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Mental Health and Obesity among Veterans: A Possible Need for Integrated Care

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Abstract

Objective: The goal was to examine mental health diagnosis rates among a national cohort of primary care patients with and without obesity.

Methods: The cohort was derived from national Veterans Health Administration data (342,262 women, 4,524,787 men). Sex-stratified descriptive statistics characterized mental health diagnosis rates. Chi square tests determined whether diagnosis rates differed by obesity status (α=0.001).

Results: Rates of any mental health diagnosis were higher among women and people with versus without obesity (women: 53.9% vs 50.4%; men 37.9% vs. 35.2%). Depression and post-traumatic stress disorder diagnosis rates were higher for people with versus without obesity. Substance use disorder diagnosis rates were lower for people with versus without obesity. Anxiety diagnosis rates were slightly lower among women with versus without obesity.

Conclusions: Programs simultaneously addressing weight management and mental health could address the mental health comorbidity observed among people with obesity. Women are most likely to need these services.

There is evidence for a bidirectional link between mental health conditions and obesity, which is likely affected by a host of biopsychosocial factors (1–7). For example, mental health status may contribute to obesity via emotional eating, neuroendocrine factors, or obesogenic psychotropic medications. Conversely, obesity may contribute to mental health status via physical disability and weight stigma. The limited, existing work suggests that rates of depressive disorders and anxiety disorders are higher among people with versus without obesity, particularly for women (5, 7). However, there is a critical gap in

understanding differences in rates of other mental health conditions among people with and without obesity, such as psychotic disorders and post-traumatic stress disorder (PTSD).

Veterans Health Administration (VHA) data are ideal for comparisons of mental health diagnosis rates among people with and without obesity. Among the six million veterans using VHA, over 40% have obesity (8). VHA is also the largest integrated healthcare system in the United States and has a diverse patient population. Further, roughly 95% of VHA patients are weighed annually (9) and VHA administrative data provide national, population-level information on a wide range of mental health conditions (10).

Our objective was to examine rates of mental health diagnoses among a national cohort of women and men VHA primary care patients with and without obesity. All analyses were sex-stratified, given that women veterans who use VHA are known to be younger, more racially/ethnically diverse, and have a greater mental and physical health burden than men veterans who use VHA (10). A better understanding of similarities and differences in mental health diagnosis rates between people with and without obesity will help guide clinical practice, research, and policy for the delivery of weight management and mental health care.

Methods

The national study cohort used VHA administrative data and was comprised of all veteran primary care patients who used VHA primary care services in fiscal year 2014 (October 2013 – September 2014) and who had a body mass index (BMI) $\geq$ 18.5 kg/m^2. Unless otherwise noted, additional information, including details on specific ICD-9 codes, are available elsewhere (10). This work was approved by Stanford University institutional review board.

Mental health diagnoses included those related to depressive disorders, anxiety disorders, post-traumatic stress disorder (PTSD); alcohol use disorders; drug use disorders, psychotic disorders (e.g., schizophrenia), and other mental health diagnoses (e.g., eating disorders, personality disorders). The presence/absence of diagnoses was based on fiscal year 2014 ICD-9 diagnosis codes in VHA inpatient, ambulatory care, and VHA-purchased community care (10).

We initially categorized patients by *obesity status*, that is, having *no obesity* (BMI < 30 kg/m^2) or *obesity (*BMI $\geq$ 30 kg/m^2). Follow-up analyses used the categories: *normal weight* (18.5 kg/m^2 $\leq$ BMI < 25 kg/m^2), *overweight* (25 kg/m^2 $\leq$ BMI < 30 kg/m^2), *obesity class 1* (30 kg/m^2 $\leq$ BMI < 35 kg/m^2), *obesity class 2* (35 kg/m^2 $\leq$ BMI < 40 kg/m^2), and *obesity class 3* (BMI $\geq$ 40 kg/m^2). BMIs were based on a previously-developed algorithm that draws upon centralized VHA vital signs data collected during routine clinical encounters. This approach calculates BMI using modal height and the weight taken closest to the patient's first primary care appointment in fiscal year 2014 (8).

Sex, age, and race/ethnicity came from VHA administrative data.

We used descriptive statistics to assess the proportion of patients with any mental health diagnosis, using a chi square analysis to assess sex differences (α=0.001). Next, in sex-

stratified analyses, we used descriptive statistics to assess rates of any mental health diagnosis and specific diagnoses by obesity status (no obesity, i.e., BMI < 30 kg/m², versus obesity, i.e., BMI 30 kg/m²). Then, we used separate, sex-stratified chi square analyses to assess rates of any and specific mental health diagnoses by obesity status (α=0.001). Finally, we used descriptive statistics to assess rates of any and specific mental health diagnoses within more granular weight categories, by sex. Because of the large sample size, there was a high likelihood of statistically significant chi square tests. Therefore, we considered an absolute difference 5% as indicating clinical significance for analyses with the composite variable, any mental health diagnosis, but report smaller differences for specific diagnoses, given their relatively low frequency.

Results

The cohort included 342,262 women (44.2% with obesity) and 4,524,787 men (41.7% with obesity). Mean BMI was 29.9±6.5 among women and 29.7±5.7 among men. Mean age was 48.1±14.9 years for women and 63.0±15.4 years for men. Roughly 55.5% of women and 71.0% of men were white, 28.9% of women and 14.8% of men were black or African American, and 6% of women and 6% of men were Hispanic. A greater proportion of women than men had any mental health diagnoses (52.0% versus 36.3%, p<.001).

All chi square tests assessing rates of mental health diagnoses (any and specific diagnoses) by obesity status (obesity versus no obesity) were statistically significant (p<.001 for all). As seen in Figure 1, a greater proportion of women with obesity had any mental health diagnosis (53.9%) compared to women without obesity (50.4%). The same was found for men, 37.9% of men with obesity had any mental health diagnosis compared to 35.2% without obesity.

As seen in Figure 1, depressive disorders were the most common diagnoses among women with and without obesity. The difference in the rates of depressive disorder diagnoses among women with vs. without obesity was on the border of the clinically significant threshold (39.5% vs. 34.0%). it is notable that PTSD and psychotic disorder diagnosis rates were also higher among women with versus without obesity, with a nearly 50% higher rate of psychotic disorders in women with versus without obesity (3.0% versus 2.2%). Substance use disorder diagnosis rates were lower among women with versus without obesity, with large relative differences. Anxiety disorder diagnosis rates were slightly lower among women with versus without obesity.

Among men, depression was the most commonly diagnosed condition and men with obesity had higher rates than those without obesity (Figure 1). There was a 25% higher PTSD diagnosis rate in men with obesity versus without (15.3% versus 12.1%). Substance use disorder diagnosis rates were lower among men with versus without obesity, and as among women, there were sizeable relative differences.

The Online Supplement provides mental health diagnosis rates within normal weight, overweight, and obesity classes. The same patterns were generally observed for these more granular weight categories.

Discussion

This national, population-based study is one of the first to provide information on mental health diagnoses rates among women and men with and without obesity. We found a higher mental health burden among people with versus without obesity, particularly with regard to depression and PTSD. Women with obesity had higher rates of psychotic disorder diagnoses than women without obesity. In addition, women and men with obesity had lower rates of substance use disorder diagnoses than those without obesity. Women with obesity had slightly lower rates of anxiety disorder diagnoses than women without obesity. While small, this finding has not been previously reported, perhaps because much past work occurred before anxiety disorders and PTSD became separate diagnostic categories.

As in past work, rates of mental health disorders were more common among women than men (5, 7). However, rates of mental health diagnoses were lower in prior studies comparing diagnosis rates between people with and without obesity (5, 7). Due to differences between veterans who use VHA and the general population (11), it is not possible to make direct comparisons. Nonetheless, the present results underscore the substantial mental health burden among VHA patients with obesity. At the same time, it is important to recognize the sizeable proportion of women (46.1%) and men (62.1%) with obesity who had no mental health diagnoses, particularly as most prior population-level studies do not provide these data.

Our results provide further support for the finding that many veterans have concurrent obesity and mental health diagnoses. Integrated treatments addressing obesity and mental health could benefit patients, providers, and the healthcare system by meeting patients' physical and mental health needs in less time than separate treatments. Judiciously using resources to achieve this goal will require answering questions about optimal treatments for patients with different combinations of conditions. For example, given that physical activity could help patients manage both obesity and depression (12), health care systems could focus on exercise-based weight management programs. Or, weight management could be explicitly incorporated into psychiatric care, extending the reach of weight management programs beyond current arrangements. In the latter case, stabilizing mental health symptoms may take priority over weight management, but psychiatrists could be encouraged to consider factors such as weight-related side effects of psychopharmaceuticals. Psychological treatments could also indirectly affect weight-related behaviors, for example, by helping patients use cognitive behavioral skills to reduce emotional distress, which could also reduce emotional eating.

Existing work finds comparable weight loss among VHA patients with and without serious mental illness who participate in MOVE!, VHA's flagship weight loss program (9). Programs tailored for patients with serious mental illness and obesity have been shown to increase physical activity within (13) and outside VHA (14), a particularly promising development as physical activity could affect mental health and weight. Additional research on the effectiveness of weight management programs tailored for people with other mental health conditions would help shape health services and program implementation. The high rates of mental health diagnoses among women in the present work suggest it may be

important for this future research to occur in women's health clinics with co-located medical and mental health services (15).

Limitations to the present study include a focus on VHA patients, who may not represent US citizens or veterans not using VHA. We did not assess differences by race/ethnicity and we included normal weight and overweight in a single category, potentially attenuating differences. However, rates for these groups are provided in the Online Supplement. Finally, given a reliance on administrative data, it is possible patients had undiagnosed mental health conditions. Strengths include the national and diverse cohort representative of the universe of VHA patients, as well as the availability of measured BMI values for categorizing those with and without obesity.

Conclusions

Clinical practices and policies supporting programs that simultaneously address weight management and mental health have the potential to help address the substantial mental health comorbidity observed among people with obesity. Such services may be particularly useful for women. The novel finding of lower rates of anxiety disorders among women with versus without obesity merit additional research to confirm the finding and/or to explain possible causal mechanisms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Disclosures and acknowledgements:

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Highlights

- Rates of any mental health diagnosis were higher among women than men and people with versus without obesity (women 53.9% vs 50.4%; men 37.9% vs. 35.2%; $p<0.001$)

- Programs simultaneously addressing weight management and mental health could address the mental health comorbidity observed among people with obesity.
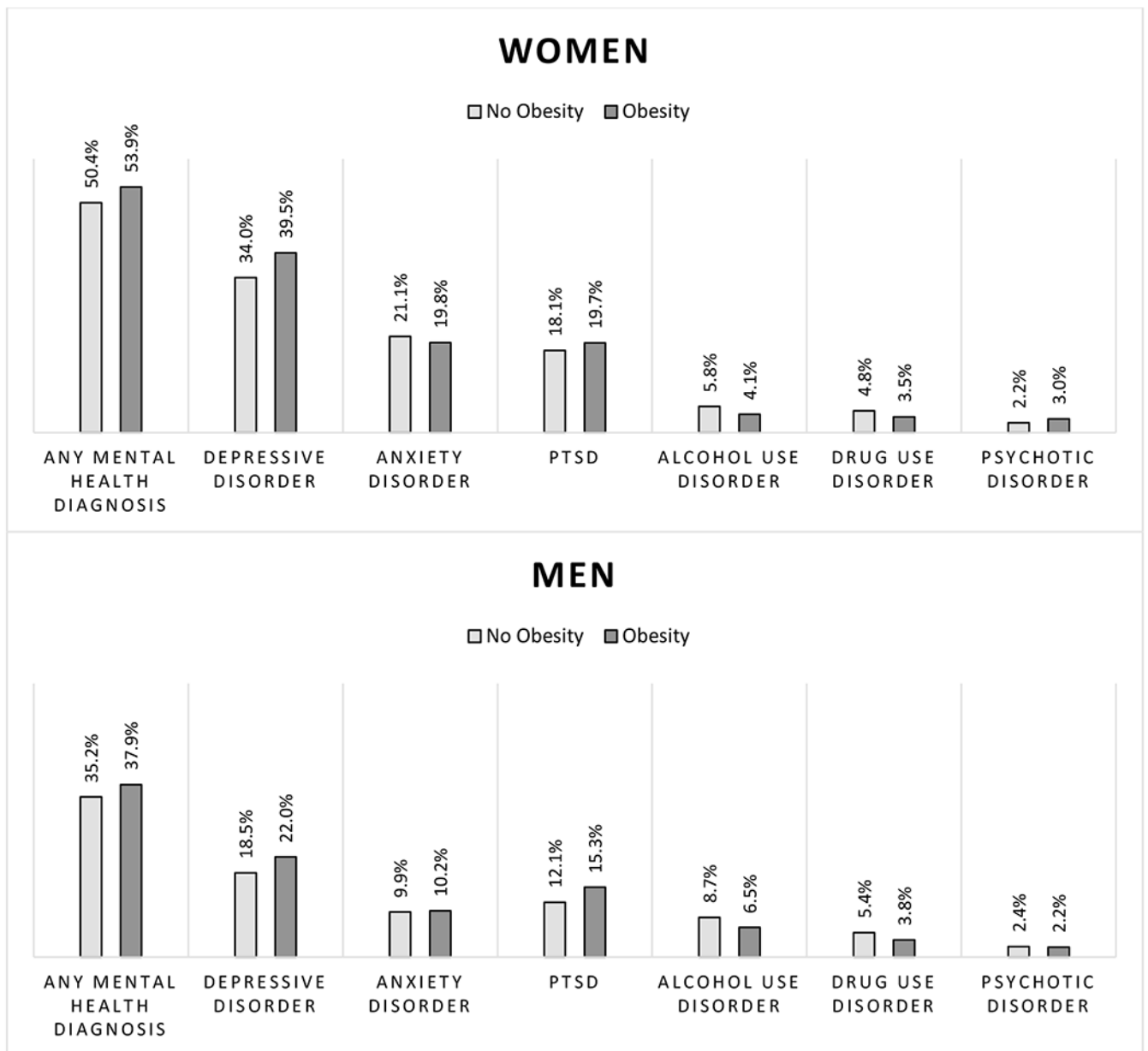
WOMEN

☐ No Obesity ■ Obesity

	No Obesity	Obesity
ANY MENTAL HEALTH DIAGNOSIS	50.4%	53.9%
DEPRESSIVE DISORDER	34.0%	39.5%
ANXIETY DISORDER	21.1%	19.8%
PTSD	18.1%	19.7%
ALCOHOL USE DISORDER	5.8%	4.1%
DRUG USE DISORDER	4.8%	3.5%
PSYCHOTIC DISORDER	2.2%	3.0%

MEN

☐ No Obesity ■ Obesity

	No Obesity	Obesity
ANY MENTAL HEALTH DIAGNOSIS	35.2%	37.9%
DEPRESSIVE DISORDER	18.5%	22.0%
ANXIETY DISORDER	9.9%	10.2%
PTSD	12.1%	15.3%
ALCOHOL USE DISORDER	8.7%	6.5%
DRUG USE DISORDER	5.4%	3.8%
PSYCHOTIC DISORDER	2.4%	2.2%

Figure 1.

Rates of mental health diagnoses among veteran VHA primary care patients with and without obesity in fiscal year 2014

All chi-square tests assessing rates of psychiatric diagnoses by obesity status (obesity vs. no obesity) were statistically significant for both men and women (p<.001 for all). VHA: Veterans Health Administration; PTSD: Post traumatic stress disorder; No obesity: BMI < 30 kg/m^2; Obesity: BMI ≥ 30 kg/m^2.