

Instrumental Activities of Daily Living Among Community-Dwelling Older Adults: Personality Associations With Self-Report, Performance, and Awareness of Functional Difficulties

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Self-reports of the ability to engage in instrumental activities of daily living (IADLs) among older adults are known to be related to personality traits. However, self-reports are sometimes discrepant with performance-based IADL assessments, and little is known about personality associations with objective functionality or with poor insight about functional deficits. This study examined the NEO Personality Inventory-Revised profiles associated with (a) self-report of functional problems, (b) functional errors evidenced on performance-based IADL assessment, and (c) discrepancies between self-report and performance. Participants were 65 community-dwelling individuals ranging in age from 60 to 87 years. The results showed that self-report of IADL problems are associated with higher neuroticism and lower conscientiousness, actual IADL difficulties with higher neuroticism and lower agreeableness and openness to experience, underreporting of problems with higher conscientiousness, and overreporting of problems with higher extraversion and neuroticism. These relationships were partly mediated by age, education, and cognitive status. When unique personality associations with self-report and performance were examined, neuroticism and agreeableness, respectively, emerged as the strongest predictors.

Key Words: Activities of daily living—Aging—Personality—Self-awareness.

THE ability to engage in instrumental activities of daily living (IADLs) represents an important aspect of functional independence among older adults. IADLs refer to a variety of self-care tasks, such as housekeeping, cooking, shopping, bill paying, and the correct use of medications. Although IADLs are known to decline in the course of various neurodegenerative diseases (Jefferson, Cahn-Weiner, et al., 2006; Mariani et al., 2008; Schmitter-Edgecombe, Woo, & Greeley, 2009), apparently healthy older individuals who live independently in the community also exhibit considerable variability in their IADL skills (Burton, Strauss, Hultsch, & Hunter, 2006; Chapman, Duberstein, & Lyness, 2007; Plehn, Marcopulos, & McLain, 2004).

The causes of functional declines among apparently healthy and cognitively intact individuals are not well understood, although recent research suggests that personality factors may represent important correlates. In particular, a number of investigators have found that IADL disabilities among older adults are associated with personality disorders (Abrams, Spielman, Alexopoulos, & Klausner, 1998; Morse, Pilkonis, Houck, Frank, & Reynolds, 2005) and depression (Ormel, Rijdsdijk, Sullivan, van Sonderen, & Kempen, 2002; Patrick, Johnson, Goins, & Brown, 2004) as well as with higher neuroticism and lower extraversion, conscientiousness, and agreeableness within the Five-Factor Model (FFM) of personality (Chapman et al., 2007). Increases in self-reported IADL disability among individuals without dementia or disability at study onset have been

associated with lower extraversion and conscientiousness and (marginally) with higher neuroticism (Krueger, Wilson, Shah, Tang, & Bennett, 2006).

However, one complicating factor in this line of research is that many of these studies have relied only on self-report assessments of IADLs. This is problematic as some differences between self-report and performance-based IADL assessments have been identified. Most notably, whereas self-reported problems appear to be more related to depressive symptomatology than to cognition (Grigsby, Kaye, Baxter, Shetterly, & Hamman, 1998), objectively assessed difficulties tend to be more related to cognition than to depressive symptoms (Goverover, Chiaravalloti, Gaudino-Goering, Moore, & DeLuca, 2009; Grigsby, Kaye, Kowalsky, & Kramer, 2002). Additionally, the discrepancies between self-report and performance are themselves meaningful, especially if they reflect a lack of awareness of deficits, as they tend to be related to poorer outcomes and functionality (Goverover et al.; LaBuda & Lichtenberg, 1999). However, personality correlates of such discrepancies have not been examined.

Characteristic ways of thinking, feeling, and behaving (i.e., personality) should be associated with the perception and reporting of functional difficulties as well as objectively determined functional problems that occur in the course of aging. The purpose of the present study was to examine personality correlates (using the NEO Personality Inventory-Revised; NEO PI-R; Costa & McCrae, 1992) of self-report

and performance-based IADL assessments as well as associations with discrepancies between self-report and performance-based assessments in a sample of 65 community-dwelling healthy older adults.

We expected that, based on past research (Chapman et al., 2007; Jang, Haley, Mortimer, & Small, 2003), self-reported IADL difficulties would be associated with higher neuroticism and lower extraversion, conscientiousness, and agreeableness. Because there is little prior research on personality associations with objective indices of IADLs, predictions were based on the assumption that IADLs may reflect cognitive abilities, especially executive functioning (Jefferson, Paul, Ozonoff, & Cohen, 2006; Suchy, Blint, & Osmon, 1997). That is, whereas self-reported IADLs may reflect individual differences in the perception of difficulties (which may not be veridical with actual abilities) or willingness to describe such difficulties to others, objective IADLs should reflect individual differences in cognitive abilities. Given that poorer executive abilities are associated with higher neuroticism and lower openness to experience, agreeableness, and conscientiousness (see Williams, Suchy, & Rau, 2009 for review), we expected that a similar personality profile would also be associated with poorer performance of IADLs.

Lastly, to our knowledge, no prior research has examined the association between personality and discrepancies between self-report and performance; thus, no definitive hypotheses can be drawn. However, one can speculate that overreporting of problems could be related to higher levels of neuroticism, given that (a) neuroticism reflects propensity to negative affect, including depression, and is associated with risk for clinical depression (Hirschfeld, Klerman, Lavori, & Keller, 1989; Kendler, Neale, Kessler, & Heath, 1993) and (b) depression is more strongly related to self-report than to performance (Dunlop, Manheim, Song, Lyons, & Chang, 2005; Grigsby et al., 1998). Lastly, one can speculate that underreporting of problems could be related to lower levels of openness to experience, given that (a) openness is positively associated with intelligence (McCrae, 1994) and years of education (Costa et al., 1986), both of which serve as a protective factor against cognitive decline (Stern, 2002), and (b) cognitive decline relates to poorer awareness of deficits (Karagiozis, Gray, Sacco, Shapiro, & Kawas, 1998; Perkins, 2007).

METHODS

Participants

Participants were 65 older adults (67% women) living independently in the community and were recruited using print advertisements and an informational booth at the Salt Lake County Senior Expo. Participants who had vision, hearing, or motor problems (e.g., paralysis, severe arthritis, etc.) that would preclude them from completing the IADL

Table 1. Characteristics of the Sample

	<i>M</i>	<i>SD</i>	Range
Age (years)	70.38	6.73	60–87
Education (years)	14.26	2.62	10–22
DRS-2 (scaled scores)	10.97	2.43	5–15
Neuroticism	78.11 (50)	19.72	34–127
Extraversion	107.46 (50)	14.35	70–135
Openness	112.37 (51)	19.47	71–157
Agreeableness	126.22 (51)	11.72	96–152
Conscientiousness	115.48 (46)	19.12	60–159

Note: *N* = 65; T-scores based on combined male and female adult norms for the NEO PI-R factors (*M* = 50, *SD* = 10; Costa & McCrae, 1992) are presented in parentheses. DRS-2 = Dementia Rating Scale, 2nd edition; NEO PI-R = NEO Personality Inventory-Revised.

survey or the timed instrumental activities of daily living (TIADLs) tasks were not eligible to participate in the study. Additionally, left-handers as well as individuals who reported having a diagnosis of dementia or moderate to severe chronic illness were also not eligible. Some participants reported mild chronic problems, including hypertension (*n* = 27), heart disease (*n* = 4), chronic obstructive pulmonary disease (*n* = 2), sleep apnea (*n* = 9), stroke (*n* = 5), and seizure disorder (*n* = 2). All participants enrolled in the study completed the assessment session. Sample characteristics are presented in Table 1.

Procedure

Participants were screened over the telephone regarding exclusion criteria (i.e., uncorrected vision or hearing problems, difficulty using the right hand, left-handedness, or a diagnosis of dementia). Following this initial screening, participants were scheduled for individual testing that took place in the Department of Psychology at the University of Utah in a quiet testing room. On the day of testing, participants underwent IRB-approved informed consent procedures, personality testing, and both performance-based and self-report IADL assessments. Additionally, as part of a larger study, a battery of cognitive and motor tasks was also administered. The entire testing session lasted approximately 2.5–3 hr, with breaks as needed. Participants were reimbursed \$30 per session. All testing was conducted by well-trained research assistants.

Measures

Performance-Based IADL Assessment.—The TIADLs (Owsley, Sloane, McGwin, & Ball, 2002) was used to assess accuracy of common tasks, including finding a telephone number, making change, reading the ingredients on a can of food, finding food items on a shelf, and reading instructions on a medicine container. Typical errors produced on these tasks included misidentifying the target name in the phone book or not finding it at all due to looking in the business section, substituting a nickel for a dime when making

Table 2. Demographic and Cognitive Characteristics of the Sample by Self-report of IADL Problems, IADL Performance Errors, and Concordance Between Self-report and Performance

	Self-report		Performance		Concordance	
	Problems (<i>n</i> = 23)	No problems (<i>n</i> = 42)	Errors (<i>n</i> = 24)	No errors (<i>n</i> = 41)	Yes (<i>n</i> = 38)	No (<i>n</i> = 27)
Age (years), <i>M</i> (<i>SD</i>)	71.52 (7.72)	69.73 (6.12)	72.46 (7.16)	69.13 (6.22)	71.19 (7.43)	69.26 (5.59)
Education (years), <i>M</i> (<i>SD</i>)	14.30 (2.64)	14.24 (2.65)	13.88 (2.66)	14.49 (2.61)	14.34 (2.66)	14.15 (2.61)
DRS-2 total SS, <i>M</i> (<i>SD</i>)	10.70 (2.84)	11.12 (2.19)	9.96 (2.27)	11.58 (2.34)	10.84 (2.26)	11.15 (2.69)
Female, % of total sample	73	64	63	70	63	74

Note: DRS-2 = Dementia Rating Scale, 2nd edition; IADL = instrumental activity of daily living; SS = scaled score.

change or otherwise miscounting change, identifying a bag of pasta shells when asked to identify a box of macaroni and cheese, misreading medication instructions, or reading information other than ingredients on a can of food. It should be noted that although producing a single error does not in any way suggest serious problems with everyday functionality, it nevertheless points to the potential for occasional functional lapses, which may reflect subtle preclinical signs of functional decline. The TIADL has test-retest reliability of .85 (Owsley et al.).

Self-report IADL Assessment.—We used the IADL scale (Lawton & Brody, 1969) that allows individuals to rate their level of independence (on a 4-point scale) in each of the following domains: communication, financial management, meal preparation, shopping, medication management, house-keeping, and transportation. This scale has been extensively validated (Mariani et al., 2008; Ng, Niti, Chiam, & Kua, 2006), with reliability reported at .85 (Lawton & Brody).

Mattis Dementia Rating Scale, 2nd Edition.—The Dementia Rating Scale, 2nd edition (DRS-2) is an individually administered screening instrument of general cognitive functioning among older adults and was used in this study to characterize the cognitive status of the sample. The DRS-2 has been extensively validated and shown to have excellent reliabilities (.98; Jurica, Leitten, & Mattis, 2001).

NEO PI-R—Form S.—The NEO PI-R is a 240-item self-report measure designed to assess the domains of the FFM of personality, including neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness, each with six 8-item lower order facet scales. The higher order factors and the facet scales have demonstrated high internal consistency, convergent and discriminate validity, and reliabilities ranging from .86 to .91 for the domain scales (Costa & McCrae, 1992).

RESULTS

Preliminary Analyses

Base Rates of IADL Problems Identified via Self-report and Performance.—On the self-report measure of IADLs,

42 participants (64.6%) denied any problems (zero self-reported problems), which is consistent with other community-based research (Chapman et al., 2007). Similarly, on the performance-based measure of IADLs, 41 participants (63.1%) made no errors. However, there was less than perfect overlap among those who denied problems and those who performed well. In particular, from among the 42 participants who denied problems, 14 participants (21.5% of the entire sample) actually produced errors on the performance-based assessment. In contrast, from among the 23 participants who did report problems, only 10 (15% of the entire sample) also made errors during performance-based assessment. Demographic characteristics and DRS-2 Scaled Scores of sample subgroups based on self-report of problems, IADL performance errors, and concordance between self-report and performance can be seen in Table 2.

Effects of Chronic Illness.—Although moderate to severe chronic illness was not present in the sample, nevertheless some participants reported mild chronic problems. To determine whether presence of chronic illness was related to self-report or performance of IADLs or to personality, we compared participants with (*n* = 27) and without (*n* = 38) reported high blood pressure on all dependent and independent variables. No group differences were found between those with versus those without hypertension, all *t* values <1.26 and all *p* values >.212. We then compared those with (*n* = 34) and without (*n* = 31) any self-reported chronic illness. Participants with chronic illness showed a trend toward reporting somewhat more IADL problems (*t* = 1.73, *df* = 63, *p* = .089). There were no other group differences, all *t* values <.99 and all *p* values >.33. These results suggest that chronic illness did not have a differential effect on the results or did not mediate the relationship between personality and IADLs.

Principal Analyses

Personality Associations With Self-report and Performance of IADLs.—To determine whether self-reported and performance-based IADL problems were associated with unique personality profiles, we first examined the correlations for each of the IADL measures with the five NEO PI-R factors. In all performed tests, we reported significance

Table 3. Correlations Among Self-reported Problems, Performance Errors, Personality Scales, Demographics, and Cognitive Status

	Self-reported problems	Performance errors	Age	Education	DRS-2 total
Self-report	—	.081	.100	.057	-.344**
Performance	.081	—	.279*	-.043	-.389**
Neuroticism	.348**	.227	.073	-.201	-.224
Extraversion	-.078	-.158	-.153	.196	.071
Openness	.034	-.256*	-.320*	.468**	.235
Agreeableness	-.093	-.285*	-.201	-.066	.121
Conscientiousness	-.302*	-.017	.015	.074	.011

Note: $N = 65$. DRS-2 = Dementia Rating Scale, 2nd edition.

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

in comparison with an alpha = .05, two tailed. As can be seen in Table 3, self-reported IADL problems were positively correlated with neuroticism ($p = .01$) and negatively correlated with conscientiousness ($p = .02$). Performance-based IADL problems were negatively correlated with openness ($p = .05$) and agreeableness ($p = .02$).

We then conducted a pair of Poisson regressions using self-reported and performance-based IADL problems as the dependent variables. Our choice of a Poisson regression model stems from the inherent distribution of both functionality measures in that the data were squeezed up against zero problems with a tail of more problems. This distributional issue is common among count variables, creating substantial violations in OLS regression for which a Poisson model can potentially compensate (Cohen, Cohen, West, & Aiken, 2003). In both cases, we entered the five NEO PI-R factors simultaneously. Thus, the results are distinct from those of the correlation matrix in that they indicate the extent to which each NEO PI-R factor uniquely relates to self-reported or performance problems.

When using self-reported problems as the dependent variable, the NEO PI-R factors together were a significant predictor, $\chi^2(5) = 13.94$, $p = .02$. Consistent with the zero-order correlations, neuroticism emerged as a significant predictor of self-report above and beyond the other factors, $b = 0.025$, $\chi^2(1) = 5.034$, $p = .03$. In contrast, the conscientiousness effect, observed among the zero-order correlations, was subsumed by variance accounted for by the other factors, $b = -0.013$, $\chi^2(1) = 1.754$, $p = .18$. As with the univariate relationships, none of the other NEO PI-R factors reached significance, $b_{\text{Extraversion}} = 0.004$, $\chi^2(1) = 0.088$, $p = .77$; $b_{\text{Openness}} = 0.006$, $\chi^2(1) = 0.349$, $p = .56$; and $b_{\text{Agreeableness}} = 0.003$, $\chi^2(1) = 0.035$, $p = .85$.

When using performance-based IADL problems as the dependent variables, the NEO PI-R factors as a set were once again a significant predictor, $\chi^2(5) = 18.072$, $p < .01$. Additionally, consistent with the zero-order correlations, agreeableness emerged as a significant predictor of performance above and beyond the other factors, $b = -0.031$, $\chi^2(1) = 4.458$, $p = .04$. However, the openness effect observed among the zero-order correlations no longer reached

conventional significance, $b = -0.017$, $\chi^2(1) = 3.164$, $p = .08$, though this may be an issue of the small sample size and insufficient power to fully detect the effect. Following this same logic, neuroticism did not reach conventional significance but showed an effect of roughly the same caliber, $b = 0.022$, $\chi^2(1) = 3.537$, $p = .06$. All the other NEO PI-R factors failed to reach conventional significance, $b_{\text{Extraversion}} = 0.002$, $\chi^2(1) = .034$, $p = .85$ and $b_{\text{Conscientiousness}} = 0.016$, $\chi^2(1) = 2.500$, $p = .11$.

Controlling for Demographics and Cognition.—To examine the extent to which current findings were influenced by demographic and cognitive factors, we repeated the above analyses testing for the inclusion of the five NEO PI-R factors above and beyond age, education, and cognitive status (i.e., the DRS-2 total score). In both cases, the NEO PI-R factors, as a set, continued to add significant prediction of IADL problems above and beyond the demographics, $\chi^2_{\text{Self-report}}(5) = 12.87$, $p = .02$ and $\chi^2_{\text{Performance based}}(5) = 11.02$, $p = .05$. This resulted in a somewhat decreased association in the effects reported above such that none of the unique contributions continued to reach statistical significance. Nonetheless, we are confident that this was due to shared variance among the personality factors because the associations indicated in the zero-order correlation remained after controlling for the demographic and cognitive set. For example, conducting a series of Poisson regressions including the demographics and cognitive factors and then adding NEO PI-R factor scores one at a time indicated the same pattern as observed earlier: Self-report was predicted by neuroticism, $b = 0.025$, $\chi^2(1) = 8.273$, $p < .01$, and conscientiousness, $b = -0.026$, $\chi^2(1) = 8.420$, $p < .01$, and performance was predicted by openness, $b = -0.021$, $\chi^2(1) = 4.575$, $p = .03$, and agreeableness, $b = -0.032$, $\chi^2(1) = 5.213$, $p = .02$. Lastly, there was a trend for performance being predicted by neuroticism ($p = .056$).

Personality Associations With Awareness of IADL Difficulties.—Individuals in the community who underreport their existing IADL problems arguably represent the most clinically relevant group with respect to self-awareness and functionality. Thus, our next set of analyses was aimed at distinguishing individuals who underreport their existing problems from those who either overreport or have some degree of accuracy. However, analytically, it is difficult to distinguish these three groups, especially because self-report and performance-based IADL problems are not necessarily on the same metric. To begin to tease these apart, we conducted analyses aimed at identifying those NEO PI-R factors that were associated with individuals in whom performance-based IADL problems were predictive of self-reported IADL problems. Specifically, we conducted a Poisson regression using (a) the self-reported IADLs as the dependent variable and (b) performance-based IADLs, the five NEO PI-R factors, and the interaction term between

Table 4. Coefficients From a Poisson Regression of Self-reported IADL Problems

Parameter	<i>B</i>	<i>SE</i>	95% Wald confidence intervals	
			Lower	Upper
Intercept	-.832	0.235	-1.292	-.373
Performance errors	.008	0.180	-.345	.361
Neuroticism	.006	0.017	-.026	.039
Extraversion	-.019	0.023	-.064	.026
Openness	.020	0.016	-.011	.050
Agreeableness	.006	0.018	-.029	.041
Conscientiousness	-.031	0.014	-.059	-.004
Self-report × Neuroticism	-.032	0.017	-.065	.000
Self-report × Extraversion	-.059	0.026	-.111	-.007
Self-report × Openness	.031	0.019	-.005	.068
Self-report × Agreeableness	-.005	0.019	-.042	.032
Self-report × Conscientiousness	-.015	0.014	-.041	.012

Note: Poisson regression predicts the outcome (self-reported IADL) in log metric. Performance-based IADLs are centered at 1, whereas the NEO scales are centered at their means. IADI = instrumental activity of daily living; NEO = NEO PI-R = NEO Personality Inventory-Revised.

the performance-based IADLs and the NEO PI-R factors as the predictors. The NEO factors were all centered at their mean, and performance-based IADL problems were centered at having one problem. Though centering of performance-based IADL problems at one is nonstandard, we chose to do this to facilitate the interpretation of all the effects and the intercept. Specifically, under accuracy, both the performance-based and self-report values should be the same or similar in value. Because Poisson regression implies a log transformation of the dependent variable (this transformation is implicit but not actually conducted), a value of zero in the dependent variable parallels a self-report of one problem. Thus, the performance-based and self-report IADLs are parallel when under this scaling.

Table 4 includes all the coefficients from this model. In summary, the extraversion by performance interaction reached statistical significance, $\chi^2(1) = 5.005, p = .03$, and the neuroticism by performance interaction approached significance, $\chi^2(1) = 3.743, p = .05$. Figures 1 and 2 exemplify predicted self-reported problems when having zero or one performance-based problem as a function of low, average, and high NEO PI-R factor scores (represented by using 1 SD in each direction). Notably, both interactions were more consistent with overreporting when high in extraversion or high in neuroticism. The only effect consistent with underreporting was in the conscientiousness main effect such that higher conscientiousness was related to lower self-reported IADL problems regardless of the performance-based indicator.

Supplementary Analyses

Neuroticism Facets.—Because of the well-known association of depression with self-report of IADL problems

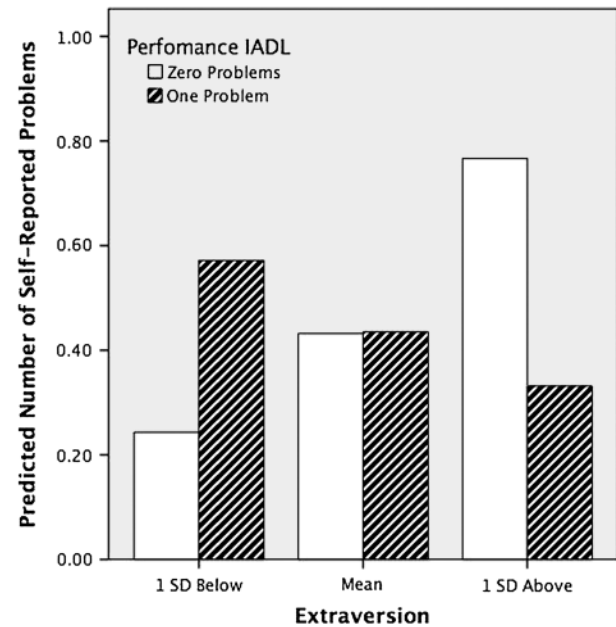


Figure 1. Predicted self-reported instrumental activity of daily living (IADL) problems as a function of extraversion and performance-based IADL errors. All other predictors were treated as being at their mean values. Predicted scores have been exponentiated to place them back into the raw self-report metric. When extraversion was low, self-reported IADL problems paralleled performance-based IADL problems. When extraversion was high, self-reported problems were higher when there were no performance-based problems, consistent with overreporting problems under high extraversion.

(Grigsby et al., 1998; Kempen et al., 1999; Onishi et al., 2004) as well as prior reports that the NEO PI-R neuroticism scale contributed to self-report of IADLs independently from depression (Chapman et al., 2007), the individual facets of neuroticism were examined. Specifically, we conducted a pair of Poisson regressions predicting self-report and performance-based IADLs as the dependent variables, and the six neuroticism facets entered simultaneously as predictors. The results showed that self-report of greater problems was positively associated with the angry hostility and vulnerability facets, $b = 0.156, \chi^2(1) = 6.540, p = .01$ and $b = 0.247, \chi^2(1) = 10.955, p < .01$, respectively. In contrast, production of errors on the performance-based IADL assessment was positively associated with angry hostility, $b = 0.140, \chi^2(1) = 7.899, p < .01$, and negatively associated with impulsiveness, $b = -0.185, \chi^2(1) = 9.290, p < .01$. Thus, the anxiety, depression, and self-consciousness facets were not uniquely associated with either self-reported or performance-based IADLs.

DISCUSSION

The present study examined personality correlates of self-report and performance of IADL skills in a sample of 65 community-dwelling older adults. The results showed that these presumably independently functioning individuals displayed variability both with respect to IADL functionality

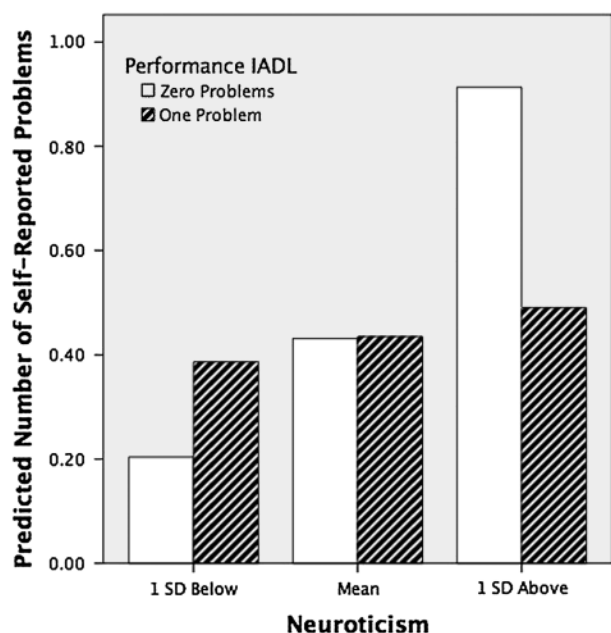


Figure 2. Predicted self-reported instrumental activity of daily living (IADL) problems as a function of neuroticism and performance-based IADL errors. All other predictors were treated as being at their mean values. Predicted scores have been exponentiated to place them back into the raw self-report metric. When neuroticism was low, self-reported IADL problems paralleled performance-based IADL problems, though less sensitive to the pattern under extraversion. When neuroticism was high, self-reported problems were higher when there were no performance-based problems, consistent with overreporting problems under high neuroticism.

and with respect to self-awareness about functional declines. The present study replicated prior research (Chapman et al., 2007) in that self-reported IADL difficulties were primarily related to higher neuroticism and lower conscientiousness. The present study extended prior findings by demonstrating that performance-based IADL difficulties were associated with lower openness and agreeableness and, to some extent, higher neuroticism. Importantly, individuals who made errors on the performance-based assessment but did not admit to having difficulties were characterized by higher conscientiousness. In contrast, tendency to overreport problems was associated with higher extraversion and neuroticism.

That self-reported IADLs were associated with higher neuroticism and lower conscientiousness is consistent with prior research, demonstrating that individuals with these characteristics report more physical symptoms and poorer overall health (Goodwin & Friedman, 2006) as well as poorer health-related quality of life (Kempen, Jellicic, & Ormel, 1997). In addition, the combination of higher neuroticism and lower conscientiousness predicts greater reported functional impairment in the context of life stress among young adults (Williams & Moroz, 2009). Although prior research has demonstrated that depressive tendencies mediate neuroticism associations with change in self-reported disability (Krueger et al., 2006), the strongest facet-level associations for neuroticism in the current study were

for tendencies toward anger and vulnerability to poor stress coping; propensity to depression was not uniquely associated with self-reported IADLs.

The association between openness to experience and better performance on an objective measure of IADLs can likely be explained by the well-known association between openness and cognition. For example, in a recent study of FFM personality traits and Alzheimer's dementia, Openness had the strongest association with cognitive performance on a neuropsychological test battery (Duchek, Balota, Storandt, & Larsen, 2007). Importantly, openness is associated with performance on cognitive tasks presumably associated with dorso-lateral prefrontal cortex functioning (DeYoung, Peterson, & Higgins, 2005), a neural region associated with cognitive abilities that govern mental and behavioral control (i.e., executive functioning). These abilities, in turn, are known to be among the best cognitive predictors of functional independence (Jefferson, Paul, et al., 2006; Suchy et al., 1997). In addition, openness is associated with better stress regulation, suggesting that it may be a resilience factor in aging (Williams, Rau, Cribbet, & Gunn, 2009).

Findings of the current study also suggest that agreeableness is associated with better objective IADL performance. Agreeableness is thought to reflect the ability to inhibit disagreeable tendencies, particularly emotional expressions that may affect relationship quality (Tobin, Graziano, Vanman, & Tassinary, 2000), and is negatively associated with the behavioral disinhibition factor of impulsivity (Flory et al., 2006). Thus, to the extent that agreeableness reflects an ability to inhibit negative tendencies in the service of interpersonal harmony, a certain degree of cognitive control may underlie this personality trait, thereby influencing objective performance on IADLs. Moreover, examination of the neuroticism facets indicated that higher hostility and lower self-regulatory ability around urges (i.e., the impulsiveness facet) were associated with poorer objective IADL performance. Taken together, these findings suggest that a personality style characterized by interpersonal antagonism and poor perceived self-regulation is associated with greater functional disability. Although agreeableness has been less studied in relation to cognitive abilities, there is evidence that individuals with mild dementia of the Alzheimer's type are lower in agreeableness compared with a healthy aging comparison group (Duchek et al., 2007).

The current study is the first to examine personality associations with subjective versus objective IADL discrepancies. Conscientiousness was associated with underreporting functional deficits. Individuals high in conscientiousness describe themselves as being highly organized and orderly, persistent, self-disciplined, deliberate, and competent. Thus, high-conscientious individuals may have difficulty admitting to problems of functionality. That is, individuals who perceive themselves to be highly competent may be unwilling to acknowledge signs of functional decline. Although this may be useful in the service of goal-oriented behavior

in the short term, poor insight into functional abilities may eventually be problematic as individuals fail to develop compensatory strategies in the face of progressively declining functionality.

Analysis of subjective—objective IADL discrepancy also indicated that higher neuroticism and extraversion were associated with overreporting of deficits. Because aspects of neuroticism were also associated with poorer objective performance, the findings are more in line with the notion that neurotic individuals are more sensitive to shifts in functional status. The association between extraversion and overreporting was not predicted; however, prior research has demonstrated a curvilinear association between extraversion and physical symptom reports in young adults, such that extraversion is positively associated with symptoms only at high levels (Williams, O'Brien, & Colder, 2004). Although underdetection of functional problems is likely problematic, the implications of overreporting are unclear. Because perception of functional limitations is necessary for appropriate self-regulation (e.g., implementing compensatory strategies), it may be that overdetection could be beneficial. On the other hand, overdetection could also lead to unnecessary withdrawal from life activities, setting the stage for social isolation and, potentially, increased risk for depression.

Although some personality—IADL associations were diminished or eliminated when age and education were controlled, prior evidence suggests that personality is associated with age, education, and cognitive status. For example, because openness and education are correlated and education serves as a protective factor against functional decline, treating education as a covariate likely removes a meaningful personality—IADL association. Indeed, examination of the role of age, education, and cognitive status in personality—functional status associations points to potentially important mechanisms.

A primary limitation of the present study is the relatively modest sample size. However, prior research on functionality that has utilized larger samples has generally relied only on self-report assessments. In contrast, most prior studies that have utilized assessments similar to ours (i.e., both self-report and performance-based) have generally relied on samples of comparable size (Goverover et al., 2009) or smaller (Karagiozis et al., 1998; LaBuda & Lichtenberg, 1999). Additionally, despite the modest sample size, our results replicated prior findings, lending support to the representativeness of our sample. By the same token, it is important to recognize that additional associations between personality factors and functionality (as well as awareness of limitations in functionality) might have emerged had the sample size (and power) been larger. In fact, some results were marginal and most likely would have reached conventional levels of significance had the sample been larger.

An additional limitation is that our sample was recruited from among attendees of a senior expo. One could argue that individuals who attend such an event and who volun-

teer to participate in research are not representative of the population in general. Although such individuals are likely somewhat more prosocial in their personality style, comparisons with normative personality data indicated that the current sample was in the average range on all NEO PI-R factors except conscientiousness, which was in the low average range. This is consistent with prior research, demonstrating that conscientiousness declines in older adults aged 70 years and older (Donnellan & Lucas, 2008). Moreover, the sample was quite representative with respect to cognitive status, as evidenced by average DRS-2 scaled scores (Tables 1 and 3). Nevertheless, replication of the present findings in a randomly selected sample is warranted.

The representativeness of the present sample is further limited by the fact that only individuals without moderate to severe chronic illness were included in the study. In other words, it is not clear whether individuals with severe chronic illness would exhibit different types of correlations between personality and IADLs (whether self-report or performance), as these individuals' IADL problems may in some cases be more linked to chronic physical disability than to personality factors. However, the purpose of the present study was precisely to identify which factors, besides dementia or chronic disabling illness, are associated with IADL limitations.

The concurrent nature of these data precluded examination of causal direction; dynamic associations among personality and changes in functional disability over time should be investigated. That is, both personality and functional status change with aging, and there is potential for reciprocal associations across time. Additionally, future research should examine the role of depressed mood as a potential mediator in personality—disability associations. Because declines in functional status may also lead to increases in depression, prospective examination of reciprocal associations among these variables will be important. Thus, important directions for future research would be to obtain informant reports of both personality and daily functioning, investigation of cognitive and mood mediators of personality—IADL relations, and longitudinal examination of these associations.

Lastly, we did not have medical records available for the participants, and health status was assessed via self-report. Participants who reported serious chronic illnesses or neurologic disorders were excluded from the study. However, participants with mild chronic illnesses (e.g., high blood pressure) were not excluded, so as to preserve the representativeness of the sample. Nevertheless, mild chronic illness likely had negligible, if any, effect on findings, given that we found no association between chronic illness and any of the dependent and independent variables.

Successful aging is a multidimensional construct that includes physical health, cognitive functioning, functional status, emotional adjustment, and social engagement (Ko, Berg, Butner, Uchino, & Smith, 2007). There is, however,

considerable variability among individuals in aging trajectories and profiles. Overall, results of the current study provide important information about individual differences in subjective and objective functional abilities and point to the importance of assessing functionality with both perceived and performance-based measures. Investigation of discrepancies between self-report and performance has the potential to shed light on self-regulation in the context of increasing functional problems and to inform interventions to maximize functional independence among older adults.

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REFERENCES

- Abrams, R. C., Spielman, L. A., Alexopoulos, G. S., & Klausner, E. (1998). Personality disorder symptoms and functioning in elderly depressed patients. *American Journal of Geriatric Psychiatry, 6*, 24–30.
- Burton, C. L., Strauss, E., Hultsch, D. F., & Hunter, M. A. (2006). Cognitive functioning and everyday problem solving in older adults. *Clinical Neuropsychologist, 20*, 432–452.
- Chapman, B., Duberstein, P., & Lyness, J. M. (2007). Personality traits, education, and health-related quality of life among older adult primary care patients. *Journal of Gerontology: Series B: Psychological Sciences and Social Sciences, 62*, 343–352.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavior sciences, third edition*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Costa, P. T., & McCrae, R. R. (1992). *Manual for the revised NEO Personality Inventory (NEO-PI-R) and the NEO Five-Factor Inventory (NEO-FFI)*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T., Jr., McCrae, R. R., Zonderman, A. B., Barbano, H. E., Lebowitz, B., & Larson, D. M. (1986). Cross-sectional studies of personality in a national sample: II. Stability in neuroticism, extraversion, and openness. *Psychology and Aging, 1*, 144–149.
- DeYoung, C. G., Peterson, J. B., & Higgins, D. M. (2005). Sources of openness/intellect: Cognitive and neuropsychological correlates of the fifth factor of personality. *Journal of Personality, 73*, 825–858.
- Donnellan, M. B., & Lucas, R. E. (2008). Age differences in the big five across the life span: Evidence from two national samples. *Psychology and Aging, 23*, 558–566.
- Duchek, J. M., Balota, D. A., Storandt, M., & Larsen, R. (2007). The power of personality in discriminating between healthy aging and early-stage Alzheimer's disease. *Journal of Gerontology Series B: Psychological Science Social Science, 62*, 353–361.
- Dunlop, D. D., Manheim, L. M., Song, J., Lyons, J. S., & Chang, R. W. (2005). Incidence of disability among preretirement adults: The impact of depression. *American Journal of Public Health, 95*, 2003–2008.
- Flory, J. D., Harvey, P. D., Mitropoulou, V., New, A. S., Silverman, J. M., Siever, L. J., et al. (2006). Dispositional impulsivity in normal and abnormal samples. *Journal of Psychiatric Research, 40*, 438–447.
- Goodwin, R. D., & Friedman, H. S. (2006). Health status and the five-factor personality traits in a nationally representative sample. *Journal of Health Psychology, 11*, 643–654.
- Goverover, Y., Chiaravalloti, N., Gaudino-Goering, E., Moore, N., & DeLuca, J. (2009). The relationship among performance of instrumental activities of daily living, self-report of quality of life, and self-awareness of functional status in individuals with multiple sclerosis. *Rehabilitation Psychology, 54*, 60–68.
- Grigsby, J., Kaye, K., Baxter, J., Shetterly, S. M., & Hamman, R. F. (1998). Executive cognitive abilities and functional status among community-dwelling older persons in the San Luis Valley Health and Aging Study. *Journal of the American Geriatrics Society, 46*, 590–596.
- Grigsby, J., Kaye, K., Kowalsky, J., & Kramer, A. M. (2002). Association of behavioral self-regulation with concurrent functional capacity among stroke rehabilitation patients. *Journal of Clinical Geropsychology, 8*, 25–33.
- Hirschfeld, R. M., Klerman, G. L., Lavori, P., & Keller, M. B. (1989). Premorbid personality assessments of first onset of major depression. *Archives of General Psychiatry, 46*, 345–350.
- Jang, Y., Haley, W. E., Mortimer, J. A., & Small, B. J. (2003). Moderating effects of psychosocial attributes on the association between risk factors and disability in later life. *Aging & Mental Health, 7*, 163–170.
- Jefferson, A. L., Cahn-Weiner, D., Boyle, P., Paul, R. H., Moser, D. J., Gordon, N., & Cohen, R. A. (2006). Cognitive predictors of functional decline in vascular dementia. *International Journal of Geriatric Psychiatry, 21*, 752–754.
- Jefferson, A. L., Paul, R. H., Ozonoff, A., & Cohen, R. A. (2006). Evaluating elements of executive functioning as predictors of instrumental activities of daily living (IADLs). *Archives of Clinical Neuropsychology, 21*, 311–320.
- Jurica, P., Leitten, C., & Mattis, S. (2001). *DRS-2 dementia rating scale—2: Professional manual*. Lutz, FL: Psychological Assessment Resources.
- Karagiozis, H., Gray, S., Sacco, J., Shapiro, M., & Kawas, C. (1998). The Direct Assessment of Functional Abilities (DAFA): A comparison to an indirect measure of instrumental activities of daily living. *The Gerontologist, 38*, 113–121.
- Kempen, G. I. J. M., Jelicic, M., & Ormel, J. (1997). Personality, chronic medical morbidity, and health-related quality of life among older persons. *Health Psychology, 16*, 539–546.
- Kempen, G. I. J. M., van Heuvelen, M. J. G., van Sonderen, E., van den Brink, R. H. S., Kooijman, A. C., & Ormel, J. (1999). The relationship of functional limitations to disability and the moderating effects of psychological attributes in community-dwelling older persons. *Social Science & Medicine, 48*, 1161–1172.
- Kendler, K. S., Neale, M. C., Kessler, R. C., & Heath, A. C. (1993). A longitudinal twin study of personality and major depression in women. *Archives of General Psychiatry, 50*, 853–862.
- Ko, K. J., Berg, C. A., Butner, J., Uchino, B. N., & Smith, T. W. (2007). Profiles of successful aging in middle-aged and older adult married couples. *Psychology and Aging, 22*, 705–718.
- Krueger, K. R., Wilson, R. S., Shah, R. C., Tang, Y., & Bennett, D. A. (2006). Personality and incident disability in older persons. *Age and Aging, 35*, 428–433.
- LaBuda, J., & Lichtenberg, P. A. (1999). The role of cognition, depression, and awareness of deficit in predicting geriatric rehabilitation patients' IADL performance. *Clinical Neuropsychologist, 13*, 258–267.
- Lawton, M. P., & Brody, E. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist, 9*, 179–186.
- Mariani, E., Monastero, R., Ercolani, S., Rinaldi, P., Mangialasche, F., Costanzi, E., Vitale, D. F., Senin, U., Mecocci, P., & the ReGAI Study Group (2008). Influence of comorbidity and cognitive status on instrumental activities of daily living in amnesic mild cognitive impairment: Results from the ReGAI project. *International Journal of Geriatric Psychiatry, 23*, 523–530.
- McCrae, R. R. (1994). Openness to experience: Expanding the boundaries of factor V. *European Journal of Personality, 8*, 251–272.
- Morse, J. Q., Pilkonis, P. A., Houck, P. R., Frank, E., & Reynolds, C. F., III (2005). Impact of cluster C personality disorders on outcomes of acute and maintenance treatment in late-life depression. *American Journal of Geriatric Psychiatry, 13*, 808–814.

- Ng, T.-P., Niti, M., Chiam, P.-C., & Kua, E.-H. (2006). Physical and cognitive domains of the instrumental activities of daily living: Validation in a multiethnic population of Asian older adults. *Journal of Gerontology: Series A: Biological Sciences and Medical Sciences*, *61*, 726–735.
- Onishi, J., Umegaki, H., Suzuki, Y., Uemura, K., Kuzuya, M., & Iguchi, A. (2004). The relationship between functional disability and depressive mood in Japanese older adult inpatients. *Journal of Geriatric Psychiatry and Neurology*, *17*, 93–98.
- Ormel, J., Rijdsdijk, F., Sullivan, M., van Sonderen, E., & Kempen, G. I. J. M. (2002). Temporal and reciprocal relationship between IADL/ADL disability and depressive symptoms in late life. *Journal of Gerontology: Series B: Psychological Sciences and Social Sciences*, *57*, 338–347.
- Owsley, C., Sloane, M., McGwin, G., Jr., & Ball, K. (2002). Timed instrumental activities of daily living tasks: Relationship to cognitive function and everyday performance assessments in older adults. *Gerontology*, *48*, 254–265.
- Patrick, J. H., Johnson, J. C., Goins, R. T., & Brown, D. K. (2004). The effects of depressed affect on functional disability among rural older adults. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation*, *13*, 959–967.
- Perkins, E. (2007). Self- and proxy reports across three populations: Older adults, persons with Alzheimer's disease, and persons with intellectual disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, *4*, 1–10.
- Plehn, K., Marcopulos, B. A., & McLain, C. A. (2004). The relationship between neuropsychological test performance, social functioning, and instrumental activities of daily living in a sample of rural older adults. *Clinical Neuropsychologist*, *18*, 101–113.
- Schmitter-Edgecombe, M., Woo, E., & Greeley, D. R. (2009). Characterizing multiple memory deficits and their relation to everyday functioning in individuals with mild cognitive impairment. *Neuropsychology*, *23*, 168–177.
- Stern, Y. (2002). What is cognitive reserve? Theory and research application of the reserve concept. *Journal of the International Neuropsychological Society*, *8*, 448–460.
- Suchy, Y., Blint, A., & Osmon, D. S. (1997). Behavioral dyscontrol scale: Criterion and predictive validity in an inpatient rehabilitation unit population. *Clinical Neuropsychologist*, *11*, 258–265.
- Tobin, R. M., Graziano, W. G., Vanman, E. J., & Tassinari, L. G. (2000). Personality, emotional experience, and efforts to control emotions. *Journal of Personality and Social Psychology*, *79*, 656–669.
- Williams, P. G., & Moroz, T. L. (2009). Personality vulnerability to stress-related sleep disruption: Pathways to adverse mental and physical health outcomes. *Personality and Individual Differences*, *46*, 598–603.
- Williams, P. G., O'Brien, C. D., & Colder, C. R. (2004). The effects of neuroticism and extraversion on self-assessed health and health-relevant cognition. *Personality and Individual Differences*, *37*, 83–94.
- Williams, P. G., Rau, H. K., Cribbet, M. R., & Gunn, H. E. (2009). Openness to experience and stress regulation. *Journal of Research in Personality*, *43*, 777–784.
- Williams, P. G., Suchy, Y., & Rau, H. (2009). Individual differences in executive functioning: Implications for stress regulation. *Annals of Behavioral Medicine*, *37*, 126–140.