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Mood Disorders in Middle-Aged and Older Veterans With Multimorbidity

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Abstract

Objective—This study identified the prevalence of and relationship between mood disorders and multimorbidity in middle-aged and older veterans.

Method—Cross-sectional data were obtained from veterans who received primary care services at VA Pittsburgh Healthcare System from January 2007 to December 2011 ($n = 34,786$).

Results—Most veterans had three or more organ systems with chronic disease (95.3%), of which 4.1% had a depressive disorder, 2.5% had an anxiety disorder, and 0.7% had co-occurring depression and anxiety. The odds of having a mood disorder increased with each additional organ system with chronic disease, with odds being the greatest in those with 10 to 13 organ systems with chronic disease. Younger age, female gender, non-married marital status, and having a service connected disability were also significant predictors of having a mood disorder.

Discussion—These findings suggest a need to integrate mental health assessment and treatment in chronic health care management for veterans.

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Authors' Note

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Keywords

multimorbidity; veterans; mental health; aged; chronic health conditions

An estimated 9.9 million older veterans (U.S. Department of Veterans Affairs, Office of Policy and Planning, 2014) are at increased risk for having mental and physical health conditions (Chatterjee, Spiro, King, & Davison, 2009). For instance, veterans are more likely than nonveterans to report fair or poor health and experience multiple chronic health conditions (i.e., multimorbidity; Kramarow & Pastor, 2012). A recent study also found that veterans are 5 times more likely to have major depression compared with civilians, with many struggling with depression prior to military service (Kessler et al., 2014). Unfortunately, chronic health conditions rarely occur in isolation but rather in combination with mental health conditions, such as mood disorders (Katon, 2011; Meghani et al., 2013). In the general population, irrespective of age, gender, or specific disease, the risk of depression and/or anxiety increases with each chronic health condition acquired (Gunn et al., 2012; Stanners, Barton, Shakib, & Winefield, 2014). Similarly, primary care patients with depression compared with those without depression are more likely to have multimorbidity (2.65 greater odds of having five or more physical health conditions; Smith et al., 2014). The co-occurrence of multimorbidity and mood disorders (Evans et al., 2005) is associated with increased symptom burden, additive functional impairment, greater medical utilization costs, worse quality of life, poor adherence to health self-management regimens, and negative impact on the course of medical illnesses including morbidity and mortality (Katon, 2011).

Despite the clinical and public health relevance of depression and/or anxiety in chronic health conditions (Findley, Shen, & Sambamoorthi, 2011), there is sparse research reporting on the prevalence of having these mental health disorders in a sample of middle-aged and older veterans, particularly among those with multimorbidity. The high prevalence of chronic diseases in veterans (Steinman et al., 2012) makes this an ideal population in which to fill that gap in the literature as well as to determine risk factors for having a mood disorder. The primary hypothesis for this study was that the odds of having a depressive and/or anxiety disorder in middle-aged and older veterans would increase with each additional organ system with chronic disease (i.e., at least one chronic health condition within an organ system). An understanding of the relationship between multimorbidity and mood disorders in veterans will assist with future efforts to (a) improve co-management of mental and physical health conditions through collaborative care models, (b) increase provider awareness of the complicated burden of living with co-occurring mental and physical health conditions, and (c) help inform policymakers and health care systems to provide more balanced and cost-effective care for this complex population.

Method

Cross-sectional data from veterans aged 50 and older ($n = 34,786$) were selected from a larger archival cohort ($N = 38,879$; 4,093 veterans were excluded because they were younger than 50 years of age). All veterans in the original cohort received primary care services at

VA Pittsburgh Healthcare System (VAPHS) during 2007 (January 1, 2007–December 31, 2007). Mental and physical health data were tracked prospectively from 2007 through the end of 2011 (December 31, 2011) and retrospectively from 2007 back to the first records for each veteran in the VAPHS electronic medical records. This study was approved by the institutional review board at VAPHS.

Patient Population

Independent variables—Measures of sociodemographic characteristics including age (50–64, 65–79, 80+ years), gender, race (White, non-White), marital status (married, non-married), and service connection (none, 1%–49%, 50%+) were extracted from medical records at entry into the dataset (January 1, 2007–December 31, 2007). Percentage of service connection (0%–100%) is based on disability due to illness or injury sustained during or aggravated by military service. The degree of service reflects the degree of disability veterans are determined to be suffering as a result of the chronic health condition and determines the amount of monetary compensation they receive. Veterans with less than 10% service connection do not receive money. Veteran's service connected status and the degree of service connection were abstracted from the VAPHS database. For both chronic health conditions and mood disorders, medical records had to contain at least two diagnoses in the veterans' record to be coded as present (Holowka et al., 2014). The Chronic Condition Indicator (CCI), which was developed as part of the Healthcare Cost and Utilization Project (HCUP), for Outpatient International Classification of Diseases (ICD-9) codes was used to calculate the total number of organ systems with chronic disease (excluding psychiatric illnesses) affected for each veteran. At least one chronic health condition within an organ system was required for it to be considered an impacted organ system with chronic disease (e.g., at least two medical encounters for chronic obstructive pulmonary disorder would be considered as a impacted chronic respiratory system). Therefore, organ system with chronic disease count (e.g., endocrine, digestive, circulatory, respiratory, etc.) was calculated with scores ranging from 0 to 17, with higher scores indicating greater multimorbidity.

Dependent variable—Diagnoses of a depressive (293.83, 296.20–296.26, 296.30–296.36, 296.90, and 300.04) and/or anxiety (293.89, 300.00–300.02, 300.21–300.23, 300.29, 300.3, and 308.3) disorder were identified using the ICD-9 codes. We examined the presence of any depressive or anxiety disorder.

Statistical Analyses

Differences among demographic and health variables across specific mood disorders (i.e., depression-only, anxiety-only, depression + anxiety, and no mood disorder) were examined using chi-square analysis. Binary logistic regression analysis was used to examine which factors were associated with the odds of having a depressive and/or anxiety disorder. Presence of a mood disorder (0 = does not have a diagnosis of a depressive and/or anxiety disorder, 1 = has a diagnosis of a depressive and/or anxiety disorder) was the dependent variable, and age, organ system with chronic disease count, gender, marital status, race, and service connection were entered as independent variables. All independent variables were simultaneously entered into the model. In this analysis, the timing of onsets of the diagnoses of the mood disorders or the organ systems with chronic disease were not considered. Odds

ratios (OR) and 95% confidence intervals (CI) were estimated, along with Wald chi-square tests. *P* values of $<.05$ were considered significant. All analyses were conducted using SPSS version 23.0 for Windows (IBM, Armonk, NY).

Results

Table 1 presents the demographic and health characteristics of our sample. This sample of middle-aged and older veterans (age: $M = 69.86 \pm 10.42$) was predominantly male (98.2%), White (86.7%), married (58.8%), and in relatively poor health (organ system with chronic disease count: $M = 6.67 \pm 2.55$). The majority of the sample were non-service connected (74.2%), which means they were not receiving monetary compensation for any disabilities due to illness or injury sustained during or aggravated by military service. A large proportion of the sample had three or more organ systems with chronic disease (95.3%), of which 4.1% had a depressive disorder, 2.5% had an anxiety disorder, and 0.7% had co-occurring depression and anxiety. Significant differences ($p < .001$) were observed in the prevalence of mood disorders (i.e., depression-only, anxiety-only, co-occurring depression and anxiety, and no mood disorder) by age, organ system with chronic disease count, marital status, race, service connection, and sex.

Table 2 presents the results of the binary logistic regression analysis. Age, sex, marital status, service connection, and organ system with chronic disease count were all significant predictors of having a mood disorder. Compared with middle-aged veterans (50–64 years of age), veteran's aged 65 to 79 (OR = 0.30, 95% CI = [0.27, 0.33], $p < .001$) and 80+ (OR = 0.22, 95% CI = [0.19, 0.26], $p < .001$) had decreased risk of having a mood disorder. Female as compared with male (OR = 2.12, 95% CI = [1.68, 2.64], $p < .001$) veterans and non-married as compared with married (OR = 1.49, 95% CI = [1.36, 1.63], $p < .001$) veterans had an increased odds of having a depressive and/or anxiety disorder. Compared with non-service connected veterans, those with 1% to 49% service connection (OR = 1.23, 95% CI = [1.08, 1.39], $p = .001$) and 50%+ service connection (OR = 1.53, 95% CI = [1.38, 1.71], $p < .001$) also had an increased odds of having a depressive and/or anxiety disorder. Therefore, veterans with greater monetary compensation for disabilities or illnesses sustained or aggravated by military service were at increased risk of having a mood disorder. In addition, the odds of having a depressive and/or anxiety disorder increased with each additional organ system with chronic disease, with odds being the greatest in those with 10 to 13 organ systems with chronic disease involved (compared with 0 to 2 organ systems with chronic disease: OR = 6.62, 95% CI = [4.73, 9.25], $p < .001$).

Discussion

The vast majority of middle-aged and older veterans in this sample had three or more organ systems with chronic disease with a small proportion having a co-occurring mood disorder. Consistent with our hypothesis, and previous research (Gunn et al., 2012), a dose–response relationship exists between the number of organ systems with chronic disease and likelihood of a mood disorder. Compared with veterans that had none to minimal chronic health complications (i.e., 0–2 organ systems with chronic disease), those that had six or more organ systems with chronic disease were at an increased risk of having a mood disorder. Our

study not only confirms the findings of prior studies, but also focuses on a particularly vulnerable sample for having co-occurring physical and mental health conditions, older veterans in the United States receiving VA primary care services.

Given that the number of organ systems with chronic disease were a strong predictor of mood disorders, the finding of decreased odds of having a mood disorder with increased age seems counter-intuitive. One explanation may be that older adults may develop adaptive coping strategies, such as positive self-appraisals, in the presence of physical health declines. For instance, increased resilience and decreased depression have been found to be significantly associated with self-rated successful aging, even in older adults with physical disabilities (Jeste et al., 2013). As suggested by Byers, Yaffe, Covinsky, Friedman, and Bruce (2011), other potential explanations for a decreased risk of having a mood disorder with age include (a) cohort effects (i.e., as middle-aged veterans age, they may maintain higher rates of mood disorders), (b) healthy survivor bias (i.e., the most chronically ill veterans were not sampled), and (c) diagnostic issues of assessing mood disorders in older adults with multimorbidity (i.e., somatic symptoms thought to be related to chronic health conditions instead of mood disorders). For instance, compared with younger or middle-aged adults, older adults tend to present concerns about physical health, social relationships, or economic burden to physicians, which may not typically signal a diagnosis of late-life depression (Hegeman, Kok, Van der Mast, & Giltay, 2012).

Other predictors of the presence of a mood disorder in middle-aged and older veterans included being female, non-married, and having a service connected disability. Compared with male veterans, female veterans have been found to be more likely to have depression and anxiety, as well as co-occurring mental and physical health problems (Curry et al., 2014). Previous research has found marital status as a predictor of mood symptoms, and this relationship was mediated by family support (Zhang & Li, 2011). Specifically, higher levels of depressive symptoms in non-married older adults were found to be partially caused by insufficient family support. Finally, middle-aged and older veterans with greater service connection have more medical and mental health care benefits and, in turn, greater access to such services, than non-service connected veterans.

Clinical Implications

To translate these results to numbers that can help with clinic scheduling and/ or assessing the number of trained behavioral health specialists needed, the number of veterans with diagnosed anxiety or depressive disorders was estimated based on our results. In a women's clinic which sees 20 female veterans per day, 2.3 (95% CI = [2, 3]) patients with a diagnosed anxiety or depressive disorder could be expected. In a VA primary care clinic which sees 20 male veterans per day, less than 1 patient (95% CI = [0.8, 0.9]) with a diagnosed anxiety or depressive disorder could be expected. If the number of veterans seen increases to 50, these numbers jump to 5.8 (95% CI = [4.5, 7.7]) females and 2.1 (95% CI = [2, 2.2]) males with a diagnosed mood disorder. If 2% of patients are female and 98% are male, a clinic serving 20 veterans a day will see on average 0.9 (95% CI = [0.8, 0.9]) patients per day with a mood disorder, and a clinic serving 50 veterans per day will see on average 2.2 (95% CI = [2.1,

2.2]) patients per day with a mood disorder. Because late-life anxiety and depression often goes unrecognized, these rates are likely an underestimate of the true prevalence.

Not only does this research identify specific veteran sub-populations (e.g., chronically ill middle-aged veterans; chronically ill female veterans) at-risk for having mood disorders, but findings also indicate a need for integrating mental health treatment into chronic health care management. The bidirectional relationship between multimorbidity and mood disorders (Evans et al., 2005) suggests the need to simultaneously address both mental and physical health conditions to prevent or delay the development of a mood disorder and/or multimorbidity. Previously studies have found that depression care management integrated into primary care settings can mitigate detrimental effects, such as decreased risk for mortality (Gallo et al., 2013).

An expansion of integrated medical and psychiatric self-management interventions is recommended to address mood disorders and various medical disease states. Self-management interventions teach individuals how to self-monitor medical and psychiatric symptoms, recognize early signs of relapse, and self-administer care prescribed by providers. Fortunately, there are effective interventions that address co-occurring mental and physical health conditions for veterans. A series of studies have tested an integrated medical and psychiatric self-management intervention, Life Goals Collaborative Care (LGCC), with veterans with serious mental illness (i.e., bipolar spectrum disorder) and have resulted in improvements in health-related quality of life (Kilbourne, Post, Nossek, Drill, et al., 2008; Kilbourne, Post, Nossek, Sonel, et al., 2008), decreased impaired functioning, reduction in depressive symptoms (Kilbourne et al., 2012), and a reduction in blood pressure (Goodrich et al., 2012; Kilbourne et al., 2013). As LGCC is expanding to include individuals with major depressive disorder (Kilbourne et al., 2014), we recommend building on this clinically effective intervention and examining the effectiveness of this intervention with middle-aged and older veterans who present with less severe mood disorders and multimorbidity.

Limitations

Several considerations and limitations should be noted. Cross-sectional data do not allow for causal inferences about the relationship between multimorbidity and mood disorders. For instance, timing was not a factor in the regression analysis so presence of a mood disorder could have occurred prior, concurrently, or following identification of an organ system with chronic disease. Therefore, multimorbidity may increase the odds of a mood disorder while a mood disorder may increase the odds of multimorbidity. Another limitation is the data are only as reliable as the staff and/or automated processes in which data are entered and there is always some level of error and uncertainty about the accuracy. Next, data were restricted to veterans that are currently receiving care within one VA system; it is possible that other VA systems and non-VA systems have different rates and factors associated with having a depressive and/or anxiety disorder. In addition, results about gender should be interpreted with caution as female veterans represented a small proportion of our sample and at rates lower than typically reported in national samples (U.S. Department of Veterans Affairs, Office of Policy and Planning, 2014). The study also did not have measures of severity of mood symptoms (e.g., Patient Health Questionnaire-9 or Generalized Anxiety Disorder-7

scores) or chronic health conditions (e.g., Cumulative Illness Rating Scale-Geriatric score). Future studies should begin to examine the impact of specific organ systems and severity of chronic health conditions that precede mood disorders as some chronic conditions likely increase risk more than others. Furthermore, longitudinal datasets should be used to examine whether a change in multimorbidity over time increases the odds of a subsequent mood disorder. An understanding of how chronic conditions interact to increase the risk of mood disorders would be useful to guiding treatment efforts.

Conclusion

Providers treating middle-aged and older veterans need to consider the complexity of the patient, including the cumulative effect of numerous emotional and physical health disorders. Because co-occurring chronic health conditions and mood disorders are associated with many negative consequences, it is important that providers screen middle-aged and older veterans for depression and anxiety. As middle-aged and older adults most commonly turn to their primary care providers for behavioral health treatment (Institute of Medicine, 2008), VA primary care providers can play a major role in identifying mood disorders and also referring patients to the appropriate mental health providers or for integrated self-management interventions within VA primary care centers. Moreover, additional research is needed to aid in the development and selection of mental health treatments (e.g., the development of treatment algorithms for providers) and to determine the efficacy of such treatments for middle-aged and older adults with multimorbidity. Such information could in turn improve quality of care and outcomes for middle-aged and older veterans with multimorbidity.

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Table 1
Demographic and Health Characteristics of Middle-Aged and Older Veterans by Mood Disorder Category.

	No mood disorder (<i>n</i> = 32,315; 92.9%)	Depression-only (<i>n</i> = 1,367; 3.9%)	Anxiety-only (<i>n</i> = 854; 2.5%)	Depression + anxiety (<i>n</i> = 250; 0.7%)	Test statistic (χ^2)
Age					
50–64	10,998 (86.2%)	1,050 (8.2%)	518 (4.1%)	189 (1.5%)	1,426.03
65–79	13,736 (96.5%)	223 (1.6%)	231 (1.6%)	49 (0.3%)	
80+	7,581 (97.3%)	94 (1.2%)	105 (1.3%)	12 (0.2%)	
Sex					
Male	31,789 (93.1%)	1,295 (3.8%)	830 (2.4%)	231 (0.7%)	147.11
Female	526 (82.1%)	72 (11.2%)	24 (3.7%)	19 (3.0%)	
Race					
White	24,341 (87.0%)	1,070 (4.1%)	729 (2.8%)	212 (0.8%)	82.25
Non-White	3,629 (90.0%)	286 (7.1%)	81 (2.0%)	37 (0.9%)	
Marital status					
Married	19,378 (94.7%)	534 (2.6%)	456 (2.2%)	91 (0.4%)	300.22
Non-married	12,934 (90.3%)	833 (5.8%)	398 (2.8%)	159 (1.1%)	
Service connection					
None	24,417 (94.6%)	794 (3.1%)	456 (1.8%)	146 (0.6%)	581.88
1–49	3,887 (91.4%)	201 (4.7%)	129 (3.0%)	38 (0.9%)	
50+	4,011 (85.0%)	372 (7.9%)	269 (5.7%)	66 (1.4%)	
Organ system with chronic disease count					
0–2	1,604 (97.4%)	23 (1.4%)	17 (1.0%)	3 (0.2%)	1,012.94
3–5	9,527 (96.4%)	165 (1.7%)	171 (1.7%)	24 (0.2%)	
6–7	10,041 (94.8%)	282 (2.7%)	208 (2.0%)	64 (0.6%)	
8–9	6,892 (90.8%)	412 (5.4%)	223 (2.9%)	62 (0.8%)	
10–13	4,251 (83.9%)	485 (9.6%)	235 (4.6%)	97 (1.9%)	

Note. All comparisons were significant ($p < .001$).

Table 2

Predictors of Having a Depressive and/or Anxiety Disorder.

Characteristics	OR	95% CI	Wald χ^2	df	p
Female (reference: Male)	2.11	[1.68, 2.64]	42.35	1	<.001
Age (reference: 50–64)			721.45	2	<.001
65–79	0.30	[0.27, 0.33]	473.25	1	<.001
80+	0.22	[0.19, 0.26]	384.58	1	<.001
Non-White (reference: White)	0.99	[0.88, 1.11]	.03	1	.86
Non-married (reference: Married)	1.49	[1.36, 1.63]	75.99	1	<.001
Service connection (reference: None)			62.53	2	<.001
1–49	1.23	[1.08, 1.39]	10.17	1	.001
50+	1.53	[1.38, 1.71]	61.44	1	<.001
Organ system with chronic disease count (reference: 0–2)			507.70	4	<.001
3–5	1.70	[1.21, 2.40]	9.26	1	.002
6–7	2.56	[1.83, 3.59]	29.90	1	<.001
8–9	4.05	[2.89, 5.66]	66.79	1	<.001
10–13	6.62	[4.73, 9.25]	122.00	1	<.001

Note. OR = odds ratio; CI = confidence interval.