



PERSONNEL AND
READINESS

UNDER SECRETARY OF DEFENSE

4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

AUG 24 2023

The Honorable Ken Calvert
Chairman
Subcommittee on Defense
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

The Department's response to House Report 116-453, page 65, accompanying H.R. 7617, the Department of Defense Appropriations Bill, 2021, "Body Composition Testing," is enclosed. House Report 116-453, page 65, requests that the Secretary of Defense, in coordination with the Secretaries of the Military Departments, submit a report on the status of changes to military fitness testing and the scientific evidence that led to the changes.

The report describes updates to physical readiness standards, including body composition, which focuses on operationally-relevant physical performance requirements. Current physical fitness and body composition testing programs promote readiness by emphasizing necessary physical capabilities, minimizing injuries, and meeting Military Service-specific operational mission requirements.

Thank you for your continued strong support for our Service members. I am sending similar letters to the other congressional defense committees.

Sincerely,

A large black rectangular redaction box covering the signature area.

Gilbert R. Cisneros, Jr.

Enclosure:
As stated

cc:
The Honorable Betty McCollum
Ranking Member



PERSONNEL AND
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UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

AUG 24 2023

The Honorable Jon Tester
Chairman
Subcommittee on Defense
Committee on Appropriations
United States Senate
Washington, DC 20510

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cc:
The Honorable Susan Collins
Ranking Member



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4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

AUG 24 2023

The Honorable Mike D. Rogers
Chairman
Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515

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As stated

cc:
The Honorable Adam Smith
Ranking Member



PERSONNEL AND
READINESS

UNDER SECRETARY OF DEFENSE

4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

AUG 24 2023

The Honorable Jack Reed
Chairman
Committee on Armed Services
United States Senate
Washington, DC 20510

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Gilbert R. Cisneros, Jr.

Enclosure:
As stated

cc:
The Honorable Roger F. Wicker
Ranking Member

Report to Congressional Defense Committees



Body Composition Testing

August 2023

The estimated cost of report or study for the Department of Defense (DoD) is approximately \$7,000 for the 2020 Fiscal Year. This includes \$0.00 in expenses and \$7,000 DoD labor. Generated on Month DAY RefID: 2-6165DD3

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EXECUTIVE SUMMARY

This report is in response to House Report 116–453, page 65, accompanying H.R. 7617, the Defense Appropriations Bill, 2021, which requests that the Secretary of Defense, in coordination with the Secretaries of the Military Departments, submit a report to the congressional defense committees on the status of changes to military fitness testing and the scientific evidence that led to the changes.

Updating physical readiness standards, including body composition, focuses on operationally-relevant physical performance requirements. Physical readiness standards are based on scientific research, and establish both health-based criteria and operational physical performance-based criteria for physical fitness. Current physical fitness (PF) and body composition (BC) testing programs promote readiness by emphasizing necessary physical capabilities, minimizing injuries, and meeting Military Service-specific operational mission requirements.

Military Service fitness tests, at minimum, address the primary physical fitness components of cardiorespiratory endurance, muscular strength, muscular endurance, and BC for all Military Service applications. For career fields, where it is deemed necessary to ensure adequate skill, performance, and safety, the Military Services promote physical fitness programs that incorporate occupationally-specific physical fitness requirements.

Body composition is not mutually exclusive to PF; BC is inherent to fitness, and it is a PF component as recognized by exercise physiology texts and numerous exercise/fitness professional organizations. “Overweight” does not necessarily equal “overfat,” and it is important that Department of Defense (DoD) BC standards are linked to substantiated health standards, common tasks, or military occupational specialty (MOS)-specific task criteria.

Updates to PF and BC standards account for new data associated with pregnancy and postpartum BC. Affording a postpartum Service member more time before mandating fitness testing and BC compliance enables a fuller recovery and lower injury risk, as well as preventing potential long-term persistent factors and eliminating potential impact on reduced breast milk production due to rapid weight loss.

Due to the emphasis on physical readiness over weight reduction/management, Service members who fall below Military Service-required fitness standards are placed in remedial programs that prescribe physical training/exercise activities, nutritional, and behavioral counseling in accordance with medical guidance. Service members are referred to medical authorities for evaluation upon entry in remedial training, and medical evaluation provides recommendations for continued physical training, or specifies medically limiting circumstances.

INTRODUCTION

House Report 116–453, page 65, accompanying H.R. 7617, the Defense Appropriations Bill, 2021, “Body Composition Testing,” requests a report on the status of changes to military fitness testing and the scientific evidence that led to the changes.

The Committee recognizes the need for body composition testing for servicemembers to be based on medically tested and scientifically accurate indicators of health and fitness. The Committee directs the Secretary of Defense, in coordination with the Service Secretaries, to submit a report to the congressional defense committees not later than 90 days after the enactment of this Act on the status of changes to military fitness testing and the scientific evidence that led to the changes.

The DoD last formalized PF and BC requirements in Department of Defense Instruction (DoDI) 1308.3, “DoD Physical Fitness and Body Fat Programs Procedures,” which was published in 2002. Updates to the DoDI are in-progress, and current PF and BC standards and training in the Military Services reflect scientific evidence, and emphasize warfighter lethality and performance.

PHYSICAL FITNESS TESTING

Mission requirements have re-emphasized warfighter lethality and performance (Department of Defense, 2018). Compared to previous physical readiness standards, which conflated physical performance with health behaviors standards as a condition of employment, updates to physical readiness standards, including BC, focus on operationally-relevant physical performance requirements. Physical readiness standards are based on scientific research, and establish both health-based criteria and operational physical performance-based criteria for physical fitness (Friedl & Vogel, 1999; Caspersen, Powell, & Christenson, 1985). These standards meet occupationally-specific, operationally-relevant physical requirements for physically demanding career fields, and includes identifying specific physical capabilities required by the physically demanding occupational specialties (e.g., the occupation’s mission critical operational physical tasks).

The Military Services design PF and BC testing programs that: (1) promote combat readiness; (2) minimize injuries; and (3) meet Military Service-specific operational mission requirements. Research conducted by the Military Services (Friedl & Vogel, 1999) determined that PF should emphasize two separate objectives of physical training and physical readiness standards: health-based criteria for minimal generalized physical readiness (e.g., overall health-based fitness); and job-specific physical capabilities for occupationally-specific, operationally-relevant physical readiness (Nindle, et al., 2015; Caspersen, Powell, & Christenson, 1985).

Health-based criteria leverage science-based physical testing and training programs, which promote physical fitness required to maintain health and fitness for general duty, and help prevent negative consequences of suboptimal fitness, such as musculoskeletal injury. Comparatively, to account for occupationally-specific, operationally-relevant physical requirements for physically demanding career fields, specific physical capabilities required by these occupational specialties are identified (e.g., the occupation’s mission critical operational physical tasks), and result in the development of specific physical fitness tests and standards associated with each identified occupational physical task or group of tasks (Foulis, 2017; Sharp, et al., 2017).

Military Service fitness tests, at a minimum, address the primary physical fitness components of cardio-respiratory endurance (aerobic fitness), body composition, muscular strength, and muscular endurance for all Military Service applications. Military Service-wide standards for these components are considered generalized baseline fitness levels, and are not intended to represent occupationally specific fitness demands. Raw performance on these tests are formally recorded for all Service members, regardless of sex, age, or rank; however, general physical readiness scoring standards may be adjusted for sex and age.

For career fields, where it is deemed necessary to ensure adequate skill, performance, and safety, the Military Services may promote physical fitness programs that incorporate occupationally-specific physical fitness requirements. These occupationally-specific physical standards are age, rank, and sex independent, and development of these additional physical fitness standards include a risk assessment for prevention of injuries, and reflect levels of physical abilities necessary to meet the duty-related physical demands of the occupation.

Detailed analyses of common tasks and military job specialties are leveraged to develop practical test batteries, which are predictive of a Service member's ability to safely and effectively assess occupational physical performance associated with high physical demand job specialties tasks (Foulis, 2019; Foulis, 2017; Baumgartner, Logan, Gruse, Hale, & Batterton, 2016; NATO, 2019). Further highlighting the need for occupationally-specific standards, supporting data associated with occupational physical demands links predictive test standards to rates of job attrition and musculoskeletal injury. The U.S. Army Physical Demands Study identified a common set of exercise constructs associated with common Soldier and MOS-specific tasks (Foulis, 2017). Similarly, operationally relevant physical fitness tests for U.S. Air Force Battlefield Airmen were more effective than general physical fitness tests with normative standards for reflecting task achievement in military occupations (Baumgartner, Logan, Gruse, Hale, & Batterton, 2016). These studies illustrate the benefit of developing occupation and operationally-specific standards that are highly predictive of performance, require no complex equipment, cover a range of physical fitness domains, and focus on DoD mission requirements, promoting a ready force.

The Military Services consider emerging science and training methodologies when designing appropriate physical fitness training. Established physical training resources and courses certified by professional exercise science organizations are leveraged to create and conduct physical training programs and fitness assessments. For example, individuals with high fitness levels and high non-fat mass may be misclassified as "overweight" when assessed by weight-for-height or Body Mass Index (BMI) standards alone; thus, additional considerations must be taken into account when assessing these individuals for fitness standards. Consequently, if high scores on physical fitness tests are attained which may enhance duty-related physical requirements (e.g., high muscular power or strength), individuals could be considered for exemption from negative consequences of exceeding body fat (BF) standards (Pierce, et al., 2017). These type of exemptions promote physical training and exercise in a manner that minimizes scientifically-recognized risks of injury or other adverse health outcomes, such as poor nutrition fitness or fatigue. Furthermore, these exemptions aim to minimize exclusion of military members who are overweight or overfat by traditional standards, but otherwise excel on certain fitness attributes required of selected occupations.

Physical training is more important than physical fitness testing. High rates of musculoskeletal injury during military training and high rates of attrition during the first term of enlistment highlight the need to move away from previous/outdated training models, which focused on high-volume running and resulted in overuse injuries (Knapik, et al., 2005). In addition, integration of other readiness components (e.g., sleep, nutrition, mental outlook) are emerging as important aspects of more effective physical training including musculoskeletal remodeling and repair. Thus, it is imperative that physical training follow key exercise principles of consistency, progression, and proper overload, and also attempt to reduce overuse and overtraining related musculoskeletal injuries.

Current policies and programs assist in motivating Service members toward the achievement of high fitness standards. For example, Military Services leverage the use of ability groups, which is especially important for unfit Service members, bringing individuals of similar fitness levels together to provide cohesion, support, and motivation while exercising at a level that is more likely to be appropriate to their needs. (Hewett, Meyer, Ford, Paterno, & Quatman, 2016; Hong & Kim, 2018). Additionally, policies and procedures are in place which prescribe PF/BC programs that are scientifically shown to enhance physical capabilities needed for job performance, while minimizing risk of adverse health outcomes. These PF/BC programs focus on frequency, volume, and intensity of physical training and exercises to optimize performance in a context that minimizes musculoskeletal injury, particularly those due to overuse.

BODY COMPOSITION TESTING

Described above, evolving mission requirements in the last several years have re-emphasized warfighter lethality and performance (Department of Defense, 2018). BC is not mutually exclusive to PF, but rather inherent to fitness, and is a core PF component as recognized by exercise physiology texts and numerous exercise/fitness professional organizations (e.g., The American College of Sports Medicine, National Strength and Conditioning Association, National Heart, Lung, and Blood Institute (NHLBI), American Heart Association, National Institutes of Health, President's Council on Fitness, Sports, and Nutrition, National Association for Health and Fitness, National Coalition for Promoting Physical Activity, American Council on Exercise, Medical Fitness Association, IDEA Health & Fitness Association, International Health, Racquet and Sportsclub Association, Shape Up America). Similar to PF, the latest updates to BC policies and procedures (as indicated in this report) are based on scientific research and utilize a hybrid of health-based criteria and operationally-relevant physical performance requirements.

Evaluating BC via weight-screening thresholds is a vestigial remnant of standards that were used 40 years ago. Further, Military Service observations indicate that shifts in weight screening thresholds are associated with changes in fitness and demographic diversity. Weight-screening may, in fact, overlook metabolically obese individuals that screen as normal weight (e.g., "skinny fat"). Given the limited data associated with sex-specific relationships between weight, body composition, and performance, weight-screening may not be the most accurate measurement for the increasing representation of female Service members in all MOS roles.

Weight screening, such as BMI, which is an anthropometric index of weight divided by height squared ($\text{weight (kg)} / \text{height (m)}^2$), is not based on fat content or distribution, is not a true

measure of overfat/obesity, and does not appropriately assess the metabolic effects of excess fat on cardiovascular health (Lee, Blair, & Jackson, 1999; Zhu, et al., 2002). Further, BMI does not adequately evaluate on the individual level: type of mass (e.g., bone, muscle, or fat); type of mass gained or lost; or the relationship between BC and health outcomes. The use of BMI alone may result in the misclassification of healthy, overweight, or obese adults (Tomiyama, Hunger, Nguyen-Cuu, & Wells, 2016).

“Overweight” does not necessarily equal “overfat,” particularly on the individual level. For example, two individuals that have the same weight and height will exhibit the same BMI; however, these individuals may have different types of mass (e.g., muscle vs. fat), which contribute to the BMI result. These individuals may also exhibit vastly different levels of physical performance (Pierce, et al., 2017) and different levels of fat-related health risks (Hruby, et al., 2017) (e.g., cardiovascular diseases (CVD)). Briefly, BMI potentially misclassifies Service members with high levels of fat-free mass (e.g., muscle) as overweight or obese. Conversely, BMI can misclassify Service members with low fat-free mass, but high fat mass (e.g., “skinny fat”), as healthy. These misclassifications have negative performance and health implications, and potentially result in misapplication of intervention resources (e.g., missing an intervention opportunity for Service members that are “skinny fat” and/or unfit, yet classified as BMI “healthy”).

Height-weight screening tables are poor predictors of obesity in high performers (Wellham & Behnke, 1942; Wilmore & Behnke, 1969; Wilmore & Behnke, 1970), and data shows that BMI misclassifies various military members; Service members with a BMI greater than 25 kg/m² labeled as “overweight” and deemed a higher health risk, can also exhibit a relatively high fitness levels and a BC comprised of high fat-free mass. Further illustrating potential misclassification, studies show that some Service members that fail body composition standards can achieve exceptional physical fitness scores (Jones, et al., 2017) (Friedl K. , 2002), and preliminary unpublished observations demonstrate that female soldiers engaged in strength training with exceptional performance, may not be correctly assessed for BF with BMI methods.

While BC standards exist to promote physical readiness and motivate fitness behaviors, current screening weights are viewed as actual standards, and processes may stigmatize Service members who must be subsequently assessed for body fat using alternative methodology. In addition to being poor predictors of BC, height-weight screening thresholds are poor predictors of total adiposity, body fat distribution, fat deposition pattern, and cardiorespiratory endurance (CRE), and BC taping methodology is vulnerable to sex and ethnicity biases, and may “encourage” unhealthy fat and other risky health behaviors. Thus, individuals with proven high physical fitness achievement should be protected from BC standards, especially if they demonstrate exceptional performance. As described in the previous section, the evolving science has been leveraged to enable the Military Services to implement policies that exempt personnel from negative consequences of exceeding BF standards if high scores on physical fitness tests are attained.

Impaired performance and disease susceptibility are not mediated solely by overall body fat mass, and depend largely on differences in regional body fat distribution. Locations of fat deposits (android (apple-shaped) vs. gynoid (pear-shaped) fat distribution patterns) are more

important than actual amount of fat, with particular regard to metabolic health. Better evaluators of BC include measures of central adiposity, such as abdominal circumference (AC), waist-to-height ratio (WHtR), fitness-fatness index (FFI), or any combination thereof. These measures are superior to BMI for assessing health risk and injury risk, and may be coupled with total adiposity measures for assessing performance.

AC can be utilized as an anthropometric predictor of visceral adipose tissue (VAT), which is involved in the etiology of metabolic disturbances. Medically labile VAT significantly predicts disease risk factors and morbidity, independent of BMI; therefore, AC can also be used to predict health risks (e.g., CVD) (Nye, et al., 2014; Janssen, Katzmarzyk, & Ross, 2002; Kannel, et al., 1991). Measuring AC is a simple and convenient measure, highly reproducible, and positively correlates with body fat percentage and intra-abdominal fat content, regardless of BMI level. However, there are short-comings with using AC alone without correction for height, as it may be biased against taller Service members.

WHtR evaluates BC, accounting for stature (Han, et al., 1997), and evaluating BC with FFI adjusts for WHtR to produce a single value that incorporates central adiposity and stature with respect to a Service member's fitness level ($FFI = CRE / WHtR$). Because FFI accounts for changes in fitness or fatness, it is an advantageous measure that addresses PF components for health and fitness (Firth & Loprinzi, 2017). Importantly, FFI increases Service member autonomy – the individual has control, and can mitigate some of the negative consequences of higher AC by improving CRE (e.g., aerobic test score). Thus, the greater the CRE, the larger the allowable AC.

Individual readiness standards are different than NHLBI obesity guidelines that established single male and female waist circumferences (e.g., AC) as public health goals in the 1980s. Abdominal circumference methodology employs science-based health criterion standards which are independent of BMI, unlike the 1988 NHLBI guidelines. Fitness levels (e.g., CRE) are inversely proportional to abdominal fat independent of BMI, and higher CRE reduces health risk across all categories of BC (Nevill, Duncan, & Sandercock, 2017; Firth & Loprinzi, 2017). Further, higher levels of CRE and muscle fitness mitigate some of the negative effects of fat (lower BC fitness scores) (Lee, Blair, & Jackson, 1999), illustrating an inextricable inverse relationship between CRE and central adiposity.

It is important that DoD BC standards are linked to substantiated health standards, common tasks, or MOS-specific task criteria. Body composition standards exist to ensure physical readiness and motivate healthy fitness behaviors. For instance, studies indicate a correlation between females with a higher BMI and low injury rates during physically demanding training (Jones, et al., 2017) therefore, it is important to accommodate for more muscularly dense women that perform at high levels of physical fitness vice succumbing to poor nutrition and unhealthy habits to meet weight-for-height standards.

When assessing BC, the interrelationships of sex, age and fitness should also be kept in mind (APHC HoF 2020 in press). For instance, Army surveillance data demonstrate that, on average, women have a higher BF percentage and run slower than men on timed running events (e.g., 2-mile run). Taking age into account, as women and men age, successively higher age

groups exhibit higher BF percentages and slower runtimes for two miles compared to their younger counterparts. Although there are some exceptions, sex and age have predictable effects on BC and aerobic fitness (e.g., increased body fat percentage and slower run times, respectively), and sex appears to further modify age-associated declines changes in BC and physical performance.

Service members who fall below Military Service-required fitness standards are placed in remedial programs that prescribe physical training/exercise activities, nutritional, and behavioral counseling in accordance with medical guidance. Service members are referred to medical authorities for evaluation upon entry in remedial training, and medical evaluation provides recommendations for continued physical training, or specifies medically limiting circumstances.

PHYSICAL FITNESS, BODY COMPOSITION, AND PREGNANCY

Updates to PF and BC standards account for new data associated with pregnancy and postpartum BC. Pregnant Service members are exempt from said PF and BC assessments for 12 months from date of delivery, where additional time may be granted, as necessary, due to unique medical circumstances, including difficult pregnancies, cesarean sections, or still births. Affording a postpartum Service member more time before mandating fitness testing and BC compliance enables a fuller recovery and lower injury risk, as well as preventing potential long-term persistent factors and eliminating potential impact on reduced breast milk production due to rapid weight loss.

The American Academy of Pediatrics recommends that infants be exclusively breastfed for the first 6-months, with continued breastfeeding along with introducing complementary foods for a year or longer. Joint laxity persists for approximately 3 months following termination of lactation for women that breastfeed. While joint laxity persists, Service members who are postpartum are recommended to take a gradual approach for introducing high impact, high intensity activities, with maximal exertion avoided during this period to avoid injury (Butte, Wong, Treuth, Ellis, & Smith, 2004).

Updates to PF and BC policies associated with pregnancy account for: (1) children of women with inadequate weight gain during pregnancy are at risk for obesity and insulin resistance, depending on the affected stage of pregnancy; and (2) guidelines for appropriate weight gain during pregnancy differ on the basis of pre-pregnancy weight status (Ravelli, 1998; Ravelli, Stein, & Susser, 1976; Normile, 2018) (Butte, Wong, Treuth, Ellis, & Smith, 2004). CRE and BC are very important fitness components during pre-conception, pregnancy, and postpartum. Additionally, data indicate that service women can generally return to pre-partum BC and fitness programs within 12 months postpartum if they engage in safe and appropriate physical training and nutritional regimens (Mottola, 2009; Mottola M. , 2010; O'Toole, 2003).

Pregnant Service members should engage in appropriate physical activity to maintain healthy gestational weight gain and aerobic and anaerobic fitness throughout the pregnancy and postpartum period, in accordance with medical guidance. Moderate-to-high participation in the Army's Pregnancy Postpartum Physical Training (P3T) resulted in better postpartum recovery in 2-mile run time performance, postpartum recovery in sit-up performance, and a lower Army

Body Composition Program failure rate compared to non-to-low participation. Proportions of Soldiers sustaining a musculoskeletal injury during pregnancy and postpartum did not appear to differ between groups (Dada, et al., 2020). Additionally, exercise regimens should consist of routines that include physical training and nutritional counseling. The Army P3T Program and the nascent Air Force/Space Force P4 Program for female Service members are examples of best practices employed in the DoD.

CONCLUSION

Updating physical readiness standards, including BC standards, has re-focused on operationally-relevant requirements. Physical readiness standards are based on scientific research, and establish both health-based criteria and operational physical performance-based criteria for physical fitness. Current PF and BC testing programs promote readiness by emphasizing necessary physical capabilities, minimizing injuries, and meeting Military Service-specific operational mission requirements.

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APPENDIX: LIST OF ACRONYMS

ACRONYM	Description
AC	abdominal circumference
BC	body composition
BF	body fat
BMI	Body Mass Index
CRE	cardiorespiratory endurance
CVD	cardiovascular disease
DoD	Department of Defense
DoDI	Department of Defense Instruction
FFI	fitness-fatness index
MOS	military occupational specialty
PF	physical fitness
P3T	Postpartum Physical Training
WHtR	waist-to-height ratio
VAT	visceral adipose tissue