Age Changes and Differences in Personality Traits and States of the Old and Very Old

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The purpose of this study was to examine stability and change in personality traits and states for 3 age groups: centenarians, octogenarians, and sexagenarians. One hundred seventy-nine older adults participated in the 2-wave study. Results concerning age-group differences indicated that centenarians scored higher in Suspiciousness but lower in Intelligence and Stress when compared with the other 2 age groups. Octogenarians were lower in the personality traits Intelligence, Dominance, and Conscientiousness when compared with sexagenarians. Octogenarians were lower in the personality state Arousal, but higher on Regression. Results from the longitudinal analyses for centenarians indicated lower scores for Sensitivity, but higher scores for Radicalism (both personality traits), as well as higher scores of Fatigue and Depression (personality states) at follow-up. For the younger 2 age groups, age changes included higher scores for Sensitivity and Suspiciousness (personality traits). Stability scores for traits and states were considerably lower for centenarians when compared with the younger age groups.

PERSONALITY traits have been assessed in many studies including older adults (Heatherton & Weinberger, 1994; Helson & Wink, 1992; McCrae & Costa, 1990). Very little work, however, has been done within and between older age groups that include the old old (i.e., 80 years and older) and the oldest old (i.e., 85 years and older; cf. Baltes & Mayer, 1999, for an exception). The purpose of this study was to examine age changes and age differences on personality traits and states for three age groups: centenarians, octogenarians, and sexagenarians.

The demographic age group defined as the "oldest old" is the fastest growing segment of our population (Taeuber & Rosenwaike, 1992; Wade, 1992). More specifically, centenarians have also experienced a steady growth in numbers, with more than 37,000 centenarians counted in the 1990 Census and a projection of almost 850,000 centenarians by the year 2050 (U.S. Department of Health and Human Services, 1999). Only a few studies have described in detail the characteristics of this population. Perhaps the most detailed studies are concerned with the functional, physical, and cognitive condition of this population (Holtsberg, Poon, Noble, & Martin, 1995; Johansson, Zarit, & Berg, 1992; Martin, Poon, Kim, & Johnson, 1996; Seeman et al., 1994). Although there can be substantial physical and cognitive impairment in many of these very old individuals, the strength of these persons is perhaps not expressed in their level of cognitive or physical functioning, but rather in their resilient self (Baltes & Baltes, 1990) or robust personality. We have therefore emphasized in our earlier studies that personality is an important aspect to study in the oldest old (Adkins, Martin, & Poon, 1996; Martin et al., 1992).

Previous research still remains inconclusive on whether personality can change (Butcher et al., 1991; Field & Millsap, 1991; Helson & Wink, 1992; Kogan, 1990; McCrae & Costa, 1990) and to what extent cohort differences might explain between-group differences in personality (Douglas & Arenberg, 1978; Schaie & Parham, 1976; Woodruff & Birren, 1972). Recent results champion stability of personality traits in adulthood (Costa & McCrae, 1994; McCrae, 1993), but, likewise, several other studies indicate that change in personality is possible (Helson & Stewart, 1994).

In general, two different approaches are taken to study personality stability (Costa & McCrae, 1994): stability of mean levels to estimate normative changes in personality variables with age and stability of individual differences referring to the stability of individual's rank ordering. Although results seem to suggest that mean level changes are small or nonexistent, studies emphasizing the stability of individual differences demonstrate some traits with very high stability, such as Neuroticism and Openness, with other factors showing lower levels of stability, particularly over longer periods of time (Costa & McCrae, 1994). Interindividual stability of specific traits across extended time periods is quite substantial, but the longer the time interval between assessments, the greater the instability (Kogan, 1990).

Recent findings from the Berlin Aging Study indicated a negative age trend for Extraversion and Openness, whereas there was no significant age difference for Neuroticism (Smith & Baltes, 1999). What is not known is whether personality remains stable at the extreme end of the life span or whether personality becomes more fluid in very late life (Costa, McCrae, & Arenberg, 1980).

Today there is growing documentation that personality attributes have both state and trait characteristics (Bengtson, 1996; Headey & Wearing, 1991). Much of the stability in personality has been investigated by trait concepts that rely on items indicating stability. Much less attention has been paid to potentially more variable personality states (Adkins et al., 1996; Nesselroade, 1988). Personality states tap into

nonsystematic situational variation, allowing for more intraindividual variability over time. Using state concepts parallel to trait dimensions also widens the scope of personality research, because several personality dimensions are assessed (i.e., stress, fatigue, and guilt) that are not typically components of enduring personality characteristics. Therefore, the purpose of the present study was to assess age differences and changes in personality traits and personality states within a population of old and very old adults. If there is an important distinction between relatively stable personality traits and more variable personality states, then we would expect more stability in trait and more nonsystematic variability in personality state measures.

In a preliminary study, when comparing three age groups in later life, we reported on cross-sectional findings of personality, coping, and mental health (Martin et al., 1992). We noted age differences in basic personality traits, such as higher Suspiciousness and lower Tension scores in centenarians. Other studies noted that very old individuals are less energetic (Field & Millsap, 1991), show more depressive symptoms (Martin, Rott, Kerns, Poon, & Johnson, 2000), and may score higher on Introversion and lower on Openness (Butcher et al., 1991; Smith & Baltes, 1999) than younger age groups. Age differences, however, cannot inform us about possible longitudinal changes of personality. A follow-up study allowed us to assess the survivors' personality stability and change over time. Furthermore, by following very old persons over time, we were also able to assess the possible impact of cognitive impairment on personality changes.

Building on the existing research, this project had several research questions in mind. First, considering adaptational characteristics of the oldest old, we focused on mean level of age differences and changes for the three age groups under study. Consistent with the literature, we hypothesized no differences or changes for measures of Neuroticism (i.e., Emotional Stability, Insecurity, Tension, and state Anxiety), but lower levels concerning Extraversion (i.e., Warmth, Dominance, Boldness, and state Extraversion) and higher levels of Fatigue, Depression, and Suspiciousness, particularly in the very old age groups. With regard to stability of individual differences, we hypothesized lower levels of stability for centenarians because of their increased frailty over time.

METHODS

Participants

The original baseline study included 327 older adults during the first wave of the study, whereas 205 participants were retested during the second wave. Twenty-six participants had missing data on the personality questionnaire, leaving a sample size of 179 participants for this study.

To assess whether those who participated in the first wave of the study were different from those who participated in the second wave, we computed three logistic regressions: the first one with age group, gender, race, subjective health, instrumental activities of daily living, mental status, education, and depression as predictors, the second with personality traits, and the third with personality states as predictors of participation at Time 2. Age group and depression were significant predictors of Time 2 participation ($B = -.03$, $p < .05$, and $B = -.07$, $p < .05$, respectively). Of the personality variables, Intelligence, Apprehension, and Control (personality traits), as well as Stress and Fatigue (personality states) significantly predicted participation ($B = .14$, $p < .05$, $B = .17$, $p < .05$, $B = .22$, $p < .05$, $B = .17$, $p < .05$, and $B = -.39$, $p < .01$, respectively). Taken together, Time 2 participants were more likely to be younger, less depressed, more intelligent, more apprehensive and controlled, and more stressed, but less fatigued.

Demographic characteristics of the sample are summarized in Table 1. Sixty-seven participants were in their sixties ($M = 64.9$), 57 were in their eighties ($M = 82.8$), and 55 were centenarians ($M = 100.5$) at the first time of testing. Two thirds of the sample were female, whereas one third were male. Approximately 30% of the sample were African American. More than 70% of the sample rated their health as either good or excellent.

The timing of retesting was different for centenarians and the two younger age groups. We decided to retest the octogenarians and sexagenarians after 5 years to allow for change to occur. Five years obviously would have been too long a time for retesting centenarians. Therefore, centenarians were retested after 18 months. The consequence of the different testing times is that data analysis had to be conducted separately for centenarians and the other two age groups.

The baseline centenarian sample was recruited through the University of Georgia's Survey Research Center, the Office of the Governor of Georgia, the media, and state and local agencies on aging. Centenarians and their families were asked to contact the Gerontology Center at the University of Georgia. After obtaining information about the centenarians, we sent out a letter with information to prospective participants with an invitation to participate in the study. Follow-up phone calls were made to answer any question and to schedule preliminary appointments to ex-

Table 1. Demographic Characteristics

Variable	Total n	Percent[a]	Age group 60–69	80–89	≥100
Age					
Sexagenarians	67	37.9			
Octogenarians	57	31.6			
Centenarians	55	30.5			
Total	179	100.0			
Gender					
Male	54	30.2	25	19	10
Female	125	69.8	42	38	45
Total	179	100.0	67	57	55
Ethnicity					
Caucasians	124	69.3	43	45	36
African Americans	55	30.7	24	12	19
Total	179	100.0	67	57	55
Subjective health ratings					
Poor	5	2.8	3	0	2
Fair	39	21.9	8	12	19
Good	93	52.2	36	33	24
Excellent	41	23.0	19	12	10
Total	178	99.9	66	57	55

[a]Percentages may not add up because of rounding.

plore the question of participation. During the first visit, informed consent was obtained and the Mini-Mental Status Exam (MMSE; Folstein, Folstein, & McHugh, 1975) was used as a screening device to determine eligibility of participants for the baseline recruitment. A cutoff score of 23 or a score of 2 on the Global Deterioration Scale (Reisberg, Ferris, de Leon, & Crook, 1982) had to be reached to participate in the study. During the follow-up testing, all surviving participants were assessed. At that time, no sexagenarians and only one octogenarian obtained a score less than 23 on the MMSE. However, only 60% of the surviving centenarians (compared with 69% at Time 1) reached this cutoff score at the second measurement time. Participants were all community dwelling.

Sexagenarians and octogenarians were recruited with random-digit dialing by the University of Georgia Survey Research Center to obtain a sample that would imitate the gender and racial characteristics of citizens of Georgia. Testing with these two age groups was primarily done in small groups at central community settings. Typically 5 to 15 participants were invited for a testing session. Most participants of the younger age groups filled out questionnaires on their own, but, in cases of visual impairment, interviewers posed questions directly to the participants.

Measures

Measurement instruments relevant for this study included the fourth edition of the Sixteen Personality Factor Questionnaire (16PF) questionnaire (Form A), assessing personality traits and the Eight State Questionnaire (8SQ) questionnaire, assessing personality states. The 16PF measured the following primary personality traits: Warmth ("If asked to work with a charity drive, I would accept or politely say I'm too busy"), Intelligence ("Spade" is to "dig" as "knife" is to "sharp," "cut," or "point"), Emotionality ("I feel a bit nervous of wild animals even when they are in strong cages"), Dominance ("I like it when I know so well what the group has to do that I naturally become the one in command"), Impulsivity ("I enjoy doing 'daring,' foolhardy things 'just for fun'"), Conformity ("I find the sight of an untidy room very annoying"), Boldness ("I find it easy to mingle among people at a social gathering"), Sensitivity ("Because it is not always possible to get things done by gradual, reasonable methods, it is sometimes necessary to use force"), Suspiciousness ("I have sometimes been troubled by people's saying bad things about me behind my back, with no grounds at all"), Imagination ("You can almost always notice on people's faces when they are dishonest"), Shrewdness ("I would rather take the gamble of a job with possibly large but uneven earnings than one with a steady, small salary"), Insecurity ("Once in a while I have a sense of a vague danger or sudden dread for reasons that I do not understand"), Radicalism ("I think society should let reason lead it to new customs and throw aside old habits or mere traditions"), Self-Sufficiency ("I like to do my planning alone, without interruptions and suggestions from others"), Self-Discipline ("I like to go my own way instead of acting on approved rules"), and Tension ("I sometimes get in a state of tension and turmoil as I think of the day's happenings"). Cattell, Eber, and Tatsuoka (1970) reported test–retest reli-

abilities with intervals of 4 to 7 days ranging from .58 to .92, depending on the trait. At 2-month intervals, reliabilities ranged from .35 to .85.

Personality states were assessed by the 8SQ (Institute for Personality and Ability Testing, 1974). This instrument was designed to complement the traditional trait concepts measured by the 16PF. The 8SQ included Anxiety ("I'm so worked up and worried that my hands are shaking"), Stress ("At the moment I'm not feeling any great stress or strain"), Depression ("In my present mood I think I'd almost be in tears if things went wrong"), Regression ("I'm pretty demanding and complaining today"), Fatigue ("I am very tired today"), Guilt ("At the moment I'm feeling sort of guilty about things"), Extraversion ("If a social gathering were going on right now, I'd probably just sit back and watch the others"), and Arousal ("The way I feel now I could get enthusiastic about almost anything"). Test–retest reliability coefficients reported by the Institute for Personality and Ability Testing (1974) varied from .88 to .96. All 16 trait and eight state measures were used in the analyses.

RESULTS

To assess change, we computed univariate repeated measures analyses of variance (ANOVAs) for centenarians, whereas 2 (age group) × 2 (time of measurement) repeated (ANOVAs) were computed for the other two age groups. Additional 3 (age group) × 2 (time of measurement) (ANOVAs) were computed to test for age-group differences between centenarians and the other two age groups. Stability over time was calculated with Pearson correlations, and stability differences across age groups were assessed with Fisher's Z test.

The first data analysis step was concerned with age-group effects, comparing personality for the octogenarians and sexagenarians (see Table 2). The omnibus multivariate analysis of variance (MANOVA) test for age-group differences was significant for personality traits and personality states, Wilks's λ (16,228) = .807, $p < .001$, and Wilks's λ (8,208) = .89, $p < .01$, respectively. Differences were obtained for Intelligence, Dominance, and Conscientiousness with regard to the personality trait questionnaire, indicating that octogenarians were lower on all three traits. For the personality states questionnaire, age-group differences were obtained for Regression and Arousal, indicating that octogenarians were higher in Regression, but lower in Arousal.

The overall MANOVA test did not reveal any overall changes over time regarding personality traits, Wilks's λ (16,228) = .95, $p > .05$. A statistical trend was observed for changes over time in personality states, Wilks's λ (16,228) = .93, $p < .06$. For the younger two age groups, significant increases were obtained for the personality traits Sensitivity and Suspiciousness (see Table 2). For personality states, a significant interaction was obtained for Depression, indicating that sexagenarians had decreasing scores over time, whereas octogenarians had increasing scores.

Change over time was observed separately for centenarians (see Table 3), because of the differential retest interval. The omnibus MANOVA test did not indicate any overall personality changes over time for personality traits or states, Wilks's λ (16,87) = .88, $p > .05$, and Wilks's λ (8,98) =

Table 2. Mean Changes in Personality Traits and States of Octogenarians and Sexagenarians

Dependent variables	60–69		80–89		Age group		Time		A×T	
	T1	T2	T1	T2	M	η^2	M	η^2	M	η^2
Personality Traits (*df* = 123)										
Warmth	5.63 (1.45)	5.40 (1.83)	5.71 (1.98)	6.05 (1.79)	1.81		.25		3.01	
Intelligence	5.21 (2.24)	5.03 (1.72)	4.29 (1.88)	4.02 (1.93)	10.80***	.08	1.53		.07	
Emotional Stability	5.46 (2.27)	5.39 (1.95)	5.04 (1.67)	5.16 (1.86)	.93		.00		.31	
Dominance	4.58 (2.05)	4.63 (1.91)	3.82 (1.48)	4.00 (1.64)	4.88*	.04	.50		.15	
Enthusiasm	4.28 (1.77)	4.43 (1.65)	4.30 (1.61)	4.21 (1.63)	.10		.01		1.04	
Conscientiousness	6.60 (1.99)	6.70 (1.67)	6.02 (1.60)	6.07 (1.67)	4.79*	.04	.20		.05	
Boldness	5.52 (1.67)	5.51 (1.68)	5.32 (1.60)	5.16 (1.60)	1.11		.30		.18	
Sensitivity	6.00 (2.01)	6.30 (1.88)	5.71 (1.89)	6.11 (1.73)	.78		4.91*	.04	.03	
Suspiciousness	5.46 (1.76)	5.57 (1.88)	5.32 (2.08)	5.80 (1.74)	.13		3.96*	.03	1.72	
Imagination	4.43 (2.05)	4.33 (1.81)	4.20 (1.93)	3.86 (1.46)	1.58		1.74		.44	
Shrewdness	6.27 (1.97)	6.57 (1.87)	6.75 (1.78)	7.00 (1.89)	2.99		1.67		.05	
Insecurity	5.18 (1.93)	5.19 (1.83)	5.14 (1.76)	5.11 (1.68)	.03		.03		.08	
Radicalism	4.72 (1.80)	4.90 (1.98)	4.66 (1.56)	4.93 (1.70)	.02		1.65		.08	
Self-Sufficiency	6.61 (2.04)	6.64 (1.67)	6.30 (1.93)	6.77 (1.83)	.13		1.92		1.50	
Self-Discipline	7.04 (1.54)	6.72 (1.98)	6.68 (1.67)	6.61 (1.78)	.79		1.05		.68	
Tension	5.31 (2.13)	5.28 (1.98)	5.21 (1.71)	5.23 (1.83)	.06		.00		.03	
Personality States (*df* = 95)										
Anxiety	4.70 (1.61)	4.74 (1.66)	4.89 (1.30)	5.09 (1.59)	1.12		.38		.15	
Stress	4.34 (1.97)	3.88 (1.78)	3.74 (1.71)	3.80 (1.96)	1.46		.87		.35	
Depression	5.30 (1.52)	5.02 (1.53)	5.33 (1.23)	5.76 (1.51)	2.39		.24		5.68*	.06
Regression	4.98 (1.49)	4.80 (1.40)	5.39 (1.18)	5.76 (1.48)	8.22**	.08	.28		2.97	
Fatigue	5.06 (1.66)	5.04 (1.70)	5.37 (1.78)	5.89 (1.59)	3.88		2.87		3.36	
Guilt	4.42 (1.86)	4.50 (1.81)	4.59 (1.61)	5.28 (1.99)	1.86		2.94		1.71	
Extraversion	5.00 (1.56)	5.42 (1.42)	4.74 (1.69)	4.83 (1.68)	2.33		3.09		1.10	
Arousal	5.50 (1.59)	5.46 (1.18)	4.85 (1.66)	4.93 (1.34)	6.37*	.06	.07		.27	

Notes: Standard deviations appear in parentheses. T1 = Time 1; T2 = Time 2.
*$p < .05$; **$p < .01$; ***$p < .001$.

.90, $p > .05$, respectively. For centenarians, a significant decrease was obtained for the personality trait Sensitivity, but an increase in Radicalism. The personality states Fatigue and Depression yielded a significant increase over time.

Age Group × Time repeated ANOVAs were computed again with the inclusion of all three age groups. Main age group effects were obtained for Intelligence, $F(2,170) = 26.45$, $p < .001$, $\eta^2 = .24$, Dominance, $F(2,171) = 3.53$, $p < .05$, $\eta^2 = .04$, Sensitivity, $F(2,171) = 5.26$, $p < .01$, $\eta^2 = .06$, Suspiciousness, $F(2,170) = 4.85$, $p < .01$, $\eta^2 = .05$, and Tension, $F(2,171) = 4.11$, $p < .05$, $\eta^2 = .05$. Significant age group differences were also obtained for personality states: Stress, $F(2,146) = 7.43$, $p < .01$, $\eta^2 = .09$, Regression, $F(2,146) = 6.47$, $p < .01$, $\eta^2 = .08$, Fatigue, $F(2,146) = 7.07$, $p < .01$, $\eta^2 = .09$, and Arousal, $F(2,145) = 3.22$, $p < .05$, $\eta^2 = .04$. Post hoc Scheffé tests indicated that

Table 3. Mean Changes (Within Centenarians) in Personality Traits and States

Dependent Variables	Time 1	Time 2	F	η²
Personality Traits (df = 51)				
Warmth	5.71	5.75	.02	
	(1.74)	(1.73)		
Intelligence	2.90	3.06	.20	
	(1.58)	(2.08)		
Emotional Stability	5.51	5.27	.71	
	(1.77)	(1.70)		
Dominance	4.45	4.55	.09	
	(1.63)	(1.83)		
Enthusiasm	4.43	4.18	.98	
	(1.90)	(1.85)		
Conscientiousness	6.20	6.20	.01	
	(1.47)	(1.67)		
Boldness	5.22	5.14	.18	
	(1.68)	(1.55)		
Sensitivity	5.47	4.96	4.58*	.08
	(1.51)	(1.47)		
Suspiciousness	6.40	6.34	.03	
	(1.82)	(1.89)		
Imagination	3.78	3.88	.11	
	(1.25)	(1.81)		
Shrewdness	6.88	7.14	.73	
	(1.84)	(1.64)		
Insecurity	5.10	4.88	.52	
	(1.94)	(1.70)		
Radicalism	4.98	5.69	4.80*	.09
	(1.88)	(1.96)		
Self-Sufficiency	6.80	6.84	.02	
	(1.65)	(1.59)		
Self-Discipline	7.04	6.67	1.95	
	(1.51)	(1.57)		
Tension	4.31	4.59	.86	
	(1.85)	(1.80)		
Personality States (df = 53)				
Anxiety	4.92	5.11	.54	
	(1.45)	(1.55)		
Stress	3.32	2.68	4.02	
	(1.96)	(1.86)		
Depression	5.38	5.91	4.07*	.07
	(1.38)	(1.50)		
Regression	5.55	5.72	.55	
	(1.32)	(1.42)		
Fatigue	5.72	6.42	9.79**	.16
	(1.43)	(1.20)		
Guilt	4.66	4.72	.04	
	(1.81)	(1.79)		
Extraversion	5.09	4.75	1.30	
	(1.60)	(1.71)		
Arousal	5.17	4.90	.31	
	(1.57)	(1.39)		

Note: Standard deviations appear in parentheses.

*p < .05; **p < .01.

all three groups were significantly different from each other in Intelligence, with centenarians having the lowest scores and sexagenarians having the highest scores. Post hoc tests also revealed that centenarians had significantly higher scores for Suspiciousness, but lower scores for Stress when compared with both younger age groups.

Age changes for all three age groups revealed that centenarians had significantly lower scores in Radicalism, $F(1,171) = 5.82$, $p < .05$, $\eta^2 = .03$, and Fatigue, $F(1,146) = 10.52$, $p < .01$, $\eta^2 = .07$, when compared with the other age groups. Three significant Age Group × Time interactions were obtained: Sensitivity as a personality trait, $F(1,171) = 4.88$, $p < .01$, $\eta^2 = .05$, and Depression, $F(1,146) = 3.67$, $p < .05$, $\eta^2 = .05$, as well as Fatigue, $F(1,146) = 3.15$, $p < .05$, $\eta^2 = .04$, as personality states. For Sensitivity, sexagenarian and octogenarian scores increased, whereas, for centenarians, Sensitivity scores decreased. Post hoc Scheffé tests indicated that centenarians differed from the other two age groups at the follow-up testing only. For Depression, sexagenarian scores decreased, whereas, for octogenarians and centenarians, scores increased over time. Post hoc Scheffé tests determined that octogenarians and centenarians differed from sexagenarians at Time 2 only. Finally, Fatigue scores increased for octogenarians and centenarians, but stayed stable for sexagenarians. Post hoc Scheffé tests determined that octogenarians and centenarians differed from sexagenarians at Time 2 only.

Stability measures over time were computed separately for each age group for the personality measures (see Table 4). For personality traits, sexagenarians had the lowest stability for Self-Discipline and the highest for Tension. For octogenarians, the lowest stability coefficient was found for Shrewdness and the highest for Suspiciousness. For centenarians, the lowest stability was found for Intelligence and the highest for Boldness.

Stability measures for personality states indicated that sexagenarians had lowest scores for Stress and highest for Fatigue. Octogenarians had lowest stability scores in Regression, and—as did the sexagenarians—highest scores in Fatigue. Finally, centenarians had lowest state stability in Depression, whereas their highest stability measures were noted in Guilt. Stabilities were compared across age groups by computing Fisher's Z test. This test is appropriate for testing significant differences of two correlation coefficients representing two different populations (Hays, 1988). The results indicated that stabilities contrasting octogenarians and centenarians with sexagenarians differed for Intelligence ($Z = 2.31$, $p < .05$, and $Z = 3.57$, $p < .05$, respectively), for Sensitivity ($Z = 2.25$, $p < .05$, and $Z = 3.04$, $p < .05$, respectively), and for Imagination ($Z = 2.71$, $p < .05$, and $Z = 4.02$, $p < .05$, respectively; see Table 4). Stabilities contrasting centenarians with octogenarians and sexagenarians differed for Dominance ($Z = 2.67$, $p < .05$, and $Z = 4.08$, $p < .05$, respectively), for Fatigue ($Z = 2.32$, $p < .05$, and $Z = 2.32$, $p < .05$, respectively) and for Extraversion, ($Z = 1.96$, $p < .05$, and $Z = 2.35$, $p < .05$, respectively).

Because cognitive impairment can be quite prevalent in very old individuals, possibly affecting results for the centenarian survivors, we divided the centenarian group into a higher cognitively functioning group (with MMSE scores ≥ 23, $n = 29$) and a lower cognitively functioning group (with MMSE scores < 23, $n = 20$). (We thank one of the anonymous reviewers for this suggestion.) Mean trait stabilities were indeed higher for centenarians in the higher cognitive functioning group, however, stabilities were lower for mean stabilities for personality states. Significant state stabilities were only obtained for Guilt, $r(29) = .55$, and

Table 4. Stability Measures for Personality Traits and States

Personality measure	60–69 (*n* = 67)	80–89 (*n* = 57)	≥100 (*n* = 53)
Personality traits			
Warmth	.45**	.47**	.28*
Intelligence	.60**ₐ	.25_b	.02_b
Emotional Stability	.73**ₐ	.57**_{a,b}	.30*_b
Dominance	.67**ₐ	.51**ₐ	.04_b
Enthusiasm	.68**	.52**	.52**
Conscientiousness	.53**	.49**	.26
Boldness	.72**	.52**	.67**
Sensitivity	.74**ₐ	.49**_b	.36**_b
Suspiciousness	.56**	.62**	.31*
Imagination	.69**ₐ	.33**_b	.09_b
Shrewdness	.53**ₐ	.07_b	.26_{a,b}
Insecurity	.58**	.57**	.34*
Radicalism	.47**	.26	.32*
Self-Sufficiency	.45**	.29*	.41**
Self-Discipline	.42**	.31*	.21
Tension	.77**ₐ	.61**_{a,b}	.33**_b
Overall mean	.60	.43	.30
Personality states			
Anxiety	.53**	.27	.24
Stress	.26	.34*	.29
Depression	.54**ₐ	.44**_{a,b}	.12_b
Regression	.57**ₐ	.26_b	.30*_{a,b}
Fatigue	.64**ₐ	.65**ₐ	.31*_b
Guilt	.42**	.49**	.32*
Extraversion	.59**ₐ	.55**ₐ	.23_b
Arousal	.43**	.42**	.26
Overall mean	.50	.43	.26

Note: Stabilities with different subscripts are significantly different from each other.

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 5. Stability Measures for Personality Traits and States by Mental Status (Centenarians Only)

Personality measure	MMSE < 23 (*n* = 20)	MMSE ≥ 23 (*n* = 29)
Personality Traits		
Warmth	.06	.28
Intelligence	−.36	.44*
Emotional Stability	.39	.40*
Dominance	−.18	−.03
Enthusiasm	.60**	.43*
Conscientiousness	.10	.32
Boldness	.60**	.62**
Sensitivity	.32	.37
Suspiciousness	.20	.24
Imagination	−.09	.24
Shrewdness	−.13	.41*
Insecurity	.36	.50**
Radicalism	.77**ₐ	.05_b
Self-Sufficiency	.21	.36
Self-Discipline	.08	.30
Tension	.62**ₐ	−.01_b
Overall mean	.22	.31
Personality States		
Anxiety	.35	.18
Stress	.13	.35
Depression	.19	.08
Regression	.27	.35
Fatigue	.32	.09
Guilt	.55*	.14
Extraversion	.31	.02
Arousal	.44*	.02
Overall mean	.32	.15

Notes: Stabilities with different subscripts are significantly different from each other. MMSE = Mini-Mental State Exam.

*$p < .05$; **$p < .01$; ***$p < .001$.

Arousal, $r(29) = .44$, in the lower cognitively functioning group. Fisher's *Z* tests were computed for all personality traits and states, but only two trait dimensions yielded significant stability differences (see Table 5). The lower cognitively functioning group showed significantly higher stabilities in the personality traits Radicalism and Tension ($Z = 3.03$, $p < .05$, and $Z = 2.24$, $p < .05$, respectively).

DISCUSSION

In our earlier work, we emphasized the importance of individual characteristics as contributors to optimal adjustment to late life changes (Poon et al., 1997). We consider personality traits and states to be important when one is faced with adverse health and social changes that very old people particularly encounter (Zarit, 1996). To serve as an important resource, personality would have to be a stable characteristic. In the current study, we assessed personality traits and states at two time periods with a sample of second-wave survivors of three older age groups. We explored what outstanding characteristics might exist in the oldest groups and how stable those characteristics would be over time.

The overall results seem to suggest conflicting results concerning age-group differences. As hypothesized, differences were not obtained for measures of Neuroticism (i.e., Emotional Stability, Insecurity and Tension, and state Anxiety). Contrary to our hypothesis, age group differences were also not obtained for measures of Extraversion (except for

Dominance). Rather, differences between octogenarians and sexagenarians were obtained for Intelligence, Dominance, Conscientiousness, Regression, and Arousal. The older participants were lower in Intelligence, less dominant and conscientious, and lower in Arousal, but higher in Regression. Cross-sectional differences, of course, can be due to age changes or age-group differences. Some of the results, such as lower scores on Intelligence, mirror other age-group comparison findings (e.g., Schaie, 1996). Why the older age group is less dominant and conscientious is less clear, but perhaps the Depression era and the experience of World War II influenced their pattern of personality, as the older age group were young adults at that time. Possible age changes may reflect cognitive decline, but none of the cross-sectional results were mirrored in the longitudinal analysis, suggesting that the mean level of personality remains stable into very old age (Costa & McCrae, 1994).

Overall, few personality changes were obtained over time. Even though there were no significant changes in overall personality patterns, it is still important to assess changes in particular source traits (Cattell, 1993). Changes were observed for Suspiciousness (as hypothesized) and Sensitivity in the younger old age groups, and for Sensitivity and Openness in centenarians. The increase of Suspiciousness, particularly in the octogenarian age group, is noteworthy, because it corresponds to the finding that cente-

narians have higher scores in Suspiciousness than younger old-age groups (Martin et al., 1992). If this finding can be replicated and continues to emerge as an important change variable among the oldest old, it may well mark an important survival characteristic for the oldest old. The importance of suspiciousness can be explained by increased paranoia and fear of victimization in the older adults (Blazer, George, & Hughes, 1988; Ferraro & LaGrange, 1992).

The change in Sensitivity is striking, because it indicates a different direction in the group comparison. Although Sensitivity scores increased in the younger old-age groups, they tended to decrease at the second testing time in centenarians. High scores on this trait suggest that persons are tender-minded, dependent, fidgety, and insecure (Krug, 1981). People who score high on this trait demand attention and help, and they may also be impatient and temperamental (Institute for Personality and Ability Testing, 1991). These characteristics seem to become more prevalent for adults in their 60s and 80s, perhaps indicating an increased sense of vulnerability. To survive beyond 100, however, it may be increasingly important to feel tough minded, less dependent, and more secure. The change in Sensitivity for centenarians may also correspond with a higher score in Radicalism; over time and toward the end of life, it may become more acceptable to stay open for experiences. For state measures, Fatigue and Depression scores increased in centenarians. These results are consistent with our hypotheses and confirm earlier findings by Field and Millsap (1991), who reported that very old people are less energetic than younger age groups. It is possible that toward the biological end of life, physical reserve capacities start to diminish and older individuals may have to household with their individual reservoir of strength. Noticing such changes, centenarians may also show increased levels of depressive symptoms (Martin et al., 2000). In general, then, changes in several source traits and states may be a result of increased demands to adapt to changes in very late life or may be an indication for the depletion of resilience in very old age.

Although some of these personality changes were observed, it should be noted that many personality traits did not change over time. These results are consistent with findings by McCrae and Costa (1990). However, it may be necessary to not only assess the broad Big Five aspects of personality, but also look at primary-level traits that, perhaps, may be more likely to change over time (Cattell, 1993).

The inspection of age-group differences and age changes when including all three age groups revealed mostly similar results, but also a few differences. The same age-group effects were obtained for Intelligence, Dominance, Regression, and Arousal. New age differences were obtained indicating differences for centenarians in Sensitivity, Suspiciousness, Tension, Stress, and Fatigue. With regard to age changes, increases for Suspiciousness were only obtained for the younger two age groups, whereas Radicalism and Fatigue increased significantly when centenarians were included. Significant interactions were obtained for Sensitivity (which decreased in centenarians, but increased in the younger two age groups), Fatigue, and Depression (which increased in the older two age groups). Although these results have to be viewed with caution, as the retesting

time for centenarians was shorter, the direct comparison of all three age groups possibly suggests unique personal strengths and weaknesses, particularly for centenarians. Lower scores in Sensitivity, Tension, and Stress in combination with higher scores in Suspiciousness and Radicalism point to continued personal adaptive capacity, a robust or resilient self (Baltes & Baltes, 1990). Higher scores in Fatigue and Depression, on the other hand, point to lower reserve capacity in very late life.

The second question of this study was concerned with the interindividual stability of personality traits and states. To this end, we examined stability coefficients for personality traits and states. Consistent with our hypothesis, the stability coefficients for centenarians were significantly lower than those for the other two age groups, even though centenarians were retested after a relatively shorter time. The relatively low stability of centenarians might point to a higher level of vulnerability as social and psychological resources diminish (Martin et al., 1996). In any case, our results may for the first time provide some indication that personality becomes more fluid and prone to change at the extreme end of the human life span (Costa et al., 1980). This late-in-life change may be due to the fact that centenarians are getting closer to the end of their lives, to increased fatigue, or to cognitive changes late in life. The last interpretation would also suggest that a larger number of response errors in centenarians at the second measurement time could account for lower stability.

To test the hypothesis that cognitive functioning may account for lower stability scores in centenarians at the second measurement point, we divided the centenarian survivors into two smaller subgroups: those with a relatively high score on the MMSE and those with a relatively low score. Lower stabilities for cognitively impaired centenarians may merely reflect the inability to comprehend questions. The results indicated that trait stability is not significantly higher in centenarians with high mental-status scores. Personality-state stability was actually higher in centenarians with relatively low scores on the mental status test. Particularly, the Guilt and Arousal dimensions, as well as Radicalism and Tension for personality traits, turned out to be high for centenarians with low mental-status scores, although stability differences were only significant for Radicalism and Tension. Taken together, the results suggest that personality states and traits stabilities do not uniformly decline as a function of increased cognitive impairment, but may concentrate around a few specific traits and states, such as Radicalism and Tension (as traits) and Guilt and Arousal (as states). If this finding can be replicated with larger samples, then persistent feelings of guilt and arousal may be found to relate to mental-status decline.

We also wish to point out that assessing traits and states conjointly is important when considering personality stability and change (Adkins et al., 1996). Items on trait questionnaires are designed to capture stability over time. For example, the response to the trait statement "I have been let down by my friends" (measured on a scale from hardly ever to quite a lot) as a measure of emotional stability may not change much over time, whereas the response to the state statement "Physically I feel tired or full of energy" as a

measure of fatigue may depend on the day's circumstances. Trait measures of personality therefore overestimate stability, whereas state measures are designed to allow for more intraindividual variability over time. This does not mean, however, that state measures are completely random assessments of personality. Individuals do tend to react even to nonsystematic environmental demands in consistent ways. As a matter of fact, the findings reported in this study suggest that the stability measures for personality states are not dramatically lower than those for personality traits; particularly for the two older age groups, stability of traits and stability states appear to be very similar.

The second reason we favor assessing both personality traits and states is that a broader perspective is gained on what entails important personality features in later life. By including dimensions such as Stress, Regression, and Fatigue, researchers gain a more comprehensive perspective on personality, and, indeed, several of the personality state dimensions added to our understanding of age group differences and longitudinal changes in personality.

We acknowledge that this study has several limitations. The sample selection strategy and the follow-up interval had to be different for centenarians than for the other two age groups. We therefore had to consider the results of the age groups separately. The selection of the participants was from one geographic region, and results cannot be generalized to all older adults. The fact that only survivors of two data waves participated limits the generalizability of our findings as well. The survivors were younger, less depressed, and more intelligent, and more apprehensive and controlled, as well as more stressed, but less fatigued, than the nonsurvivors. The fact that all participants resided in the community and were cognitively well functioning at the first measurement point, as well as the differing testing conditions used across participants (i.e., home vs. group testing) further limit the generalizability of the results.

Despite these limitations, findings from the present study contribute to our understanding that unique personality characteristics might exist in a long-lived sample. The growing documentation that personality attributes have both state and trait characteristics (Headey & Wearing, 1991; Mischel, 1990) suggests that personality can exhibit continuity over time as well as discontinuity across situations (Chiriboga, 1996). Future researchers may want to assess the relationship between personality traits and states and life changes over time. As we begin to understand the physical problems and the diminishing resources that very old people are often confronted with, it is important to also look at the factors that continue to provide them with a sense of strength and unique character.

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