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Association of the cumulative burden of late-life anxiety and depressive symptoms with functional impairment

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Abstract

Objectives: This study investigates the association of the cumulative burden of anxiety-only, depression-only, and comorbid anxiety and depression symptoms with: 1) incident self-care or household activities impairment among those with no baseline self-care or household activities impairment, respectively, or 2) change in status of self-care or household activities impairment among those with baseline impairment.

Methods: This study consists of participants (N=4,619) from the National Health and Aging Trends Study, a longitudinal study that examines a nationally representative sample of United States adults aged 65 years and older. Outcomes included incident or change in self-care or household activity impairment. Primary independent variables were yearly counts of screening positive for clinically significant symptoms for anxiety-only, depression-only, or co-occurring anxiety and depression. Multivariable logistic regression models examined incident impairment and change in impairment status.

Results: Yearly counts of anxiety-only symptoms were associated with incident impairment in self-care and household activities and less improvement in self-care functioning. Yearly counts of depression-only symptoms were associated with incident impairment in self-care and household activities. Yearly counts of co-occurring symptoms of anxiety and depression were associated with incident impairment in self-care and household activities, less improvement in self-care activities, and worsening impairment in household activities.

Conclusions: This study finds that the cumulative burden of co-occurring anxiety and depression symptoms is associated with incident impairment in functioning, persistent self-care impairment, and deterioration in household activity impairment. These findings emphasize the

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Dataset availability

We used data from the NHATS public use dataset (rounds 1–7), which is sponsored by the National Institute on Aging (grant number NIA U01AG032947) through a cooperative agreement with the Johns Hopkins Bloomberg School of Public Health and is available at www.nhats.org.

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importance of managing late-life anxiety and depressive symptoms, which are treatable, frequently co-occur, and contribute to disability.

Keywords

Epidemiology; aging in place; disability; self-care

INTRODUCTION

Many prospective epidemiological studies have examined the association between depression with functional impairment. Findings indicate that depression (i.e., depressive disorders and symptoms) place older adults at an increased risk for developing, having persistent, or having worsening functional impairment or disability.^{1–21} Evidence also suggests that functional impairment affects mental health, with disability increasing the risk for subsequent depression.^{22–25}

Few longitudinal studies have examined the association of anxiety with functional impairment.²⁶ Similar to depression, evidence suggests that anxiety (i.e., anxiety disorders and symptoms) are associated with an increased risk of developing or having worsening of functional impairment or disability.^{5,27–29} Anxiety and depression are frequently co-morbid in older adults, however.^{30,31} When they co-occur, anxiety and depression are associated with higher levels of functional impairment than when they occur separately.³² For example, a cross-sectional study of 374 adults living in California found that anxiety and depression were associated with disability when examined independently.³³ When analyses accounted for anxiety-only, depression-only, and co-morbid anxiety and depression, however, only comorbid anxiety and depression was associated with disability.³³ Thus, examining the association of either anxiety or depression (but not both) with disability provides an incomplete representation of the relationship between anxiety, depression, and disability. Many of the prior studies in this area are cross-sectional, and longitudinal studies examining concomitant anxiety and depression are needed.

Longitudinal examination of the association of comorbid anxiety and depression with functional impairment in a general older adult population rarely has occurred, however. Although a few longitudinal studies have examined anxiety and depression simultaneously, they either did not specifically examine comorbid anxiety and depression or considered anxiety and depression at baseline (rather than a cumulative exposure to anxiety and depression).^{27,29,34} For example, a two-year examination of 909 older adults living in South Korea, found that comorbid anxiety and depression at baseline was associated with worsening of disability scores.³⁴ This study had several limitations in that it only included older adults from two catchment areas in a single South Korean region, included only anxiety and depression that were assessed at baseline, and examined change in disability scores but did not examine newly incident functional impairment or separate self-care from household activity limitations.³⁴ Consequently, there are substantial gaps in our understanding of how the cumulative exposure to anxiety-only, depression only, and co-occurring anxiety and depression are associated with either the development or trajectory of functional limitations.

Our study aims to address these gaps by answering this research question: among a national sample of United States adults aged 65 years and older, how is the cumulative exposure to anxiety-only, depression-only, and comorbid anxiety and depression symptoms associated with either: 1) new onset limitations in self-care or household activities among those with no self-care or household activities limitations at baseline, respectively, or 2) the trajectory of self-care or household activities limitations among those with self-care or household activities limitations at baseline, respectively. In this study, the term cumulative refers to an increasing number of positive anxiety and/or depression symptom screenings that occurred during the follow-up period. We hypothesize that the cumulative exposure to anxiety-only, depression-only, and comorbid anxiety and depressive symptoms each is associated with new onset, persistent, and worsening of self-care or household activities limitations even after accounting for demographic, socioeconomic status, and health status measures. We examine anxiety-only, depression-only, and comorbid anxiety and depression symptoms concurrently in our analyses.

METHODS

Participants and study design

The National Health and Aging Trends Study (NHATS) is a longitudinal cohort study that commenced in 2011 and examines a nationally representative sample of United States Medicare beneficiaries aged 65 years and older with annual, in-person interviews.³⁵ Of note, Medicare is a federal program that provides health care coverage to adults aged 65 years and older. The National Institute on Aging has funded NHATS to provide a publicly available resource to facilitate the investigation of functioning in later life. A primary goal of NHATS is to foster research that will inform efforts to maximize health and functioning, reduce disability, and improve quality of life among older adults.³⁵ NHATS is administered in English and Spanish (many older adults of Hispanic ethnicity speak Spanish as their primary language), recruits disproportionately higher levels of Black older adults and older age groups, and is publicly available at www.nhats.org.³⁶ The 2011 interview had an unweighted response rate of 70.9%; subsequent NHATS response rates for the following six years ranged from 76.8% to 93.0%.³⁵ NHATS was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. We examined NHATS participants who participated in at least two interviews between 2011 and 2017, had information on self-care or household activities impairment, and did not die during the period of follow-up from 2011–2017. We excluded deceased older adults because mortality has been associated with anxiety,³⁷ depression,⁹ co-morbid anxiety and depression,³⁷ and functional impairment,^{38–40} and we were concerned that mortality status could affect the association of anxiety and depressive symptoms with functional impairment.

Outcomes

Study outcomes were based on self-care and household activities impairments. We determined impairments to be present for self-care activities if participants reported having any difficulty with performing in the past month the following activities: eating, bathing, toileting, and dressing.⁴¹ We determined impairments to be present for household activities if participants reported that, in the past month, they had any difficulty with performing or,

because of health or functioning, they either did not perform or did not perform by themselves the following activities: laundry, shopping, meal preparation, and banking.⁴¹ For older adults with no self-care or household activities impairments at the 2011 baseline interview, the outcomes were incident self-care or household activities impairment reflected in a binary indicator (impairment present or absent), which was determined by whether self-care or household activities impairments, respectively, were present in a participant's last available NHATS interview. For older adults with self-care or household activities impairments at the 2011 baseline interview, the outcome was change in self-care or household activities impairment status (categorical: better, same, worse), which was determined by subtracting the number of self-care or household activities impairments in a participant's last available NHATS interview year by the respective impairments in the baseline interview year.

Covariates

Study covariates include measures for mental health, demographic factors, socioeconomic status, and health status domains, which have been associated with functional impairment or disability.^{6,42} Our primary independent variables consist of the total number of years that older adults screened positive for the presence of clinically significant anxiety and/or depression symptoms, which were assessed annually at each follow-up interview. All other covariates were determined at the baseline 2011 interview. With the exception of number of medical conditions and our examination of anxiety and depressive symptoms, we treated all covariates as unordered dummy variables with a reference category.

Measures for our primary independent variables of interest included the Patient Health Questionnaire (PHQ-2) and the Generalized Anxiety Disorder (GAD-2) scale. The PHQ-2 is a validated two-item depression screening instrument,⁴³ assessing depression symptoms, and the Generalized Anxiety Disorder (GAD-2) scale is a validated two-item anxiety screening instrument,⁴⁴ assessing anxiety symptoms. NHATS modified the PHQ-2 and GAD-2 to assess the prior one month period (rather than a two week period) and scored both from 2 to 8,³⁵ with scores of 5 or higher indicating the presence of clinically significant depression or anxiety symptoms. For any given interview year, we created four exclusive groupings of anxiety and depression symptoms: 1) no anxiety or depression, 2) anxiety-only, 3) depression-only, and 4) co-occurring anxiety and depression symptoms. We subsequently added these categories together to create count variables: 1) total number of anxiety-only years, 2) total number of depression-only years, and 3) total number of co-occurring anxiety and depression years (totals range from 0 to 7).

We also included in our models measures for demographic factors, socioeconomic status, and health status. The demographic measures included age (65–74, 75–84, 85+ years old), sex (male or female), race and ethnicity (white non-Hispanic, black non-Hispanic, Hispanic or other), and marital status (married or living with a partner, separated or divorced, widowed or never married). In the NHATS database, there are five race and ethnicity groupings (non-Hispanic white, non-Hispanic black, Hispanic, other, more than one race and ethnicity, and missing).^{35,41} As NHATS consists of a nationally representative population of older adult United States Medicare beneficiaries, the weighted frequency of the racial and

ethnic composition of its cohort is similar to that of the United States older adult population with approximately 9 in 10 of being of non-Hispanic white or non-Hispanic black race and ethnicity. The socioeconomic status measures included education (high school or less, some college or vocational training, college degree) and Medicaid status (yes, no). Medicaid is a federal and state health care program in the United States that assists low-income families or individuals in paying for medical care. Health status variables included self-reported measures of physical and cognitive health and sensory impairment. Medical conditions were coded as being present if older adults reported that a doctor had ever told them they have one of the following conditions: heart attack, heart disease, high blood pressure, arthritis, osteoporosis, diabetes, lung disease, stroke, or cancer.⁴¹ Total possible number of medical conditions ranged from zero to nine. Dementia was examined separately and we relied upon NHATS coding for the determination of probable, possible, and no dementia.^{45,46} Auditory impairment (present, absent) was based on whether a participant (even if a hearing aid was used) was able to “hear well enough to carry on a conversation in a room with a radio or TV playing.” Vision impairment (present, absent) was based on whether a participant (even if glasses or contacts were used) was able to “see well enough to read newspaper print.”⁴¹

Statistical analyses

We used bivariate and multivariable analyses to characterize the associations of anxiety and/or depression symptoms either new onset self-care or household activities impairment in older adults with no self-care or household activities impairment at baseline, respectively, or with change in self-care or household activities impairment in those with self-care or household activities impairment at baseline, respectively. We utilized the Rao-Scott F adjusted chi-square statistic for categorical variables and F statistic for continuous variables⁴⁷ to examine differences in these variables across the two groups indicated by the presence or absence of baseline self-care or household activities impairment. We next conducted a series of binary and multinomial logistic regression analyses to test our hypotheses that anxiety and/or depression symptoms are associated with either new onset self-care or household activities impairment (binary logistic regression: yes, no) or change in self-care or household activities status (multinomial: better, same, worse) serving as our outcomes; a priori, we selected multinomial modeling instead of an ordinal logistic regression approach because we sought to examine factors associated with both improvement and deterioration in functioning separately. We initially conducted the regression modeling with just the primary independent variables of interest. For the fully adjusted models, we added the full set of demographic, socioeconomic status, and health status variables. For models estimated on the sample of adults who had impairment at baseline, and thus focus on examining change in self-care or household activities impairment status, the number of self-care or household activities impairments at baseline, respectively, were included in models for this group. We utilized SAS survey procedures (version 9.4, SAS Institute, Inc., Cary, NC) and applied the Round 1 analytic weights, the stratification and cluster variables to adjust for NHATS’ complex sampling design and nonresponse.³⁵ We used list-wise deletion to manage participants with missing covariate data in the multivariable analyses. To account for participants with missing data, we used the SAS “nomcar” option, which treats these participants as being “not missing completely at

random” and computes variance estimates by analyzing the non-missing values as a domain or subpopulation.

RESULTS

Functional impairment at baseline

Among our NHATS sample of United States Medicare beneficiaries, participants had a median of 6 years (mean of 4.6 years) of follow-up. Sample summary information and bivariate analysis results are given in Table 1. At the baseline interview, 15.3% (N=762) had self-care impairment and 23.0% (N=1276) had household activities impairment. Compared to older adults without self-care or household activities impairment at baseline, those with self-care or household activities impairment had more medical conditions at baseline and a higher cumulative dose of anxiety-only, depression-only, and co-occurring anxiety and depression symptoms during the follow-up period. Older adults with baseline self-care or household activities impairment were more likely to be older, have less formal education, have Medicaid, have cognitive impairment, and have sensory impairment, relative to older adults without impairment at baseline. Race and ethnicity status and sex also differed by baseline impairment status (higher proportion of non-Hispanic Black and Hispanic or other race and female sex in those with impairment).

Logistic regression analyses

Among older adults with either no self-care or household activities impairment at baseline, binary logistic regression models for new onset self-care or household activities impairment including anxiety-only, depression-only, and co-occurring anxiety and depression symptoms demonstrated that all mental health symptoms indicators were associated with incident self-care or household activities impairment. In similar logistic regression analyses that added controls for demographic factors, socioeconomic status, and health status factors, the association of the cumulative burden of anxiety-only, depression-only, and co-occurring anxiety and depression symptoms with incident self-care or household activities impairment persisted (Table 2).

Among older adults with either self-care or household activities impairment present at baseline, multinomial logistic regression for changes in self-care or household activities impairment status (e.g., improve, same, worsen) including anxiety-only, depression-only, depression, and co-occurring anxiety and depression symptoms demonstrated that anxiety-only and co-occurring anxiety and depression symptoms were associated with less improvement in self-care functioning. In multinomial logistic regression analyses that added controls for demographics, socioeconomic status, and health status factors, anxiety-only and co-occurring anxiety and depression symptoms were associated with lower odds of improvement in self-care activities functioning. Co-occurring anxiety and depression symptoms also were associated with greater odds of worsening household activities function (Table 3).

In sensitivity analyses that included participants who died during follow-up, anxiety-only, depression-only, and co-occurring anxiety and depression were associated with incident self-

care or household activities impairment (Supplemental Table 1). Anxiety-only and co-occurring anxiety and depression symptoms were associated with lower odds of improvement in self-care activities functioning, and co-occurring anxiety and depression symptoms were associated with greater odds of worsening household activities function (Supplemental Table 2).

DISCUSSION

To our knowledge, this is the first study to examine the association of the cumulative exposure to co-occurring anxiety and depressive symptoms with impairment in self-care and household activities in a national sample of older adults. Examining co-occurring late-life anxiety and depression is clinically pertinent because they are frequently co-morbid,^{30,31} and are associated with higher levels of functional impairment than when they occur separately.³² We find that, among older adult United States Medicare beneficiaries without self-care impairment at baseline, screening positive for anxiety-only, depression-only, and comorbid anxiety and depressive symptoms was associated with 30 to 49% greater odds for developing incident impairment in self-care activities over a maximum of six years of observation. Similarly, among older adults without household activities impairment at baseline, screening positive for anxiety-only, depression-only, and co-occurring anxiety and depressive symptoms was associated with 29 to 60% greater odds of incident household activities impairment. These associations remained after accounting for demographic characteristics, socioeconomic status, and health status variables, which suggest that the cumulative exposure to anxiety-only, depression-only, and co-occurring anxiety and depressive symptoms meaningfully contributes to the development of late-life impairment in both self-care and household activities.

Among older adult Medicare beneficiaries with impairments in self-care at baseline, multinomial logistic modeling (with no change in functioning serving as the reference group) showed that exposure to anxiety-only and co-occurring anxiety and depressive symptoms was associated with 27 to 29% lower odds of improvement in self-care activities. In those with impairments in household activities at baseline, multinomial logistic modeling showed that co-occurring anxiety and depressive symptoms were associated with a 13% greater odds of having worsening household activities impairment. These findings suggest that the cumulative exposure to co-occurring anxiety and depressive symptoms modestly contributes both to the chronicity of self-care activities impairment and to the worsening of household activities impairment.

While the literature examining the association of depression with disability and functional impairment is well developed,^{1–21} our study expands upon prior work examining anxiety^{5,27–29} and co-occurring anxiety and depression. A prior study found that baseline comorbid anxiety and depression had a statistically significant, though clinically modest 2% greater odds of a worsening disability score after 2 years.³⁴ In contrast, our study's findings on the cumulative burden of co-occurring anxiety and depressive symptoms generally showed a stronger association with functional impairment. This link between the dose of anxiety and depression symptoms and impairment in self-care and household activities is congruent with findings that the persistence of depression may increase the risk of having

new onset or worsening disability.^{14,20} The connection between anxiety and functioning is not entirely clear, but the somatic symptoms of anxiety (e.g., shortness of breath) may impact functioning, anxiety may decrease physical activity due to perception of risk, and anxiety is a risk factor for some diseases (e.g., hypertension, heart disease), which can affect disability.²⁷ Additionally, concomitant anxiety and depression are typically more severe and persistent than when they occur independently of each other.³¹ Depression severity has been associated with the severity of disability,² and it is possible that older adults with co-occurring anxiety and depressive symptoms may have more severe psychopathology than those experiencing only anxiety or depression. Future work examining comorbid anxiety and depression thereby should examine symptomatology severity to help clarify the possible role of symptom severity and/or the combined anxious-depression state in the observed association with functional impairment.

Intriguingly, prior work targeting mental illness as a means to reduce functional impairment in older adults has shown some promise. A short-term in-home social worker support program intervention reduced functional disability, and much of this disability reduction was mediated by reduced depressive symptoms.⁴⁸ Other promising efforts to reduce disability also have targeted depressive symptoms.⁴⁹ Our study's findings, however, suggest that consideration of co-occurring anxiety and depression may assist in the development of interventions to reduce functional impairment.

Study strengths and limitations

This study has several strengths. First, this study examines anxiety and depression symptoms concurrently. Second, the analyses are based on a national sample of older adult United States Medicare beneficiaries, which increases its generalizability. Third, the study sample had an average of 4.6 years of follow-up, which facilitated our examination of the association of the cumulative exposure to anxiety and depression symptoms with functional impairment. Lastly, we examined both newly incident impairment in self-care and household activities as well as the trajectories of impairment in those with impairment at baseline.

The study has several limitations as well. Anxiety and depression were not assessed with a diagnostic psychiatric interview. The PHQ-2 and GAD-2, however, performed well when validated against a structured mental health professional interview.^{43,44} Although the PHQ-2 and GAD-2 were initially validated to examine a two-week timeframe, they were modified in NHATS to examine a one-month period. We are unaware of any studies that have examined the effect of this modification on the psychometric properties of the PHQ-2 and GAD-2. As the one-month timeframe is a more rigorous standard, it is possible that this modification may be associated with a decreased sensitivity and increased specificity compared to the two-week timeframe. This study also was not designed to examine the severity of anxiety and depressive symptoms as it relied upon two item screeners. Lastly, we did not conduct power analyses prior to performing this study, and our sample size may be too small to detect a clinically meaningful association between anxiety and/or depressive symptoms and our outcomes of interest.

Conclusion

Self-care and household activities impairment is a major public health concern. Impairment in these activities threatens the ability of older adults to live independently in the community and increases the risk of death and institutionalization. That co-occurring anxiety and depression is associated with incident impairment in functioning, persistent self-care impairment, and deterioration in household activity impairment suggests the importance of identifying, treating, and monitoring late-life anxiety and depressive symptoms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Key Points:

- To our knowledge, this is the first study to examine the association of the cumulative exposure to co-occurring anxiety and depressive symptoms with impairment in self-care and household activities in a national sample of older adults.
- Among older adults without functional impairment at baseline, our findings suggest that the cumulative burden of anxiety-only, depression-only, and co-occurring anxiety and depression symptoms are associated with new onset impairment in functioning over maximum of six years of follow-up.
- Among older adults with functional impairment at baseline, our findings suggest complex associations between the cumulative burden of anxiety-only, depression-only, and co-occurring anxiety and depressive symptoms with changes in impairments in self-care and household activities.

Table 1.

Anxiety and Depression Symptoms, Demographics, Socioeconomic Status, and Health Status among Community-Dwelling Medicare Beneficiaries Aged 65 Years and Older Stratified by Presence of Self-Care or Household Activities Impairment at Baseline

	Self-Care Impairment at Baseline					Household Activities Impairment at Baseline					<i>P value</i> [†]			
	Absent N = 3675	Present N = 762	SE	N	% or mean	Absent N = 3343	Present N = 1276	SE	N	% or mean				
Anxiety and Depression Symptoms														
Number of years anxiety only symptoms present	3675	0.24	0.01	762	0.40	0.03	<0.001	3343	0.22	0.01	1276	0.43	0.03	<0.001
Number of years depression only symptoms present	3675	0.28	0.01	762	0.64	0.04	<0.001	3343	0.27	0.01	1276	0.61	0.03	<0.001
Number of years with comorbid anxiety and depression symptoms present	3675	0.17	0.01	762	0.64	0.05	<0.001	3343	0.15	0.01	1276	0.60	0.04	<0.001
Demographics														
Age in years							<0.001							<0.001
65–74	1822	62.2	0.8	317	53.1	2.1		1734	64.3	0.7	444	45.3	1.7	
75–84	1459	31.5	0.8	329	36.5	1.9		1302	30.4	0.7	551	38.6	1.3	
85+	394	6.3	0.3	116	10.4	1.3		307	5.3	0.3	281	16.1	1.2	
Sex							0.044							<0.001
Male	1581	44.8	1.0	283	39.8	2.3		1568	48.1	1.0	341	28.0	1.3	
Female	2094	55.2	1.0	479	60.2	2.3		1775	51.9	1.0	935	72.0	1.3	
Race and ethnicity							<0.001							<0.001
White, non-Hispanic	2612	83.1	0.9	459	75.9	1.9		2418	83.8	0.9	741	74.4	1.8	
Black, non-Hispanic	732	7.3	0.5	209	11.1	1.0		632	6.8	0.5	370	12.2	1.0	
Hispanic or other	302	9.6	0.7	87	13.0	1.7		268	9.4	0.8	151	13.5	1.6	
Marital Status							<0.001							<0.001
Married or living with a partner	2052	62.1	0.9	361	53.6	2.0		1993	64.9	1.0	476	43.7	1.5	
Separated or divorced	462	12.4	0.6	100	13.4	1.3		408	12.0	0.6	175	14.4	1.0	
Widowed or never married	1157	25.5	0.8	299	33.0	2.0		940	23.1	0.8	623	41.8	1.6	
Socioeconomic status														
Education							0.007							<0.001
High school degree or equivalent or less	1781	43.6	1.3	410	49.5	2.3		1536	41.5	1.3	782	57.9	2.0	
Some college or vocational training	747	21.5	0.9	151	22.4	2.0		694	21.9	0.9	228	19.6	1.2	

	Self-Care Impairment at Baseline					Household Activities Impairment at Baseline					<i>P</i> value [‡]
	N	% or mean	SE	N	% or mean	SE	N	% or mean	SE	N	
College degree	1119	34.9	1.4	194	28.1	1.9	1087	36.6	1.6	251	1.6
Medicaid											<0.001
Yes	394	8.3	0.6	171	19.3	1.6	328	8.0	0.7	311	1.7
No	3222	91.7	0.6	573	80.7	1.6	2964	92.0	0.7	929	1.7
Health status											
Total number of self-reported conditions	3654	2.15	0.02	752	3.02	0.06	3323	2.09	0.03	1263	0.05
Dementia or Alzheimer's											<0.001
Probable	168	3.7	0.3	80	9.3	1.2	106	2.7	0.4	218	1.1
Possible	352	7.6	0.6	132	14.4	1.2	298	7.3	0.7	210	1.0
No dementia	3155	88.7	0.8	550	76.3	1.6	2939	90.0	0.9	848	1.6
Hearing impairment											<0.001
Yes	356	9.0	0.7	136	17.4	1.6	310	8.8	0.6	218	1.3
No	3306	91.0	0.7	623	82.6	1.6	3029	91.2	0.6	1045	1.3
Vision impairment											<0.001
Yes	97	2.1	0.3	61	7.1	1.1	78	1.9	0.3	108	0.8
No	3572	97.9	0.3	696	92.9	1.1	3263	98.1	0.3	1156	0.8

SE, standard error

[‡] *P* values determined by Rao-Scott *F* adjusted chi-square statistic for categorical variables or *F*-test statistic for continuous variables.

Logistic Regression Analyses of Anxiety and Depressive Symptoms, Demographics, Socioeconomic Status, and Health Status of Community-Dwelling Medicare Beneficiaries Aged 65 Years and Older with Incident Self-Care or Household Activities Impairment Serving as the Outcome

Self-Care Impairment (1 = Incident Impairment, 0 = No Incident Impairment)						
Model 1, N = 3675			Model 2, N = 3565		Household Activities Impairment (1 = Incident Impairment, 0 = No Incident Impairment)	
OR	95% CI [†]	OR	95% CI [†]	OR	95% CI [†]	OR
Anxiety and depression symptoms						
Number of years with anxiety only symptoms	1.34	1.17–1.54	1.30	1.14–1.50	1.33	1.16–1.52
Number of years with depression only symptoms	1.56	1.35–1.79	1.49	1.29–1.72	1.53	1.31–1.80
Number of years with comorbid anxiety and depression symptoms	1.50	1.30–1.74	1.45	1.24–1.71	1.78	1.37–2.30
Demographics						
Age in years (ref = 65–74)						
75–84			1.91	1.49–2.45		1.80
85+			3.80	2.84–5.09		4.26
Sex, male			1.08	0.88–1.31		0.79
Race and ethnicity (ref = white, non-Hispanic)						
Black, non-Hispanic			0.98	0.76–1.28		0.99
Hispanic or other			0.68	0.41–1.12		0.96
Marital Status (ref = married or living with a partner)						
Separated or divorced			0.84	0.57–1.22		1.49
Widowed or never married			0.92	0.70–1.21		1.28
Socioeconomic status						
Education (ref = college degree)						
High school degree or equivalent			0.88	0.69–1.13		0.91
Some college or vocational training			0.78	0.59–1.03		0.99
Medicaid, yes			1.33	0.93–1.90		1.52
Health status						
Number of self-reported conditions			1.24	1.16–1.31		1.17
Dementia (ref = no dementia)						
Probable dementia			1.39	0.81–2.39		2.85

	Self-Care Impairment (1 = Incident Impairment, 0 = No Impairment)			Household Activities Impairment (1 = Incident Impairment, 0 = No Incident Impairment)		
	Model 1, N = 3675	Model 2, N = 3565	Model 1, N = 3343	Model 2, N = 3261		
	OR	OR	OR	OR	95% CI [†]	95% CI [†]
Possible dementia		1.02		1.53		1.16–2.02
Hearing impairment, yes		1.37		1.44		1.05–1.98
Vision impairment, yes		0.93		2.32		1.36–3.95

Multivariable logistic regression models included: Model 1: All of the anxiety and depressive symptoms variables; Model 2: Model 1 + all of the demographic, socioeconomic status, and health status variables.

[†]Intervals based on 95% Wald confidence limits.

Table 3.

Multinomial Logistic Regression Analyses of Anxiety and Depressive Symptoms, Demographics, Socioeconomic Status, and Health Status of Community-Dwelling Medicare Beneficiaries Aged 65 Years and Older with Self-Care or Household Activities Impairments at Baseline with Change in Self-Care or Household Activities Impairment Status Serving as the Outcome

	Self-Care Impairment (ref = same)			Household Activities Impairment (ref = same)		
	Model 1, N = 762	OR	95% CI [†]	Model 2, N = 728	OR	95% CI [†]
Disability Improving						
Anxiety and depression symptoms						
Number of years with anxiety only symptoms	0.74	0.57–0.96	0.73	0.56–0.94	0.96	0.78–1.19
Number of years with depression only symptoms	0.96	0.78–1.18	0.91	0.73–1.12	1.01	0.82–1.24
Number of years with comorbid anxiety and depression symptoms	0.75	0.63–0.89	0.71	0.59–0.86	0.89	0.78–1.01
Demographics						
Age in years (ref = 65–74)						
75–84		0.86	0.48–1.54		0.74	0.50–1.11
85+		0.77	0.38–1.57		0.77	0.47–1.26
Sex, male		0.84	0.51–1.38		1.49	1.02–2.17
Race and ethnicity (ref = white, non-Hispanic)						
Black, non-Hispanic		1.37	0.83–2.26		1.16	0.79–1.69
Hispanic or other		1.81	0.94–3.49		1.05	0.65–1.68
Marital Status (ref = married or living with a partner)						
Separated or divorced		1.43	0.68–3.01		0.96	0.55–1.68
Widowed or never married		0.76	0.46–1.24		0.90	0.58–1.40
Socioeconomic status						
Education (ref = college degree)						
High school degree or equivalent		1.49	0.89–2.49		0.80	0.52–1.23
Some college or vocational training		1.29	0.77–2.17		0.97	0.52–1.81
Medicaid, yes		0.94	0.51–1.74		0.61	0.43–0.86
Health status						
Number of self-reported conditions		0.83	0.72–0.95		1.00	0.90–1.11
Dementia (ref = no dementia)						

	Self-Care Impairment (ref = same)			Household Activities Impairment (ref = same)		
	Model 1, N = 762	OR	95% CI [†]	Model 2, N = 728	OR	95% CI [†]
Probable dementia		0.42	0.21–0.88		0.61	0.40–0.92
Possible dementia		1.20	0.65–2.21		0.92	0.61–1.40
Hearing impairment, yes		0.90	0.51–1.58		0.98	0.60–1.59
Vision impairment, yes		0.92	0.41–2.04		0.89	0.51–1.54
Number of self-care impairments at baseline		1.79	1.35–2.38			
Number of household activities impairments at baseline					0.95	0.82–1.11
Disability Worsening						
Anxiety and depression symptoms						
Number of years with anxiety only symptoms	1.14	0.86–1.51	1.08	0.80–1.46	1.16	0.92–1.46
Number of years with depression only symptoms	0.87	0.71–1.06	0.85	0.68–1.06	1.01	0.81–1.27
Number of years with comorbid anxiety and depression symptoms	1.11	0.91–1.35	1.10	0.90–1.34	0.99	0.86–1.13
Demographics						
Age in years (ref = 65–74)						
75–84		1.54	0.88–2.70		1.50	0.92–2.47
85+		1.33	0.65–2.74		2.42	1.39–4.21
Sex, male		0.91	0.56–1.49		0.97	0.65–1.44
Race and ethnicity (ref = white, non-Hispanic)						
Black, non-Hispanic		1.36	0.79–2.34		1.50	0.99–2.27
Hispanic or other		1.55	0.64–3.75		1.35	0.74–2.46
Marital Status (ref = married or living with a partner)						
Separated or divorced		0.58	0.27–1.23		0.84	0.44–1.62
Widowed or never married		0.87	0.49–1.52		1.12	0.68–1.83
Socioeconomic status						
Education (ref = college degree)						
High school degree or equivalent		1.23	0.66–2.28		0.70	0.37–1.30
Some college or vocational training		1.07	0.77–2.17		0.72	0.36–1.46
Medicaid, yes		1.67	0.94–3.00		0.82	0.53–1.28
Health status						
Number of self-reported conditions		0.88	0.76–1.02		1.11	0.99–1.25

	Self-Care Impairment (ref = same)			Household Activities Impairment (ref = same)		
	Model 1, N = 762	OR	95% CI [†]	Model 2, N = 728	OR	95% CI [†]
Dementia (ref = no dementia)						
Probable dementia		0.78	0.34–1.77		0.88	0.57–1.36
Possible dementia		1.39	0.70–2.75		1.23	0.75–2.00
Hearing impairment, yes		1.08	0.57–2.06		0.85	0.45–1.61
Vision impairment, yes		0.62	0.24–1.59		0.81	0.47–1.41
Number of self-care impairments at baseline		0.95	0.66–1.37			
Number of household activities impairments at baseline					0.40	0.33–0.48

Multinomial logistic regression models included: Model 1: All of the anxiety and depressive symptoms variables; Model 2: Model 1 + all of the demographic, socioeconomic status, and health status variables including baseline self-care or household activities impairment. Outcome reference group is no change in self-care or household activities.

[†]Intervals based on 95% Wald confidence limits.