Personality Traits of Centenarians' Offspring

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OBJECTIVES: To determine whether the offspring of centenarians have personality characteristics that are distinct from the general population.

DESIGN: Case-control.

SETTING: Nationwide U.S. sample.

PARTICIPANTS: Unrelated offspring of centenarians (n = 246, mean age 75) were compared with published norms.

MEASUREMENTS: Using the NEO-Five-Factor Inventory (NEO-FFI) questionnaire, measures of the personality traits neuroticism, extraversion, openness, agreeableness, and conscientiousness were obtained. T-scores and percentiles were calculated according to sex and used to interpret the results.

RESULTS: Male and female offspring of centenarians scored in the low range of published norms for neuroticism and in the high range for extraversion. The women also scored comparatively high in agreeableness. Otherwise, both sexes scored within normal range for conscientiousness and openness, and the men scored within normal range for agreeableness.

CONCLUSION: Specific personality traits may be important to the relative successful aging demonstrated by the offspring of centenarians. Similarities across four of the five domains between male and female offspring is noteworthy and may relate to their successful aging. Measures of personality are an important phenotype to include in studies that assess genetic and environmental influences of longevity and successful aging. **J Am Geriatr Soc 57:683–685, 2009.**

Key words: personality; longevity; centenarian; extraversion; neuroticism; agreeableness

Research on siblings and offspring of centenarians has documented that exceptional longevity runs strongly in families.[1–4] Studies of the offspring of centenarians have shown that their mortality is lower that that of other members of their birth cohort[5] and that they have lower prevalence[1,6] and delayed onset of cardiovascular disease, hypertension, and diabetes mellitus.[7] Thus, they are regarded as a model of healthy aging. Because personality traits have been shown to have substantial heritable components,[8] it was hypothesized that certain personality features may be important to the healthy aging observed in the offspring of centenarians.

Several studies have assessed the effect of personality traits on survival using the Five-Factor Model (FFM) of Personality. Studies have used the Revised NEO Personality Inventory, a 240-item measure of the five broad factors and the 30 narrower facet scales or the NEO Five-Factor Inventory (NEO-FFI), a 60-item self-report questionnaire that measures only the five personality factors: neuroticism (emotional reactivity and distress), extraversion (tendency to be outgoing, active), openness (flexibility and openness to new ideas), agreeableness (cooperation and empathy), and conscientiousness (social responsibility and self-discipline).[9] Findings from longitudinal studies have, to some extent, been consistent, indicating that high conscientiousness, low neuroticism, and perhaps high extraversion are predictive of lower mortality and longevity in aging populations.[10–13] Prior research suggests that offspring of centenarians are a model of healthy aging and that certain personality traits are associated with mortality and longevity. Thus, this study aimed to test the hypothesis that above-average levels of health-promoting traits (e.g., conscientiousness and extraversion) and below-average levels of health-damaging traits (e.g., neuroticism) characterize offspring of centenarians.

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Using the NEO-FFI from the FFM, this study set out to measure the personality characteristics of offspring of centenarians and to compare NEO-FFI scores of centenarians' offspring with normative scores.

METHODS

Study Participants

Participants were biological offspring of centenarians enrolled in the New England Centenarian Study, an ongoing nationwide study of centenarians and their families. From 560 sibships, the oldest living sibling was chosen, yielding 352 female and 208 male centenarian offspring. A power analysis revealed that a total sample of 200 subjects was needed to detect a difference of 2.5 points or more in mean scores between the centenarian offspring and reported normative mean scores with an $\alpha = 0.05$ and $\beta = 0.80$. Thus, anticipating some losses to follow-up or refusals to participate, a random sample of 308 unrelated subjects was selected (168 women and 140 men, reflecting the expected proportions of women and men for an average age of 75). Of the women, 24 were unavailable, 14 had died, and five refused, resulting in an analytical sample of 125 women. Of the males, 15 had died, and four others could not be reached, resulting in an analytical sample of 121 men.

Measures

Participants completed Form S (self-report version) of the NEO-FFI,[9] a 60-item version of the NEO Personality Inventory (NEO PI-R), which operationalizes the FFM. Means and standard deviations for each of the five NEO-FFI personality factors were calculated separately in the men and women. Raw scores were converted into sex-specific standardized T-scores with a mean of 50 and a standard deviation of 10. T-scores were calculated using within-sex published NEO-FFI means and standard deviations that represent population norms published in Table B-4 on page 78 of the NEO PI-R manual.[9] The following guide was used to interpret the T-scores; T-scores between 45 and 54 are considered average, scores of 44 or less are low, and scores of 55 or greater are high. The raw scores were also converted into percentiles using the scales provided in Table C-7 on page 85 of the manual.[9]

RESULTS

Age, ethnicity, and education level according to sex are displayed in Table 1. The education level of the present sample is comparable with the education level of the NEO-FFI norm group. Table 2 contains NEO-FFI mean raw domain scores, T-scores, and percentiles comparing the offspring with a sex-matched referent cohort aged 21 to 96. Within the offspring of centenarian group, men and women did not differ significantly in their mean raw scores for the five factors, except for agreeableness, which was higher for the women (Student t-test = 4.5, $P < .001$). According to T-scores, male offspring of centenarians were low in neuroticism; high in extraversion; and average in openness, agreeableness, and conscientiousness. Percentile scores showed that men scored in the bottom third percentile for neuroticism and the top third percentile for extraversion. Female offspring, per T-scores, were also low in neuroticism and high in extraversion but also high in agreeableness. Otherwise, they were average in openness and conscientiousness. Women scored in the bottom third percentile for neuroticism and the top third percentiles for extraversion and agreeableness.

Table 1. Characteristics of Sample

Characteristic	Men n = 121	Women n = 125
Age, mean ± SD	75.6 ± 6.5	74.9 ± 7.6
Caucasian, %	99	97
Education, years, mean ± SD	16.7 ± 3.4	15.2 ± 2.3

SD = standard deviation.

Table 2. Mean NEO Five-Factor Inventory Domain Scores Expressed as Mean Raw Scores, T-Scores for the Full Adult Range (Aged ≥21), and Percentiles

Domain	Raw Score Mean ± Standard Deviation	T-Score	Percentile	Interpretation
Men				
Neuroticism	13.1 ± 5.9	44.0	32	Low
Extraversion	30.8 ± 6.5	56.1	75	High
Openness	27.5 ± 6.0	50.7	58	Average
Agreeableness	34.4 ± 5.3	54.9	70	Average
Conscientiousness	34.7 ± 6.0	51.0	58	Average
Women				
Neuroticism	14.4 ± 6.8	41.9	22	Low
Extraversion	31.3 ± 6.0	55.4	70	High
Openness	27.5 ± 6.2	50.9	59	Average
Agreeableness	37.3 ± 4.7	57.5	81	High
Conscientiousness	36.0 ± 6.0	51.7	59	Average

DISCUSSION

In this study of personality traits, the offspring of centenarians appear to have distinctive characteristics that may have important implications for their longevity. The data presented here suggest that the offspring of centenarians demonstrate greater extraversion and lower neuroticism and that the female subjects also reveal greater agreeableness. The high levels of extraversion are all the more impressive given that the extraversion scores were higher than in the full adult sample, which had a lower mean age ($\sim$ 50 vs 73). Lower extraversion, not higher, would normally be expected with older age.[14] Generally speaking, women usually score higher than men in neuroticism, particularly in Western and European cultures,[15] yet among the offspring of centenarians, the male and female mean T-scores for neuroticism were similar.

It is possible that the low neuroticism and higher extraversion will confer health benefits to these subjects. For example, people who are lower in neuroticism may be able to manage or regulate stressful situations more effectively than those with higher neuroticism levels. Similarly, high extraversion levels have been associated with greater subjective well-being, vitality, and longevity. A limitation of the current study is that it does not include facet-level data.

Future research might employ the 30 facets of the NEO-PI-R, which could help identify which lower-order traits are driving the low neuroticism and high extraversion. Also, larger samples and prospective follow-up of offspring could facilitate the comparison for age-related diseases and mortality of offspring and other referent cohorts with and without personality traits (and facets) associated thus far with longevity. The findings of the current study suggest that personality is an important phenotype to include in studies that assess genetic and environmental determinants of longevity. Such studies will be possible soon with the availability of fruitful genomics technologies, ongoing recruitment of ever-growing samples of long-lived families (https://longlifefamilystudy.wustl.edu/), and collaborating centenarian studies that also enroll offspring.

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