Personality Facets and All-Cause Mortality Among Medicare Patients Aged 66 to 102 Years

Personality Facets and All-Cause Mortality Among Medicare Patients Aged 66 to 102: A Follow-on Study of Weiss and Costa (2005)

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Note:
The present study is partially based on data used in previous studies, including Weiss, Costa, Karuza, Duberstein, Friedman, and McCrae (2005) as well as Weiss and Costa (2005). Paul T. Costa, Jr. receives royalties from the Revised NEO Personality Inventory.

Abstract

Objectives: To investigate associations between the Revised NEO Personality Inventory (NEO-PI-R) facets and survival. **Methods:** Using proportional hazards regression, a previous analysis of the NEO-PI-R domains and selected facet scores revealed that the Neuroticism facet Impulsiveness, Agreeableness facet Straightforwardness, and Conscientiousness facet Self-Discipline were related to longer life in 66- to 102-year-old Medicare recipients (n = 597) followed for approximately 4 years. We extended those analyses by including a longer follow-up period (an additional 4 years), examining all 30 facets, and using an additional analytic approach, accelerated failure time (AFT) modeling. Unlike proportional hazards regression, AFT permits inferences about the median survival length conferred by predictors. Each facet was tested in a model that included health-related covariates and NEO-PI-R factor scores for dimensions that did not include that facet. **Results:** Over the 8-year mortality surveillance period, Impulsiveness was not significant, but Straightforwardness and Self-Discipline remained significant predictors of longevity. When dichotomized, being high versus average or low on Self-Discipline was associated with an approximately 34% increase in median lifespan. Longer mortality surveillance also revealed that each standard deviation of Altruism, Compliance, Tender-Mindedness, and Openness to Fantasy was associated with an estimated 9-11% increase in median survival time. **Conclusions:** After extending the follow-up period from 4 to 8 years, Self-Discipline remained a powerful predictor of survival. Facets associated with imagination, generosity, and higher quality interpersonal interactions become increasingly important when the follow-up period was extended to 8 years.

Keywords: mortality, facets, elderly, openness, agreeableness, conscientiousness, NEO-FFI

Acronyms: ADL = activities of daily living, **IADL** = instrumental activities of daily living, **NEO-PI-R** = Revised NEO Personality Inventory, **NEO-FFI** = NEO Five-Factor Inventory.

Personality Facets and All-Cause Mortality Among Medicare Patients Aged 66 to 102: A Follow-on Study of Weiss and Costa (2005)

Having established that personality is related to health outcomes (1), researchers seeking to understand these associations have used two approaches. One approach relies on regression-based methods (2), and tests whether associations between personality and mortality are explained by potential mediators associated with both (e.g., 3). Findings using this approach suggest that personality effects on mortality operate via many paths, which may differ across samples (1).

A second approach capitalizes on the fact that personality domains are comprised of lower-order facets (4). By identifying facets that underlie the association between a domain and longevity, one may rule out or rule in possible pathways. Ideally, these hypothesis-generating findings will guide research using intervention trials to mitigate the unhealthful elements of personality or to amplify its salutary effects. For example, if the unhealthful effects of lower Conscientiousness are attributable to low self-discipline, that would suggest behavioral and psychoeducational interventions to improve time management skills.

Research underscores the importance of the Revised NEO Personality Inventory's (NEO-PI-R; 5) Self-Discipline facet of Conscientiousness. Self-Discipline is associated with smoking (6, 7), obesity (8), the inflammatory marker interleukin-6 (9), cholesterol and triglyceride levels (10), and longevity (11). Other facets are implicated in health. For example, a hostile interpersonal style, an aspect of low Agreeableness, has been identified as a contributor to heart disease risk posed by the Type A Behavior Pattern (12-14). Reduced all-cause mortality risk has been found to be associated with higher scores on Agreeableness's Straightforwardness facet (11), Extraversion's Activity facet (15), and the Openness's Feelings and Actions facets (16).

Higher scores on Neuroticism's Impulsiveness facet have been associated with smoking (6), poorer lipid profiles (10), higher interleukin-6 levels (9), and higher adiposity (17). Therefore, one might expect that elevated Impulsiveness would be related to higher mortality, but, surprisingly, Weiss and Costa (11) found the opposite.

This study follows-on from Weiss and Costa's study (11). In addition to testing whether additional facet-level predictors are associated with survival time, this study aims to see if the Impulsiveness findings (11) are observed over a longer follow-up period. It differs from the previous study (11) in three respects. First, we extended mortality surveillance by ~4.4 years and thereby observed an increased mortality rate (from ~18% in 2003 to ~61% in 2007), yielding greater statistical power (18). Second, we tested all 30 facets. Weiss and Costa (11) tested only facets belonging to domains that found to be associated with mortality. This earlier approach may have been overcautious because some studies have shown that personality facets are associated with mortality even if their parent domains are not (15, 16). Third, in addition to using proportional hazards regression as did the previous study (11), we used accelerated failure time (AFT) modeling. Parameter estimates derived from AFT modeling reflect differential median survival time, rather than the proportion deceased. Inferences can therefore be drawn about the influence of personality on median longevity.

Methods

Participants

Participants were sampled from 1444 community-dwelling adults aged 65 to 100 at baseline who took part in the Medicare Primary and Consumer-Directed Care Demonstration (19). Eligibility requirements included enrollment in Medicare Parts A and B, needing or receiving help with at least two Activities of Daily Living (ADLs) or three Instrumental Activities of Daily Living (IADLs), and being a hospital inpatient, nursing home resident, or home care patient within the previous year or visiting the emergency room at least twice

within the past 6 months (19). Enrollment lasted from July 1998 through June 2000. Enrolled persons participated for 24 months unless they died, dropped out, or were disenrolled for pre-specified reasons. The last person completed the Demonstration in June 2002. Research data were collected at study entry and 22 months later.

The sample was drawn from 1082 participants who had valid NEO Five-Factor Inventories (NEO-FFIs; 5) at baseline and were not excluded for reasons such as not residing in the catchment area (11). Participants also had to pass a cognitive screen, which involved being able to answer questions about subjective health, functional status, and life satisfaction, and to recall at least one of three words presented five minutes earlier. Of these participants, 324 died prior to the 22-month follow-up assessment. In addition, individuals were excluded if they failed the cognitive screen at 22-months post-baseline (n = 67), did not have NEO-PI-R data or missed more than 40 NEO-PI-R items (n = 64), did not pass the NEO-PI-R validation screen (n = 13), or had missing data for any covariate (n = 17) (11). The 597 remaining participants[1] were 66 to 102 years old at 22 months post-baseline (M_{age} = 80.7; SD = 7.21) and included 144 men (M_{age} = 79.7; SD = 6.74) and 453 women (M_{age} = 81.0; SD = 7.33).

Mortality Surveillance

Like the previous study, mortality status and date of death were determined using the Social Security Death Index (20). The censoring date in the prior study (11) was July 31, 2003. For this study, we selected the most recent update to the database that we have, December 31, 2007, adding 53 months of surveillance. Mortality surveillance began with the date of each subject's 22-month NEO-PI-R personality assessment. Length of surveillance ranged from 5.55 to 7.65 years (M = 6.37; SD = 0.49). Thus, for some participants, mortality was observed for more than 9 years following study entry.

Of the 597 participants, 367 (61.5%) died. Compared to the previous study (11), 262 participants previously classified as alive were now classified as deceased and 3 individuals previously classified as deceased were now classified as alive. Cases in which participants were previously recorded as deceased but who were now recorded as alive most likely reflect the fact that, for this study (but not the prior study), date of birth was used to confirm matches. It is possible but less likely that they reflect errors within the Social Security database.

Measures

Personality. Five-Factor Model factors and facets were assessed using the NEO-PI-R (5). Following the manual (5), we substituted the value 2 for missing items and computed raw facet scores from the items. We then used adult combined-gender norms to convert the 30 raw facet scores into facet *T*-scores which were then used to create the five weighted factor *T*-scores (5).

Covariates. Like the previous study (11), we controlled for factors related to health, personality, or mortality. Demographic covariates included gender, age (75 to 84 vs. 66 to 74, 85 to 102 vs. 66 to 74), and educational achievement (did not complete high school, completed high school, completed college or more). Health-related covariates included single item measures of self-reported physician-diagnosed diabetes or cardiovascular disease (present vs. absent), and a five point (excellent, very good, good, fair, and poor) self-rated health scale, smoking status (non-smoker, former smoker, current smoker). ADLs (0 to 5) and IADLs (0 to 7) were assessed with the Home Care version of the Minimum Data Set (21). Presence of a major depressive episode in the past month was assessed using the patient version of the Mini-International Neuropsychiatric Major Depressive Episode Module (22-25) with responses scored based on *DSM*-IV criteria (26). Except for gender and educational

achievement, which were assessed at baseline, covariates were assessed 22 months post-baseline.

Analyses

The primary analysis used was AFT modeling, which differs from proportional hazards regression in that the dependent variable is the log of the survival function as opposed to the log of the hazard function (27). Proportional hazards regression and AFT models thus differ in how effects of predictor variables are interpreted. In proportional hazards regression, the effects indicate the ratio of hazards of two groups differing in the predictor variable (27). Thus, a hazard ratio of 1.6 indicates that the effect of one unit increase is associated with a $(1.6 - 1) \times 100 = 60\%$ increase in the risk. Similarly, a hazard ratio of .6 indicates that the effect of a one-unit increase is to decrease the risk by $(.6 - 1) \times 100 = 40\%$. AFT modeling effects are expressed in the degree of acceleration or deceleration, c, required so that the curve of one group equals that of another, $S_1(tc) = S_0(t)$ (27). Thus, a $\hat{c}$ (the estimated acceleration coefficient) equal to 1.6 indicates that the effect of a one-unit increase is associated with a $(1.6 - 1) \times 100 = 60\%$ increase in median lifespan. Similarly, a $\hat{c}$ equal to .6 indicates that the effect of a one unit increase is associated with a $(.6 - 1) \times 100 = 40\%$ decrease in median lifespan.

AFT modeling offers advantages over proportional hazards regression. First, AFT models provide reliable results even when proportionality is violated (27, 28). Second, AFT model parameters are less influenced by omitted covariates (29). Third, focusing on median length of survival is arguably more patient-centered; patients typically want to know "how long" they can expect to live in the presence of a risk marker, not simply the likelihood that the risk marker is associated with a shortened lifespan.

There were six sets of analyses. Predictors for each analysis included the covariates, one facet, and factor scores for the four personality domains that did not include the facet. For

example, the model for the Impulsiveness facet included the covariates, Impulsiveness, plus Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. **Thus, each facet's effect is independent of the common variance of domains other than its parent domain. While running multiple univariate tests increases the type 1 error rate, it is the most appropriate way to conduct exploratory analyses.**

The first two sets of analyses used AFT models to identify facet-level predictors of mortality risk when time to death was based on the 2003 mortality data from the earlier study (11) and the 2007 mortality data, respectively. The third set was identical to the second except that it used proportional hazards regression. Like the previous study (11), we categorized age, educational achievement, ADLs, and IADLs in these analyses. Moreover, the previous findings indicated that Conscientiousness effects were limited to the higher end of the scale (11). Thus, when testing Conscientiousness facets we dichotomized facet scores, high ($T > 55$) or average to low ($T < 55$), and categorized factor scores for Neuroticism, Extraversion, Openness to Experience, and Agreeableness as low ($T < 45$), average ($T = 45$-55), or high ($T > 55$). When testing Neuroticism, Extraversion, Openness to Experience, and Agreeableness facets, personality variables, including Conscientiousness, were entered as continuous variables scaled as *z*-scores.

The fourth, fifth, and sixth sets of analyses were comparable to the first, second, and third set, respectively. However, factor and facet scores, age, ADLs, and IADLs were continuous rather than categorical.

We conducted proportional hazards regressions and AFT modeling using the coxph and survreg functions, respectively (30) as implemented in R 3.0.2 (31). Based on preliminary analyses, we specified a Weibull distribution for AFT models.

Results

Table 1 displays sample characteristics for the full sample and by 2003 and 2007 mortality status. High disease burden and lower educational achievement characterized the sample. Compared to the NEO-PI-R standardization sample (5), while within the average range, the sample was characterized by slightly higher Neuroticism (M = 52.01), lower Extraversion (M = 45.86), and lower Conscientiousness (M = 45.28). Moreover, this sample was characterized by relatively low Openness to Experience (M = 43.90) and high Agreeableness (M = 55.78).

Table 2 shows the facet results when covariates were categorized. The left and middle panels contrast AFT results when the outcome was survival to 2003 or 2007.

For Neuroticism, Impulsiveness was significantly related to a 28% increase in survival time during the shorter surveillance period. Neuroticism facets were not associated with survival time when the surveillance period was longer.

For Extraversion, Gregariousness (which like all other Extraversion facets was not examined in the 2005 study) was significant during the shorter surveillance period. Each standard deviation increase was associated with a ~15% decrease in survival time. Extraversion facets were not associated with survival time over the lengthier surveillance period.

For the shorter surveillance period, Openness to Experience facets were not significant. However, the Fantasy facet was significant during the longer surveillance period with each standard deviation increase being associated with a ~9% increase in median survival time.

For Agreeableness facets, Straightforwardness was a significant predictor of median survival time, regardless of mortality surveillance length. Each standard deviation increase was associated with a ~20% and ~11% increase in survival time up to 2003 and 2007, respectively. Also, during the longer surveillance period, standard deviation increases in

Altruism, Tender-Mindedness, and Compliance were significantly associated with increases in median lifespan ranging around 9 to 11%.

For Conscientiousness facets, being high versus average or low in Self-Discipline was associated with a ~80% increase in median lifespan over the shorter surveillance period. The advantage high Self-Discipline conferred over the longer surveillance period was ~34%.

Full results for the analyses are presented in Supplementary Digital Content 1 to 6. In the shorter surveillance period, only ADLs were significantly associated with survival in all 30 models: compared to subjects with no ADLs, those with 2 to 5 had ~40-45% reductions in median survival time. In the extended surveillance period, six effects were significantly related to longevity in all 30 models. Compared to 66 to 74 year olds subjects, 75 to 84 year old and 85 to 102 year olds had ~20-24% and ~44-47% reductions in median survival time, respectively. Also, compared to subjects with no ADLs, those with 2 to 5 showed a ~31-34% decrease in median survival time and subjects with 5 to 7 IADLs showed median survival times that were ~23-26% less than those with 0 to 4. Finally, smoking was related to decreases in median survival time: compared to non-smokers, former smokers showed declines of ~17-21% in median survival time and current smokers showed declines of ~35-40%.

AFT results when covariates were continuous were mostly consistent with those when covariates were categorized (see left panels of Tables 2 and 3). There were three exceptions: Self-Discipline was not significant in either surveillance period, Openness to Fantasy was not significant in the longer surveillance period, and Openness to Feelings was significantly related to an 8% reduction in median survival time for the longer surveillance period.

For survival to 2007 with categorized covariates, AFT modeling and proportional hazards regression yielded similar results (see middle and right panels of Table 2). The only difference was that the significance level for Altruism was slightly lower in the proportional

hazards models than in the AFT models (p = .051 vs .045). For survival to 2007 with continuous covariates, AFT modeling and proportional hazards regression results were similar (see middle and right panels of Table 3). The only difference was that the significance level of Straightforwardness was lower in the proportional hazards models than in the AFT models (p = .035 vs. .053).

Discussion

A previous study found that higher Impulsiveness, Straightforwardness, and Self-Discipline were related to longer life in 597 66- to 102-year-old Medicare recipients (11). In this follow-on study, the counterintuitive Impulsiveness effects were not observed but Straightforwardness and Self-Discipline (when dichotomized) still predicted longevity. In addition, higher levels of the Agreeableness facets Altruism, Compliance, and Tender-Mindedness were related to longevity. Thus, facets associated with generosity and higher quality interpersonal interactions become increasingly important in predicting survival. In addition, with the longer follow-up period, and depending on whether covariates were categorized, there was some suggestion that higher Openness to Fantasy and lower Openness to Feelings were related to longer survival. Thus, while personality facets associated with being more imaginative and able to create one's own inner world are longevity markers, being more aware of one's feelings and the tendency to experience feelings more intensely may portend a relatively shorter life.

Overall, the facet effects were weaker when follow-up time was lengthier. These findings are consistent with findings from a meta-analysis that examined the protective effect of Conscientiousness (32). In this study, as the effects of some facets became weaker over the longer surveillance period, the effects of behavioral and standard biomedical (demographics, function) risk factors strengthened. For example, being a former smoker was significant in 5 of the 30 models when mortality surveillance ended in 2003 and was significant in all 30

models when surveillance was extended to 2007. Thus, causes of death may have shifted towards more distal and chronic causes.

Individuals with high Self-Discipline scores can motivate themselves to begin tasks and carry them through to completion, despite boredom or distractions (5). Self-Discipline's effect magnitude, even with the additional surveillance time, was substantial; being high was related to living one third longer than individuals who were average or low. This protective effect was just greater than that of being 65 to 74 versus 75 to 84 years olds (~30%), but smaller than the difference between being 65 to 74 versus 85 to 102 years olds (~85%). It was also equivalent to the longer lifespan of participants with 0 to 4 versus 5 to 7 IADLs (~35%) and lower than the longer lifespan enjoyed by participants with 0 versus 2 to 5 ADLs (~53%). Finally, Self-Discipline's effect magnitude was intermediate between the longer lifespan of non-smokers vs. former smokers (22%) and non-smokers vs. current smokers (57%).

The finding that Self-Discipline is protective is consistent with research showing that higher NEO-PI-R Self-Discipline and related constructs are linked to positive health outcomes (9-11, 15, 33) and health-protective behaviors (6, 7, 34). However, Self-Discipline's protective effects in this sample were limited to individuals at the higher end. This may reflect the relatively poor health of this sample compared to samples in other studies.

Like the previous study (11), we found that Straightforwardness was protective. Three Agreeableness facets --- Altruism, Compliance, and Tender-Mindedness --- joined with Straightforwardness in predicting survival.

Persons high in Straightforwardness tend to be "frank, sincere, and ingenuous," whereas low scorers are "more willing to manipulate others through flattery, craftiness, or deception" and "view these tactics as necessary social skills and may regard more straightforward people as naïve" (5). As noted before (11), high straightforwardness might

lead individuals to have relationships with healthcare providers that are more beneficial to their health.

Persons high in Altruism have an "active concern for others' welfare" (5). The Compliance facet is related to "characteristic reactions to interpersonal conflict" with high scoring individuals tending "to defer to others, to inhibit aggression, and to forgive and forget." Tender-Mindedness refers to "attitudes of sympathy and concern for others" (5). Individuals high in Altruism, Compliance, and Tender-Mindedness are thus likely to be invested in others and these dispositions should be beneficial in establishing social relations and networks. It is possible that patients with these characteristics are less likely to burden caregivers (35), more likely to involve friends and family in their health care (36), and elicit greater care and concern from health care or social services personnel.

By contrast, tough-minded individuals who operate by "cold logic" and hard facts, individuals who do not involve themselves in others' problems, or competitive individuals (5) may be at a disadvantage in establishing social relations and networks. Moreover, demanding, hostile, disagreeable patients may put more strain on their caregivers and receive poorer-quality care.

One explanation for why altruistic, compliant, tender-minded individuals live longer is that, over the longer follow-up period, participants increasingly depend on healthcare providers (physicians, nurses), informal caregivers (36), and the formal network of aging services providers, including nursing facilities (37). To test this one could explore whether Agreeableness facets are more protective when individuals become more dependent on caregivers and healthcare providers. Interestingly, a recent study in this cohort using 312 dyads (care recipients and their informal caregivers) found that Agreeableness in care recipients was associated with subjective ratings of caregiver physical but not mental health (35).

Another possibility is that altruism, compliance, and tender-mindedness are incompatible with the "toxic" component of the Type A behavior pattern (13). Future studies should thus examine the relationship between these facets and this "toxic" component and attempt to determine whether these facets are confounded by Type A behaviors.

We found that higher Openness to Fantasy and lower Openness to Feelings were protective. Individuals high in Openness to Fantasy "have a vivid imagination and an active fantasy life" and tend to "daydream not simply as an escape but as a way of creating for themselves an interesting inner world" (5). Their imaginations could represent a source of self-soothing and pleasure. As well, their inward focus may enable them to imagine, anticipate, and prepare for the need to navigate the transitions from optimization to compensation (38). It may be that these individuals, more so than low scorers who tend to be "more prosaic and prefer to keep their minds on the task at hand," (5) are better able to cope with chronic illness. Individuals high in Openness to Feelings are receptive to their "own inner feelings and emotions" they also tend to "experience deeper and more differentiated emotional states and feel happiness and unhappiness more intensely than others" (5). Low scorers tend to "have somewhat blunted affects and do not believe that feeling states are of much importance" (5). Thus, individuals higher in Openness to Feelings are more likely to experience intense affect and arousal, an experience that may become increasingly aversive with age.

Given that findings related to Openness facets were less robust than those related to Agreeableness facets, attempts should be made to replicate them. If these findings are replicated, future studies should investigate the psychological or biological mechanisms responsible. For example, to examine the role of imagination in reducing excess mortality, guided imagery could be explored as an intervention.

This study shares limitations with the previous study (11), including the use of the Social Security Death Index, which has a lower sensitivity and specificity than the National Death Index, and the use of self-reports of physician-diagnosed cardiovascular disease and diabetes. This sample is also not representative of the general population. However, as previously noted (11), these limitations are not likely to threaten this study's validity.

Another limitation was that the covariates were primarily associated with physical or psychological health; variables such as socioeconomic status were not taken into account. However, as this sample was derived from a high-risk population and AFT modeling results are less influenced by missing variables (29), it is unlikely that this limitation adversely impacted the findings.

We did not adjust for multiple tests and thus there is an increased type 1 error rate. Thus, some results may be chance findings and caution should be used when interpreting these results. However, we deliberately set out to conduct exploratory analyses and it was unclear what would be considered a 'family' of tests. As we noted earlier, future studies should attempt to replicate these findings. While this would involve the greater costs associated with incorporating broad measures of personality that include facets, the payoffs of understanding the mechanisms by which personality influences health and longevity would be well worth these costs.

Conclusions

After controlling for several risk factors, personality facets related to Agreeableness, Openness, and Conscientiousness were related to longer life in at-risk elderly. As the U.S. and international populations continue to age, finding markers of health resilience and vulnerability and determining how their effects change over time is of increasing importance. Future researchers focusing their search on paths between personality and illness could benefit from better knowledge of the facets underlying longevity. Moreover, this knowledge

could conceivably help healthcare providers to better monitor patients, distribute resources, and design intervention programs that target patient subgroups and customize or tailor interventions to patient personalities. The Patient Protection and Affordable Care Act incentivizes greater patient engagement. Personality will thus probably exert an even greater influence on the delivery of healthcare as well as mortality in years to come. Future studies modeling the dynamics of the personality-health relationship across the lifespan and in different healthcare settings could help improve the health and well being of people in their last decades of life.

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Footnotes

[1]We were recently made aware of the possibility that 73 participants were cognitively impaired and thus their personality was rated by a caregiver or informant. Nineteen of these participants were in the sample of the present study. We retained these participants because excluding them led to only minor changes in effect sizes for all analyses in the earlier paper (11).

Table 1

Characteristics of Participants in the Total Sample and as a Function of 2003 and 2007 Mortality Status

	2003 Mortality Status				2007 Mortality Status					
	Alive		Dead		Alive		Dead		Total	
	N = 489		*N* = 108		*N* = 230		*N* = 367		*N* = 597	
Variable	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Gender										
Male	111	22.7	33	30.6	36	15.7	108	29.4	144	24.1
Female	378	77.3	75	69.4	194	84.3	259	70.6	453	75.9
Age										
66 to 74	120	24.5	17	15.7	74	32.2	63	17.2	137	22.9
75 to 84	211	43.1	50	46.3	115	50.0	146	39.8	261	43.7
85 to 102	158	32.3	41	38.0	41	17.8	158	43.1	199	33.3
Educational achievement										
Did not complete HS	187	38.2	41	38.0	84	36.5	144	39.2	228	38.2
Completed HS	239	48.9	52	48.1	119	51.7	172	46.9	291	48.7

	2003 Mortality Status				2007 Mortality Status					
	Alive		Dead		Alive		Dead		Total	
	N = 489		*N* = 108		*N* = 230		*N* = 367		*N* = 597	
Variable	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Educational achievement (cont'd)										
Completed college or more	63	12.9	15	13.9	27	11.7	51	13.9	78	13.1
Diabetes										
Absent	366	74.8	78	72.2	174	75.7	270	73.6	444	74.4
Present	123	25.2	30	27.8	56	24.3	97	26.4	153	25.6
Cardiovascular disease										
Absent	61	12.5	6	5.6	29	12.6	38	10.4	67	11.2
Present	428	87.5	102	94.4	201	87.4	329	89.6	530	88.8
Self-rated health										
Fair or poor	211	43.1	59	54.6	93	40.4	177	48.2	270	45.2
Excellent, very good, good	278	56.9	49	45.4	137	59.6	190	51.8	327	54.8

	2003 Mortality Status				2007 Mortality Status					
	Alive		Dead		Alive		Dead		Total	
	N = 489		*N* = 108		*N* = 230		*N* = 367		*N* = 597	
Variable	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
ADL restrictions										
0	249	50.9	32	29.6	138	60.0	143	39.0	281	47.1
1	115	23.5	29	26.9	59	25.7	85	23.2	144	24.1
2 to 5	125	25.6	47	43.5	33	14.3	139	37.9	172	28.8
IADL restrictions										
0 to 4	317	64.8	46	42.6	179	77.8	184	50.1	363	60.8
5 to 7	172	35.2	62	57.4	51	22.2	183	49.9	234	39.2
Smoking										
Nonsmoker	259	53.0	46	42.6	125	54.3	169	46.0	294	49.2
Former smoker/missing	207	42.3	53	49.1	94	40.9	173	47.1	267	44.7
Current smoker	23	4.7	9	8.3	11	4.8	25	6.8	36	6.0

	2003 Mortality Status				2007 Mortality Status					
	Alive		Dead		Alive		Dead		Total	
	N = 489		*N* = 108		*N* = 230		*N* = 367		*N* = 597	
Variable	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Major depressive episode										
Absent	447	91.4	96	88.9	209	90.9	334	91.0	543	91.0
Present	42	8.6	12	11.1	21	9.1	33	9.0	54	9.0
Neuroticism										
Low (*T* < 45)	105	21.5	21	19.4	51	22.2	75	20.4	126	21.1
Average (*T* = 45-55)	185	37.8	52	48.1	85	37.0	152	41.4	237	39.7
High (*T* > 55)	199	40.7	35	32.4	94	40.9	140	38.1	234	39.2
Extraversion										
Low (*T* < 45)	223	45.6	52	48.1	101	43.9	174	47.4	275	46.1
Average (*T* = 45-55)	221	45.2	44	40.7	108	47.0	157	42.8	265	44.4
High (*T* > 55)	45	9.2	12	11.1	21	9.1	36	9.8	57	9.5

	2003 Mortality Status				2007 Mortality Status					
	Alive		Dead		Alive		Dead		Total	
	N = 489		*N* = 108		*N* = 230		*N* = 367		*N* = 597	
Variable	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Openness to Experience										
Low (*T* < 45)	285	58.3	62	57.4	129	56.1	218	59.4	347	58.1
Average (*T* = 45-55)	153	31.3	38	35.2	75	32.6	116	31.6	191	32.0
High (*T* > 55)	51	10.4	8	7.4	26	11.3	33	9.0	59	9.9
Agreeableness										
Low (*T* < 45)	53	10.8	17	15.7	20	8.7	50	13.6	70	11.7
Average (*T* = 45-55)	141	28.8	40	37.0	68	29.6	113	30.8	181	30.3
High (*T* > 55)	295	60.3	51	47.2	142	61.7	204	55.6	346	58.0
Conscientiousness										
Low (*T* < 45)	234	47.9	54	50.0	102	44.3	186	50.7	288	48.2
Average (*T* = 45-55)	189	38.7	47	43.5	94	40.9	142	38.7	236	39.5
High (*T* > 55)	66	13.5	7	6.5	34	14.8	39	10.6	73	12.2

Table 2

NEO-PI-R Facet Predictors of Mortality (Categorized Covariates)

Facet	2003 Mortality Status				2007 Mortality Status							
	$\hat{c}$	L_{95}	U_{95}	p	$\hat{c}$	L_{95}	U_{95}	p	HR	L_{95}	U_{95}	p
Neuroticism												
Anxiety	1.074	.919	1.255	.37	1.053	.972	1.141	.21	.932	.832	1.045	.23
Angry Hostility	1.065	.881	1.287	.52	1.006	.911	1.111	.91	.988	.857	1.138	.86
Depression	1.046	.881	1.242	.61	1.022	.938	1.114	.61	.964	.853	1.089	.56
Self-Consciousness	1.076	.914	1.268	.38	1.069	.982	1.164	.12	.910	.806	1.027	.13
Impulsiveness	**1.281**	**1.073**	**1.528**	**.006**	1.067	.976	1.167	.15	.913	.803	1.037	.16
Vulnerability	1.185	.997	1.409	.054	1.057	.969	1.153	.21	.923	.816	1.045	.20
Extraversion												
Warmth	.936	.782	1.122	.47	.961	.875	1.056	.41	1.064	.931	1.217	.36
Gregariousness	**.852**	**.727**	**.998**	**.047**	1.002	.926	1.084	.96	.986	.881	1.104	.81
Assertiveness	.963	.790	1.174	.71	1.025	.925	1.134	.64	.969	.839	1.121	.67
Activity	1.126	.941	1.348	.19	1.094	.998	1.198	.054	.882	.775	1.004	.058

Facet	2003 Mortality Status				2007 Mortality Status							
	$\hat{c}$	L_{95}	U_{95}	p	$\hat{c}$	L_{95}	U_{95}	p	HR	L_{95}	U_{95}	p
Extraversion (cont'd)												
Excitement-Seeking	.925	.776	1.102	.38	1.014	.931	1.105	.74	.982	.869	1.110	.77
Positive Emotions	.972	.825	1.145	.73	1.032	.945	1.127	.48	.962	.850	1.090	.54
Openness to Experience												
Fantasy	1.084	.925	1.269	.32	**1.089**	**1.003**	**1.183**	**.042**	**.881**	**.784**	**.991**	**.034**
Aesthetics	1.017	.870	1.188	.83	1.027	.950	1.111	.50	.949	.849	1.062	.36
Feelings	.944	.798	1.117	.50	.930	.852	1.015	.10	1.106	.976	1.254	.11
Actions	.998	.848	1.175	.98	1.045	.964	1.133	.28	.935	.833	1.051	.26
Ideas	1.013	.856	1.198	.88	1.015	.930	1.107	.74	.965	.853	1.092	.57
Values	1.133	.971	1.323	.11	1.028	.950	1.112	.49	.963	.861	1.077	.51
Agreeableness												
Trust	1.073	.901	1.280	.43	1.052	.959	1.154	.28	.937	.822	1.069	.33
Straightforwardness	**1.197**	**1.031**	**1.390**	**.018**	**1.106**	**1.022**	**1.197**	**.012**	**.874**	**.781**	**.978**	**.019**
Altruism	1.169	.978	1.398	.085	**1.097**	**1.002**	**1.201**	**.045**	.880	.774	1.001	.051

Facet	2003 Mortality Status				2007 Mortality Status							
	$\hat{c}$	L_{95}	U_{95}	p	$\hat{c}$	L_{95}	U_{95}	p	HR	L_{95}	U_{95}	p
Agreeableness (cont'd)												
Compliance	1.168	.993	1.375	.061	**1.108**	**1.019**	**1.204**	**.016**	**.860**	**.764**	**.967**	**.012**
Modesty	1.046	.895	1.223	.57	1.040	.961	1.126	.33	.935	.835	1.047	.24
Tender-Mindedness	1.152	.978	1.357	.090	**1.111**	**1.023**	**1.208**	**.013**	**.861**	**.765**	**.969**	**.013**
Conscientiousness												
Competence	1.224	.800	1.872	.35	1.026	.832	1.265	.81	.934	.692	1.261	.66
Order	1.252	.772	2.030	.36	.973	.775	1.222	.82	1.058	.766	1.461	.73
Dutifulness	1.254	.773	2.035	.36	1.127	.902	1.408	.29	.878	.639	1.205	.42
Achievement Striving	1.179	.741	1.877	.49	1.119	.886	1.413	.35	.846	.607	1.179	.32
Self-Discipline	**1.803**	**1.013**	**3.209**	**.045**	**1.340**	**1.045**	**1.719**	**.021**	**.662**	**.465**	**.942**	**.022**
Deliberation	1.146	.833	1.576	.40	1.120	.952	1.317	.17	.827	.657	1.042	.11

Note. Continuous variables are standardized (mean = 0; SD = 1). Significant effects presented in boldface. $\hat{c}$ = 'Acceleration' or 'deceleration' associated with predictor. L_{95} and U_{95} indicate the lower and upper bounds of the 95% confidence interval, respectively

Table 3

NEO-PI-R Facet Predictors of Mortality (Continuous Covariates)

Facet	2003 Mortality Status				2007 Mortality Status							
	$\hat{c}$	L_{95}	U_{95}	p	$\hat{c}$	L_{95}	U_{95}	p	HR	L_{95}	U_{95}	p
Neuroticism												
Anxiety	1.080	.925	1.260	.33	1.047	.967	1.133	.26	.937	.837	1.050	.26
Angry Hostility	1.049	.864	1.273	.63	.995	.900	1.099	.92	1.002	.868	1.157	.98
Depression	1.046	.884	1.238	.60	1.026	.942	1.118	.56	.956	.845	1.082	.47
Self-Consciousness	1.064	.905	1.250	.45	1.061	.975	1.155	.17	.919	.814	1.038	.17
Impulsiveness	**1.261**	**1.060**	**1.499**	**.009**	1.062	.973	1.160	.18	.918	.809	1.042	.19
Vulnerability	1.172	.988	1.389	.068	1.049	.963	1.144	.27	.929	.821	1.051	.24
Extraversion												
Warmth	.929	.778	1.108	.41	.960	.876	1.053	.39	1.066	.934	1.218	.34
Gregariousness	**.853**	**.730**	**.995**	**.044**	.992	.917	1.073	.84	1.000	.893	1.119	1.00
Assertiveness	.976	.802	1.188	.81	1.039	.939	1.149	.46	.949	.821	1.097	.48
Activity	1.109	.928	1.325	.26	1.092	.998	1.194	.054	.882	.776	1.003	.056

Facet	2003 Mortality Status				2007 Mortality Status							
	$\hat{c}$	L_{95}	U_{95}	p	$\hat{c}$	L_{95}	U_{95}	p	HR	L_{95}	U_{95}	p
Extraversion (cont'd)												
Excitement-Seeking	.904	.761	1.073	.25	1.000	.919	1.089	.99	1.001	.886	1.132	.99
Positive Emotions	.945	.803	1.112	.50	1.021	.937	1.114	.63	.976	.862	1.104	.70
Openness to Experience												
Fantasy	1.068	.913	1.250	.41	1.068	.984	1.160	.12	.907	.805	1.021	.10
Aesthetics	.987	.845	1.155	.87	1.003	.927	1.085	.94	.983	.878	1.100	.76
Feelings	.921	.781	1.085	.32	**.916**	**.841**	**.998**	**.045**	**1.134**	**1.001**	**1.283**	**.048**
Actions	1.007	.855	1.185	.94	1.034	.954	1.121	.42	.948	.844	1.066	.37
Ideas	1.001	.846	1.185	.99	1.007	.923	1.098	.87	.976	.862	1.105	.70
Values	1.022	.946	1.105	.58	1.022	.946	1.105	.58	.972	.869	1.086	.61
Agreeableness												
Trust	1.068	.898	1.271	.46	1.053	.960	1.154	.27	.938	.822	1.071	.35
Straightforwardness	**1.177**	**1.017**	**1.363**	**.029**	**1.088**	**1.007**	**1.176**	**.034**	.896	.802	1.002	.053
Altruism	1.181	.985	1.415	.072	**1.103**	**1.007**	**1.207**	**.035**	**.875**	**.769**	**.997**	**.044**

Facet	2003 Mortality Status				2007 Mortality Status							
	$\hat{c}$	L_{95}	U_{95}	p	$\hat{c}$	L_{95}	U_{95}	p	HR	L_{95}	U_{95}	p
Agreeableness (cont'd)												
Compliance	1.149	.979	1.348	.088	**1.099**	**1.013**	**1.193**	**.024**	**.870**	**.774**	**.978**	**.020**
Modesty	1.039	.890	1.212	.63	1.037	.959	1.121	.36	.942	.842	1.053	.30
Tender-Mindedness	1.151	.978	1.355	.091	**1.100**	**1.013**	**1.195**	**.023**	**.873**	**.776**	**.983**	**.025**
Conscientiousness												
Competence	1.048	.885	1.241	.58	1.001	.918	1.091	.99	.997	.881	1.129	.97
Order	1.071	.930	1.234	.34	1.059	.983	1.141	.13	.930	.836	1.034	.18
Dutifulness	1.053	.900	1.231	.52	1.038	.956	1.126	.38	.948	.842	1.067	.38
Achievement Striving	1.021	.878	1.186	.79	1.027	.952	1.108	.49	.960	.861	1.070	.46
Self-Discipline	1.101	.940	1.288	.23	1.060	.978	1.150	.16	.915	.814	1.027	.13
Deliberation	1.021	.873	1.195	.79	1.061	.979	1.150	.15	.908	.809	1.019	.10

Note. Continuous variables are standardized (mean = 0; SD = 1). Significant effects presented in boldface. $\hat{c}$ = 'Acceleration' or 'deceleration' associated with predictor. L_{95} and U_{95} indicate the lower and upper bounds of the 95% confidence interval, respectively

List of Supplemental Digital Content

Supplemental Digital Content 1. Table displaying full AFT modeling results for the shorter mortality surveillance period and categorized covariates. xls

Supplemental Digital Content 2. Table displaying full AFT modeling results for the shorter mortality surveillance period and continuous covariates. xls

Supplemental Digital Content 3. Table displaying full AFT modeling results for the longer mortality surveillance period and categorical covariates. xls

Supplemental Digital Content 4. Table displaying full AFT modeling results for the longer mortality surveillance period and continuous covariates. xls

Supplemental Digital Content 5. Table displaying full proportional hazards modeling results for the longer mortality surveillance period and categorical covariates. xls

Supplemental Digital Content 6. Table displaying full proportional hazards modeling results for the longer mortality surveillance period and continuous covariates. xls