Real-World Implications of Apathy Among Older Adults: Independent Associations With
Activities of Daily Living and Quality of Life

Savanna M. Tierney¹, Steven Paul Woods^{1, 2}, Michael Weinborn², and Romola S. Bucks²

¹ Department of Psychology, University of Houston, ² School of Psychological Science,
University of Western Australia

Please address all correspondence to Steven Paul Woods, Department of Psychology, University of Houston, 126 Heyne Building, Houston, Texas, USA 77004. Tel: (713) 743-6415; Email: spwoods@uh.edu

Abstract

Objectives: Apathy is common in older adults and has been linked to adverse health outcomes. The current study examined whether apathy contributes to problems managing activities of daily living (ADL) and lower quality of life (QoL) in older adults. **Method:** Participants included 83 community-dwelling older adults. Apathy was assessed using a composite of the self and family-rating scales from the Frontal Systems Behavioral Scale (FrSBe). A knowledgeable informant completed the Activities of Daily Living Questionnaire (ADLQ) and participants completed the World Health Organization Quality of Life (WHOQoL) scale. **Results:** Nominal logistic regressions controlling for age, anxiety and depression symptoms, chronic medical conditions, and global cognition revealed that higher levels of apathy were significantly associated with a wide range of mild ADL problems. In parallel, a multiple linear regression indicated that greater apathy was significantly associated with lower QoL independent of ADL problems, anxious and depressive symptomology, chronic medical conditions, global cognition and age. **Discussion:** Findings suggest that apathy confers an increased risk of problems in the independent management of daily activities and poorer well-being among community-dwelling older adults. Neurobehavioral and pharmacological interventions to improve apathy may have beneficial effects on the daily lives of older adults.

Keywords: successful aging; well-being; neuropsychology; apathy; daily functioning

Real-World Implications of Apathy in Older Adults: Independent Associations With Activities of Daily Living and Quality of Life

As the population of older adults continues to rise globally, factors that contribute to “successful” aging have received increased attention. Maintaining a high level of quality of life (QoL; e.g., Gabriel & Bowling, 2004) and functional independence (e.g., Pruchno et al., 2010) are widely recognized as fundamental aspects of “healthy” aging. Whilst older individuals commonly report QoL comparable to (and sometimes better than) their younger counterparts (Diener & Suh, 1997), there are nevertheless notable individual differences in QoL across the lifespan (Wrosch, Bauer, & Scheier, 2005). Many of the factors that can influence QoL amongst older adults overlap with those that contribute to independence in activities of daily living (ADLs) including depression (e.g., Stuck et al., 1999), health status (e.g., presence and severity of medical comorbidities; Stuck et al., 1999), psychosocial variables (e.g., social support and socioeconomic status) (e.g., Gabriel & Bowling, 2004; Stuck et al., 1999) and neurocognitive functions, such as prospective memory (e.g., Woods et al., 2015). Yet, our practical understanding of the factors contributing to ADL independence and optimal QoL among older adults remains incomplete, warranting the examination of other, clinically relevant, potentially modifiable predictors of these important outcomes.

Apathy, or a general lack of interest or emotion, may also play a role in ADL functioning and QoL among older adults. In a clinical sense, apathy has been described by patients and families as “the get up and go that got up and went,” or as a sense that “the spark is missing” (van Reekum, Stuss, & Ostrander, 2005). Apathy is conceptualized as a lack of motivation to engage in goal-directed behavior, distinguishable from neurocognitive and mood disorders (Marin, 1997). At the neural level, apathy symptoms are linked to the integrity of prefrontal-

subcortical networks (see Lanctot et al., 2016 for review). Specifically, studies implicate smaller gray matter volumes of frontal and temporal lobes, lower white matter volume of the parietal lobes, lower thalamus volumes, and a greater number of frontal white matter lesions, in the neuropathophysiology of apathy among older adults (e.g., Grool, et al. 2014). As such, older adults may be particularly susceptible to changes in apathetic behaviors due to age-related changes in the prefrontal cortex (e.g., Fortin, Godbout, & Braun, 2003). While apathy has been established as a salient feature of many clinical conditions (e.g., Robert et al., 2006), including vascular dementia (Hangrave et al., 2000) and traumatic brain injury (Kant, Duffy, & Pivovarnik, 1998), this neuropsychiatric phenomenon among typically aging individuals is not well understood.

The few studies investigating apathy in community-based older populations have yielded prevalence estimates generally ranging between 6% and 51% (e.g., Brodaty et al., 2010; Van der Mast et al., 2008; Mehta et al., 2008; Onyike et al., 2007). The variability in apathy prevalence estimates may be a function of both measurement and sampling error (Clarke, Ko, Kuhl, Reekum, Salvador, & Marin, 2011). One particularly well-designed investigation of 1,136 cognitively normal, non-depressed adults aged 50 and older reported a 23.7% prevalence of apathy and a one-year incidence rate of 22.6% (Clarke et al., 2010). Further, there appear to be an array of risk factors for apathy among older adults, including advanced age (e.g., Brodaty et al., 2010), having no partner and/or living alone (e.g., Onyike et al., 2007), male gender (e.g., Brodaty et al., 2010; cf. Clarke, Ko, Lyketsos, & Eaton, 2010), neurocognitive impairment (e.g., Onyike et al., 2007), and cardiovascular disease (e.g., Van der Mast et al., 2008). Importantly, in a recent study of community dwelling older adults, apathy was associated with incident dementia

(HR 1.26, 95% CI [1.06–1.49], $p = 0.01$) over a 6-year period, independent of depressive symptoms (Van Dalen, Van Wanrooij, Moll van Charante, Richard, & Van Gool, 2018).

To date, however, we know very little about apathy's role in critical aspects of successful aging, such as maintaining ADL independence and higher levels of QoL. Only three studies have specifically examined these issues. A study of 1,118 older (≥ 75 years) adults in the Netherlands (Groeneweg-Koolhoven et al., 2014) reported that apathy, as measured by a face-to-face interview using the Apathy Evaluation (Starkstein et al., 1992), was associated with: 1) less engagement in volunteer or paid work; and 2) lower QoL and well-being across three measures (Cantril's Ladder, the EuroQol (EQ)-5D thermometer, the De Jong-Gierveld Loneliness questionnaire for perceived loneliness). Importantly, apathy's negative association with QoL in this study was independent of depression. Clarke and colleagues (2010) showed that healthy older adults who displayed apathy as measured by specific items from the General Health Questionnaire (GHQ; Goldberg, 1978) at baseline were 4.4 times more likely to experience functional decline in both instrumental and basic ADL at one-year follow-up. Additionally, individuals who demonstrated apathy at *any* point throughout the study (baseline, 1-year and 13 year follow-up) were more than twice as likely to show ADL decline at the 13-year follow-up compared to those who did not, independent of adjustment for sociodemographic factors and depression. Finally, an investigation of 96 adults aged 70 and older in rural Japan (Yamatsita et al., 1999) showed that individuals with greater apathy as measured by an abridged version of Marin's Apathy Scale (Marin et al., 1991) reported less functional ability on the Tokyo Metropolitan Institute of Gerontology (TMIG) Competence Index (Koyano et al., 1993). However, apathy was not related to QoL as measured by the revised Philadelphia Geriatric Center (PGC; Lawton, 1975) Morale Scale (Yamatsita et al., 1999). Thus, these three early

studies broadly converge to support the hypothesis that apathy may impart significant barriers to both ADL functioning and overall well-being among older adults.

Still, mixed findings regarding the relationship of apathy to QoL, as well as the scant study of ADLs among non-clinical samples of older adults represent important limitations to the extant literature. The current study therefore sought to examine the independent relationships of apathy to ADLs and QoL among a sample of older, community-dwelling adults incorporating both self and knowledgeable informant report. Specifically, it was posited that older adults experiencing greater apathy would show difficulties with ADLs and lower QoL. The present study extends the current gaps in the literature in the following ways: 1) We examine ADLs using a well-validated informant-report scale that yields scores across different dimensions of functioning; 2) We incorporate parallel self- and informant-rating measures of apathy using a well-validated scale; and 3) We consider a comprehensive array of conceptually and clinically relevant confounding factors (e.g., neurocognitive functions, comorbid medical conditions, symptoms of depression and anxiety, and demographics).

Methods

Participants

The study sample included 83 community-dwelling older adults, aged 55 to 84 years, who were assessed within the Healthy Ageing Research Program at the University of Western Australia. Participants were excluded from the study if they received a score < 24 on the Mini Mental State Examination (MMSE; Folstein, S. Folstein, & McHugh, 1975). Given the insensitivity of the MMSE in some instances, the cognitive health of this older sample was confirmed post-hoc using the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, Tierney, Mohr, & Chase, 1998). No participant had an RBANS Total Scale Score

that fell greater than 1.5 SD below the published age-adjusted normative mean (NB. the RBANS was not used as an exclusion criterion, rather this analysis was simply a confirmation of the veracity of the MMSE exclusion). Participants were also excluded if they or reported histories of major neuromedical (e.g., seizure disorder, stroke, at least moderate traumatic brain injury) or severe psychiatric (e.g., psychosis) disorders that might affect cognition. The human research ethics office of the University of Western Australia approved this study. All participants provided written, informed consent and were offered \$15 in reimbursement of their travel expenses. Participants' basic demographic, medical, mood, and neurocognitive characteristics are summarized in Table 1.

Procedure

Apathy. Apathy was measured with a composite of the self and family-rating scales of the Frontal Systems Behavior Scale (FrSBe; Grace & Malloy, 2001). In the normative sample ($N = 436$), the intrascale reliability of the FrSBe family-rating apathy subscale was reported as .78 and .72 for the self-rating apathy subscale (FrSBe; Grace & Malloy, 2001). The FrSBe-aphathy subscale (previously referred to as Frontal Lobe Personality Scale; FLOPS; Grace, Stout, & Malloy, 1999) has shown convergent validity with other widely-used measures of apathy, such as the Neuropsychiatric Inventory in dementia (NPI; $r = 0.64$; Norton, Malloy, & Salloway, 2001), the Vigor-Activation Scale of the Profile of Mood States (POMS) in HIV ($r = -.55$; Kamat et al., 2016), and the Apathy Evaluation Scale in traumatic brain injury (AES; $r = 0.71$; Lane-Brown & Tate, 2009). The FrSBe's apathy scale also shows evidence of discriminant validity in neuropsychological samples, such as frontotemporal dementia (Boyle, et al., 2003), HIV disease (e.g., Kamat et al., 2012), and Parkinson's versus Alzheimer's dementia (Cahn-Weiner, D.A., Grace, J., Ott, B., Fernandez, H., & Friedman, J., 2002). Moreover, the FrSBe's apathy scale

shows independent associations with the structural integrity of frontal brain regions that are known to be involved in the clinical expression of apathy (e.g., Kamat et al., 2014). Finally, it shows strong, independent relationships with ADLs and QoL in some clinical populations (e.g., Kamat et al., 2016). Thus, the FrSBe's apathy scale appears to possess sufficient reliability and validity in both clinical and healthy samples that support its use in the current study.

Item content of the Apathy scale evaluates “problems with initiation, psychomotor retardation, spontaneity, drive, persistence, loss of energy and interest, lack of concern about self/care, and/or blunted affective expression”. Thus, the FrSBe's apathy scale measures mostly the cognitive and behavioral aspects of apathy. Items are rated on a 5-point scale: 1 (almost never), 2 (seldom), 3 (sometimes), 4 (frequently), and 5 (almost always). Total raw scores on the independent self- (Cronbach's $\alpha = .83$)- and family - (Cronbach's $\alpha = .84$) rating scales range from 0- 60. Among the study sample, scores ranged from 14-44 on the self-rating and 14-43 for the family-rating scale (see Table 1 for descriptive data). Intraclass correlation analysis indicated significant agreement between the self and family scales ($ICC = .57$, 95% CI [.33-.72], $p < .001$). The mean of the family and self-rating raw scales was used as a composite measure of apathy in data analyses. Note that basic univariate findings did not differ if self- or family-ratings were used (see below for details). For descriptive purposes, Table 1 shows the proportions of participants who had elevated apathy scales using the manual's demographically (i.e., age, education, and gender) adjusted T-score cutpoint of 65.

Activities of Daily Living. Everyday functioning was measured by a modified version of the Activities of Daily Living Questionnaire (ADLQ; Johnson, Barion, Bademaker, Rehkemper, & Weintraub, 2004), which was completed by a knowledgeable informant (see Table 1 for details on informants). This 28-item questionnaire assesses a range of ADL, in this

case using an expanded 5-level rating scale (total scores range from 0-140) to indicate the severity of dependence, with higher values indicative of greater difficulty (total scale Cronbach's $\alpha = .84$). The items on the ADLQ are grouped into six subscales: Self-care activities (e.g., "Dressing"), Household care (e.g., "Laundry"), Employment and recreation, Shopping and Money (e.g., "Handling cash"), Travel (e.g., "Driving"), and Communication (e.g., "Writing"). Consistent with prior research (e.g., Woods et al., 2015), a cutoff of ≥ 1 problem(s) endorsed on any item was used to classify participants into "ADL Normal" or "Mild ADL Problems" groups. Using this cutpoint, 30 (36%) participants were classified as ADL Normal and 53 (64%) were classified with Mild ADL Problems. Note that results did not differ if ADL was used as a continuous variable. Among those with Mild ADL problems, the range was 1-22 with a mean of 6.5 (SD = 5.4).

Quality of Life. Participants completed the EUROHIS- QOL 8-item index (Schmidt, Muhlan, & Power, 2006), which consists of two items from each domain of the original World Health Organization Quality Of Life-BREF (i.e., physical, psychological, environmental, and social; The WHOQOL Group, 1998). The eight items evaluate overall QOL, general health, energy, daily life activities, esteem, relationships, finances, and home satisfaction (Cronbach's $\alpha = .82$). The response index is the same as that of the original WHOQOL, using a five-point scale anchored by "very poor" (or "very dissatisfied", "not at all", scored 1) to "very good" (or "very satisfied", "completely", scored 5). The overall QOL score is calculated by a simple summation of scores on the eight items (sample range = 8 to 40), with higher scores indicative of better QOL.

Depression-anxiety composite, cognition, and medical conditions. Participants completed a neurocognitive test battery that included the Repeatable Battery for the Assessment

of Neuropsychological Status (RBANS; Randolph, Tierney, Mohr, & Chase, 1998) as a measure of neurocognitive global functioning. Total scores from the 9-item Patient Health Questionnaire (Kroenke, Spitzer, & Williams, 2001) and the Generalized Anxiety Disorder Scale (Spitzer, Kroenke, Williams, & Lowe, 2006) from which sample-based z-scores were averaged to create a depression-anxiety composite, with higher scores reflecting greater distress. Based on participant report of medical history, the presence or absence of chronic medical conditions (e.g., diabetes, arthritis, high cholesterol) was recorded for each individual (see Table 1). A dichotomous, “yes or no” variable in response to this demographic information was used in analyses.

Data Analysis

Univariate statistics were conducted using independent samples t-tests, chi-square tests, and Pearson’s correlation coefficients (or their non-parametric counterparts, if indicated). Next, a logistic regression was conducted to assess the association between apathy and the presence or absence of mild ADL problems. A linear multiple regression analysis was performed to examine the relationship of apathy to the WHOQoL. In both models, covariates were determined *a priori* and were based on the extant literature examining determinants of ADLs and QoL among older adults reviewed above. Specifically, covariates for both models included age, the depression-anxiety composite, presence of chronic medical condition(s), and the RBANS total score as a measure of global neurocognitive function. In the WHOQoL model, we also included the dichotomous mild ADL problem variable as a covariate. The critical alpha level for hypothesis testing was set at 0.05 for all analyses, which were conducted using JMP 11.2.0.

Results

Activities of Daily Living. As shown in Figure 1, the severity of apathy (sample-based z-score composite of self- and family-report apathy ratings) was significantly higher in persons

with at least mild ADL problems ($M = 0.22$, $SE = .12$) compared to participants classified as having normal ADL function ($M = -0.40$, $SE = .10$, $p = .001$). This group-level difference was accompanied by a large effect size (Cohen's $d = .83$). Analyses examining the differences in the relationships of the ADL functioning with the FrSBe apathy self ($r = -0.21$) scale, the family-report scale ($r = -0.42$), and apathy composite ($r = -0.38$) showed the same magnitude and direction of association (all steiger z-test $ps > .10$). Results of a nominal logistic regression examining the influence of apathy on ADL functioning and controlling for age, symptoms of depression and anxiety (via the depression-anxiety composite), presence of chronic medical conditions, and global cognition were significant ($\chi^2[5] = 15.59$, $p = .008$). Within this model, the apathy composite emerged as the only significant contributor ($\chi^2[5] = 7.16$, $p = .008$, OR = 2.72 [95% CI = 1.31- 5.67]). Follow-up nominal logistic regressions were performed to examine the influence of apathy on the six subscales of ADLs (i.e., Self-care, Household care, Employment and recreation, Shopping and Money, Travel, and Communication), including the same covariates listed above. The models significantly fit the data for all six ADL subscales (all $ps < .05$). With the exception of the Communication subscale, the apathy composite was the only significant contributor in each of the models (all $ps < .05$). For the Communication subscale, both the apathy composite ($\chi^2[5] = 4.11$, $p = .043$) and RBANS total score ($\chi^2[5] = 7.05$, $p = .008$) emerged as independent predictors of ADL functional status.

Quality of Life. As shown in Figure 2, there was a significant ($p < .0001$) and large ($r = -0.49$) negative association between the apathy composite and WHOQoL total score. Analyses examining the differences in the relationships of the WHOQoL total score with the FrSBe apathy self ($r = -0.44$) scale, the family-report scale ($r = -0.40$), and apathy composite showed the same magnitude and direction of association (all steiger z-test $ps > .10$). The overall multiple linear

regression model evaluating apathy as a predictor of WHOQoL was significant ($\text{Adj } R^2 = 0.29, p < .0001$). Within this model the depression-anxiety ($\beta = -2.63, p = .01$) and apathy ($\beta = -3.74, p < .001$) composites emerged as significant predictors of WHOQoL total scores. No other variable in this model reached statistical significance including, age, RBANS total, level of ADL functioning, and presence of chronic medical conditions (all $ps > .10$).

Discussion

A few early studies showed that apathy may be linked to adverse clinical outcomes in older adults including poorer health behaviors (Van Reekum, Stuss & Ostrander, 2005), reduced engagement in vocational activities, and diminished perception of QoL (Groeneweg-Koolhoven et al., 2014). Replicating and extending this limited earlier work, the present study examined the relationship between apathy and both mild ADL problems and QoL in 83 community-dwelling older Australians. Consistent with our expectations, results revealed that individuals with higher levels of apathy were more likely to have at least mild ADL difficulties and lower QoL. These relationships were of a large magnitude and were not explained by demographic factors, depression and anxiety symptoms, comorbid medical conditions, or global cognitive functioning. In the case of QoL, greater apathy also predicted lower QoL above and beyond level of ADL function. These findings are consistent with prior reports of the adverse impact of apathy on ADLs and QoL and extend that research by providing evidence that both of these constructs are independently and negatively affected by apathy, within a single, non-clinical sample of older adults.

Individuals with at least mild ADL problems in our sample had significantly higher levels of apathy compared to participants with no ADL difficulties. In other words, older adults with behavioral symptoms of diminished interest and motivation were notably more likely to

experience problems independently managing their daily affairs, even in the absence of frank dementia. These results are consistent with findings among clinical populations (e.g., AD; Freels et al., 1992) and with the two previous studies demonstrating that apathy was related to decreased instrumental and basic ADL functioning and vocational activity in older adults (Clarke et al., 2010; Groeneweg-Koolhoven et al., 2014). The current study extends these prior works by including informant report and a broad array of functional ADL domains, including self-care activities, household care, employment and recreation, shopping and money, travel and communication. The consistent apathy and ADL relationship across subscale domains suggests that apathy may serve as a general, underlying mechanism of functional disruption, rather than a psychological phenomenon that imposes only isolated, adverse effects.

Another novel contribution of the current study is the finding that greater levels of apathy were associated with poorer QoL above ADL difficulties, depression and anxiety symptomology, demographic characteristics, and cognition. This finding differs from that of Yamashita et al. (1999), who reported that apathy and QoL were not associated in a rural Japanese sample of older adults. While it is possible that demographic and cultural differences may account for this stark difference in both prevalence and findings regarding apathy's relationship to QoL, it is more likely that the contrasting results are the result of measurement and sampling differences between the current and previous investigation. For example, it is possible that the restricted variance in apathy ratings in the previous study limited the ability to observe a statistical association with QoL. The prevalence of apathy symptoms in our sample is, however, consistent with a study of older adults from the Baltimore Epidemiologic Catchman Area study, which reported an apathy prevalence of 23.7% (Clarke et al., 2010).

Of particular note, the association between apathy and both ADLs and QoL was independent of depression. Though studies have demonstrated apathy and depression as separable affective constructs (e.g., Marin et al., 1991), in many investigations the two are not distinctly operationalized. Indeed, literature suggests that apathy can occur without depression and depression can be present without apathy (see Van Reekum, Stuss, & Ostrander, 2005 for review); a finding that has been observed across a number of disorders. For example, Starkstein et al., (2001) reported that 37% of 319 individuals with Alzheimer's disease had apathy as assessed by the Apathy Scale, while only 24% also had depression, yielding a net of 13% of participants with apathy alone. Approximately one-fifth of our older adult sample demonstrated clinically elevated apathy, but only 25% of those also showed elevations in depressive symptoms on the PHQ-9. Likewise, only 36% of the participants who endorsed at least mild depressive symptomology also had elevated apathy. Studies among individuals with Parkinson's disease (Starkstein et al., 1992), HIV infection (e.g., Kamat et al., 2012) and traumatic brain injury (Kant, Duffy, & Pivovarnik, 1998) have also shown discriminability between apathy and depression. Results are consistent with a recent study of community dwelling older adults, which identified apathy as a possible prodromal symptom to dementia without depressive symptoms (van Dalen, et al., 2018). Findings from the current study lend support to the notion that depression and apathy are discriminable dimensions of behavior in community-dwelling older adults as apathy emerged as a predictor of QoL and ADLs beyond the impact of the depression-anxiety composite variable.

Our approach to measuring apathy with a composite of self- and informant-ratings on the FrSBe has both strengths and limitations. The strengths of this methodology include that the FrSBe is a well-validated, reliable, clinical measure that assesses multiple viewpoints of apathy.

While informant rating may be limited by the inherent subjective experience of apathy and thus, may not accurately capture all aspects of the syndrome, self-report of apathy symptoms can nevertheless be confounded by diminished insight. It has been suggested that the focus on goal-directed behaviors on the FrSBE apathy scale may lend itself to completion by an informant as many of the items assess observable activities rather than internal experiences (Lane-Brown & Tate, 2009). In the current study, we employ an apathy composite comprised of both self- and family-report, which may help reconcile the pros and cons of these separate methods. Indeed, the two indices of apathy were robustly correlated and showed the same pattern and magnitude of findings when considered separately. Still, the measurement of apathy remains difficult as various available measures assess different aspects of the construct (Clarke et al., 2011). In this case, the FrSBe apathy scale is somewhat unidimensional and does not allow us to determine whether it is the cognitive, behavioral, and/or affective symptoms (Robert et al., 2002) of apathy that are driving the observed associations with daily functioning and/or differ across ADLs and QoL. Although the FrSBe apathy scale shares considerable variance with the AES and NPI in some neuropsychological populations, these scales are not necessarily interchangeable and have been shown to measure different components of apathy (e.g., Lane-Brown & Tate, 2009). In this vein, it may be beneficial for future research to replicate these findings with other instruments (e.g., AES, NPI), which might also allow for an examination of factors of apathy as they relate to everyday functioning and well being.

Relatedly, while informant report is a reliable and valid indicator of manifest ADL functions (e.g., Miller, Brown, Mitchell, & Williamson, 2013), our independent variable was nevertheless comprised of a single informant report questionnaire. Use of a multimodal ADL assessment approach that includes self-report, informant-report, and performance-based

measures may provide a more comprehensive measurement of the inherent complexity of everyday functioning in future studies (see Blackstone et al, 2012). The cross-sectional design of the current study limits our ability to draw causal inferences concerning the effects of apathy on QoL and ADLs among older adults. Longitudinal studies are necessary better to understand the inter-individual patterns of apathy changes and associated functional consequences for various aspects of “successful aging.” It is also possible that the use of raw MMSE cutscores in a healthy sample resulted in a few errors of exclusion (i.e., inaccurately excluding cognitively normal participants who fall below the MMSE cutpoints due to low education or advanced age). Thus the generalizability of our findings to such at-risk subpopulations of older adults remains to be determined. Despite these caveats, as our results indicate that apathy may be a potential target of interventions to address ADL difficulty and reduced QoL, further investigation of the management of apathy symptoms is warranted.

This study adds to the few prior investigations of apathy among non-clinical older adult samples. Results indicate that apathy is present and prevalent among the relatively understudied population of older, community-dwelling adults. Additionally, findings identify a potential target for intervention of a treatable factor, apathy, on clinically important outcomes (i.e., ADLs and QoL). Indeed, evidenced based effective treatment of apathy is largely lacking and the limited investigations of pharmacologic (e.g., Corcoran, Wong, & O’Keane, 2004) and psychosocial interventions (e.g., Verkaik, van Weert, & Francke, 2005) have been conducted among clinical populations, often with comorbid neuropsychiatric disorders. Future studies may wish to investigate the specific components of apathy that contribute to QoL and ADL difficulty as well as behavioral programs to address apathy in older individuals. As the prevalence of older adults

continues to increase, studies investigating factors that affect “successful aging” are essential to provide effective care, preventative interventions, and treatment techniques for this population.

Acknowledgments

The authors report no conflicts of interest. The authors thank the study volunteers for their participation.

References

- Blackstone, K., Moore, D. J., Heaton, R. K., Franklin, D. R. Jr., Woods, S. P., Clifford, D. B....
CNS HIV Antiretroviral Therapy Effects Research (CHARTER) Group. (2012).
Diagnosing symptomatic HIV-associated neurocognitive disorders: self-report versus
performance-based assessment of everyday functioning. *Journal of International
Neuropsychological Society*, 18(1), 79-88. doi: 10.1017/S135561771100141X.
- Boyle, P.A., Malloy, P.F., Salloway, S., Cahn-Weiner, D.A., Cohen, R., & Cummings, J.L.
(2003). Executive dysfunction and apathy predict functional impairment in Alzheimer
Disease. *The American Journal of Geriatric Psychiatry*, 11(2), 214-221.
- Brodaty, H., Altendorf, A., Withall, A., et al. (2010). Do people become more apathetic as they
grow older? A longitudinal study in healthy individuals. *International Psychogeriatrics*, 22,
426-436. doi:10.1017/s1041610209991335.
- Cahn-Weiner, D.A., Grace, J., Ott, B.R., Fernandez, H.H., Friedman, J.H. (2002). Cognitive and
behavioral features discriminate between Alzheimer's and Parkinson's disease.
Neuropsychiatry, Neuropsychology, and Behavioral Neurology, 15(2), 79-87. PubMed
PMID: 12050470.
- Clarke, D. E., Ko, J. Y., Lyketsos, C., Rebok, G. W., Eaton, W. W. (2010). Apathy and cognitive
and functional decline in community-dwelling older adults: results from the Baltimore
ECA longitudinal study. *International Psychogeriatrics*, 22(5), 819-29.
doi:10.1017/S1041610209991402.
- Clarke, D.E., Ko, J.Y., Kuhl, E.A., van Reekum, R., Salvador, R., Marin, R.S. (2011). Are the
available apathy measures reliable and valid? A review of the psychometric evidence.
Journal of Psychosomatic Research, 70(1), 73-97. doi: 10.1016/j.jpsychores.2010.01.012.

- Clarke, D. E., van Reekum, R., Simard, M., Streiner, D. L., Conn, D., Cohen, T., & Freedman, M. (2008). Apathy in dementia: clinical and sociodemographic correlates. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 20, 337–347.
doi:10.1017/s1041610209991402.
- Corcoran, C., Wong, M. L., O'Keane, V. (2004). Bupropion in the management of apathy. *Journal of Psychopharmacology*, 18(1):133-5. PubMed PMID: 15107198.
- Diener, E. D., & Suh, M. E. (1997). Subjective well-being and age: An international analysis. *Annual Review of Gerontology and Geriatrics*, 17, 304.
- Folstein M. F., Folstein S. E., & McHugh P. R. (1975). “Mini-mental state.” A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12(3), 189-198. PubMed PMID: 1202204.
- Fortin, S., Godbout, L., & Braun, C. M. (2003). Cognitive structure of executive deficits in frontally lesioned head trauma patients performing activities of daily living. *Cortex*, 39(2), 273-291. doi:10.1016/s0010-9452(08)70109-6.
- Freels, S., Cohen, D., Eisdorfer, C., Paveza, G., Gorelick, P., Luchins, D. J., Hirschman, R., Ashford, J. W., Levy, P., Semla, T., et al. (1992). Functional status and clinical findings in patients with Alzheimer's disease. *Journal of Gerontology* 47(6):M177-82. PubMed PMID: 1430852.
- Gabriel, Z., & Bowling, A. (2004). Quality of life from the perspectives of older people. *Ageing and Society*, 24, 675–691. doi:10.1017/S0144686X03001582.
- Goldberg, D. (1978). Manual of the General Health Questionnaire. Windsor, United Kingdom: NFER Publishing Company.

- Grace, J., Malloy, P.F. (2001). Frontal Systems Behavioral Scale: Professional manual. Lutz, FL, Psychological Assessment Resources, Inc.
- Grace, J., Stout, J. C., & Malloy, P. F. (1999). Assessing Frontal Lobe Behavioral Syndromes with the Frontal Lobe Personality Scale. *Assessment*, 6(3), 269-284. doi: 10.1177/107319119900600307.
- Grool, A. M., Geerlings, M. I., Sigurdsson, S., Eiriksdottir, G., Jonsson, P. V., Garcia, M. E., Siggeirsdottir, K., Harris, T. B. , Sigmundsson, T., Gudnason, V., Launer, L. J. (2014). Structural MRI correlates of apathy symptoms in older persons without dementia: AGES-Reykjavik Study. *Neurology*, 82(18),1628-35. doi: 10.1212/WNL.0000000000000378.
- Groeneweg-Koolhoven, I., de Waal, M.W., van der Weele, G. M, Gussekloo, J., Van der Mast, R. C. (2014). Quality of life in community-dwelling older persons with apathy. *American Journal of Geriatric Psychiatry*, 22(2), 186-94. doi: 10.1016/j.jagp.2012.10.024.
- Hargrave, R., Geck, L. C., Reed, B., et al. (2000). Affective behavioural disturbances in Alzheimer's disease and ischaemic vascular disease. *Journal of Neurology, Neurosurgery, & Psychiatry*, 68, 41–46. doi:10.1136/jnnp.68.1.41.
- Johnson, N., Barion, A., Rademaker, A., Rehkemper, G., & Weintraub, S. (2004). The Activities of Daily Living Questionnaire: A validation study in patients with dementia. *Alzheimer's Disease & Associated Disorders*, 18, 223-230. PubMed PMID: 15592135.
- Kamat R., Brown, G., Bolden, K., Fennema-Notestein, C., Archibald, S., Marcotte, T.D., Letendrem S.L., Ellis, R., Woods, S.P., Grant, I., Heaton, R.K., & The TMARC Group. (2014). Apathy is associated with white matter abnormalities in anterior, medial brain

- regions in persons with HIV infection. *Journal of Clinical and Experimental Neuropsychology*, 36(8), 854-866.
- Kamat, R., Doyle, K. L., Iudicello, J. E., Morgan, E. E., Morris, S., Smith, D. M., ... the Translational Methamphetamine AIDS Research Center (TMARC) Group. (2016). Neurobehavioral Disturbances During Acute and Early HIV Infection. *Cognitive and Behavioral Neurology : Official Journal of the Society for Behavioral and Cognitive Neurology*, 29(1), 1–10. <http://doi.org/10.1097/WNN.0000000000000084>
- Kamat, R., Woods, S. P., Cameron, M. V., Iudicello, J. E., & The HIV Neurobehavioral Research Program (HNRP) Group. (2016). Apathy is associated with lower mental and physical quality of life in persons infected with HIV. *Psychology, Health & Medicine*, 21(7), 890–901. <http://doi.org/10.1080/13548506.2015.113199>.
- Kamat, R., Woods, S. P., Marcotte, T. D., Ellis, R. J., & and the HIV Neurobehavioral Research Program (HNRP) Group, I. (2012). Implications of Apathy for Everyday Functioning Outcomes in Persons Living with HIV Infection. *Archives of Clinical Neuropsychology*, 27(5), 520–531. <http://doi.org/10.1093/arclin/acs055>.
- Kant, R., Duffy, D., & Pivovarnik, A. (1998). Prevalence of apathy following head injury. *Brain Injury*, 12, 87–92. doi:10.1080/026990598122908.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a Brief Depression Severity Measure. *Journal of General Internal Medicine*, 16(9), 606–613. doi:10.1046/j.1525-1497.2001.016009606.
- Koyano, W., Shibata, H., Nakazato, K., Haga, H., Suyama, Y. (1993). Measurement of competence in the elderly living at home: Development of an index of competence (abstract in English). *Japanese Journal of Public Health*, 40, 85–94.

- Lancotot, K. L., et al. (2016). Apathy associated with neurocognitive disorders: recent progress and future directions. *Alzheimer's and Dementia*, 16, 30282-5. Review. doi: 10.1016/j.jalz.2016.05.008.
- Lane-Brown, A.T., Tate, R.L. (2009). Measuring apathy after traumatic brain injury: Psychometric properties of the Apathy Evaluation Scale and the Frontal Systems Behavior Scale. *Brain Injury*, 23(13-14), 999-1007. doi: 10.3109/02699050903379347.
- Lawton, M. P. (1975). The Philadelphia Geriatric Center Morale Scale: A revision. *Journal of Gerontology*, 30, 85–89. doi:10.1093/geronj/30.1.85.
- Marin, R. S., Biedrzycki, R. C., Firinciogullari, S. (1991). Reliability and validity of the Apathy Evaluation Scale. *Psychiatry Research*, 38, 143–162. doi:10.1016/0165-1781(91)90040-v.
- Marin, R. S. (1997). Apathy: Who cares? An introduction to apathy and related disorders of diminished motivation. *Psychiatric Annals*, 27, 18-23. doi:10.3928/0048-5713-19970101-06.
- Mehta, M., Whyte, E., Lenze, E., Hardy, S., Roumani, Y., Subashan, P., Huang, W., Studenski, S. (2008). Depressive symptoms in late life: associations with apathy, resilience and disability vary between young-old and old-old. *International Journal of Geriatric Psychiatry*, 23(3), 238-243.
- Miller, L. S., Brown, C. L., Mitchell, M. B., Williamson, G. M. (2013). Activities of daily living are associated with older adult cognitive status: caregiver versus self-reports. *Journal of Applied Gerontology*, 32(1):3-30. doi: 10.1177/0733464811405495.
- Norton, L.E., Malloy, P.F., Salloway, S. (2001). The impact of behavioral symptoms on activities of daily living in patients with dementia. *American Journal of Geriatric Psychiatry*, 9(1), 41-8. PubMed PMID: 11156751.

- Onyike, C. U., Sheppard, J. M., Tschanz, J. T., et al. (2007). Epidemiology of apathy in older adults: the Cache County Study. *American Journal of Geriatric Psychiatry*, 15, 365-375. doi:10.1097/01.jgp.0000235689.42910.0d.
- Pruchno, R. A, Wilson-Genderson, M., Cartwright, F. (2010). A two-factor model of successful aging. *Journals of Gerontology Series B Psychological Sciences and Social Sciences*, 65(6), 671-9. doi: 10.1093/geronb/gbq051.
- Randolph, C., Tierney, M. C., Mohr, E., & Chase, T. N. (June 1998). "The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): preliminary clinical validity". *Journal of Clinical Experimental Neuropsychology*, 20(3), 310–319. doi:10.1076/jcen.20.3.310.823.
- Robert, P. H., Berr, C., Volteau, M., Bertogliati, C., Benoit, M., Sarazin, M., Legrain, S., Dubois, B. (2006). Apathy in patients with mild cognitive impairment and the risk of developing dementia of Alzheimer’s disease: A one-year follow-up study. *Clinical Neurology and Neurosurgery*, 108,733–736.
- Robert, P. H., Clairet, S., Benoit, M., Koutaich, J., Bertogliati, C., Tible, O., Caci, H., Borg, M., Brocker, P., Bedoucha, P. (2002). The apathy inventory: assessment of apathy and awareness in Alzheimer's disease, Parkinson's disease and mild cognitive impairment. *International Journal of Geriatric Psychiatry*, 17(12):1099-105. PubMed PMID: 12461757.
- Schmidt, S., Muhlan, H., Power, M. (2006). The EUROHIS-QOL 8-item index: psychometric results of a cross-cultural field study. *European Journal of Public Health*, 16, 420 – 8. doi:10.1093/eurpub/cki155.

- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder. *Archives of International Medicine*, 166, 1092-1097. doi:10.1001/archinte.166.10.1092.
- Starkstein, S. E., Mayberg, H. S., Preziosi, T. J., et al. (1992). Reliability, validity, and clinical correlates of apathy in Parkinson's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 4, 134-139. doi:10.1176/jnp.4.2.134.
- Stuck, A. E., Walthert, J. M., Nikolaus, T., Büla, C. J., Hohmann, C., & Beck, J. C. (1999). Risk factors for functional status decline in community-living elderly people: a systematic literature review. *Social Science & Medicine*, 48(4), 445-469. doi:10.1016/s0277-9536(98)00370-0.
- The WHOQOL Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychological Medicine*, 28, 551– 8. doi:10.1017/s0033291798006667.
- Van der Mast, R. C., Vinkers, D. J., Stek, M. L., et al. (2008). Vascular disease and apathy in old age. The Leiden 85-Plus Study. *International Journal of Geriatric Psychiatry*, 23, 266-271. doi:10.1002/gps.1872.
- van Reekum, R., Stuss, D.T., Ostrander, L. (2005). Apathy: why care? *The Journal of Neuropsychiatry and Clinical Neurosciences*, 17(1), 7-19. Review. doi:10.1176/appi.neuropsych.17.1.7.
- Verkaik, R., van Weert, J. C., Francke, A. L. (2005). The effects of psychosocial methods on depressed, aggressive and apathetic behaviors of people with dementia: a systematic review. *International Journal of Geriatric Psychiatry*, 20(4):301-14. Review. PubMed PMID: 15799081.

Van Dalen, J.W., Van Wanrooij, L., Moll van Charante, E.P., Richard, E., & Van Gool, W.

(2018). Apathy is associated with incident dementia in community-dwelling older people.

Neurology, 90(1), 82-89.

Woods, S. P., Weinborn, M., Li, Y. R., Hodgson, E., Ng, A. R., Bucks, R. S. (2015). Does

prospective memory influence quality of life in community-dwelling older adults?

Neuropsychology, Development, and Cognition Section B. Aging Neuropsychology and

Cognition, 22(6), 679-92. doi:10.1080/13825585.2015.1027651.

Wrosch, C., Bauer, I., & Scheier, M. F. (2005). Regret and quality of life across the adult life

span: The influence of disengagement and available future goals. *Psychology and Aging*,

20, 657–670. doi:10.1037/0882-7974.20.4.657

Yamashita, K., Iijima, K., Kobayashi, S. (1999). Relationship among activities of daily living,

apathy, and subjective well-being in elderly people living alone in a rural town.

Gerontology, 45(5), 279-82. doi:10.1159/000022102

Table 1.

Descriptive Data for the Study Sample of Older Adults (N = 83).

Variable	Statistic
<i>Biopsychosocial Variables</i>	
Age (years)	69.7 (6.4)
Education (years)	14.3 (3.3)
Gender (% men)	44.6%
Chronic medical conditions (% present)	71.1%
Mean number of conditions (range)	1.9 (1-4)
Depression-Anxiety Composite	
PHQ-9 (of 27)	2.0 (2.9)
GAD-7 (of 21)	1.7 (3.0)
<i>Neurocognition</i>	
MMSE total score (of 30)	28.5 (1.4)
RBANS total score	104.1 (12.7)
<i>Informant Characteristics</i>	
Spouse (%)	82.1%
Hours/wk spent with participant	101.0 (54.2)
Years known participant	38.2 (17.0)
<i>ADLQ (of 140)</i>	
Total	2 (0-7)
Self-care	0 (0-0)
Household care	1 (0-3)
Employment and recreation	0 (0-1)
Shopping	0 (0-0)
Travel	0 (0-1)
Communication	0 (0-0)
<i>WHOQoL Total Score (of 40)</i>	34.7 (4.0)
<i>FrSBE Apathy</i>	
Self-rating Apathy (raw of 70)	27.2 (6.9)
Clinically elevated (% yes)	19.6%
Family-rating Apathy (raw of 70)	24.4 (7.6)
Clinically elevated (% yes)	21.6%

Note: Values are means (SD) except as noted. Mean number of conditions = among participants having at least 1 condition (n = 35); PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder Assessment-7; MMSE = Mini Mental State Examination; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status; ADLQ = Activities of Daily Life Questionnaire values are median (interquartile range; higher scores indicate greater dependence); WHOQoL = World Health Organization Quality of Life (higher scores indicate better QoL); FrSBE Apathy = Frontal Systems Behavior Scale (14 Apathy items; higher scores indicate greater apathy).

Figure 1. Bar graph depicting mean (SE) sample-based z-score composite of self- and family-report apathy ratings among older adults with (n=53) and without (n=30) mild problems endorsed by informants on the Activities of Daily Living Questionnaire (ADLQ).

Figure 2. Simple fit line of sample-based z-score composite of self- and family-report apathy ratings in relation to World Health Organization Quality of Life (WHOQoL) scale total scores in a sample of 83 community-dwelling older adults. Axes have been expanded.