

## Factors Impacting Post-9/11 Veterans' Body Mass Index Over Time



Wave 8 of the Veterans Engaging in Transition Studies (VETS) was coordinated by the Clearinghouse for Military Family Readiness at Penn State in collaboration with the Arthur M. Blank Family Foundation, The Heinz Endowments, May & Stanley Smith Charitable Trust, and the Wounded Warrior Project. VETS was an extension of a large, longitudinal study called [The Veterans Metrics Initiative: Linking Program Components to Post-Military Well-Being](#) (TVMI). During TVMI implementation, six waves of data were collected from almost 10,000 post-9/11 veterans who had separated from military service in 2016. Of the original sample, 3,514 veterans voluntarily chose to participate in Wave 7 of the online VETS Survey in 2020. Between March 2023 and April 2023, 2,970 post-9/11 veterans completed the Wave 8 VETS Survey; at that time, they were about 78 months or 6.5 years post-discharge/separation.

### What is Body Mass Index?

Body Mass Index (BMI) is a computation that considers a person's body fat in relation to their risk for health concerns, and it is used to screen for unhealthy weights. However, BMI, alone, is not indicative of the body fat or health of an individual as factors, such as muscle mass, can affect the measurements. According to the Centers for Disease Control and Prevention, BMI is most accurately calculated when a person's weight in kilograms is divided by the square of height in meters. This formula has been adapted for inches and pounds.



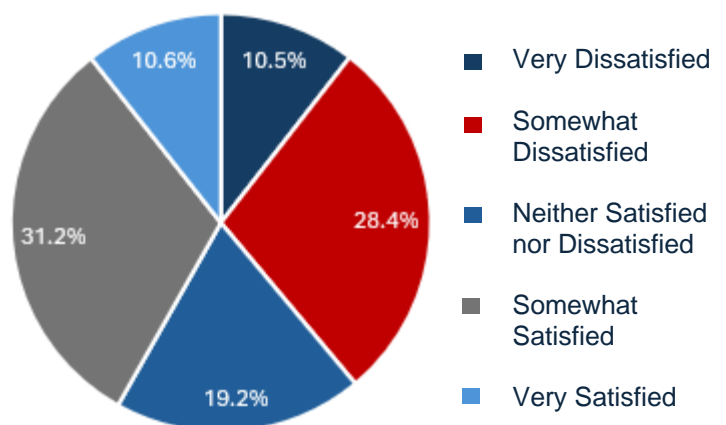
- A BMI less than 18.5 falls within the underweight range.
- A BMI between 18.5 to 24.9 falls within the healthy weight range.
- A BMI between 25.0 to 29.9 falls within the overweight range.
- A BMI of 30.0 or higher falls within the obese range (over 40 = extreme obesity).

### Obesity as a National Epidemic

- In the United States, the prevalence of obesity has tripled in the last five decades (Kranjac & Kranjac, 2023).
- Data reported in *The 2019-2021 Behavioral Risk Factor Surveillance System* indicated that nineteen states/territories have obesity rates of 35% or higher.
- Population weight gain perpetuates higher rates of disease (e.g., type 2 diabetes, musculoskeletal disorders), premature disability, and mortality (World Health Organization, 2021).
- Veterans who have disproportionate poorer health status than civilians are at higher risk for obesity and its comorbidities (Betancourt et al., 2020).
- Rates of obesity in active duty Service members doubled between 2012 (10.4%) and 2022 (21.6%), which makes post-9/11 veterans, who have transitioned to civilian lives, a subpopulation of significant concern (Manning, 2023).

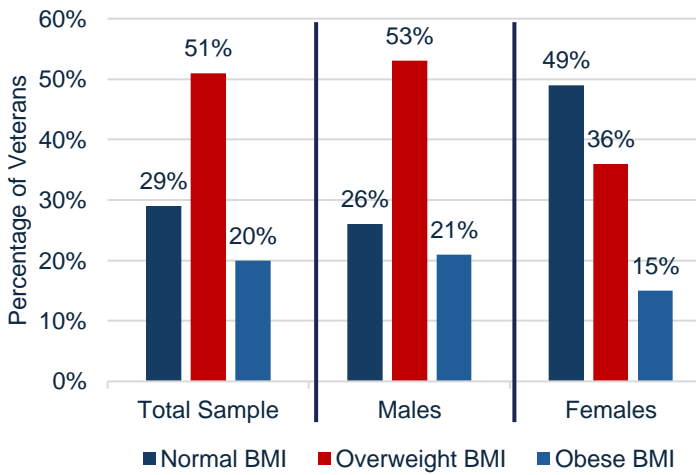
### Veterans' Physical Health Satisfaction

In Wave 8 of VETS, post-9/11 veterans reported on their satisfaction with their physical health. Dissatisfaction was reported by 38.9%. Another 19.2% were neither dissatisfied nor satisfied.



# Change in Veteran's BMI Over time

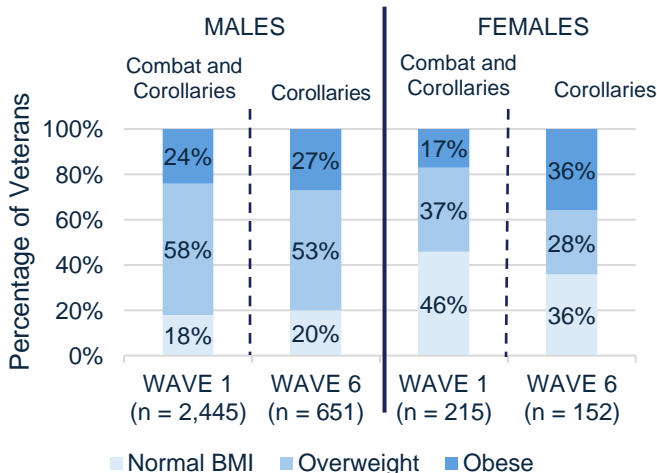
## Wave 5 Weighted BMI



- Weight and height at discharge/separation were retrospectively reported by TVMI post-9/11 veterans at Wave 2.
- In a weighted, Wave 5 analysis ( $n = 48,965$ ), BMIs were calculated with self-reported weights at approximately 27 months post-military service.
  - Less than 2% of the post-9/11 veterans were underweight (not shown in graph).
  - The majority of the total sample (71%) had BMIs in the overweight or obese categories.
  - Females were more likely to have a normal weight (49% vs. 26%), and 74% of males were overweight or obese.
- In an analysis of BMI change over time, the percentage of female and male post-9/11 veterans with an obese BMI increased between Waves 1 and 6.

## Impact of Adversity on Weight Gain

**Warfare Exposure** (e.g., corollaries, combat patrols) influenced weight gain for male and female post-9/11 veterans. At Wave 1, a higher percentage of females had normal BMIs than males. However, females exposed to corollaries of war exposure saw the greatest increase in obesity by Wave 6 (20% to 36%).



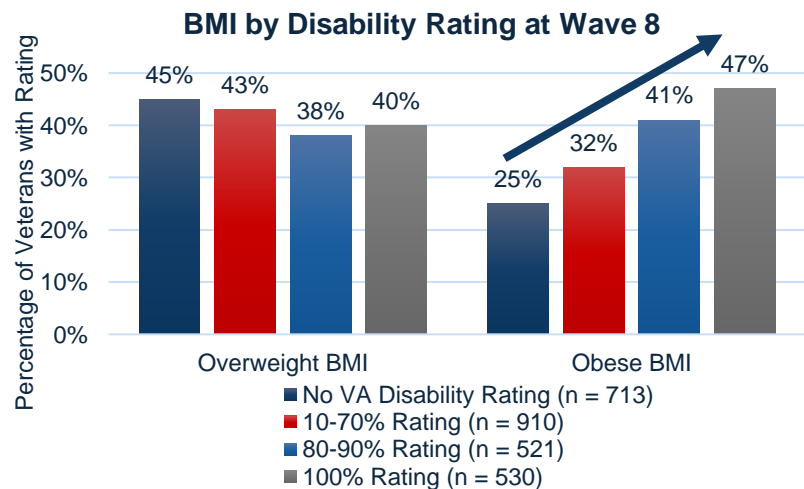
**Adverse Childhood Experiences (ACEs)** demonstrated long-term effects on BMI.

- Male post-9/11 veterans who experienced 3-7 ACEs had a higher BMI (0.74) compared to males without any ACEs, and they increased their BMI 0.08 per year.
- Female post-9/11 veterans who experienced 1-2 ACEs had a higher BMI (0.89) compared to female veterans without ACEs.

**Post-traumatic stress disorder and depressive symptoms** reported by female and male post-9/11 veterans decreased the likelihood of a normal BMI at Wave 1. By Wave 6, 45% of the males were in the obese category vs. 37% of the females.

## Obesity Increases With Disability

Wave 8 BMIs were calculated using self-reports of weights at Wave 8 and heights at Wave 7. The percentages of post-9/11 veterans of a normal BMI decreased with increases in Department of Veterans Affairs (VA) disability ratings; only 13% of post-9/11 veterans with a 100% disability rating were of a normal BMI. However, 70% of post-9/11 veterans with no disability rating had an overweight or obese BMI.



## Practice Implications: A Holistic Approach

Civilian reintegration is often a health stressor, and having childhood and warfare adversities are risk factors for obesity for Service members. In addition, research indicates that veterans gain weight within a few years postservice. Therefore, initiating and supporting interventions prior to and early in Service members' civilian transition by strengthening gender, age-appropriate fitness standards and health promotion (e.g., nutrition) and implementing diagnosis, treatment, and reporting of BMI (e.g., disability reports) could promote protective factors and decrease obesity risk. In addition, mental health screening and treatment should be a part of bolstering veterans' physical health, so veterans can confidently and happily live in and positively contribute to their communities.