

Costs and Consequences:

Obesity's Compounding Impact on the Military Health System

WHITE PAPER



American Security Project



In this Report

The United States Armed Forces face an unprecedented challenge as obesity rates continue to rise. Amid the largest manpower shortage since the initiation of the all-volunteer force, our military personnel must remain fit to defend against global threats. With over 41% of the nation affected by obesity, however, there are no longer sufficient replacements for personnel affected by the disease in critical defense roles.

America can no longer afford to ignore this crisis. In 2023, obesity cost the Department of Defense more than \$1.25 billion in direct care costs and an additional \$99 million in lost productivity due to active-duty hospitalizations. Despite this, service branches continue to focus their efforts on unproven weight loss programs and body composition policies that negatively impact personnel health and readiness. Evidence-based obesity identification and treatment in clinical settings remains the most effective and economical approach; these interventions must be prioritized before service members with obesity develop life-altering complications, not after.

IN BRIEF

- Applications for active duty decreased 54% from 2002 to 2022, and annual active-duty separations increased by 65% from 2019 to 2023. As a result, Department of Defense total active-duty end strength has fallen over ten percent in the past four years.
- Obesity is the leading cause of recruitment disqualifications and separations. An estimated 52,000 applicants were disqualified on the basis of their weight alone in fiscal year 2023—11,000 more than the services' 41,000-person recruitment shortfall. Service members diagnosed with overweight or obesity leave service an average of 18 months earlier than their normal-weight counterparts.
- With active-duty manpower at its lowest point since 1973, loosening fitness standards, granting weight waivers, and retaining service members with obesity have been vital to ensure force strength. As a result, the estimated cost burden of obesity in active-duty service members now exceeds \$1.35 billion annually, with direct care costs comprising \$1.25 billion and productivity lost to hospital stays costing the Department of Defense an additional \$99 million in 2023.
- After separation, veterans are at much greater risk of obesity and its comorbid conditions. Obesity rates are highest in those who serve in combat arms, leadership, administrative, and technical positions. Late-stage obesity complications are most prevalent in service members with low educational attainment, from racial and socioeconomic groups predisposed to obesity, and in those who have been diagnosed with PTSD and other mental health disorders.
- Even under the best circumstances, on average, military weight management programs reduce BMI and/or body weight by less than 1% in active-duty military populations, and none have been proven to maintain weight loss over time. Pharmacotherapy options have been found to be highly effective at managing obesity, but these medications are needed continually for best results.

About the Author

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Introduction

The United States Armed Forces face an unprecedented challenge as obesity prevalence among service members continues to rise. As combat and incidental injuries become less prevalent year-over-year, rates of obesity-related conditions including diabetes, osteoarthritis, hypertension, and steatotic liver disease increasingly meet or exceed civilian trends. These conditions lead to prolonged time spent out of service, reduced ability to meet the physical demands of service, and rising attrition rates across the services. With both recruitment and retention on the decline, maintaining fit and capable personnel is critical to ensure a force structure sufficient to combat rising global threats.

ASP's 2023 white paper, "Combating Military Obesity," spotlighted obesity's compounding effects on military recruitment, retention, and readiness. One year later, these trends have only worsened. With active duty end strength at its lowest point since the initiation of the all-volunteer force and annual separations increasing 38% over the past five years, loosening fitness standards, granting weight waivers, and reducing applicants' body mass before enlistment are now vital to ensure sufficient manpower.¹ As obesity rates climb nationwide, these stopgaps are reaching their breaking point. In 2023, an estimated 52,000 military applicants were disqualified from enlistment on the basis of their weight alone—11,000 more than the Department of Defense's stated 41,000-person recruitment deficit.²



Soldiers undergoing physical fitness tests. U.S. Army photo.

While solutions are urgently needed to mitigate personnel shortfalls, increasing manpower alone is not enough. Buy-now, pay-later approaches to tackling the military recruitment crisis prioritize getting troops in without considering downstream effects on personnel health and readiness. Overweight applicants lose as much as 1.7% body fat per week in order to enlist, but as obesity rates rapidly return to pre-enlistment levels, the respiratory, circulatory, and osteoarthritic effects of obesity become a ticking clock towards early separation. Willpower-based rapid weight loss programs increase risk of depression, anxiety, eating disorders, and loss of muscle and bone density, contributing to both rising injury rates and all-cause mortality in service members and veterans. Incidence rates of type 2 diabetes, hypertension, musculoskeletal disorders, and fatty liver disease are increasing in line with obesity trends. When left untreated, these conditions trigger health events such as strokes, heart attacks, organ failure, and pulmonary embolisms, leading to permanent disability or death.

The good news: thanks to recent advances in medical science, nearly all later-stage obesity comorbidities can now be mitigated using affordable, evidence-based treatments for obesity. The bad: unlike nearly all other diseases affecting service members today, obesity itself is not considered a disability nor disease by the service branches nor the Department of Veterans Affairs, making it difficult to proactively identify and treat.³ Without this written classification and its associated protections, service members face bias and discrimination for 'exceeding weight standards,' becoming ineligible for promotion, educational privileges, deployment, or disability compensation. Contradicting policies, such as those mandating separation proceedings if personnel cannot lose weight and exemptions for service members with obesity from identification and treatment if they pass combat and fitness testing, incentivize falsification of body composition measurements and worsen health impacts down the line.⁴ As every service member is needed to fulfill mission, even commanders and health service providers who are well-informed on obesity risk factors are reticent to identify and treat the disease for fear of formal reprimand.

This report delves into the latest data from 2024 and proposes new strategies to combat overweight and obesity within recruitment, readiness, and retention. ASP analysis is informed by data from regular reports published by the Department of Defense's Defense Health Agency, researchers and clinicians from the Walter Reed Army Institute of Research and U.S. Army Research Institute of Environmental Medicine, and biomedical research conducted by civilians in conjunction with the Defense Health Agency. Special emphasis has been placed on new findings from fiscal year 2023 and on comorbidities experienced by service members with obesity.

The Impact of Obesity on Manpower Shortages

The United States Armed Forces are facing their largest recruitment crisis since the initiation of the all-volunteer force in 1973. Across all services, active-duty end strength fell nearly forty percent between 1987 and 2023.⁵ The most pressing shortages occur within entry enlistment levels E1-E3, the nation’s first line of defense in a crisis.⁶ With active wars in Ukraine and Israel in the West and an increasingly hostile Russia, China, and North Korea in the East, the scale and magnitude of the obesity threat is seriously jeopardizing the ability of recruiters to fill and keep ranks.

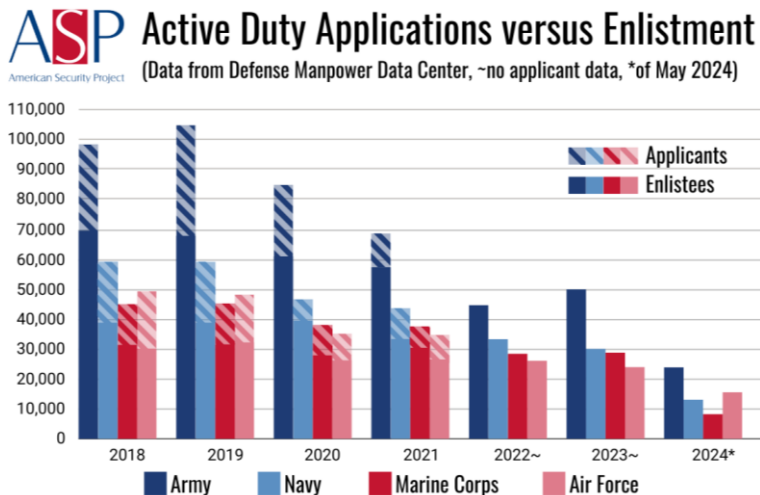
Obesity’s Impacts on Recruitment

The recruitment crisis is an issue of both shrinking applications and fewer qualified accessions. Although the military manpower shortage ranks high among domestic security concerns for policymakers and commanders, several proposed motivators occupy disproportionate space in the public discourse.

Applications for active-duty service decreased 54% from 2002 to 2022.⁷ The most commonly cited reasons for this trend include low rates of civilian unemployment, reduced youth proclivity to serve, and controversial policies such as vaccine mandates, diversity initiatives, and abortion access. In reality,

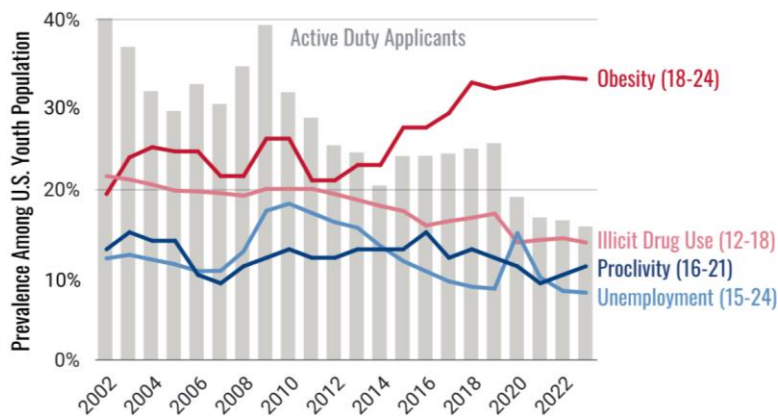
youth propensity to serve has alternated between nine and fifteen percent since 2003; only two percentage points fewer youth are interested in service than in the months post-9/11.⁸ Unemployment rates, which once strongly correlated with military application rates, stopped aligning in a statistically significant way after the 2008 financial crisis.⁹ Despite lowered body composition requirements having a significant positive effect on application rates during the ARMS 1.0 trials between 2005 and 2009,¹⁰ a recent congressional testimony on the recruiting crisis did not evaluate whether service branch fitness or body composition standards deterred applicants.¹¹ Instead, RAND economist Beth Asch recommended public advertising, enlistment bonuses, and higher service retention goals to boost applications.¹²

Without strong evidence to explain the diminishing rate of applications, re-evaluating prohibitors to enlistment in service-inclined populations is a more practical target. Common disqualifications include not meeting academic requirements, failing the Armed Forces Qualification Test (AFQT), history of drug use, mental illness diagnoses, and exceeding weight standards.¹³ As of 2023, 94.4% of 18 to 24-year-olds hold a high school diploma or equivalent,¹⁴ and less than one percent of applicants fail the AFQT.¹⁵ While over 40 percent of adolescents reported using illicit drugs in 1997, that statistic has dropped to only 27 percent of the same population today.¹⁶ While mental health diagnoses in youth are rising,¹⁷ by far the most significant factor impacting accession rates is obesity. An estimated 21% of military applicants are disqualified for exceeding weight standards each year.¹⁸ This means an estimated 52,000 applicants were disqualified on the basis of their weight alone in 2023—11,000 more than the services’ announced 41,000-person recruitment shortfall.¹⁹



Proposed Barriers to Military Recruitment

(Data from US Depts. of Defense, Labor, Education, and SAMHSA)

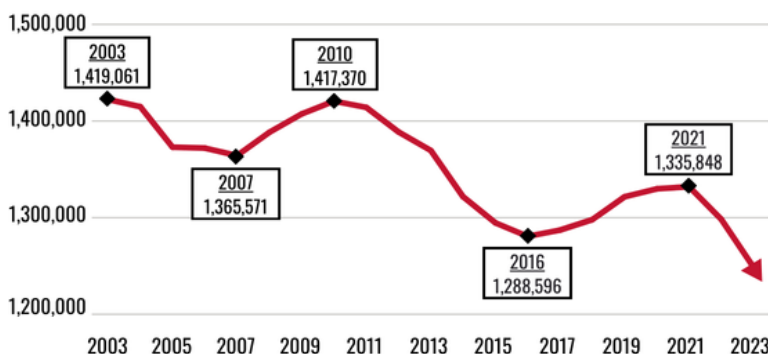


Obesity's Impacts on Retention

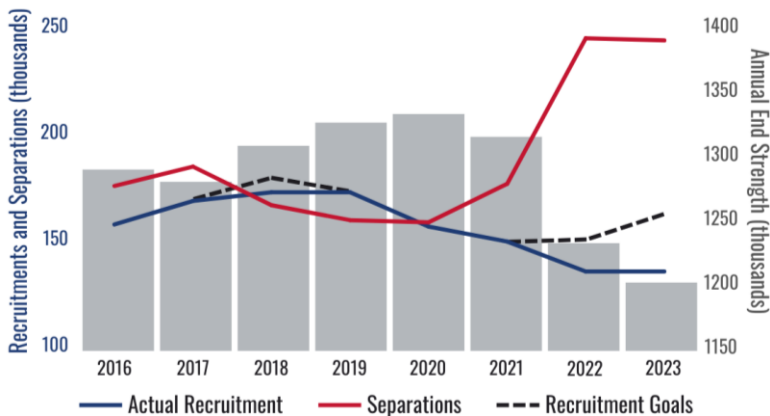
As services increasingly struggle to attract qualified applicants, recruiters are forced to choose whether to induct lower-quality accessions or miss recruiting targets. These difficult decisions have cascading impacts on the overall health, fitness, and suitability of incoming military personnel and the all-volunteer military at large. Pre-existing conditions, behavioral concerns, and low educational attainment contribute to rising rates of early separation, though not at levels high enough to categorically disqualify individuals with these indicators.

Although the military's body mass and composition policies mandate initiation of separation action after a fixed period of exceeding weight standards, chronic personnel shortfalls have made it imperative to retain service members with obesity. Entry-level roles in the military typically recruit from lower-income populations that have higher rates of occupational stress and mental illness, lower educational attainment, and less access to healthy foods. As a result, despite the rigorous physical demands of their roles, enlisted troops are 38% more likely to have obesity than their officer and civilian counterparts.²⁰ Administratively separating overweight enlisted would only increase replacement time and cost, exacerbating the recruiting shortfall at these levels. Obesity is also prominent within cyber, intelligence, and engineering positions where daily tasks are sedentary, occupational stress is high, and working hours are long. As technologized and specialized roles have lucrative civilian opportunities, individuals in these roles may choose to leave military service rather than comply with body composition standards and weight-management interventions, worsening already dire service member retention rates in areas critical to the national defense.²¹

ASP Active Duty End Strength Over Time
(Data from Department of Defense OneSource Demographics Reports)



ASP Active Duty Personnel Gains and Losses
(Data from Defense Manpower Data Center, Department of Defense)



Service members who are diagnosed with overweight or obesity leave service an average of 18 months earlier than their normal-weight counterparts.²² Individuals categorized upon separation as nonduty unfit, administratively separated, or not physically qualified are given the outcome category “Separated without DoD Disability Benefits” or “other,” depending on the service branch and reporting agency. As these categories are excluded from public reports and comprise several codes, it is difficult to track separation trends resulting from overweight and obesity over time.²³ While obesity is no longer parsed as a variable in retention statistics,²⁴ inability to meet physical readiness standards has been the leading category for early attrition since at least 2005.

Because administrative separations for exceeding body composition standards can be mitigated through selective enforcement of body composition and military appearance policies, these are less significant than medical separations caused by obesity and its comorbid conditions. These separations have had a highly detrimental impact on manpower, contributing to an estimated 101,000 personnel losses from 2018 to 2022.²⁵ In total, annual active-duty separations have risen by 65% over just the past four years, from 157,548 in FY2019 to 242,132 in FY2023.²⁶

The Impacts of Obesity on The Military Health System

Active duty service members have almost ten times as many annual healthcare visits as civilians.²⁷ Obesity contributes to 30 of 39 leading clinical diagnosis categories in service,²⁸ including 6 of the top 9 contributors to all-cause mortality.²⁹ Direct healthcare costs of obesity in active duty are estimated at \$1.25 billion annually, with lost productivity due to hospitalizations costing an additional \$99 million (See Appendix.)³⁰ As military services increasingly recruit and retain individuals with obesity, action must be taken to identify and treat obesity before onset of more severe comorbidities.

ASP Obesity Stages and Associated Effects

(Data from the NIH, U.S. Department of Health and Human Services)



Overweight and Obesity

Obesity has three stages of disease progression, with complications ranging from minor to life-threatening.³¹ In the first stage, obesity may not impose noticeable symptoms besides an adiposity (body fat percent) above 30 kg/m², subtle changes in the body's hormonal balance, and mild pressure on other body systems. Onset of additional symptoms depend on the location and metabolic activity level of the individual's excess fat tissue. While individuals may not feel ill or fatigued, however, "healthy obesity" does not exist.³² Excess weight on joints, cartilage, and bones makes service members at this stage 47% more vulnerable to in-service injuries than normal-weight personnel.³³

Over time, the direct effects of obesity lead to physical conditions such as high blood pressure, inflammation, restricted airways, and chronic fatigue and chemical effects such as high cholesterol, hormonal dysfunction, hyperglycemia, and insulin resistance. These stage 2 risk factors can be mitigated in a healthcare setting; if not addressed, however, they can develop into stage 3 diseases such as type 2 diabetes, chronic kidney disease, steatotic liver disease, and cardiovascular disease. These diseases greatly increase risk of heart attack, cardiac arrest, and stroke.

Cardiovascular Disease

Cardiovascular disease, the leading cause of death since the 1950s, is responsible for over twenty percent of U.S. deaths annually.³⁴ Between 2000 and 2011, approximately seven percent of in-service active-duty deaths were the result of cardiovascular disease.³⁵ However, as active duty are often medically separated before their disease progresses, these figures significantly understate cardiovascular deaths stemming from a service member's time in the military. After separation from service, military personnel are 60% more likely to die from heart disease than civilians.³⁶

Obesity is both an independent risk factor of cardiovascular disease and a leading contributor to other cardiovascular disease risk factors such as hypertension, dyslipidemia, sleep apnea, and type 2 diabetes.³⁷ Failing to treat these risk factors leads to higher medical costs in the long run. Of the 697 service members medically evacuated from Middle East operations for cardiovascular disease from 2001 to 2017, only 0.3% had a cardiac referral in their pre-deployment paperwork, a sign that early interventions for cardiovascular risk factors are not being properly instituted before deployment into combat zones and other operational areas.³⁸

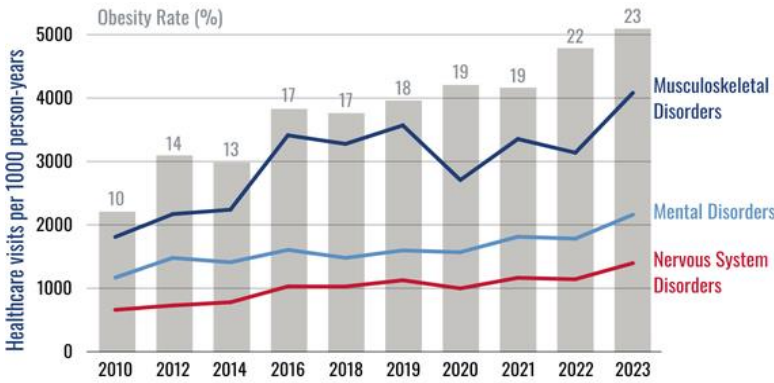
ASP Obesity and Related Disorders, Active Duty

(Data from MSMR, Military Health System, Defense Health Agency)



ASP Leading Diagnosis Categories, Active Duty

(Data from MSMR, Military Health System, Defense Health Agency)



Musculoskeletal Conditions

In 2023, there were more than 620,000 documented instances of musculoskeletal disease in active duty, an average of 0.6 diagnoses per person. Healthcare visits for these conditions, most commonly lower back pain, degenerative arthritis, limitation of motion, joint disorders, inflammation, and osteoarthritis, comprise 17.4 percent of all medical encounters in active duty.³⁹ When combined with acute musculoskeletal injuries such as herniated discs, sprains, and strains, healthcare visits for these conditions comprise around 40 percent of all primary care, specialist, and hospital visits for active-duty service members.

Most musculoskeletal conditions and injuries are directly caused or aggravated by the known risk factors associated with obesity. These conditions pose the greatest risk to both healthcare spending and readiness during deployment, where missions are critical and evacuations are costly. Despite policies limiting overweight applicants from deploying, personnel shortages have driven an increasing number of overweight service members to deploy using waivers.⁴⁰ Deployment increases stress, lowers available food quality, and inhibits sleep,⁴¹ leading to increased obesity risk in enlisted personnel and those deployed for longer periods of time.⁴² Musculoskeletal disorders among deployed personnel have risen in both quantity and severity over time, accounting for more than half of all medical encounters in service members deployed to the U.S. Central and Africa Command in 2023.⁴³

Musculoskeletal disorders and injuries have significant impacts on retention. In 2022, about 60 percent of Soldiers and Marines and about 35 percent of Airmen and Sailors who received disability discharges had one or more musculoskeletal disorders.⁴⁴ Three of the five most common unfitting conditions were musculoskeletal-related, regardless of combat-related determination and OCO deployment status.

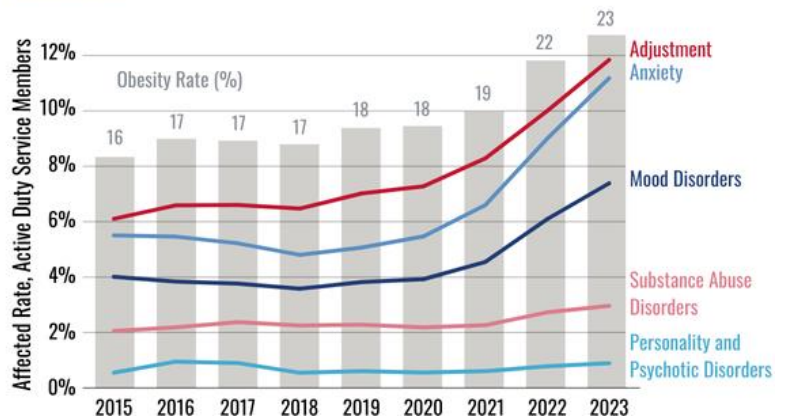
Mental Health Conditions

Mental health disorders contributed to over 50 percent of Active Duty hospital bed days and 2.6 million medical encounters in 2023.⁴⁵ Healthcare visits for mental health disorders increased by over 35% from 2019 to 2023, and diagnoses rates have more than doubled since 2018.⁴⁶ These disorders have a greater impact on active-duty operational readiness than any other diagnostic category as the result of prolonged hospitalizations, more frequent ambulatory healthcare visits, early attrition, and suicide risk.⁴⁷ Evidence for correlation between obesity and mental health conditions are strongest for post-traumatic stress disorder, anxiety, and depression, particularly when combined with binge eating symptoms.⁴⁸

Socioeconomic factors beginning in early childhood such as food insecurity and sleep deprivation, as well as behavioral factors such as poor diet and tobacco use, can contribute to both poor mental health and obesity.⁴⁹ However, even after adjusting for covariates such as tobacco use, lifestyle factors, and cardiovascular risk, service members and veterans with mental health diagnoses have significantly higher rates of obesity than their civilian counterparts.⁵⁰ Research suggests that this relationship is bidirectional, with obesity adversely influencing mental health outcomes and mental health disorders increasing obesity risk.⁵¹

ASP Obesity and Mental Health Disorder Rates

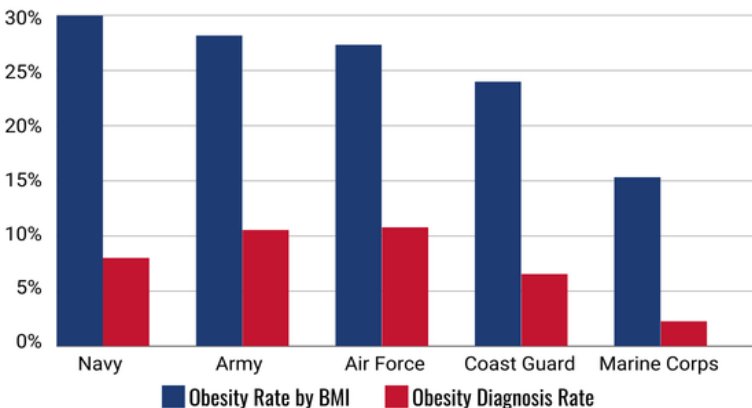
(Data from MSMR, Military Health System, Defense Health Agency)



Obesity Identification and Treatment

While disease progression is highly variable on an individual basis, nearly all individuals with obesity eventually experience at least one obesity-related complication.⁵² Diagnosing and treating obesity in its first stage is critical to prevent the emergence of severe comorbidities in its second and third stages.⁵³ Comorbidities are considerably more complex and costly to manage than obesity alone and can endure long after a person returns to a healthy weight.

ASP Obesity Rate vs Diagnoses in Active Duty
 (Yang et al, "Relationship Between BMI and Diagnosis of Obesity in the MHS," 2022)



Identification

Despite their access to universal healthcare,⁵⁴ only around 12 percent of active-duty service members who fit the diagnosis criteria for obesity are currently diagnosed.⁵⁵ Diagnosis rates for obesity have risen since 2018, in part due to MHS approval of anti-obesity medications (AOMs) in Tricare populations.⁵⁶ However, chronic underdiagnosis endures due to several factors, including obesity not being recognized as a disease by the Department of Veterans Affairs⁵⁷ and widespread lack of provider education.⁵⁸

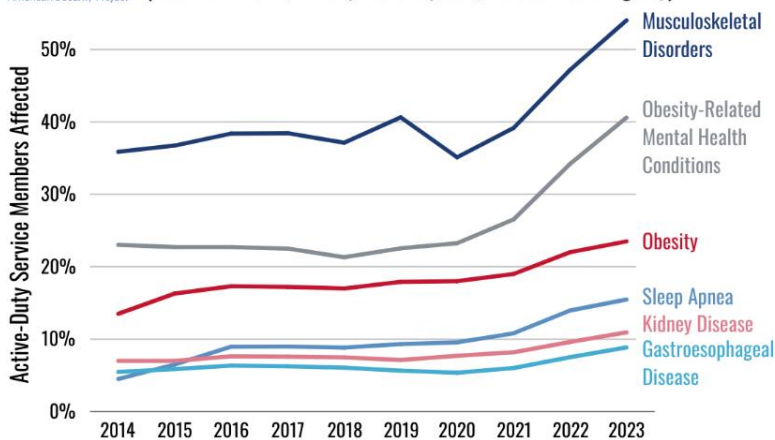
Rising obesity rates have led to more forgiving body mass standards. As field measurements target military

bearing and combat effectiveness, their outputs are no longer aligned with the BMI value at which obesity is identified and diagnosed.⁵⁹ As a result, commanders are less able to reliably identify and refer service members with obesity to medical professionals during combat and fitness assessments. Systemic deprioritization of obesity identification can lead service members to view obesity as a matter of fitness and not health.⁶⁰ While fitness and counseling programs can supplement comprehensive identification and treatment programs, objectives such as “human performance” and “holistic wellness” can be subjective and ill-defined, increasing bias and discrimination against service members.⁶¹

Treatment

While obesity identification is critical, health status awareness and nutrition education alone are not enough to improve health outcomes. In civilian settings, only around one in five individuals with obesity are able to lose weight through lifestyle interventions alone, with mean body weight lost averaging between one to four percent.⁶² Studies evaluating the efficacy of military-specific weight loss programs consistently find that the vast majority of these programs fail to induce statistically significant weight loss of more than 1% body weight or 1 BMI point.⁶³ No military program has been proven to sustain weight loss 12 months post-intervention.⁶⁴

ASP Obesity and Most Common Comorbidities
 (Data from MSMR, Military Health System, Defense Health Agency)



A common myth surrounding obesity management within the Department of Defense is that successful weight loss is dependent on character traits such as willpower, mental fortitude, intrinsic motivation, or confidence. A recent review of the Navy’s Weight Loss Readiness Test (WLRT), which monitors the motivation of sailors to engage in weight loss, found that these factors are not reliable predictors of future weight loss or attendance in weight loss program meetings.⁶⁵ Similarly, a limited study of active duty service members found that perceived ease or difficulty of engaging in healthy eating habits did not translate to actual changes in body fat during the COVID-19 pandemic.⁶⁶

Recommendations

Remove Non-Empirical Body Composition Standards

Military appearance, not health status, has been the historic driver of policies limiting body fat percent in service members. These policies are designed outside of the military health system based on factors which may or may not align with the threshold at which an individual needs medical intervention. Absent significant research findings, non-health related body composition standards are no longer feasible nor advisable for administrative and technical roles. If a military operational specialty (MOS) requires a level of physical fitness above that of a typical civilian, such as combat arms or special forces, additional fitness standards should be determined for reasons beyond general health. These additional standards should have clear justifications, be based on empirically determined metrics, and should not replace nor exempt the threshold at which an individual should be screened or treated for obesity.

Improve Identification and Diagnosis of Obesity

To mitigate the military obesity crisis, it is critical to institutionalize a system-wide process for obesity referrals, screenings, and diagnoses. Body composition measurements taken in non-clinical settings should not result in disciplinary action or determine who remains in service; these factors have been found to promote falsification and manipulation of readings, as well as disordered eating behaviors such as dehydration, induced vomiting, and excessive exercise.⁶⁷ Instead, individuals who are found to have a BMI above 30 or equivalent during mandatory bi-annual physical and combat fitness tests should be discreetly referred to a healthcare provider who has received specialized training in obesity identification and management.

In addition to combat and fitness tests, Periodic Health Assessments, Armed Forces Wellness Centers, Holistic Health and Fitness sessions, Total Force Fitness Health Promotion initiatives, and Morale, Welfare and Recreation programs provide ample opportunities for early intervention and referral for diagnosis.⁶⁸ At these intersections, coaches and commanders should be empowered to make appropriate workflow referrals to clinicians, specialists, and registered dietitians. Once in a clinical setting, personnel who are found to exceed an adiposity of above 30 kg/m² by a reliable testing method should be appropriately coded. At this point, providers should follow clinical practice guidelines for obesity and conduct additional tests for blood pressure, blood sugar, lipid function, and other risk indicators in order to identify and treat common obesity-related complications such as pre-diabetes, hypertension, and high cholesterol.

Improve Weight-Loss Interventions and Treatment

More and longer-term research is needed on non-pharmacotherapy treatments for military populations with obesity. Non-clinical, “lifestyle coach” sessions popular across the Department of Defense are statistically ineffective and can have detrimental effects on these populations, with two-year follow-up studies demonstrating significant weight regain in participants.⁶⁹ An individualized combination of methods known as comprehensive lifestyle interventions, or CLI, results in better post-treatment outcomes, and interventions with a licensed dietician are significantly more effective in reducing average waist circumference, percent of body fat, and BMI in soldiers than other methods.⁷⁰ Even under the best circumstances, however, these interventions reduce BMI and/or body weight by less than 1% in active-duty military populations, and none have been proven to maintain weight loss over time.⁷¹ Pharmacotherapy options have been found to be highly effective at managing obesity, but these medications are needed continually for best results.⁷²

Very little research has been conducted on the efficacy of military nutrition and exercise programs that aim to reduce obesity risk in healthy service members. A Government Accountability Office report found that military installations have not addressed congressionally directed efforts to increase access to nutritious food.⁷³ Fast food restaurants on military bases introduced by Morale, Welfare, and Recreation programs contribute to rising in-service obesity rates; they are highly convenient, financially incentivized, and not subject to the same nutritional requirements as appropriated dining facilities.⁷⁴ Deployment stress, exposure to combat, and trauma also increases obesity risk.⁷⁵

Improve Data and Reporting on Military Separations

Administrative separations, including separation codes, should be published by the Department of Defense in existing annual reports to improve analysis and decision-making on retention.⁷⁶ Without data on initiation of separation hearings and subsequent separations for exceeding weight standards, it is impossible for researchers and military leadership to determine the efficacy and impact of current body composition and military appearance policies in the wake of the worsening military obesity crisis. These policies are only viable so long as they are enforced, and existing data suggests that they are not. If administrative separation data suggests that a declining number of military personnel are subject to body composition related separations to improve retention, or that separation actions are inconsistent on the basis of race, gender, age, or other protected category, then these policies should be reconsidered or adjusted.

Update Clinical Practice Guidelines for Obesity

Clinical practice guidelines ensure consistency and quality of medical care for military personnel. Current guidelines for obesity should be re-written based on evidence-based best practices for methodology and sequencing. Once adjusted, they should be broadly and consistently utilized by healthcare providers and commanders. This may require stronger investments in implementation and oversight; in 2021, the U.S. Government Accountability Office found that service branches were not adequately monitoring implementation of new clinical practice guidelines.⁷⁷ Once clinical practice guidelines are improved, provider education should be a priority. Despite two-thirds of service members having either overweight or obesity, only 8% of medical students receive formal nutrition education.⁷⁸

Increase Focus on Obesity Prevention

Once an individual's neurohormonal weight regulatory system becomes dysfunctional due to obesity, it is exceedingly difficult to return it to its pre-obesity state. As a result, only a small percent of individuals with obesity are able to successfully lose weight and maintain weight loss through lifestyle interventions alone. To prevent more individuals from needing the lifelong care that can accompany this chronic disease, it is important to invest in programs that reduce and mitigate obesity in children and young adults.

One mechanism to reduce obesity in military applicants is the Supplemental Nutrition Program for Women, Infants, and Children (WIC), which increases access to nutritious food for families with children under 5 years of age.⁷⁹ Research has found that a lack of program awareness and misinformation prevent military beneficiaries from seeking and acquiring WIC benefits despite a high rate of program eligibility among these populations.⁸⁰

Conclusion

In addition to its impacts on health, excess body fat has significant and far-reaching impacts on readiness and national security. Obesity disqualifies interested military applicants, hinders operational readiness, and jeopardizes the lives of veterans more than combat itself. While the wide range of solutions proposed from outside of the military health system have been complicated by unintended negative effects, advances in medical science provide hope. Evidence-based obesity identification and treatment in clinical settings is an effective option in both civilian and military populations and should be prioritized before individuals with obesity develop life-altering complications.

Given the enormous sacrifice of military service members and their families, all service branches should strive to reverse policies that stigmatize obesity and reduce discrepancies in health care access between civilian and military populations. These recommendations aren't just well-justified by the existing research; they are highly cost-effective. Upfront investments in clinical care saves tens of thousands of dollars per patient in the long run, even if those patients remain overweight.⁸¹ In addition to maximizing retention, implementing evidence-based obesity treatment programs would greatly improve military readiness, save the Military Health System at least one billion dollars annually, significantly decrease veteran disability ratings, and aid in the continuing recruitment of capable personnel.

Appendix

By replicating the Military Health System cost-of-disease methodology developed by Timothy Dall et al. (2007), ASP researchers estimate that the Department of Defense spent at least \$1.25 billion on direct care costs for active-duty service members with obesity and an additional \$99 million in lost productivity costs as a result of hospitalization for obesity and related conditions in 2023. Unlike Dall et al. (2007), this analysis targets only Active Duty and not Active, Reserve, and Tricare beneficiary populations in combination due to lack of data publicly available. This analysis assumes that direct care costs for obesity comorbidities have not significantly changed since last publication and does not account for increases in healthcare personnel salary or changes in clinical care guidelines that may raise or lower annual healthcare costs per case. These figures are likely underestimated, as limited data is publicly available on obesity-related conditions in active duty, and conservative estimates were used for both attributable risk and direct healthcare costs for each comorbidity. In addition, as musculoskeletal injuries are not published in Military Health System annual reports, this data was adopted from U.S. Army Public Health Center data published in March 2022. As a result, direct healthcare costs and lost duty costs due to hospitalization for musculoskeletal injuries are significantly underestimated.

Direct Healthcare Costs Associated with Obesity in Active Duty, 2023

| Comorbidity | Total Individuals Affected ⁸² | Attributable Risk Ratio ⁸³ | Obesity-Associated Cases | Annual Healthcare Cost per Case ⁸⁴ | Total Cost |
|-----------------------------|--|---------------------------------------|--------------------------|---|---------------|
| Overweight and Obesity | 21,039 | 1 | 21,039 | \$1,962 | \$41,278,518 |
| Musculoskeletal Injuries | 675,354 | 0.46 | 310,663 | \$965 | \$299,789,641 |
| Musculoskeletal Diseases | 256,586 | 0.22 | 56,449 | \$1,888 | \$106,575,561 |
| Sleep Apnea | 171,501 | 0.58 | 99,471 | \$4,329 | \$430,608,141 |
| Anxiety Disorders | 131,309 | 0.25 | 32,827 | \$5,684 | \$186,590,089 |
| Adjustment Disorders | 123,984 | 0.12 | 14,878 | \$4,925 | \$73,274,544 |
| Mood Disorders | 81,931 | 0.25 | 20,483 | \$3,813 | \$78,093,352 |
| Cervicalgia | 64,733 | 0.3 | 19,420 | \$513 | \$9,962,409 |
| Hypertension | 40,894 | 0.74 | 30,262 | \$3,391 | \$102,616,950 |
| Esophagus Disease | 31,545 | 0.47 | 14,826 | \$3,511 | \$52,054,613 |
| Gastroenteritis | 27,298 | 0.35 | 9,554 | \$2,721 | \$25,997,250 |
| Osteoarthritis | 21,300 | 0.36 | 7,668 | \$5,250 | \$40,257,000 |
| Lipid Metabolism Disorders | 18,865 | 0.56 | 10,564 | \$1,233 | \$13,025,905 |
| Urinary Stress Incontinence | 15,597 | 0.2 | 3,119 | \$2,944 | \$9,183,514 |
| Asthma | 15,298 | 0.25 | 3,825 | \$2,402 | \$9,186,449 |
| Testicular Hypofunction | 5,510 | 0.35 | 1,929 | \$2,100 | \$4,049,850 |
| Diabetes Mellitus | 5,025 | 0.53 | 2,663 | \$6,623 | \$17,638,705 |
| Iron-deficiency Anemia | 4,897 | 0.1 | 490 | \$37 | \$18,119 |
| Gout | 4,150 | 0.31 | 1,287 | \$108 | \$138,942 |
| PCOS | 3,452 | 0.36 | 1,243 | \$475 | \$590,292 |
| Ischemic Heart Disease | 3,053 | 0.4 | 1,221 | \$19,061 | \$23,277,293 |

| | | | | | |
|-------------------------------|-------|-------|-----|----------|------------------------|
| Cerebrovascular Disease | 2,354 | 0.22 | 518 | \$18,184 | \$9,417,130 |
| Multiple Myeloma | 655 | 0.14 | 92 | \$40,312 | \$3,696,610 |
| Multiple Sclerosis | 534 | 0.14 | 75 | \$10,943 | \$818,099 |
| Cervical cancer | 524 | 0.38 | 199 | \$8,314 | \$1,655,484 |
| Thyroid Cancer | 475 | 0.137 | 65 | \$21,936 | \$1,427,485 |
| Breast Cancer | 463 | 0.11 | 51 | \$37,889 | \$1,929,687 |
| Colon and Rectum Cancers | 352 | 0.24 | 84 | \$51,141 | \$4,320,392 |
| Prostate cancer | 221 | 0.2 | 44 | \$36,323 | \$1,605,477 |
| Cirrhosis of the Liver | 172 | 0.17 | 29 | \$7,143 | \$208,861 |
| Cholecystitis, Cholelithiasis | 91 | 0.75 | 68 | \$10,249 | \$699,494 |
| Stomach Cancer | 51 | 0.035 | 2 | \$54,851 | \$97,909 |
| Ovarian Cancer | 44 | 0.07 | 3 | \$17,206 | \$52,994 |
| Liver Cancer | 39 | 0.51 | 20 | \$25,102 | \$499,279 |
| Pancreas Cancer | 35 | 0.12 | 4 | \$21,165 | \$88,893 |
| Corpus and Uterine Cancer | 19 | 0.57 | 11 | \$15,892 | \$172,110 |
| Esophagus Cancer | 9 | 0.3 | 3 | \$62,173 | \$167,867 |
| Total | | | | | \$1,251,275,266 |

Lost Workdays Due to Hospitalization Associated with Obesity in Active Duty, 2023

| Comorbidity | Hospital Bed Days ⁸⁵ | Attributable Risk Ratio ⁸³ | Obesity-Associated Hospital Bed Days | Lost Productivity Cost due to Hospitalization ⁸⁶ |
|--------------------------|---------------------------------|---------------------------------------|--------------------------------------|---|
| Overweight and Obesity | 41 | 1 | 41 | \$98,400 |
| Mood Disorders | 69,881 | 0.25 | 17,470 | \$41,928,600 |
| Adjustment Disorders | 40,298 | 0.12 | 4,836 | \$11,605,824 |
| Anxiety Disorders | 30,773 | 0.25 | 7,693 | \$18,463,800 |
| Musculoskeletal Injuries | 14,841 | 0.46 | 6,827 | \$16,384,464 |
| Musculoskeletal Diseases | 4,365 | 0.22 | 960 | \$2,304,720 |
| Cerebrovascular Disease | 2,483 | 0.22 | 546 | \$1,311,024 |
| Gastroenteritis | 1,671 | 0.35 | 585 | \$1,403,640 |
| Colon and Rectum Cancers | 882 | 0.24 | 212 | \$508,032 |
| Ischemic Heart Disease | 834 | 0.4 | 334 | \$800,640 |
| Diabetes Mellitus | 794 | 0.53 | 421 | \$1,009,968 |
| Multiple Myeloma | 723 | 0.14 | 101 | \$242,928 |
| Esophagus Disease | 595 | 0.47 | 280 | \$671,160 |

| | | | | |
|-------------------------------|----------------|-------|---------------|---------------------|
| Osteoarthritis | 482 | 0.36 | 174 | \$416,448 |
| Sleep Apnea | 467 | 0.58 | 271 | \$650,064 |
| Cirrhosis of the Liver | 321 | 0.17 | 55 | \$130,968 |
| Asthma | 293 | 0.25 | 73 | \$175,800 |
| Cholecystitis, Cholelithiasis | 204 | 0.75 | 153 | \$367,200 |
| Thyroid Cancer | 175 | 0.137 | 24 | \$57,540 |
| Hypertension | 163 | 0.74 | 121 | \$289,488 |
| Iron-deficiency Anemia | 155 | 0.1 | 16 | \$37,200 |
| Urinary Stress Incontinence | 151 | 0.2 | 30 | \$72,480 |
| Multiple Sclerosis | 145 | 0.14 | 20 | \$48,720 |
| Breast Cancer | 134 | 0.11 | 15 | \$35,376 |
| Stomach Cancer | 91 | 0.035 | 3 | \$7,644 |
| Cervicalgia | 65 | 0.3 | 20 | \$46,800 |
| Lipid Metabolism Disorders | 65 | 0.56 | 36 | \$87,360 |
| Corpus and Uterine Cancer | 59 | 0.57 | 34 | \$80,712 |
| Liver Cancer | 40 | 0.51 | 20 | \$48,960 |
| Prostate cancer | 31 | 0.2 | 6 | \$14,880 |
| Cervical cancer | 27 | 0.38 | 10 | \$24,624 |
| Pancreas Cancer | 26 | 0.12 | 3 | \$7,488 |
| Gout | 23 | 0.31 | 7 | \$17,112 |
| Ovarian Cancer | 21 | 0.07 | 1 | \$3,528 |
| Esophagus Cancer | 14 | 0.3 | 4 | \$10,080 |
| PCOS | 8 | 0.36 | 3 | \$6,912 |
| Testicular Hypofunction | 0 | 0.35 | 0 | \$0 |
| Total | 171,341 | | 41,404 | \$99,370,584 |

Endnotes

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- ⁵ In 1987, active duty end strength was 2,163,578. See “Population Representation in the Military Services: Fiscal Year 2019 Summary Report,” *Office of the Under Secretary of Defense, Personnel and Readiness*, 2021, <https://www.cna.org/pop-rep/2019/appendixd/appendixd.pdf>. In 2023, active duty end strength was 1,305,400. See Total Force Manpower & Analysis Directorate, “Defense Manpower Profile Report Fiscal Year 2024,” *Office of the Assistant Secretary of Defense for Manpower & Reserve Affairs*, May 2023, https://prhome.defense.gov/Portals/52/Documents/MRA_Docs/MPP/FY24%20DMPR.pdf?ver=6Q-QGLuHqpXvh7_fgKqIDw%3d%3d.
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- ⁹ Courtney Manning, “Combating Military Obesity: Stigma’s Persistent Impact on Operational Readiness,” *American Security Project*, October 11, 2023, <https://www.americansecurityproject.org/white-paper-combating-military-obesity/>.
- ¹⁰ Ibid.
- ¹¹ *Addressing the Recruiting Crisis in the Armed Services, Before the U.S. House Transportation and Infrastructure Committee, Subcommittee on Coast Guard and Maritime Transportation*, 118th Congress (May 11, 2023) (Testimony of Beth J. Asch, Senior Principal Economist, RAND), <https://democrats-transportation.house.gov/imo/media/doc/RAND%20Testimony.pdf>.
- ¹² Army military bonuses from 2000 to 2008 were found by RAND to have a weak but statistically significant impact on increased applications. See Beth Asch et al., “Cash Incentives and Military Enlistment, Attrition, and Reenlistment,” *RAND*, May 14, 2010, https://www.rand.org/content/dam/rand/pubs/monographs/2010/RAND_MG950.pdf. The U.S. Government Accountability Office refuted the cost-effectiveness of increasing bonuses. See “Military Personnel: Army Needs to Focus on Cost-Effective Use of Financial Incentives and Quality Standards in Managing Force Growth,” *U.S. Government Accountability Office*, May 4, 2009, <https://www.gao.gov/products/gao-09-256>. When enlistment factors were reviewed for this report, correlation between bonuses and increased accessions was weak but statistically significant at [r(18)=.45, .044] from 2002-2022. See bonus data from Department of the Army, Fiscal Year (FY) Budget Estimates, Army Justification Book FY 2002-2024, <https://www.asafm.army.mil/Budget-Materials/>. Application and accession data from “Population Representation in the Military Services: Fiscal Year Summary Reports,” Department of Defense Office of People Analytics, <https://docs.opa.mil/opa.mil-production1/population-representation-21/Appendix%20A.%20Active%20Component%20Applicant%20Tables/Table%20A-1.%20Applicants%20for%20Active%20Component%20Enlistment,%20FY21-%20By%20Service,%20Gender,%20and%20Age%20with%20Civilian%20Comparison%20Group.pdf>.
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- ¹⁷ Jean Twenge et al., “Age, Period, and Cohort Trends in Mood Disorder Indicators and Suicide Related Outcomes in a Nationally Representative Dataset, 2005–2017,” *Journal of Abnormal Psychology* 128, No. 3 (2019): 185-199, <https://www.apa.org/pubs/journals/releases/abn-abn0000410.pdf>.
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- ²⁰ Courtney Manning, “Combating Military Obesity.”
- ²¹ According to the Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs, “All Military Departments continue to lack the required number of fully trained and qualified personnel across the Cyber Mission Force and face chronic personnel shortfalls in key work roles due in part to below average Service retention rates.” See “Defense Manpower Profile Report: Fiscal Year 2024,” *Total Force Manpower and Analysis Directorate*, 187, https://prhome.defense.gov/Portals/52/Documents/MRA_Docs/MPP/FY24%20DMMPR.pdf?ver=6Q-QGLuHqpXvh7_fgKqIDw%3d%3d.
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- ²³ “2023 Annual Report: FY 2018-2022 Disability Evaluation System Metrics,” *Disability Evaluation System Analytics and Research*, Walter Reed Army Institute of Research, 2023, https://wrair.health.mil/Portals/87/Documents/DESAR%20FY23%20Annual%20Report%20_Final.pdf?ver=LQVWHTJX4sZOO75ODsaWOw%3d%3d.
- ²⁴ A number of factors have precluded the Department of Defense from collecting and publishing accurate data on obesity-specific attrition, including absence of a clear process for reporting, a seven-year conversion of USMEPCOM databases to MHS Genesis, disagreements over what data should be reported, and the intermixing of terms for non-disability physical and mental conditions. See “MILITARY PERSONNEL: Improvements Needed in the Management of Enlistees’ Medical Early Separation and Enlistment Information,” *U.S. Government Accountability Office*, July 2017, <https://www.gao.gov/assets/gao-17-527.pdf>; “Defense Health Care: Better Tracking and Oversight Needed of Servicemember Separations for Non-Disability Mental Conditions,” *U.S. Government Accountability Office*, February 13, 2015, <https://www.gao.gov/products/gao-15-266>. For data on “condition, not a disability,” a category predominantly composed of obesity-related attrition, see “FEMALE ACTIVE DUTY PERSONNEL: Guidance and Plans Needed for Recruitment and Retention Efforts,” *U.S. Government Accountability Office*, May 2020, <https://www.gao.gov/assets/710/707122.pdf>.
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- ²⁷ The crude annual rate of illness- and injury-related healthcare visits (11.8 visits per p-yr) among ACSMs far exceed the rate of visits among civilians aged 15-24 years (1.6 visits per p-yr) and 25-44 years (2.0 visits per p-yr). See “Ambulatory Health Care Visits Among Active Component Members of the U.S. Armed Forces, 2023,” *MSMR* 31, No. 6 (June 2024): 19-25, <https://www.health.mil/Reference-Center/Reports/2024/06/01/MSMR--Vol-31-No-6-June-2024>.
- ²⁸ Joseph Knapik et al., “The Medical Burden of Obesity and Overweight in the US Military: Association of BMI with Clinically Diagnosed Medical Conditions in United States Military Service Members,” *The Journal of Nutrition* 153, No. 10 (October 2023): 2951-2967, [https://jn.nutrition.org/article/S0022-3166\(23\)72551-0/fulltext](https://jn.nutrition.org/article/S0022-3166(23)72551-0/fulltext).
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- ³³ Sixteen military studies have found strong scientific evidence of obesity (as measured by BMI) as a leading risk factor for in-service injury. See Darren Hearn et al., “Modeling Risk for Lower Extremity Musculoskeletal Injury in U.S. Military Academy Cadet Basic Training,” *Military Medicine*, March 30, 2024, <https://doi.org/10.1093/milmed/usac083>; Stefan Sammito et al., “Risk factors for musculoskeletal injuries in the military: a qualitative systematic review of the literature from the past two decades and a new prioritizing injury model,” *Military Medical Research* 8, No. 1 (2021): 66, <https://doi.org/10.1186/s40779-021-00357-w>. Military service members above body fat standards are 47% more likely to experience a musculoskeletal injury and have 49% higher health care utilization. See D. N. Cowan et al., “Musculoskeletal injuries among overweight army trainees: incidence and health care utilization,” *Occupational Medicine* 61, No. 4 (June 2011): 247–252, <https://doi.org/10.1093/occmed/kqr028>.
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- ⁶² Overweight/obese individuals with type 2 diabetes lost an average of 2.1% body weight after eight years of nutrition support and education during the longest and most comprehensive weight loss program on record. In the treatment group receiving the most intensive lifestyle intervention, only 13.3% of individuals achieved $\geq 5\%$ weight loss at year 1. See The Look Ahead Research Group, “Eight-year weight losses with an intensive lifestyle intervention: The Look AHEAD Study,” *Obesity* 22 (2015): 5-13, <https://onlinelibrary.wiley.com/doi/10.1002/oby.20662>. A meta-analysis of 14 multi-component weight loss programs found that interventions lasting 6 months or less lead to a mean weight loss of 2.59 kg. See Wendi Rotunda et al., “Weight Loss in Short-Term Interventions for Physical Activity and Nutrition Among Adults With Overweight or Obesity: A Systematic Review and Meta-Analysis,” *Preventing Chronic Disease* 21 (April 2024), https://www.cdc.gov/pcd/issues/2024/23_0347.htm. Long-term sustenance of lost weight is much more challenging, and by five years more than 80% of weight lost during weight loss programs is regained. See Kevin Hall and Scott Kahan, “Maintenance of lost weight and long-term management of obesity,” *Med Clin North America* 102, No. 1 (January 2018): 183-197, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5764193/>; James Anderson et al., “Long-term weight-loss maintenance: a meta-analysis of US studies,” *The American Journal of Clinical Nutrition* 74, No. 5 (November 2001): 579–584, <https://www.sciencedirect.com/science/article/pii/S0002916523063748>. Note: According to Douketis et al., “A major methodologic limitation of weight-loss studies involves the reporting of only mean group weight changes. Although means give clues to expected outcomes from interventions at the group level, they do not evaluate how many people attained a significant weight loss.” See Marion Franz, “Weight-Loss Outcomes: A Systematic Review and Meta-Analysis of Weight-Loss Clinical Trials with a Minimum 1-Year Follow-Up,” *Journal of the American Dietetic Association* 107, No. 10 (November 2007): 1755-1767, https://www.researchgate.net/publication/5939896_Weight-Loss_Outcomes_A_Systematic_Review_and_Meta-Analysis_of_Weight-Loss_Clinical_Trials_with_a_Minimum_1-Year_Follow-Up.
- ⁶³ A recent meta-analysis found only 21 randomized controlled trials evaluating efficacy of military weight loss programs, 19 of which centered on five treatments: behavioral and lifestyle intervention, diet and nutritional intervention, self-monitoring intervention, counseling-provided intervention, and Internet-based intervention. While multi-modal, comprehensive lifestyle interventions induced minor weight loss compared to control groups, body weight reductions across all pertinent studies were statistically insignificant and BMI values across all pertinent studies were reduced by only 0.16 BMI (95% CI -0.26, -0.06; $p=.001$), with insufficient data to support long-term weight loss maintenance. See Davide Gravina, “Randomized Controlled Trials to Treat Obesity in Military Populations: A Systematic Review and Meta-Analysis,” *Nutrients* 2023, 15(22): 4778; <https://doi.org/10.3390/nu15224778>. Also see Asma Bukhari et al., “Evidence-Based Strategies to Enhance Weight Management Programs for Adult Military Beneficiaries: A Narrative Review,” *Military Medicine* 188, Issue Supplement 6 (November/December 2023): Pages 215–224, <https://doi.org/10.1093/milmed/usad092>. Army researchers who evaluated the DoD Advanced Tactical Athlete Conditioning (ATAC) program, Ranger Athlete Warrior program, and CrossFit extreme conditioning program (ECP) found no statistically significant evidence in favor of implementation of these programs. See

Tyson Grier et al., “Extreme Conditioning Programs and Injury Risk in a US Army Brigade Combat Team,” *The Army Medical Department Journal* (Oct-Dec 2013):36-47, <https://paulogentil.com/pdf/Extreme%20Conditioning%20Programs%20and%20Injury%20Risk%20in%20a%20US%20Army%20Brigade%20Combat%20Team.pdf>.

⁶⁴ Paul Sanderson, Stacy Cledes, and Stuart Biddle, “The Correlates and Treatment of Obesity in Military Populations: A Systematic Review,” *Obesity Facts* 4, No. 3 (2011): 229-237, <https://doi.org/10.1159/000329450>; GERALYN CSIZMAR and MELINDA IRWIN, “Efficacy of Weight Loss Interventions in United States Active Duty Military Populations: A Systematic Review,” *Military Medicine* 186, No. 11-12 (November-December 2021): 1093–1099, <https://doi.org/10.1093/milmed/usab012>; Jessica Murray et al., “Selected weight management interventions for military populations in the United States: a narrative report,” *Nutrition and Health* 23, No. 2 (April 2017), <https://doi.org/10.1177/0260106017704797>.

⁶⁵ Mara Tynan et al., “Psychometric Properties of the Weight Loss Readiness Test in Active Duty Military Personnel Enrolled in a Weight Management Trial,” *Military Medicine* (May 2024), <https://doi.org/10.1093/milmed/usae221>.

⁶⁶ Jessica Morse et al., “The Impact of COVID-19 on Health Behavior Engagement and Psychological and Physical Health Among Active Duty Military Enrolled in a Weight Management Intervention: An Exploratory Study,” *Military Medicine* (22 March 2024): <https://doi.org/10.1093/milmed/usae092>.

⁶⁷ Jeannette Haynie, Joslyn Fleming, Alicia Locker, and Alice Shih, “Impacts of Marine Corps Body Composition and Military Appearance Program (BCMAP) Standards on Individual Outcomes and Talent Management,” *RAND*, March 28, 2022, https://www.rand.org/pubs/research_reports/RRA1189-1.html.

⁶⁸ Asma Bukhari et al., “Evidence-Based Strategies to Enhance Weight Management Programs for Adult Military Beneficiaries: A Narrative Review,” *Military Medicine* 188, No. 6 (November/December 2023):215-224, <https://doi.org/10.1093/milmed/usad092>.

⁶⁹ Successful induction of weight loss in the short term is not evidence that an obesity treatment is effective in the long run. Only two studies collected service member body mass data after 18-24 months post-treatment. These studies found poor maintenance of weight loss across all treatment groups, mirroring similar civilian studies on obesity maintenance over time. See Davide Gradina et al., “Randomized Controlled Trials to Treat Obesity in Military Populations: A Systematic Review and Meta-Analysis,” *Nutrients* 15, No. 22 (November 2023): 4778, <https://doi.org/10.3390/nu15224778>.

⁷⁰ Ibid.

⁷¹ Ibid.

⁷² Donna Ryan et al., “Long-term weight loss effects of semaglutide in obesity without diabetes in the SELECT trial,” *Nature Medicine* 30 (2024): 2049-2057, <https://www.nature.com/articles/s41591-024-02996-7>.

⁷³ “GAO-24-106155, DOD FOOD PROGRAM: Additional Actions Needed to Implement, Oversee, and Evaluate Nutrition Efforts for Service Members,” *U.S. Government Accountability Office*, June 2024, <https://www.gao.gov/assets/gao-24-106155.pdf>.

⁷⁴ Ibid.

⁷⁵ Dora Lendvai Wischik, Cherie Magny-Normilus, and Robin Whittemore, “Risk Factors of Obesity in Veterans of Recent Conflicts: Need for Diabetes Prevention,” *Current Diabetes Reports* 19 (July 2019): 70, <https://link.springer.com/article/10.1007/s11892-019-1191-9>.

⁷⁶ According to researchers at the Walter Reed Army Institute of Research, RMSAR reports “consist of data on only a subset of service members who have failed to meet retention medical standards – specifically, those whose cases were processed through the DES and were adjudicated by a PEB, [which] is only one possible outcome of the retention medical process.” The authors list “Administrative Separation Data for Medical Conditions Not Amounting to a Disability,” a category predominantly composed of overweight and obesity, as an untapped data source useful for their work. See “2022 Annual Report: Retention Medical Standards Analytics and Research,” Walter Reed Army Institute of Research, May 2023, <https://apps.dtic.mil/sti/trecms/pdf/AD1211504.pdf>.

⁷⁷ As of August 2024, the Department of Defense has not addressed GAO recommendations. See “DOD Health Care: DOD Should Monitor Implementation of Its Clinical Practice Guidelines,” *U.S. Government Accountability Office*, February 5, 2021, <https://www.gao.gov/products/gao-21-237>.

⁷⁸ Gail Cresci et al., “Educating future physicians in nutritional science and practice: the time is now,” *Journal of the American College of Nutrition* 38, No. 5 (July 2019): 387–94, <https://pubmed.ncbi.nlm.nih.gov/30726681/>.

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- ⁸⁰ Binny Chokshi et al., “Military Family Perspectives on Enrollment and Engagement in the WIC Program,” *Military Medicine* (14 May 2024), <https://doi.org/10.1093/milmed/usae192>.
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- ⁸³ Attributable risk statistics for obesity were derived from Tim Dall et al., “Cost Associated With Being Overweight and With Obesity”; Joseph Knapik et al., “The Medical Burden of Obesity and Overweight in the US Military”; Gregory Simon et al., “Association between obesity and psychiatric disorders in the US adult population,” *Arch Gen Psychiatry* 63, No. 7 (July 2006): 824–830, <https://pubmed.ncbi.nlm.nih.gov/16818872/>; Mika Kivimäki et al., “Association between common mental disorder and obesity over the adult life course,” *British Journal of Psychiatry* 195, No. 2 (August 2009): 149–155, <https://pubmed.ncbi.nlm.nih.gov/19648547/>.
- ⁸⁴ Direct health care costs adjusted for inflation from Tim Dall et al., “Cost Associated With Being Overweight and With Obesity”; “Evaluation of the TRICARE Program: Access, Cost, and Quality of Care Data,” *U.S. Department of Defense*, May 9, 2018, <https://www.health.mil/Reference-Center/Reports/2018/05/09/Evaluation-of-the-TRICARE-Program-Fiscal-Year-2018-Report-to-Congress>; Lanna Forrest et al., “Estimating the Cost of Injuries among U.S. Army Soldiers,” U.S. Army Public Health Center, February 1, 2022, <https://apps.dtic.mil/sti/pdfs/AD1166831.pdf>; Lori Davis et al., “The Economic Burden of Posttraumatic Stress Disorder in the United States From a Societal Perspective,” *Journal of Clinical Psychiatry* 83, No. 3 (2022):21, <https://doi.org/10.4088/JCP.21m14116>; Dawnkimberly Hopkins and Candy Wilson, “Polycystic Ovary Syndrome in Active Duty Service Women: A Retrospective Analysis,” *Military Medicine* 184, No. 9-10 (September-October 2019): 440–446, <https://doi.org/10.1093/milmed/usz023>; Yvonne Eaglehouse et al., “Contribution Of Care Source To Cancer Treatment Cost Variation In The US Military Health System,” *Health Affairs* 38, No. 8 (August 2019):1335-1342, https://www.researchgate.net/publication/334978335_Contribution_Of_Care_Source_To_Cancer_Treatment_Cost_Variation_In_The_US_Military_Health_System.
- ⁸⁵ Hospitalization data comes from the Medical Health Surveillance Monthly Report, “Hospitalizations Among Active Component Members of the U.S. Armed Forces, 2023.”
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