and character traits in a Japanese community sample. Relation between personality and health was further investigated. Age-related changes were detected in all character dimensions as well as the temperament dimension of Reward Dependence. Physical and mental health was significantly predicted by Harm Avoidance and Self-Directedness.

**Table 2. MANOVA/ANOVA of the target variables (with Bonferroni correction).**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age ( F )</th>
<th>Gender ( \eta_p^2 )</th>
<th>Gender ( F )</th>
<th>Gender ( \eta_p^2 )</th>
<th>Gender ( F )</th>
<th>Gender ( \eta_p^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>10.91**</td>
<td>0.02</td>
<td>6.15*</td>
<td>0.02</td>
<td>5.94**</td>
<td>0.02</td>
</tr>
<tr>
<td>HA</td>
<td>3.89*</td>
<td>0.02</td>
<td>8.56**</td>
<td>0.03</td>
<td>6.52*</td>
<td>0.02</td>
</tr>
<tr>
<td>RD</td>
<td>4.88*</td>
<td>0.02</td>
<td>4.18*</td>
<td>0.02</td>
<td></td>
<td></td>
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<tr>
<td>PS</td>
<td></td>
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<td>SD</td>
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<td>CO</td>
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<td>ST</td>
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<tr>
<td>GHQ</td>
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</tr>
</tbody>
</table>

Notes: Only significant results are displayed. NS = Novelty Seeking; HA = Harm Avoidance; RD = Reward Dependence; PS = Persistence; SD = Self-Directedness; CO = Cooperativeness; ST = Self-Transcendence. *\( p < 0.05\); **\( p < 0.01\).

**Table 3. Predictors of general health: hierarchical multivariate regression analysis.**

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>SRC</th>
<th>( R ) Cum</th>
<th>Adjusted ( R^2 ) Cum</th>
<th>( F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.10</td>
<td>0.15</td>
<td>0.01</td>
<td>( F(3, 228) = 1.75), n.s.</td>
</tr>
<tr>
<td>Employment</td>
<td>-0.07</td>
<td>0.15</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Cohabitation</td>
<td>-0.01</td>
<td>0.15</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.05</td>
<td>0.16</td>
<td>0.01</td>
<td>( F(4, 227) = 1.41), n.s.</td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novelty seeking</td>
<td>-0.06</td>
<td>0.59</td>
<td>0.32</td>
<td>( F(11, 220) = 10.69, p &lt; 0.001)</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>0.37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward Dependence</td>
<td>-0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistence</td>
<td>-0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Directedness</td>
<td>-0.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>-0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Dependent variable = GHQ; \( n = 231\). SRC = standardized regression coefficient beta; \( R \) Cum = cumulative amount of explained variance.
Opposite to our initial hypothesis, the results revealed a significant decline, rather than an increase, in Reward Dependence, Self-Directedness, and Cooperativeness. Adulthood personality change might be understood within the framework of life goals, which shifts from the growth function (e.g., growing, achieving, helping children develop) to the maintenance function (e.g., balancing a career and family), and then, the management of loss (e.g., adjustment to aging or chronic illness) (Staudinger & Bluck, 2001). The two groups in our study may be deemed representative of the maintenance function and the management of loss. Since aging is argued to be increasingly experienced in terms of physical decline or social loss as opposed to continuous growth (Steverink, Westerhof, Bode, & Dittmann-Kohli, 2001), our findings of a lower Reward Dependence and Cooperativeness in old age may be related to this shrinking sphere of social life, whether enforced or voluntary. The tendency toward being less dependent, acceptant, and helpful, depicted by significant changes in the lower-order traits, is consistent with previous literature that older adults tend to deliberately discontinue their less important social relationships (Lang, 2001). The meaning of the decline in Self-Directedness, however, is less explicit because its significance is only marginal. Although similar results have been reported in a recent longitudinal study (Geppert, 2006) that both mean-level and developmental decreases were found in Conscientiousness, a Big Five trait strongly correlated with Self-Directedness (De Fruyt, Van De Wiele, & Van Heerings, 2000), more evidence has showed an increase in this trait. Being as a character dimension, there are substantial individual differences in Self-Directedness and its development tends to be influenced by temperament as well as numerous nonshared environmental factors (Cloninger, 1998). Socio-cultural and cohort backgrounds may also contribute to mixed findings in Self-Directedness. As in current study, the younger group is representative of the ‘postwar baby-boom generation’ in Japan, and differs from their older counterparts in numerous aspects such as values, education systems, experiences of war and rapid economic growth, and so on. Future research should pay more attention to this trait to clarify its developmental pattern.

An increase in Self-Transcendence, more specifically, in ‘Spiritual acceptance’ is found in the older group, suggesting a spiritual development in later life. No significant age-related changes were found in temperament such as Harm Avoidance and Novelty Seeking. To synthesize these findings, it may be concluded that personality change in late adulthood mainly occurs in the character dimensions, in a pattern of gradual social detachment and internal spiritual growth. There are also substantial individual differences in adulthood personality development, which complicates the change versus stability issue, as well as the patterns of change.

Gender differences found in the study were generally in line with the initial hypotheses. The stronger tendency to anxiety (high Harm Avoidance) in women has been thus far supported by both genetic (e.g., Jang, Stein, Taylor, & Livesley, 1999) and epidemiological (e.g., Fullerton et al., 2001; Sheikh, Leskin, & Klein, 2002) studies. The higher Reward Dependence and Cooperativeness scored by women are consistent with previous literature and may be understood as the more relationally-oriented characteristics of women (Nolen-Hoeksema, 2002; Timmers, Fischer, & Manstead, 1998). Stronger fear and fatigability reported by women may contribute to the lower level of health found in our study, which is also consistent with previous evidence (e.g., Pinquart & Sörensen, 2001; Rieker & Bird, 2005).

Lastly, the GHQ score was significantly predicted by Harm Avoidance and Self-Directedness, which supported our hypothesis. Harm Avoidance refers to a heritable tendency toward behavioural inhibition and is regulated by the serotonin system, and Self-Directedness is based on the concept of the self as an autonomous individual (Cloninger et al., 1994). The result upholds the evidence that Harm Avoidance increases susceptibility to illness as a genetic risk factor, and suggests that a mature and strong self may function as the protective agent. It is intriguing to find that it is self-oriented rather than a relation-oriented trait (e.g., Cooperativeness), which significantly predicted health conditions in later life because ‘interpersonal flourishing’ is usually argued to be pivotal social environmental factors that keep healthy functioning (Ryff & Singer, 2005). It may be understood that high individual autonomy serves to maintain healthy habits and adhere to medical care, which are especially important for older adults. Our finding endorses recent evidence on consistency of Conscientiousness in predicting mortality (e.g., Weiss & Costa, 2005).

There are several limitations to the present study that must be acknowledged. Foremost, given the cross-sectional nature of data collection, there is a lack of longitudinal evidence clarifying the developmental patterns of adulthood personality. In addition, many important variables such as marital status, physical health, income, and education were not included, which severely restricted the interpretation of the results. Future research should especially examine these variables as covariates to elucidate factors that influence individual differences in older adults’ health and well-being. A further concern is the low alpha coefficients shown in several variables, which questions the reliability of the findings. Future research need to adopt longitudinal design, include more demographic factors, and combine multiple coping or emotion regulation measures as mediators or moderators for a better understanding of the relation of personality and health.

Yet, our results highlight an important pattern of associations between the two major demographic...
variables of age and gender and personality traits, whereby changes tend to occur in character dimensions, showing a pattern of gradual social detachment and internal spiritual growth. Current findings also clarified the relation between personality and health, and may potentially benefit clinical applications such as intervention and prevention designs, to enhance older adults’ health and psychological well-being.

References


