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What is Fit? The Misconception of Fitness and Fatness: A Review of Body Composition Standards and Physical Readiness Policy Alternatives for the U.S. Navy

March 2022

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

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ABSTRACT

This thesis utilizes Eugene Bardach's eight-step method from *A Practical Guide for Policy Analysis* to analyze the Navy's height-weight standards and policies that affect physical fitness performance. It discusses the history of the height-weight standards and the Navy policy changes to the physical readiness program, compares the Navy to other services, and proposes four alternative adaptations to the policy. The first option is to maintain status quo and continue to use height-weight standards based on the body mass index. The second option is to allow body composition assessment failures to complete the physical readiness test (PRT) and exempt height-weight standards for service members with an overall outstanding PRT score. The third option is to add an additional test to assess attributes of fitness. The fourth option is to eliminate weight standards, increase fitness standards for passing, and focus on physical fitness vice body composition analysis. The purpose of this research is to provide a policy review of the United States Navy body composition program, with a specific analysis of the policy change of NAVADMIN 141/17 that allowed for validation of the PRT. Using data from the Army's Person- Event Data Environment, the research shows that adopting a policy that incentivizes physical performance is the most ideal policy change.

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I have to start by thanking my mother for her unconditional love and support. My mom and kids are the reason I am a naval officer today; they drive me to be the best daughter, mother, and woman I can be. There are not enough words to express how much I love and appreciate them. Their happiness allows me to show up and be great every day. When I am smiling and have the most positive optimistic attitude, it is because they show me that anything is possible with love and support.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABCP	Army Body Composition Program
AC	Abdominal Circumference
ACFT	Army Combat Fitness Test
BC	Body Circumference
BCA	Body Composition Assessment
BCP	Body Composition Program
BMI	Body Mass Index
CFT	Combat Fitness Test
CV	Circumference Value
DOD	Department of Defense
FEP	Fitness Enhancement Program
OPNAV	Office of the Chief of Naval Operations
PDE	Person-Event Data Environment
PFA	Physical Fitness Assessment
PFT	Physical Fitness Test
PRIMS	Physical Readiness Information Management Systems
PRT	Physical Readiness Test

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I. INTRODUCTION

A. BACKGROUND

According to the most recent Office of the Chief of Naval Operations (OPNAV) Instruction 6110.J dated July 11, 2011, the purpose of fitness standards is to "maintain a minimum prescribed level of physical fitness necessary for world-wide deployment" (p. 2). The physical fitness assessment (PFA) includes medical screening, a body composition assessment (BCA), and a physical readiness test (PRT) (Chief of Naval Operations, 2011). Failing the BCA portion of the PFA is an overall PFA failure (Chief of Naval Operations, 2015). Department of Defense (DOD) Instruction 1308.3 codified the current DOD body composition standard. A body fat assessment is used to determine if service members are overweight (Department of Defense, 2002). The Navy uses a body fat estimation calculation to assess body fat based on an equation from research performed by Hodgdon and Beckett (1984a). The Navy is mandated to use the DOD's body composition standard, but it can adapt policy to meet the needs of the Navy (Department of Defense, 2002). The policies that evaluate physical readiness need to be reevaluated to ensure Navy personnel "maintain a level of physical fitness required to support overall mission readiness" (Chief of Naval Operations, 2011).

To satisfy mission requirements, an official PFA shall be completed twice a year. To pass the PFA, the member must be within body composition assessment standards. The Navy has a three-step process to assess body composition. Step one uses height-weight tables as a preliminary screening. If the member exceeds weight for height screening based on body mass index (BMI), the second step is a single-site abdominal circumference (AC) measurement. This is commonly known as taping. If the member exceeds the AC, the third step is a body circumference (BC) measurement (Chief of Naval Operations, 2015).

Physical fitness research has recently focused on the undue influence of body size on outcome measures (Vanderburgh & Crowder, 2006). Body size is measured beyond fitness levels, which tend to penalize heavier individuals. The force is more diverse and

has changed drastically from 1984 when the study by Hodgdon and Beckett was completed, but the height and weight standards have seen no change.

BMI is a poor indicator of body fat percentage (Nuttall, 2015). BMI is defined as the body weight in kilograms, divided by the square of the body height in meters. The DOD uses BMI as an indicator if a service member is overweight because the height and weight measurements are easily accessible and inexpensive to acquire. The weight status categories are the same for men and women of all ages. Standard weight status categories are used to interpret BMI as shown in Table 1.

Table 1. Weight Status Categories Based on BMI Adapted from Pihlainen et al. (2020).

BMI	Weight Status
Below 18.5	Underweight
18.5-24.9	Normal Weight
25.0-29.9	Overweight
30.0 and above	Obesity

BMI is commonly used as a risk factor for the development of health issues and to determine public health policy, but a misinterpretation is BMI is an index for fatness (Department of Defense, 2002). BMI is the metric used to determine the maximum weights in the height-weight tables. There is a strong correlation between BMI and body fatness, but body fatness may be different even for two people with the same BMI. Gender, race, age, and physical fitness level are all factors that the BMI calculation fails to consider. For example, a person with a high fitness level may have a BMI over 30 and be considered overweight or obese because their weight is high due to higher percentage of muscle mass.

Strength is a significant measure of fitness, but the current height-weight standards may discourage muscle gain and consequentially limit strength because the standards do not consider muscle mass. To maintain a sailor's long-term health and wellness, we must use a standard that tests physical fitness rather than a Sailor's ability to stay below a specific

BMI. Rather than continuing to make modifications to conform to a policy, applying a performance-based adaptation should lead to a healthier, stronger Navy.

B. PURPOSE

This policy review uses Eugene Bardach's eight-step method of policy analysis to analyze the Navy's use of height-weight standards and policies that affect physical fitness performance. The Army's Person-Event Data Environment (PDE) is a collaborative virtual database across various DOD's military and civilian services (Vie et al., 2015). I used Physical Readiness Information Management Systems (PRIMS) Physical Readiness Test (PRT) data from the PDE to analyze weight status and performance before and after NAVADMIN 141/17. The results show that performance-based incentives may increase physical performance. This increase in physical performance will drive the recommendation for additional policy change.

This thesis answers the following questions:

1. What policy change to the physical readiness assessment program will maximize physical performance in the Navy?
2. Did NAVADMIN 141/17, which allowed for PRT validation, lead to better performance on the PRT for women and men?

C. ORGANIZATION OF THESIS

This thesis consists of six chapters. The first chapter provides the background, purpose, the research questions and gives the overall organization of the thesis. Chapter II identifies the problem with height-weight standards and use of BMI in the body composition assessment program. It includes the literature review and current physical readiness program policy. I provide a history of DOD standards, the Navy's policy changes to the physical readiness program, and overview the body composition assessment and use of BMI. Chapter III compares the Navy's physical readiness policy to adaptations of other military services. Chapter IV includes an analysis of NAVADMIN 141/17 policy change with data from the PDE. This analysis supports the policy analysis and aids in selecting the best alternative. Chapter V constructs policy alternatives, applies criteria for consideration,

and projects outcomes and tradeoffs for each course of action. Chapter VI concludes the thesis with the policy recommendation.

II. PROBLEM DEFINITION, HISTORY, AND LITERATURE REVIEW

A. PROBLEM DEFINITION

Body composition standards across the services is mandated by the DOD. The problem is the method used to estimate body composition is inaccurate and is known to overestimate body fat percentages, making it harder for Sailors to meet standards as prescribed (Hogan, 2015). The weight standard is arbitrary and strength-limiting if a person can obtain a superior fitness level at a higher weight. The standards are for weight control to decrease risk for serious health conditions, but the standards do not consider body type.

Part of the job of a service member is to maintain a certain level of physical fitness. Like athletes, servicemembers must meet a specific level of physical performance to achieve their daily goals. Athletes come in different sizes, shapes, and fitness levels, depending on tasks of their respective sport. For example, a body builder will not have the same body type or level of physical performance as a basketball player. Athletes tend to weigh more and have different body compositions than the average person. Increased muscle mass is necessary to perform the tasks of their respective sports or meet their personal fitness goals. Athletes that have higher weights because of their increased lean muscle mass are not necessarily at higher risk of serious health conditions or any less healthy. Not all servicemembers are athletes, but the necessity to be healthy and optimally perform their duties and responsibilities can be assimilated. Different body types of service members should also be considered when assessing physical fitness. Since the Navy cannot control the DOD's body composition standard, the Navy should focus on a policy amendment to incentivize fitness.

The PRT evaluates a Sailor's ability to meet minimum requirements based on a physical readiness assessment. The first step of the physical readiness assessment before the physical fitness test is the body composition analysis. If the BCA is failed, the overall PFA is a failure, no matter the score on the PRT. The Navy can adapt a policy to circumvent the use of DOD standards that doesn't undermine the intentions to reduce overall health

problems but focuses on physical fitness. A metric to determine how fit a Sailor is exists, utilizing the PRT scoring scale. The objective of this study is to cultivate a fitness culture that strives to exceed minimum standards. The policy analysis question derived from the problem of using an inaccurate body fat estimation to control weight is: What policy change to the physical readiness assessment program can be made to maximize physical performance of Sailors in the Navy?

1. What Is the Cause of the Problem?

The cause of the problem is the inaccuracy of the body fat calculation and use of BMI for height-weight standards to classify weight categories. The physical readiness program, specifically the body composition assessment policy, is analytically manageable, and all Services have made policy changes to mitigate the body composition standards. The broader DOD Instruction, based on a 1984 study, has not changed since 2002. Every service can implement and tailor its physical fitness program to suit its needs and the mission of their respective service (Department of Defense, 2002)

The current DOD policy uses BMI to categorize weight status. If a Sailor's weight status is overweight or obese, body fat estimation is completed using the taping method to complete the BCA. The body fat percentage estimation is the problem because lean muscle mass is not considered in the estimation. Using the taping method to estimate body fat percentage is known to be inaccurate (Hogan, 2015). Physical requirements to pass the BCA portion of the PFA should not use an outdated body composition standard with an emphasis on being thin and not fit. So I ask, what is fit? How can we use our physical fitness assessment to evaluate fitness? What policy mitigation to the PFA can the Navy institute to maximize physical performance?

2. Defining Success

Identifying who is affected and what policy change will benefit Sailors and the Navy is difficult. Accurately identifying the population is hard because it is difficult to quantify how many people lose weight to stay within standards. A weight stigma may exist in the military because of the weight standards (Schvey et al., 2017). The stigma of being overweight or obese may cause some Sailors to meet standards by any means necessary.

One consequence of failing any portion of the PFA is enrolment in the Fitness Enhancement Program (FEP) (Chief of Naval Operations, 2011). A danger zone can be identified as people who are within five pounds of the weight standard to account for people who may also benefit from a policy change. The policy can be evaluated by identifying the people enrolled in FEP and the number of people in the danger zone.

Allowing for a policy to relax the standards while creating a fitness incentive should provide a healthier and stronger force, benefiting the Navy. This change can be evaluated with PRT scores that assess physical fitness beyond height-weight standards. This can be quantified with the increase in PRT scores of the service members, decrease in the number of service members enrolled in FEP, and a decrease in administrative separations for PRT failures.

3. An Opportunity to Increase Fairness

The current body fat estimation tends to overestimate body fat percentage (Hogan, 2015). The current measurement practices are the simplest and least costly methods, but they are flawed. An opportunity for policy improvement should not be ignored. The confining idea "If it ain't broke don't fix it" restricts the search of plausible opportunities for creative policy improvements (Bardach, 2012)

Using outdated metrics on a more diverse military population and not taking that into account with the current standards is a battle that the DOD must take on to ensure fairness. A latent opportunity the DOD can exploit is creating height-weight standards of the current population. The number of women entering the Services since 1984 has increased. The diversity in the force for gender, race, age, and ethnicity should be considered. The Navy cannot circumvent the body fat assessment policy by the DOD, but it can continue to try to creatively balance health and physical readiness.

B. LITERATURE REVIEW

For this thesis, I explain the DOD directives that guide the Navy policy for the physical fitness and body fat programs. This history gives a better understanding of the broader DOD directives and instructions that drive Navy policy and gives context to

changes that have occurred. In the military, knowing the instructions is key. When asking questions, there is always an instruction that can be referenced. The best place to start is the beginning.

1. DOD Standards Policy Establishment

Current standards and policy are out of date. Current standards are based on an equation that was made from a 1984 study, and the broader DOD directive was revised in 2004, nearly twenty years after the study (J. Hodgdon et al., 1990). DOD Directive 1308.1, "DOD Physical Fitness and Body Fat Program," issued July 20, 1995, is the first iteration of the policy that "directed all military services to determine body fat composition and body fat standards consistent with the mission of their respective services" (J. Hodgdon et al., 1990, p. 57). The second and most recent iteration of the directive was issued June 30, 2004. It updated and canceled the 1995 policy governing physical fitness and body fat standards in the Armed Services.

The body fat policy is to "maintain desirable body composition because it is an integral part of physical fitness, general health, and military appearance" (Department of Defense, 1995, p. 2). DOD Instruction 1308.3, "DOD Physical Fitness and Body Fat Procedures," dated November 5, 2002, is the policy instruction for the procedures the Services must follow. These two policies are the guiding policy principles set by the DOD. The evolution of the establishment of the standards, the science and research done to validate the standards, and the assessment of the Navy's policies are pivotal in establishing a policy recommendation.

2. Studies that Assess Body Fat

a. Hodgdon and Beckett Studies

After the establishment of the height-weight standards, the establishment of body fat percentage standard was used for weight control decisions. Studies used for body fat estimation in the late 1980s are provided in Table 2. Every service used a different method for assessment and assessing anthropometric attributes.

Table 2. Circumference Based Estimate used by Each Service in the 1980s. Adapted from Hogan (2015).

Service	Study	Male Attributes	Female Attributes
Marine Corps	(Wright, Howell F.; Dotson, Charles O.; and Davis, Paul O., 1980, 1981)	Abdomen, Neck	Biceps, Forearm, Neck, Abdomen, Thigh
Navy	(J. A. Hodgdon & Beckett, 1984a)	Abdomen, Neck, Height	Abdomen, Hip, Neck, Height
Army	(Vogel et al., 1988)	Abdomen, Neck, Height	Weight, Wrist, Neck, Forearm, Hip, Height
Air Force	(Fuchs et al., 1978)	Flexed Bicep, Height, Weight	Forearm, Height, Weight

OPNAV Instruction 6110.1B entitled "Health and Physical Readiness" established the body fat assessment measurement of the neck and abdominal circumference comparison tables based on an equation developed by Wright, Dotson, and Davis (1981) from an underwater weighting experiment on a sample of Marines (J. A. Hodgdon & Beckett, 1984a; Wright, Dotson & Davis, 1981). The Navy adopted this interim equation for use in its instruction until a study was completed on a sample of Navy personnel. In 1984 the Naval Health Research center conducted a study of 602 male navy personnel ages 18 to 56 years old (J. A. Hodgdon & Beckett, 1984a). A concurrent study was done on 214 female navy personnel ages 18 to 44 years old (J. A. Hodgdon & Beckett, 1984b).

The results of the study were cross validated the equation on samples of Navy men and women to present a new equation with improved prediction because arthrometric predictive equations are population specific (J. A. Hodgdon & Beckett, 1984a). According to the cross correlation using other methods, results of the Hodgdon and Beckett study on men were that the predicted and measured body fat have a correlation coefficient of 0.90 with a standard error of 3.52 percentage points (J. A. Hodgdon & Beckett, 1984a). The conclusion of the study of the male population was the equation for the prediction of percent body fat represented a meaningful improvement with a sample of the intended population (Hodgdon & Beckett, 1984a). Exclusively using Navy personnel in the study, vice Marines like the Wright, Dotson, and Davis study, yielded better predictions of body fat. The new equation did not rely on skinfold thickness, but height was required as an additional measurement for accuracy.

The results of the prediction study of female personnel suggested the prediction might be improved by the addition of skinfold thickness but the measures do not affect the magnitude of the correlation coefficient of 0.85 (J. A. Hodgdon & Beckett, 1984b). The recommended equation for the prediction of body fat had meaningful improvement and required an additional "non-girth" measurement and height (J. A. Hodgdon & Beckett, 1984b, p. 16). The Navy decided on the hip circumference as the "non-girth" measurement (Department of Defense, 2002, Encl 3, p. 17)The recommendation from both studies was to change the current assessment of the body fat prediction from the Wright equation to the equation recommended by the Hodgdon and Beckett study.

The understanding of the need to conduct this study on Navy personnel and the predictive equation being population specific should be noted. This study was completed on a total of 816 Navy personnel in 1984, but there have been substantial changes in the force since 1984. In 2012 Congress modified the "1994 Direct Ground Combat Definition and Assignment Rule" that opened jobs previously closed to women (Kamarck, 2016, p. 12). The diversity in the force to include more women and non-white males have substantially increased since the 1984 study, and this population is not included in standards currently used (Atwater & Niehaus, 1993). The statistical analysis from the Hodgdon and Beckett studies for both men and women in 1984 are currently used to assess body fat, while the composition of the force and physical expectations have changed.

b. Anthropometric Measures in the U.S. Military

Overweight or obesity can be quickly screened for using BMI. But BMI does not distinguish between fat and lean muscle mass. (Shams-White et al., 2020). Muscular Sailors are often classified as overweight because lean muscle mass is not considered in BMI. Across the military services, there is no standard body fat requirement, every service sets its own body fat percentages measurement. Each branch has its own standards, but each service's standard cannot be more stringent than the broader DOD Directive. "All military branches except the U.S. Air Force first screen for overweight by calculating BMI from weight and height" (Shams-White et al., 2020, p. 363).

Shams-White et al. (2020) studied 389 active-duty volunteers (303 men and 86 women) to find the level of agreement between BMI, circumference-based equation, waist circumference, bioelectric impedance analysis. In general, all forms of measurement agree with the others and performed better in women than in men (Shams-White et al., 2020).

The caveat in the study is the rate of false positives was higher in women than in men. There were fewer woman than men in the study, 22% women vs 78% men (Shams-White et al., 2020). The rate of false positives for military BMI compared to bioelectric impedance was 9.1% for women and 10.8% for men (Shams-White et al., 2020). The rate of false positives using just circumference-based equation compared to bioelectric impedance was 19.1% for women vs 7.6% for men (Shams-White et al., 2020). The rate of false positives using a combination of military BMI and circumference-based equation compared to bioelectric impedance was 8.3% for women vs 3.5% for men (Shams-White et al., 2020). The study supports a combining the use of BMI and circumference-based equation measurements to assess estimated body fat percentage in the military because quick and accurate measurements are needed (Shams-White et al., 2020).

c. Obesity and Its Relation to Physical Fitness in the U.S. Military

There is a complex relationship between weight and physical fitness. The differentiation between overweight and muscularity must be addressed when considering occupational physical performance. Many shipboard tasks are physically demanding. To complete many shipboard tasks muscular strength is desirable. Percent body fat is unrelated to ability to perform tasks that require lifting or moving heavy weights. In many cases having more mass is an advantage and enable Sailors to perform these tasks more easily.

The physical fitness test standard is arbitrary and does not consider the required fitness performance to optimally perform job specific tasks (Vogel, 1992). Physical fitness is composed of aerobic fitness, muscular strength, and muscle endurance (Vogel, 1992). The current body composition standards address body fat percentage that may lead to increased risk for serious health conditions, but do not address muscle mass necessary for the strength and muscular endurance to perform job specific tasks. One option is to base physical performance requirement on the need to complete military duties. However, this

is difficult to implement to because of the diversity of tasks and jobs in the Navy. (Vogel, 1992).

The benefit of muscle mass is increased muscular strength which may aid in lifting, pushing, pulling, and carrying, but increased muscle mass may handicap aerobic fitness like running performance (Vogel, 1992) . Body fat percentage is not correlated to strength, but lean muscle mass is correlated to the maximum amount of weight that can be lifted. A practical application of this information would be the establishment of a minimum lean muscle level and a minimum level of muscular strength (Vogel, 1992). Body fat composition does not affect the ability of a Sailor to do their job, but muscle strength does, the Navy should have a policy that addresses this fact.

3. Navy Policy Changes to the Physical Readiness Program

OPNAV INSTRUCTION 6110.1J establishes the Navy's most recent Physical Readiness Program instruction. We cover a few policy changes to the Navy Physical Readiness Program by exploring a few NAVADMINs that have made changes to it.

a. NAVADMIN 178/15

The Secretary of the Navy sent out a message ALNAV 050/15 dated 12 JUN 15, the subject of the message was Department of The Navy Talent Management Initiatives. The objective of the changes was "to promote a healthy, agile, and innovative organization capable of attracting and retaining talent, and growing." The goal was to promote a culture of fitness in the Navy and support holistic and long-term health and fitness by ensuring fitness centers are accessible to all Sailors, providing a healthier diet for commands at sea and shore facilities, and properly measuring conditioning to the specific mission of the Navy. New policies to perform spot checks and programs that recognize individual superior physical achievement by documenting performance on Fitness Reports. These changes are to ensure the Navy retains its current talent that is already recruited and trained.

The Navy responded with NAVADMIN 178/15 dated 03 AUG 15. It stated:

> Physical Fitness Assessments should be designed and implemented to assess an individual Sailors health and mission readiness. The current PFA model enforces maximum body fat percentages and minimum physical

> readiness scores, but falls short on evaluating a Sailors overall health, and does not adequately reflect the challenges unique to sea duty and the increasingly technical nature of our jobs. The intent of these changes is to strike a better balance between health and physical readiness (Chief of Naval Operations, 2015).

The objective of this policy change was the start to increase retention, reduce attrition based on PRT failures, and "allow more Sailors to participate in the PRT portion of the PFA" (Chief of Naval Operations, 2015). The policy specifically considers physical fitness limitations from diet and exercise the Navy faces while on sea duty and the jobs unique nature of the job. "The long-term goal of the Navy to move away from PFA testing as BCA calculation and PRT minimum and focus on a realistic measure of health, fitness, and mission readiness" (Chief of Naval Operations, 2015). The introduction of an age graduated body composition and a single-site abdominal circumference measurement was the changes made for a more realistic approach to the body composition standards while staying in accordance with DOD policy (Chief of Naval Operations, 2015).

According to NAVADMIN 178/15, Sailors shall take part in the PRT regardless of a BCA failure, it also reset PRT failure determination for administrative separation numbers and allowed Sailors facing separation for PFA failures to request to be retained and enter FEP. The NAVADMIN states a future planned change to award Sailors who score outstanding.

b. NAVADMIN 141/17

NAVADMIN 141/17 (2017) outlined new policy "initiatives to the Physical Readiness Program to continue efforts to strike a better balance between physical readiness and mission accomplishment while reducing administrative distractions"(Chief of Naval Operations, 2017). NAVADMIN 141/17 made the following change:

> Sailors who pass the body composition assessment (BCA) are within the Navy age-graduated body fat standards and score an overall excellent low or better (with no single event lower than good low) on the physical readiness test (PRT) will be exempt from participation in the following PRT cycle. (Chief of Naval Operations, 2017)

This policy change created a fitness incentive for Sailors to achieve higher scores on the physical fitness test. It was a step closer to acknowledging higher performing Sailors. Maintaining an excellent level of fitness enabled Sailors to be exempt from the PRT, so an official PRT would be recorded once a year, but the BCA would be taken two times a year.

C. CURRENT PHYSICAL READINESS PROGRAM

1. Body Composition Assessment

The methods to determine Sailors BCA are maximum weight for height measurement, AC measurement, or BC measurement. Understanding the steps of the current policy is essential, as doing so identifies the Sailors affected by the policy and enables the best policy recommendation. The following are steps of the body composition assessment are adapted from the Navy's Physical Readiness Program Operating Guide 4:

1. Step 1: Maximum weight for height. Using Table 3 locate the Sailor's height in the center column. The maximum weight for men is in the left column and the maximum weight for women is in the right column "Sailors who are within maximum weight for height pass the BCA. Sailors who are not within Step-1 must participate in the Abdominal Circumference (AC) Measurement (Step-2)" (Chief of Naval Operations, 2021a, p. 3)

Table 3. Maximum Weight for Height Screening Table. Source: Chief of Naval Operations (2011).

Men Maximum Weight (pounds)	Member's Height (inches with fractions rounded up to nearest whole inch)	Women Maximum Weight (pounds)
127	57	127
131	58	131
136	59	136
141	60	141
145	61	145
150	62	149
155	63	152
160	64	156
165	65	160
170	66	163
175	67	167
181	68	170
186	69	174
191	70	177
196	71	181
201	72	185
206	73	189
211	74	194
216	75	200
221	76	205
226	77	211
231	78	216
236	79	222
241	80	227

2. Step 2: AC measurement. A tape measure made of non-stretchable material is used for a single site measurement above the uppermost hipbone at the right side of the body (Chief of Naval Operations, 2021a). "Sailors who are within AC measurement pass the BCA. Sailors who exceed 39 inches for males and 35.5 inches for females must participate in the Body Composition (BC) measurement (Step-3) (Chief of Naval Operations, 2021a, p. 3)

3. Step 3: BC measurement. A tape measure made of non-stretchable material is used to measure multiple sites. Male Sailors are to be measured at the neck and abdomen, female Sailors are to be measured at the neck, natural waist, and hips. The measurements are taken twice and averaged for the recorded score (Chief of Naval Operations, 2021a).

   - For males: "Subtract neck circumference from abdominal circumference to obtain the circumference value (CV).

Calculation: Abdominal-Neck=CV" (Chief of Naval Operations, 2021a, p. 9).

- For females: "Add waist and hip circumferences, then subtract neck circumference to obtain Sailor's CV. Calculation: waist + hips-neck=CV" (Chief of Naval Operations, 2021a, p. 10)

The recorded CV is used in the body fat estimation tables, see Table 5. According to the Physical Readiness Program Operating Guide 4: "Sailors who are within BC measurements pass the BCA. Sailors who exceed the maximum allowable body fat limits of 26 percent for males and 36 percent for females fail the BCA and the overall PFA for the cycle, regardless of PRT results" (Chief of Naval Operations, 2021a, p. 3).

These measurements are anthropometric values used to predict body fat. Table 4 provides the maximum allowable body fat limits. The body fat percentage limits are only for Sailors that are not within height- weight standards.

Table 4. Navy Age Graduated Body Composition Standard. Source: Chief of Naval Operations (2021a).

Gender	Age Groups (Years)			
	17-21	22-29	30-39	40+
Male	22%	23%	24%	26%
Female	33%	34%	35%	36%

The studies used to establish the prediction stated in the policy are "Prediction of percent body fat for U.S. Navy men from body circumferences and height." and "Prediction of percent body fat for U.S. Navy women from body circumferences and height" (Department of Defense, 2002, Encl 3, p. 17). Table 5 and Table 6 are constructed based on the measurements acquired by the command fitness leaders, during the taping process. The equation used in body fat calculation are listed, the equation is converted to look up tables for convivence. The measurements acquired by the command fitness leaders are converted to a circumference value and based on height and circumference value the service member either passes or fails the body composition assessment.

- Males

  % body fat = 86.010 x log10(abdomen - neck) - 70.041 x log10(height) + 36.76 (All circumference and height measurements are in inches.)

- Females.

  % body fat = 163.205 x log10(waist + hip - neck) - 97.684 x log10(height) - 78.387 (All circumference and height measurements are in inches.) (Department of Defense, 2002, Encl 3, p. 13)

Servicemembers know when they are not within height-weight standards and need to be taped to acquire the anthropometric measurements necessary to estimate body fat. If the servicemember must be taped the goal is to pass BCA with the single-site abdominal circumference because that is only one measurement, but if body circumference is used than body fat estimation tables are used to see if the service member passes.

The circumference values (CV) on the tables in the first column combined with the height, across the top of the table, equate to the body fat estimation for each height. The grey in Table 5 indicates female body fat estimation percentage of 36% which is the highest percentage for a female age 40 and above. To read the chart the age group for the Sailor must be known to cross reference the correct maximum allowable body fat limit. For example, a female aged 25 has a maximum body fat limit of 34% as shown in Table 4. Using Table 5, a female Sailor with a height of 63 inches the CV must be less than 68.5 to pass the BCA by body composition using the body fat estimation.

Table 5. Percent Body Fat Estimation Table for Women. Source: Chief of Naval Operations (2021).

PERCENT BODY FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (Inches)																			
	58	58.5	59	59.5	60	60.5	61	61.5	62	62.5	63	63.5	64	64.5	65	65.5	66	66.5	67	67.5
50.5	27	27	27	26	26	26	25	25	25	24	24	23	23	23	23	22	22	22	21	21
51	28	28	27	27	27	26	26	26	25	25	25	24	24	24	23	23	23	22	22	22
51.5	29	28	28	28	27	27	27	26	26	26	25	25	25	24	24	24	23	23	23	22
52	29	29	29	28	28	28	27	27	27	26	26	26	25	25	25	24	24	24	23	23
52.5	30	30	29	29	29	28	28	28	27	27	27	26	26	26	25	25	25	24	24	24
53	31	30	30	30	29	29	29	28	28	28	27	27	27	26	26	26	25	25	25	24
53.5	31	31	31	30	30	30	29	29	29	28	28	28	27	27	27	26	26	26	25	25
54	32	32	31	31	31	30	30	30	29	29	29	28	28	28	27	27	27	26	26	26
54.5	33	32	32	32	31	31	31	30	30	30	29	29	29	28	28	28	27	27	27	26
55	33	33	33	32	32	32	31	31	31	30	30	30	29	29	29	28	28	28	27	27
55.5	34	34	33	33	33	32	32	32	31	31	31	30	30	30	29	29	29	28	28	28
56	35	34	34	34	33	33	33	32	32	31	31	31	30	30	30	30	29	29	29	28
56.5	35	35	35	34	34	34	33	33	32	32	32	31	31	31	30	30	30	29	29	29
57	36	36	35	35	34	34	34	33	33	33	32	32	32	31	31	31	30	30	30	29
57.5	37	36	36	35	35	35	34	34	34	33	33	33	32	32	32	31	31	31	30	30
58	37	37	36	36	36	35	35	35	34	34	34	33	33	33	32	32	32	31	31	31
58.5	38	37	37	37	36	36	36	35	35	35	34	34	34	33	33	33	32	32	32	31
59	38	38	38	37	37	37	36	36	36	35	35	35	34	34	34	33	33	33	32	32
59.5	39	39	38	38	38	37	37	36	36	36	35	35	35	34	34	34	33	33	33	33
60	40	39	39	38	38	38	37	37	37	36	36	36	35	35	35	34	34	34	33	33
60.5	40	40	39	39	39	38	38	38	37	37	37	36	36	36	35	35	35	34	34	34
61	41	40	40	40	39	39	39	38	38	38	37	37	37	36	36	36	35	35	35	34
61.5	41	41	41	40	40	40	39	39	38	38	38	37	37	37	36	36	36	36	35	35
62	42	42	41	41	40	40	40	39	39	39	38	38	38	37	37	37	36	36	36	35
62.5	>42	>42	>41	>41	>40	>40	>40	>39	>39	>39	39	39	38	38	38	37	37	37	36	36
63	>42	>42	>41	>41	>40	>40	>40	>39	>39	>39	40	39	39	39	38	38	38	37	37	37
63.5	>42	>42	>41	>41	>40	>40	>40	>39	>39	>39	40	40	39	39	39	38	38	38	37	37
64	>42	>42	>41	>41	>40	>40	>40	>39	>39	>39	41	40	40	40	39	39	39	38	38	38

*Circumference value = abdomen circumference – neck circumference (in inches)

In Table 6, the men have 26% indicated in the grey across the estimation table, which is the maximum body fat percentage for men aged 40 and older. From Table 4 a male age 25 has a maximum body fat limit of 23%. Using Table 5, a male Sailor that is 74 inches must have a CV less than 23 to pass the BCA by body composition using the body fat estimation.

Scientifically, the height-weight estimation is inaccurate, Sailors with higher body fat are disadvantaged in the current model because of the equation's tendency to overpredict bodyfat (Hogan, 2015). The DOD's body fat estimation equation overestimates body fat in 30% of overweight males and 82% of overweight females when tested on a sample of Marines (Hogan, 2015). The overprediction is risk that can be mitigated if the focus is incentivize Sailors to be more fit.

Table 6. Percent Body Fat Estimation Table for Men. Source: Chief of Naval Operations (2021).

PERCENT BODY FAT ESTIMATION MEN (CONT'D)

Circumference Value*	Height (inches)																			
	70	70.5	71	71.5	72	72.5	73	73.5	74	74.5	75	75.5	76	76.5	77	77.5	78	78.5	79	79.5
15	9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
15.5	10	10	9	9	9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
16	11	11	11	10	10	10	10	10	9	9	<9	<9	<9	<9	<9	<9	<9	<9	<9	<9
16.5	12	12	12	12	11	11	11	11	11	10	10	10	10	10	9	9	<9	<9	<9	<9
17	13	13	13	13	13	12	12	12	12	11	11	11	11	11	10	10	10	10	10	9
17.5	14	14	14	14	14	13	13	13	13	13	12	12	12	12	12	11	11	11	11	11
18	15	15	15	15	15	14	14	14	14	14	13	13	13	13	13	12	12	12	12	12
18.5	17	16	16	16	16	15	15	15	15	15	14	14	14	14	14	13	13	13	13	13
19	18	17	17	17	17	16	16	16	16	16	15	15	15	15	15	14	14	14	14	14
19.5	18	18	18	18	18	17	17	17	17	17	16	16	16	16	16	15	15	15	15	15
20	19	19	19	19	19	18	18	18	18	18	17	17	17	17	17	16	16	16	16	16
20.5	20	20	20	20	19	19	19	19	19	18	18	18	18	18	17	17	17	17	17	16
21	21	21	21	21	20	20	20	20	20	19	19	19	19	19	18	18	18	18	18	17
21.5	22	22	22	21	21	21	21	21	20	20	20	20	20	19	19	19	19	19	18	18
22	23	23	23	22	22	22	22	22	21	21	21	21	20	20	20	20	20	20	19	19
22.5	24	24	23	23	23	23	23	22	22	22	22	22	21	21	21	21	21	20	20	20
23	25	24	24	24	24	24	23	23	23	23	23	22	22	22	22	22	21	21	21	21
23.5	25	25	25	25	25	24	24	24	24	24	23	23	23	23	23	22	22	22	22	22
24	26	26	26	26	25	25	25	25	25	24	24	24	24	24	23	23	23	23	23	22
24.5	27	27	27	26	26	26	26	26	25	25	25	25	25	24	24	24	24	24	23	23
25	28	28	27	27	27	27	26	26	26	26	26	25	25	25	25	25	24	24	24	24
25.5	29	28	28	28	28	27	27	27	27	27	26	26	26	26	26	25	25	25	25	25
26	29	29	29	29	28	28	28	28	28	27	27	27	27	27	26	26	26	26	26	25
26.5	30	30	30	29	29	29	29	28	28	28	28	28	27	27	27	27	27	26	26	26
27	31	30	30	30	30	30	29	29	29	29	29	28	28	28	28	28	27	27	27	27
27.5	31	31	31	31	30	30	30	30	30	29	29	29	29	29	28	28	28	28	28	27
28	32	32	32	31	31	31	31	31	30	30	30	30	29	29	29	29	29	29	28	28

*Circumference value = abdomen circumference - neck circumference (in inches)

2. PRT

After the BCA is completed the final step of the PFA is the physical fitness test. The PRT consists of three events to assess cardiorespiratory fitness, muscular strength, and endurance. The following is adapted from the Navy's Physical Readiness Program Operating Guide 5 Physical Readiness Test (PRT):

1. Cardiorespiratory fitness or aerobic capacity. The options for cardio-respiratory endurance are a 1.5-mile run/walk test, "stationary bike, treadmill, Concept 2 rower, or 500-yard/450-meter swim tests" (Chief of Naval Operations, 2021b, p. 3).

2. "Muscular strength and endurance. Muscular strength and endurance are the abilities to sustain muscle contractions" in 2 minutes. (Chief of Naval Operations, 2021b, p. 3). The push-ups and forearm plank events are indicators of muscular strength and endurance. In addition to measuring strength, planks measure abdominal muscle endurance and push-ups measure upper body muscular endurance (Chief of Naval Operations, 2021b, p. 3).

3. PRT Scoring

Each event is graded on a 100-point scale. An average score of the three events is calculated to obtain an overall level of performance. The run, swim, and row cardio options are scored off total time, while the score on the bike cardio option is based on the maximum number of calories burned in 12 minutes. An event can only be scored in the point increments in Table 7.

Table 7. Point and Performance Categories for PRT Scoring Source: Chief of Naval Operations (2021b).

Performance		Points
Category	Level	
Outstanding	High	100
Outstanding	Medium	95
Outstanding	**Low**	**90**
Excellent	High	85
Excellent	Medium	80
Excellent	**Low**	**75**
Good	High	70
Good	Medium	65
Good	**Low**	**60**
Satisfactory	High	55
Satisfactory	Medium	50
Probationary		45

Outstanding: Performance above or equal to top 10 percentile.
Excellent: Performance in top 25 percentile, but less than Outstanding.
Good: Performance better than or equal to lowest 25 percentile, but less than Excellent.
Satisfactory/Probationary: Performance in bottom 25 percentile, but above lowest 10th percentile.
(Chief of Naval Operations, 2021b)

As shown in Table 7, the PRT scoring is broken down to five scoring categories with different levels for each category. The PRT tests for minimum requirements to meet standards, but a true culture of fitness would require higher standards. Overall satisfactory and probationary scores will require a Sailor to enroll in FEP. The overall performance based on the average of the three scores of the PRT gives an accepted culture of "Max, Max, Relax." If a Sailor can do well on two of the three events of the PRT, having a lower but passing score on the third event is acceptable because pride is the only incentive to

score maximize performance. Performing in the *good* category is all a Sailor needs to receive a pass on the PFA. Currently there is one incentive to score an overall *excellent* on the PRT. If a Sailor receives an overall *excellent*, or higher, he or she will validate and will not have to take the physical portion of the PRT in the next cycle.

D. SUMMARY

The Navy's PFA has three parts, a "medical screen, body composition assessment (BCA), and a physical fitness test (PRT)" (Chief of Naval Operations, 2011, p. 3). The body composition assessment use height weight standards prescribed by the DOD. The Navy can adapt policy to meet the needs of the Navy (Department of Defense, 2002). The Navy has made many changes to its physical readiness program with objectives to increase retention, reduce attrition based on PRT failures, and strike a better balance between physical readiness and mission accomplishment. A change made in NAVADMIN 178/15 maximized the allowable body fat percentage prescribed by the DOD and added an additional path to pass the body composition standards (Chief of Naval Operations, 2015). The addition of the age-graduated body composition standards and single-site abdominal circumference measurement were changes to the body composition program to relax the DOD's weight standards and allow more Sailors to participate in the PRT. One of the changes in NAVADMIN 141/17 was a performance initiative. The Navy moved to a policy to acknowledge higher performing Sailors by adding a PRT exemption for all Sailors that obtain an overall excellent score on the PRT (Chief of Naval Operations, 2017). The Navy is making strides to focus on a realistic health measure, fitness, and mission readiness.

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III. OTHER SERVICES' PHYSICAL FITNESS PROGRAMS

This chapter describes the body composition and physical fitness programs of the Army, Marine Corps, and the Air Force. Every service has different policies and adaptations of the DOD's physical readiness program for their respective services. I explore options from other services as a possible course of action for a policy alternative that increases performance on the PRT.

A. ARMY

1. Army Body Composition Program (ABCP)

The APCP is covered in Army Regulation 600-9. In the Army, the maximum body fat percentage is 22% for males and 34% for females between the ages of 28 to 39 (Department Of The Army, 2002). If a Solider exceeds prescribed body fat standards, they will be enrolled in the Army Body Composition Program, similar to the Navy's Fitness Enhancing Program, participate in monthly assessments to document progress and must meet body fat requirements to be released from the program.

2. Army Combat Fitness Test (ACFT)

As technology and fitness techniques improve the United States Army decided to modernize the U.S. Army Physical Standards. In 2019, the Army implemented the Army Combat Fitness Test (ACFT) that measures five dimensions of fitness vice the previous two dimensions of fitness assessed by the previous Army Physical Fitness Test (APFT). The ACFT standards are focused on minimal standards based upon the soldier being from a heavily, significantly, or moderately demanding Military Occupational Specialty (MOS) (Department Of The Army, 2002).

> The ACFT consists of the 3 Repetition Maximum Deadlift (known as MDL), the Standing Power Throw (known as SPT), the Hand-Release Push-Up (known as HRP), the Sprint-Drag-Carry (known as SDC), the Leg Tuck (known as LTK), and the 2-Mile Run (known as 2MR). To pass the ACFT, Soldiers must attain a score of at least 60 points on each event and an overall score of at least 360 points. The maximum score a Soldier can attain on the ACFT is 600 points. (Department Of The Army, 2002, p. 2-1)

The scoring for the ACFT is age and gender neutral. The ACFT cultivates a fitness culture that allows service members to physically excel and be held accountable for military appearance.

B. MARINE CORPS

1. Body Composition Program (BCP)

The Marine Corps body composition and military appearance program is cover in Marine Corp Order 6110.3A. In 2016, a "waiver allowed Marines who score 285 or higher on both the physical fitness test (PFT) and combat fitness test (CFT) to be exempt from maximum weight and body fat limits and Marines who score 250 or higher on both tests an additional 1 percent bod fat limit" (Commandant of the Marine Corps, 2019, Encl 3). The maximum body fat percentages are in enclosure 4 of Marine Corps Order 6110.3A and are by age as shown in Table 8.

Table 8. Maximum Body Fat Percentage Table by Age Group. Source: Commandant of the Marine Corps (2019).

Marine Corps Body Composition Standards		
Age Group	**Male**	**Female**
17-20	18% BF	26% BF
21-25	18% BF	26% BF
26-30	19% BF	27% BF
31-35	19% BF	27% BF
36-40	20% BF	28% BF
41-45	20% BF	28% BF
46-50	21% BF	29% BF
51+	21% BF	29% BF

2. Physical Fitness Test (PFT)/ Combat Fitness Test (CFT)

The Marine Corps has two physical fitness tests, the PFT and the CFT. The PFT includes pull-ups, planks and a 3-mile run. The CFT consists of an 880-yd run, 30-pound ammunition can lift, and maneuver under fire simulated event. PFT score are classified into three classes. First class is a PFT score 235 to 300, second class is a PFT score 200 to 234, and a third class is score 150 to 199. For each event the maximum score is 100 points. Marines are encouraged to strive to not only meet minimum performance but to perform at

their best. Minimum standards do not pass, because of the culture "exceeding the standard is the standard." There were changes made to the PFT and CFT scoring tables to ensure standards are relevant (Commandant of the Marine Corps, 2016).

C. AIR FORCE

The Air Force Body Mass index standards come Air Force Fitness instruction AFI 36–2905, Annex 13. In 2009, the Air Force overhauled its physical fitness and body composition program and was granted special permission to waive the DOD body fat measurement and approved to use abdominal circumference to assess body composition (Peterson, 2015a). The Air Force used the argument that the height-weight tables did not differentiate fat and muscle mass (Secretary of the Air Force, 2013). Research has shown increased health risk is associated with fat distribution than total body fat, so using abdominal circumference is a superior means of assessing body composition (Peterson, 2015b). Height and weight are recorded according to DODI 1308. But reducing AC is more important than controlling body weight, since exercise can cause an increase in muscle mass that will cause weight gain (Peterson, 2015).

1. BCA

To pass the body fat assessment, the maximum abdominal circumference of 39.0 inches male and 35.5 inches for female Airmen. "If an Airman fails the abdominal circumference portion of the Fitness Assessment, yet passes the other components of the Fitness Assessment, then a BMI screening is conducted" (Secretary of the Air Force, 2021). The maximum estimated body fat percentage is 20% for male and 28% for female Airmen (Secretary of the Air Force, 2021). Individuals whose body weight exceeds weight screening table will then be assessed for body fat as per DOD Instruction 1308.3 (Department of Defense, 1995).

2. Physical Fitness Assessment (PFA)

According to the Air Force Manuel 36–2905: "The Air Force tests aerobic fitness, body composition, and muscular fitness components to determine overall fitness. Airmen

must achieve a minimum score in each component as well as an overall composite score of 75 to remain current" (Secretary of the Air Force, 2021, p. 20).

"The components of the Tier 1 physical fitness assessment (PFA) are body composition, aerobic and muscular fitness assessed by: abdominal circumference, 1.5 mile run or 2.0 km walk, and push-ups and sit-ups" (Secretary of the Air Force, 2021, p. 20). "The components of the Tier 2 PFA an approved 5-step process" that is an occupationally specific performance-based fitness test taken in addition to the Tier-1 test for specific Air Force specialty codes (Secretary of the Air Force, 2021, p. 20). Tier 2 PFA is operationally related and age and gender neutral.

D. SUMMARY

Every service has different needs and resources available to them based on their missions. In 2019, the Army overhauled its physical fitness program by adding different exercises to better assess physical fitness and age and gender-neutral scoring standards. In 2016, the Marine Corps added an exemption from maximum weight and body fat limits to their BCP for Marines who score 285 or higher on both the PFT and CFT. The Marine Corps also increased fitness standards by adjusting the score requirements. In 2009, the Air Force received permission to waive the DOD body fat measurements and use an abdominal circumference measurement. The Air Force also has an optional occupationally specific Tier 2 PFA. These changes are all relevant options for changes to increase performance on the Navy PFA.

IV. POLICY ANALYSIS

A. DIVE INTO THE NUMBERS

This study focuses on all active-duty Navy personnel that have recorded PRT data in three specific years: 2015, 2016, and 2018. Using PRIMS data available in the PDE database, the variables I used were gender, height, weight, and PRT score. I created variables using the height-weight standards and the performance categories for my analysis. NAVADMIN 178/15 and NAVADMIN 141/17 are the policy changes the study is focused upon. The significance of 2015 is it is before both policy changes. The first complete year that includes the policy change from NAVADMIN 178/15 is 2016, and the effective year of NAVADMIN 141/17 is 2018.

1. The Population of Female and Male Sailors

The descriptive statistics of the female population for the weight relative to maximum height-weight standards is available in Table 9. This is the total number of number of Sailors that have one observation of PRT data in each year. The number of female Sailors that were within standards in 2015 is 62% and decreases to 60% in 2018. The male population has a similar decrease in number of Sailors meeting standards. In 2015, 63% of male Sailors were within standards and in 2018 this percentage drops 10 percentage points to 53%.

Table 9. Descriptive Statistics of Female Population in 2015 and 2018

	Female		Male	
Weight Category	2015	2018	2015	2018
Within Standards	31,612 (62%)	26,175 (60%)	158,834 (63%)	111,878 (53%)
Out of Standards	19,427 (28%)	17,503 (40%)	93,876 (37%)	97,338 (47%)
Total	51,039	43,678	252,710	209,216

2. Analysis of Relative Weight of the Populations in 2015 and 2018

As seen in Figure 1, there are more female and male Sailors within standard in 2015 than in 2018. Figure 1 shows a kernel density plot of Navy population of Sailors in and out of standards in 2015 and 2018. The density plots are based on each Sailor's weight relative to their maximum weight based on the height-weight table.

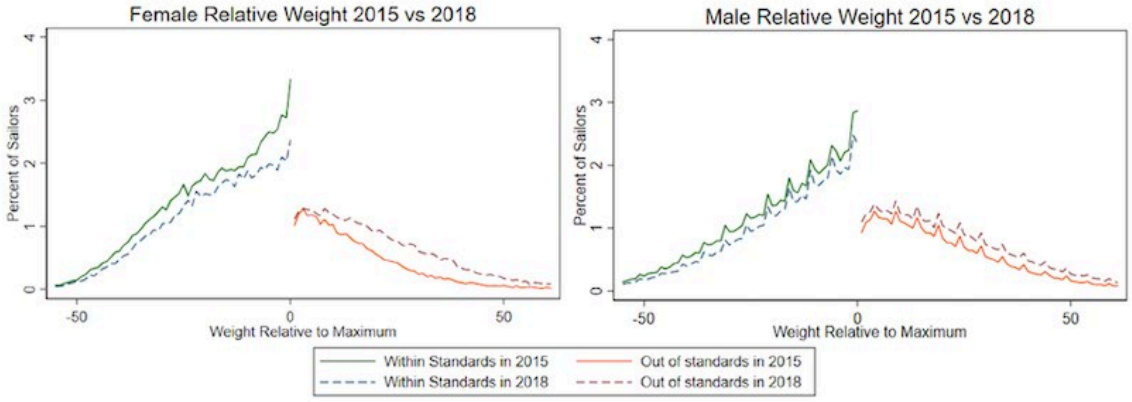

Figure 1. Female and Male Population Relative Weight 2015 and 2018

The addition of the single-site abdominal circumference measurement and age-graduated body composition standards may have caused the drop in percentage of Sailors passing height-weight standards. These changes to the body composition program relaxed the height-weight standards by adding an additional, more realistic approach to determining body fat percentage (Chief of Naval Operations, 2015). A higher percentage of Sailors were passing body composition assessment through the taping method and were able to participate in the PRT but relatively fewer Sailors were within standards. I ran additional analysis to check the change in percentage of Sailors passing height-weight standards from 2015 to 2016, but there was no significant difference. Similarly, there were more Sailors within height- weight standards in 2016 than there were in 2018.

There was not a significant increase in number of Sailors within height- weight standards after NAVADMIN 178/15 because that policy change did not change the height-

weight standards. NAVADMIN 141/17 added an additional method to pass the body composition assessment and incentivized Sailors to score an overall excellent on the PRT.

B. PHYSICAL FITNESS ANALYSIS

NAVADMIN 141/17 introduced the PRT validation for overall excellent PRT score. For this analysis, the year used for before the policy change is 2016 and the year used for after the policy change is 2018. The data was separated by females and males and sorted into the following categories: within standards, danger zone, and out of standards based solely on height-weight tables. Sailors in the danger zone are within standards but within 5 pounds of their maximum weight for their height. I created weight categories and used the categories to group Sailors to identify the performance based on the status. Table 10 shows descriptive statistics for the weight categories. In this section, I analyze physical performance before and after the policy change by both weight and performance categories.

1. Weight Category Analysis Before and After NAVADMIN 141/17

The female population results for 2016 are similar to the 2015 data set with 51% of female Sailors within standards, 11% in the danger zone, and 38% out of standards before the policy change. The population results for the males before the policy change was 51% within standards, 12% in the danger zone, and 37% out of standards.

Table 10. Description Statistics for Weight Categories before and after Policy Change

	Female		Male	
Weight Category	Before Policy	After Policy	Before Policy	After Policy
Within Standards	25,967 (51%)	21,756 (50%)	120,966 (51%)	90,624 (43%)
Danger Zone	5,436 (11%)	4,419 (10%)	26,079 (12%)	21,25 (10%)4
Out of Standards	19,248 (38%)	17,503 (40%)	101,654 (37%)	97,338 (47%)
Total	50,651	43,678	248,699	209,216

I analyzed the percentage of Sailors passing the PRT in different weight categories by height. Figure 2 the Sailors are in the weight categories I created. The figure shows that as height increases, the proportion of female Sailors within standards decreases. For females from 60 inches to 75 inches across height we can see a trend both before and after

the policy change that a higher percentage of female Sailors that are below 67 inches are with in standards, as height increases more female Sailors are out of standards, and the percentage in the danger zone is relatively unchanging across the heights. This result is consistent after the policy change.

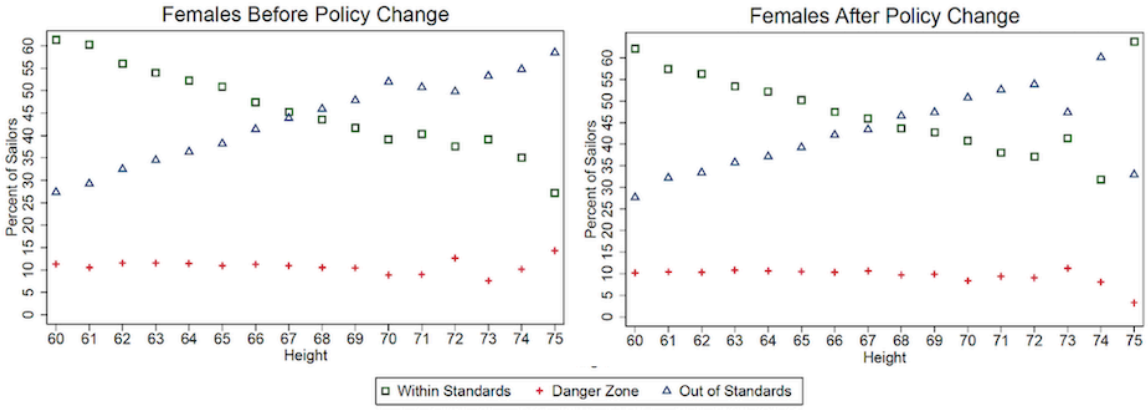

Figure 2. Percentage of Female Sailors within and out of Standards before and after NAVADMIN 141/17 by Height

In Figure 3, for males from heights 65 inches to 80 inches, there is a similar trend compared to the females before the policy change. There is a decrease in the percentage of male Sailors passing height-weight standards as males get taller and the danger zone percentage is relatively unchanging across the heights. After the policy change, the percentage of Sailors within standards decreases and out of standards across all heights.

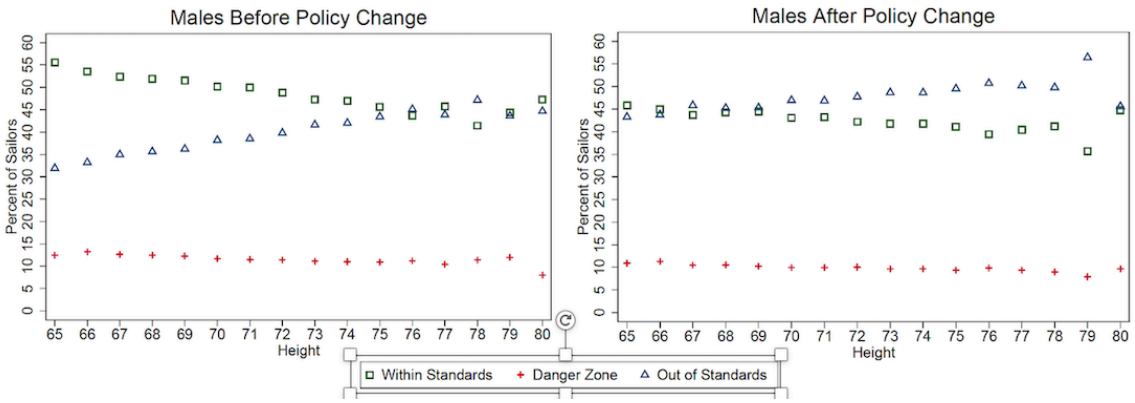

Figure 3. Percentage of Male Sailors within and out of Standards before and after NAVADMIN 141/17 by Height

For males 69 inches tall before the policy change, 52% of Sailors were within standards; 12% of Sailors were in the danger zone, and 36% of Sailors were out of standards. After the policy change, 45% of Sailors were within standards, 10% were in the danger zone, and 45% were out of standards. The number of Sailors out of standards increased 9 percentage points, while the number within standards decreased 7 percentage points.

The increase in number of taller Sailors out of standards could be related to more Sailors deciding to not lose weight to stay within standards in order to score higher on the physical fitness portion of the PRT. A greater effort to score higher on the strength and muscle endurance portion of the physical portion of the PRT may require more muscle mass and consequently a higher weight will be recorded. Male Sailors can pass the BCA portion of the PFA by staying under 43 in in the waist and with the incentive to pass the physical portion with a higher score.

Next, I analyzed average performance by weight category. The average score of Sailors within standards increased approximately 5 points from 66.9 in 2016, to 72.0 in 2018. Sailors in the danger zone category increased their scores by 8 points from 62.6 to 70.6, and the out of standard category increased 7 points from 58.3 to 64.2, as shown in Figure 4.

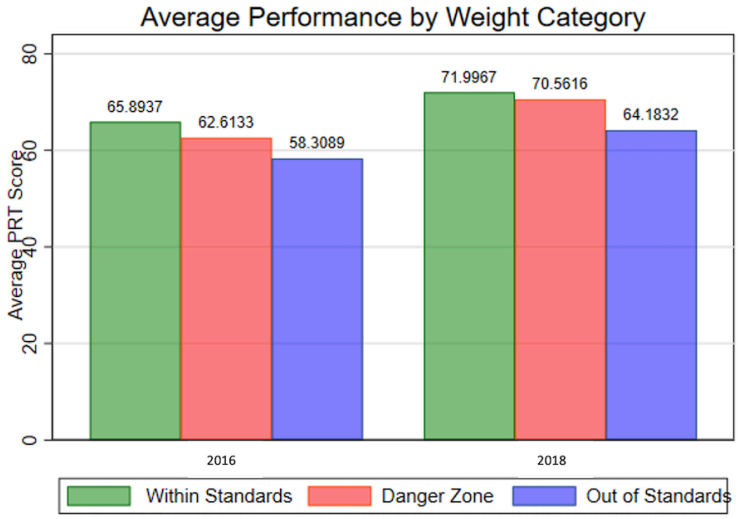

Figure 4. Average Performance by Weight Category in 2016 and 2018

The within standards average increases from a good medium PRT score to a good high and the out of standards average increases from a satisfactory high to good medium. The increase in average PRT score across all weight categories is not causal but can be correlated to the physical performance incentive.

2. Analysis of Fitness Performance in 2016 and 2018

This section covers fitness performance by performance category for 2016 and 2018. Figure 5 depicts the percentage of Sailors for each performance category for women and men in 2016 and in 2018. For reference, Table 11 has the points and performance categories for PRT scoring. The performance categories are associated with a level and a score. The outstanding, excellent, and good categories are separated into three levels, low medium and high for the indicated by three data points for each symbol. The satisfactory category has two levels, medium and high, and probationary has one indicator and no level on this graph.

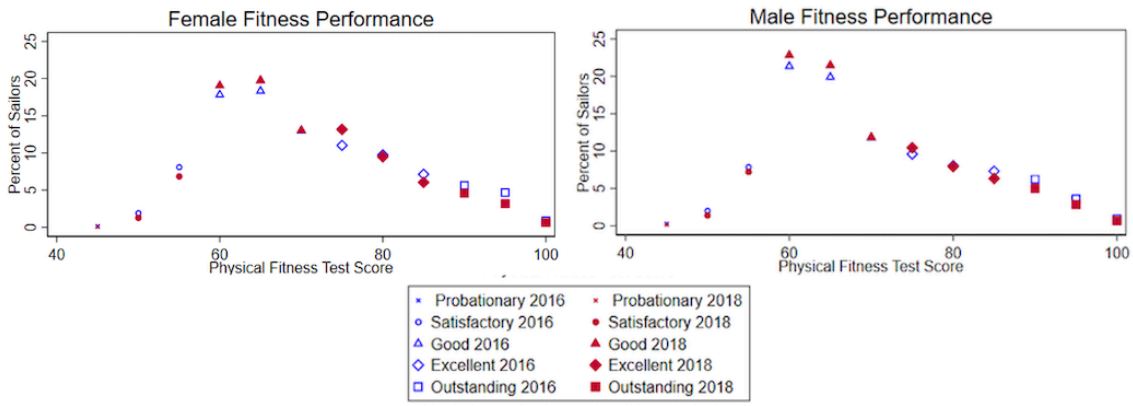

Figure 5. Percentage of Sailors by Performance Category for Female and Male Sailors in 2016 and 2018

For females, there are fewer females in the probationary and satisfactory categories, there was about a 1 percentage point increase in all good categories, and a 2.15% point increase in the excellent low category from 2016 to 2018. From Table 11, females have the highest increase in PRT scoring from 2016 to 2018. The overall excellent low category, the minimum score to receive the exemption for the PRT, had the highest increase from 11.02% to 13.17%, a 2.15 percentage point change. There are fewer females receiving excellent medium, excellent high and all outstanding categories. Similarly, the trend in males shows fewer males in the probationary and satisfactory categories, the percentage of males increases about 1 percentage point in all good categories, and in excellent low category. With no incentive to outperform the requirement to receive PRT validation, the percentage of Sailors performing in the outstanding category decreased for both men and women.

Table 11. Difference in PRT Scoring in 2016 and 2018

		Female			Male		
Performance Category	Score	2016	2018	Difference	2016	2018	Difference
Probationary	45	0.20	0.08	-0.12	0.32	0.16	-0.16
Satisfactory Medium	50	1.93	1.32	-0.61	2.01	1.39	-0.62
Satisfactory High	55	8.11	6.88	-1.23	7.87	7.21	-0.66
Good Low	60	17.84	19.05	1.21	21.36	22.83	1.47
Good Medium	65	18.34	19.77	1.43	19.91	21.47	1.56

		Female			Male		
Good High	70	12.98	13.06	0.08	11.78	11.84	0.06
Excellent Low	75	11.02	13.17	2.15	9.60	10.46	0.86
Excellent Medium	80	9.75	9.50	-0.25	8.02	7.91	-0.11
Excellent High	85	7.13	6.05	-1.08	7.35	6.32	-1.03
Outstanding Low	90	5.63	4.56	-1.07	6.21	5.50	-0.71
Outstanding Medium	95	4.68	3.17	-1.51	3.60	2.82	-0.78
Outstanding High	100	0.89	0.64	-0.25	0.91	0.66	-0.25

The scoring total category percentages for 2016 and 2018 are presented in Table 12. For females, there is a 3-percentage point increase in the good category and a 1 percentage point increase in excellent category. For the males, there is a 3-percentage point increase in the good category and a 1-percentage point decrease in satisfactory category. An overall excellent score is required to receive the PRT exemption. The physical fitness initiative to receive an overall excellent may be correlated to the scores converging around the excellent category.

In 2018, after the policy change 51.9% of female Sailors and 56%.1 of male Sailors were scoring in the good category, 28.7% of female sailors and 24.7% of male sailors were performing in the excellent category, and 8.4% of female Sailors and 9.0% of male Sailors were performing in the outstanding category.

Table 12. Scoring Category Percentages

	2016		2018	
	Female	Male	Female	Male
Failure	2.0	1.0	3.0	2.0
Probationary	0.2	0.3	0.1	-0.2
Satisfactory	10.0	9.9	8.2	8.6
Good	49.2	53.1	51.9	56.1
Excellent	27.9	25.0	28.7	24.7
Outstanding	11.2	10.7	8.4	9.0

C. SUMMARY

With no change to the height-weight standards, the addition of the single-site circumference measurement and the age-graduated body composition standards increased the number of Sailors out of standards. The objective of the policy change was to give a realistic approach to measuring body composition standards. The policy changes studied supported efforts to retain talented trained Sailors by striking "a better balance between physical readiness and mission accomplishment while reducing administrative distractions" successful by increasing the average PRT score (Chief of Naval Operations, 2017).

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V. APPLYING BARDACH'S METHODOLOGY

A. POSSIBLE COURSES OF ACTION

In this section, I review four possible policy alternatives the Navy can adopt. The possible courses of action are maintaining status quo, adapting a BCA exemption for outstanding PRT score, adding an additional PRT, or eliminating height-weight standards and increasing physical fitness standards.

1. Use Height-Weight Standards Based on BMI

Maintaining status quo is relevant because it allows for the Navy to continue to operate its physical readiness program with the iterations over the years.

2. BCA Exemption for Outstanding PRT Score

Adapting a BCA exemption for an overall outstanding PRT score, should give an incentive to service members to be more fit and attain a higher PRT score to enable them to maintain their current weight. This change is similar to the Marine Corps policy of BCP exemption for a 285 score on CFT/PFT. The policy is precedented and has been successful in the Marine Corps.

3. Add Additional PRT

An additional test will better assess a service member's ability to perform tasks outside of the current PRT. In addition to the run, plank, and pushups, the Navy can add test for deadlifts, medicine ball throws, a shuttle run, or pull ups to better assess fitness level. This training will focus on strength that can help prevent injuries by utilizing movements to increase core strength, back strength, and hip mobility. The addition of strength training, high intensity fitness training, and functional fitness training are options to add to support the additional test. This training would need to take place from the training environment when training recruits and in the fleet. There is additional training necessary to teach proper technique to Sailors to perform these movements to avoid injury, but there also should be an increase in overall health and physical performance which is the goal.

The Army, Marine Corps, and Air Force have all added additional occupation specific fitness tests.

4. Eliminate Height-Weight Standards and Increase Fitness Standards

Eliminating height-weight standards and increasing fitness standards should ensure the force is more fit. The Air Force asked for permission from the DOD to modify its use of the DOD's body composition standards. The Air Force has also modified its fitness tests and scoring to better fit the needs of the Air Force. The increased standards would be like the Marine Corps' ALMAR 022/16, which increased difficulty for both the PFT and CFT but added a body composition exemption for a PFT/CFT score of 285 or higher.

B. CRITERIA

The decision criterion I chose to evaluate the alternatives are cost, efficiency, simplicity, and fairness. These criteria are relevant to the policy alternative and can be used to help determine the best alternative.

1. Cost

One of the biggest determining factors in making policy is cost. Calculating the expense to implement the change is a task that needs consideration. The policy change must be fiscally feasible.

2. Efficiency

Efficiency as a decision criterion will answer the question if the policy change achieves the objective and which resources are being used to achieve the objective. There is an amount of mitigated risk evaluated to assess body composition to determine physical fitness. Efficiency will help determine if implementation of an alternative is worth the change. The course of action must achieve the objective to focus on fitness.

3. Simplicity

Simplicity as a decision criterion is important is because simplicity suggests sustainability. Does the policy alternative present an outcome that will last? The course of action must be simple to implement and easy to sustain.

4. Fairness

Fairness had to be considered as a decision criterion because of the number of people that may be impacted. Who is affected by the policy change and what are the potential consequences? The policy must be fair and minimize people adversely affected beyond their control.

5. Criterion Weights, Scale and Conclusion

The main objective of the problem definition is to stop centering the physical readiness standards around body composition assessment and focus on realistic health measures by focusing on fitness. The primary decision criterion is cost; fairness, simplicity, and efficiency are secondary criteria.

The primary criterion, cost, is given the largest weight in the calculation as it is the most important, and the secondary criteria are each weighted the same. The primary criterion is weighted 40%, and the three secondary criteria are weighted 20% each. This is all subjective to what I deem as important; the outcomes could change if the criteria had been different or if I changed the weight scale.

The possible courses of action are given a measurement based on how well the alternative meets each criterion. Each alternative course of action is given a measurement based on the following scale:

- 0: does not meet criteria
- 1: marginally meets criteria
- 2: modestly meets criteria
- 3: substantially meets criteria

C. PROJECT THE OUTCOMES

In this section, I give outcome matrixes, explanations for how each alternative meets each criterion, and the measurement choices I made for each for each course of action. For clarity based on the criteria, the lower the cost, the higher the measurement assessed. The more the policy alternative meets the objective to focus on fitness, the higher the measurement assessed. The policy alternative that is the simplest and positively impacts the most Sailors, the higher the measurement assessed. All assessed measurements are my opinion.

1. Alternative 1: Use Height-Weight Standards Based on BMI

The outcome of this policy continues to have several people butting up against a weight standard with no way to circumvent the standard. With no changes made to the height-weight standards, the status quo provides the Navy with a sustainable force that maintains the minimum level of fitness necessary for world-wide deployment (Chief of Naval Operations, 2011). The minimum standard is not physical fitness focused. Table 13 shows the outcome matrix for the status quo course of action.

Table 13. Outcome Matrix Alternative #1: Status Quo

Alternative	Criteria #1 Cost (0.4)	Criteria #1	Criteria #2 Efficiency (0.2)	Criteria #2	Criteria #3 Simplicity (0.2)	Criteria #3	Criteria #4 Fairness (0.2)	Criteria #4	Final Assessment
Status Quo	3	1.2	0	0	3	0.6	1	0.2	2

a. Cost

There is no additional monetary cost associated to implement a policy that already exists, so the measurement I assessed to cost is 3. A low cost is desirable, so no cost substantially meets this criterion. The cost relevant to keeping the policy is the manpower lost due to PRT failures and time spent on administrative separations. The objective of NAVADMIN 178/15 was to increase retention and reduce attrition based on PRT failures.

The administrative burden associated with losing talented Sailors that are fully trained can be detrimental to the force. Unnecessary administrative separations based on PRT failures is a constant battle the Navy faces. There are some mitigations in place with the FEP program and remediation. But the Navy will continue to have the same administrative problems by continuing to use a policy that does not account for body type and focus on BMI to assess physical fitness.

b. Efficiency

The current policy does not achieve the goal of focusing on fitness, so I assessed the efficiency measurement to 0. Currently, the Navy has many programs to ensure Sailors have access to gyms and resources to access information on diet and exercise through the FEP, weight management program (WMP), and ShipShape (SS) programs. The WMP and FEP are for Sailors who do not meet physical fitness standards, but SS is available to Sailors who are within standards (Wisbach et al., 2018). These programs and their resources are underutilized because they have a negative connotation associated with being overweight. The Navy can benefit from increased participation by increasing knowledge on overall fitness and creating a culture of fitness while being mindful of nutrition and exercise. The Navy can utilize these programs it has spent money to fund to better educate both Sailors in and out of standards to a healthier lifestyle and focus on fitness.

c. Simplicity

Maintaining status quo is highly sustainable, so I assessed the simplicity measurement to 3. The Navy can continue to use the current policy and continue to meet minimum physical fitness standards. The current use of BMI as a tool to assess overweight or obesity is easy and convenient. The mitigation in place for Sailors who fail the body composition assessment requires them to enroll in FEP and other weight loss programs to lessen administrative separations. This policy adaptation enables the Navy to use PRT failures as a force shaping tool. There is interest in having have a heathier more fit force. The current policy of PRT validation is an initiative that proves the Navy is moving in the direction of focusing on physical fitness by rewarding Sailors who exceed the minimum standard.

d. Fairness

The Sailors that are impacted by the current standards are those failing passing BCA standards but can pass the PRT, so I assessed the fairness measurement to 1. The restrictive weight standards may cause Sailors to use unsafe or unhealthy methods to stay below the maximum weight to avoid being taped. The question of physical fitness should not be based on a Sailor's ability to stay under a specific BMI but should be assessed on their body's physical ability. A study done in 2008 showed that 53% of Sailors were overweight or obese, at Naval Medical Center San Diego (Wisbach et al., 2018). Of the 53% of Sailors who were overweight or obese, 20% of those Sailors were able to pass a PRT. More Sailors were separated for BCA failures than PRT failures. According to Naval Medical Center San Diego's separation data for PFA failures in 2014, the cost of 14 separated Sailors cost the Navy over 1 million dollars (Wisbach et al., 2018). This statistic is significant because the cost the Navy incurs from separating Sailors.

2. Alternative 2: BCA Exemption for Outstanding PRT Score

This policy creates a performance incentive. This could increase the number of Sailors trying to attain the highest score. The implementation of the validation increased the number of people scoring overall excellent. The performance incentive should entice more sailors to utilize training available to them and be more physically fit. Table 14 shows the outcome for the outcome matrix for the BCA exemption course of action.

Table 14. Outcome Matrix Alternative #2: BCA Exemption

Alternative	Criteria #1 Cost (0.4)	Criteria #1	Criteria #2 Efficiency (0.2)	Criteria #2	Criteria #3 Simplicity (0.2)	Criteria #3	Criteria #4 Fairness (0.2)	Criteria #4	Final Assessment
BCA Exemption	2	0.8	3	0.6	3	0.6	3	0.6	2.6

a. Cost

The cost associated with implementing a new policy for the BCA exemption is minimal. The manpower associated with writing new policy should be considered but there is no additional cost incurred so I assessed the cost measurement to 2. A low cost is desirable, making this policy alternative modestly meet the criteria.

b. Efficiency

This policy alternative achieves the objective to focus on fitness, so I assessed efficiency the measurement to 3. The resources used to achieve the objective are resources that already exist. The current PFA and PRT scores are utilized with an additional fitness incentive of and BCA exemption for overall Outstanding PRT score and PRT validation for exceeding an overall excellent score.

The performance incentive should lead to an increased number of Sailors striving to attain higher scores and be more fit These Sailors will have more muscular strength and endurance for the push-ups and core strength and more stamina for the run or alternative cardio options. A Sailor who can attain an outstanding score while maintaining a higher body weight will no longer need to perform extraordinary measures to make weight. He or she will also have an incentive to train to be more physically fit. Sailors can focus on physical fitness without having to focus on the number on the scale, or the size of their waist.

c. Simplicity

The BCA exemption is simple because it uses standards that already exists, it does not require additional training to implement. I assessed the simplicity measurement for the BCA exemption to 3. The current PRT scores is the tool that Sailors are familiar with and can use to gauge the physical training requirement creating sustainability.

d. Fairness

The number of Sailors that are impacted by the policy alternative to add a BCA exemption is everyone, so I assessed the fairness measurement to 3. The fitness incentive

gives everyone the opportunity to be more fit and strive to reach the outstanding PRT score. This gives an incentive to train to not only to meet minimum standards but to strive to exceed the standard. Cultivating a culture of fitness that promotes healthy weight gain and considers different body types. The BCA exemption for the outstanding score, provides the opportunity for Sailors to gain muscle mass to perform physically.

3. Alternative 3: Add Additional PRT Test

The additional PRT test will require training for movements outside of running pushup and planks. There will be additional training to ensure proper form and technique. This should make for more well-rounded and fit sailors. The Navy can use the different approaches in implementing the addition test set forth by examples the Army and Marine Corps who have recently implemented new adaptations to their programs. Table 15 shows the outcome matrix for the additional PRT course of action.

Table 15. Outcome Matrix Alternative #3: Additional PRT

Alternative	Criteria #1 Cost (0.4)	Criteria #1	Criteria #2 Efficiency (0.2)	Criteria #2	Criteria #3 Simplicity (0.2)	Criteria #3	Criteria #4 Fairness (0.2)	Criteria #4	Final Assessment
Additional PRT	0	0	3	0.6	0	0	2	0.4	1

a. Cost

The cost of the implementing an additional physical readiness test is high. I assessed the cost measurement to 0, not meeting criteria. A low cost is desirable, but this course of action would require a large amount of funding to implement the policy. Research would need to be done to decide on what exercises to include in an additional test. The exercises should translate to job specific tasks of the Navy. There is a training cost associated with training command fitness leaders to be able to assess Sailors completing the new test. There are costs associated with the equipment required to complete the tests and adding the logistics to ensure the accessibility to both sea and shore commands.

b. Efficiency

This additional PRT as an alternative policy change achieves the objective to focus on physical fitness, so I assessed the efficiency measurement to 3, substantially meeting criteria. There are many resources necessary to overhaul the current physical fitness test by adding an additional test. The Navy would need to devise a process to select the new test and determine how to score it. Significant research is needed to make meaningful changes to evaluate physical fitness and overall health and wellness. The changes made in the additional physical fitness program should be specific to testing strength and physical characteristics to meet the necessary tasks of being in the Navy.

c. Simplicity

This additional PRT as a policy alternative is not simple. There are many steps to implement the additional test, so I assessed the measurement to 0 because it does not meet the criteria. The policy change requires research, and time to test and roll out the new physical readiness test. The sustainability is high because when the policy is adapted it will last a long time. There are sure to be adaptations to the policy to tailor it to meet the needs of the Navy, and that requires additional time. The additional PRT will become the new standard, the same as the other services who have multiple fitness tests.

d. Fairness

The number of Sailors that may be impacted by an additional PRT is everyone, but the additional test may not be a positive adaption for all Sailors, so I assessed the measurement to 2. The additional PRT would require Sailors to strength train specifically to the new movements the test would require. For example, if the deadlift is added as an addition exercise, learning how to deadlift correctly is essential to reduce injury. The deadlift is a technical full-body movement but translates very well for all lifting activities. If Sailors are unfamiliar with the movements the new policy adapts, additional time is necessary to allow Sailors to perform these movements safely.

4. Alternative 4: Eliminate Weight Standards and Increase Fitness Standards

The higher scores should ensure service members are training to pass the physical fitness test and are challenged to not only meet the minimum requirements but to exceed them. This requires a fitness culture shift from requirement to meet minimum standards to exceeding the current standards. Table 16 shows the outcome matrix for the increased fitness standards course of action.

Table 16. Outcome Matrix Alternative #4: Increased Fitness Standards

Alternative	Criteria #1 Cost (0.4)	Criteria #1	Criteria #2 Efficiency (0.2)	Criteria #2	Criteria #3 Simplicity (0.2)	Criteria #3	Criteria #4 Fairness (0.2)	Criteria #4	Final Assessment
Increased Standards	1	0.4	3	0.4	1	0.2	1	0.2	1.4

a. Cost

The cost of implementing a policy to increased fitness standards is minimal, so I assessed the measurement to a 1. There is manpower required to draft the policy and the research required to assess how the standards should be increased and evaluated are the necessary costs. The research can be done using past data and the new standard can be evaluated using volunteers or a transitional test where the score does not count towards passing the PRT, similar to the Navy roll out the addition of the plank.

b. Efficiency

Increasing fitness standards substantially achieves the objective of focusing on fitness, so I assessed the efficiency measurement to 3. There are many resources necessary to research a fair but challenging standard that reflect the physical requirements necessary to perform the tasks of the Navy. Increasing the standards for all Sailors is the most efficient way to ensure an increase in overall physical performance. The fitness scores may initially

decrease because of the increase of the standard, but Sailors would train to physically perform better resulting in higher scores overtime.

c. Simplicity

Arbitrarily increasing standards involves a simple policy change but making a meaningful increase is difficult so, I assessed the simplicity measurement to 1, marginally meeting criteria. Past PRT data can be analyzed to make standards attainable. This is difficult because there is no way to tell how capable the force currently is because the current evaluation is made on minimum standards and not maximum effort. To ensure the new standards are fair to all Sailors, there would be an evaluation period to gain current data on what the force is physically capable of achieving. Additional time will be necessary to ensure the adaptations to the new policy meet the needs of the Navy. Sustainability is high because when the policy is adapted it will become the new standard.

d. Fairness

Every Sailor is impacted by increasing fitness standards. The impact could be positive or negative depending on the Sailor's current fitness level and the time the Sailor must train to meet the new standards, so I assessed the fairness measurement to 1, marginally meeting criteria. Currently the physical fitness assessment evaluates a Sailor's ability to meet minimum standards, so any increase in the standards may negatively impact all Sailors who are not substantially exceeding the current standard.

5. Outcomes Matrix Summary

In this chapter, I assessed different courses of action the Navy can consider for a policy adaptation to the current physical readiness program with the objective to focus on fitness performance. The combined outcomes matrix is assembled in Table 17. Using the selected criteria, the highest final assessment measurement is adapting the BCA exemption. The BCA exemption substantially satisfies the efficiency, simplicity, and fairness criteria. The objective of the policy change should result in more Sailors striving to increase their PRT score. With the increase in physical fitness, the number of Sailors that are within height-weight standards may decrease but overall health and physical performance should increase.

Table 17. Combined Outcome Matrix

Alternative	Criteria #1 Cost (0.4)	Criteria #1	Criteria #2 Efficiency (0.2)	Criteria #2	Criteria #3 Simplicity (0.2)	Criteria #3	Criteria #4 Fairness (0.2)	Criteria #4	Final Assessment
Status Quo	3	1.2	0	0	3	0.6	1	0.2	2
BCA exemption	2	0.8	3	0.6	3	0.6	3	0.6	2.6
Additional PRT	0	0	3	0.6	0	0	2	0.4	1
Increased Standards	1	0.4	3	0.6	1	0.2	1	0.2	1.4

D. CONFRONTING THE TRADE-OFFS

1. Alternative 1: Use Height-Weight Standards Based on BMI

By staying with current policy, the Navy eliminates all costs to make any changes, but trade-off is number of Sailors' whose weight is overestimated using the current methods for body fat estimation and number of Sailors using unhealthy measures to meet the standard. The current policy does not address the number of Sailors failing the BCA portion of the PFA but can pass the PRT portion of the PFA.

The current policy does not address the stigma of being assessed overweight by the BMI standard and the number of Sailors that will make weight by any means necessary. The current policy does not address Sailors that are resorting to adverse health behaviors to be within standards during the assessment period. Decreasing the number of Sailors that resort to dehydration, disordered eating, or even seeking liposuction to stay within standards should increase the overall health of Sailors.

The current policy does not address increasing physical performance. The culture of fitness surround by a policy to meet minimum standards is not a culture to perform to maximum potential and that should also be considered when choosing a policy alternative. These are the trade-offs when choosing to maintain the status quo.

2. Alternative 2: BCA Exemption for Outstanding PRT Score

The trade-offs for allowing an BCA exemption for an outstanding PRT score is there may be more Sailors out of height-weight standards. But there could be more Sailors with higher fitness levels. In 2018, the percentage of Sailors scoring in the outstanding category was less than 10% for both the men and the women. Increasing the number of Sailor that strive to achieve a higher score benefit the Navy and the servicemembers. The body fat percentage of Sailors that have the ability to meet that standard should be a non-factor.

3. Alternative 3: Add Additional PRT

The trade-off for an additional PRT is applying that requirement to a busy sea-duty schedule. A reason the Navy has not adapted a second PRT variation, much like other services, is probably because of the feasibility to implement the policy. The common Navy saying that "Sailors belong on ships, and ships belong at sea" applies when adding an additional requirement that takes Sailors away from being at sea. An additional test increases the administrative burden and takes away from the mission of the Navy. PRT waivers are already used for commands out to sea on deployments, adding another test does not seem practical for the Navy.

4. Alternative 4: Eliminate Weight Standards and Increase Fitness Standards

Eliminating weight standards and increasing fitness standards may create a problem with Sailors being able to pass the PRT. The increase in PFA failures will increase number of Sailors enrolling into FEP and may result in more administrative separations. The policy may also require an additional policy adaptation to address the increase in failures. Introducing this policy that may cause the loss of talented Sailors the Navy is trying to retain.

The elimination of the height-weight policy may drastically change the appearance of Sailors. The objective of the policy change is to increase physical performance but eliminating the weight standards may cause an increase in obese Sailors that are unable to physically perform. With no policy to control the weight of Sailors, an avoidable obstacle may be created.

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VI. CONCLUSION AND RECOMMENDATION

A. SUMMARY

The Navy has made policy changes to its physical readiness program with a goal to focus on realistic health measures, mission readiness, and physical fitness. This was done by relaxing the DOD's body composition standards with the addition of the single-site abdominal circumference and age-graduated body composition standards. There was an increase in number of Sailors out of height-weight standards but there also was a subsequent increase in average PRT score. Moving away from a body composition standard that is based on BMI and adapting a policy that allows for higher body fat percentage allows Sailors to focus less on maintaining an arbitrary height-weight standard that classifies body status as overweight or obese. The stigma behind getting taped still exists as there are Sailors that will perform any means to avoid the tape measure, but the Navy has policies in place to help Sailors avoid the scrutiny of being overweight.

This thesis addresses the question: Did PRT validation lead to better performance on the PRT for women and men? Further statistical analysis is necessary to find the answer. From my analysis, the policy change is associated with an in average physical performance in all weight categories, but it is not causal.

My analysis of the PRT data shows a performance initiative can be correlated with an increased average PRT score, so creating a higher performance initiative to that adds a path for a BCA exemption could increase the average PRT scoring of Sailors. The initiative for increased physical performance is not causal but can be correlated to the changes in the average scores and the scores converging around the minimum score to receive the PRT exemption.

In 2018, for the population of Sailors that recorded PRT data, 40 percent of females were classified as overweight, and 60 percent of male Sailors were classified as overweight. Currently, the policy states a BCA failure is a PFA failure; it allows for two PFA failures in three years before requiring administrative separation (Chief of Naval Operations, 2015).

The FEP is in place for weight remediation, but there are Sailors on FEP that can pass the PRT. The average PRT score of the out of standards category in 2018 was a good medium.

The Navy is making efforts to decrease the administrative burden of administrative separations for PFA failures. More Sailors are failing for BCA failures than PRT failures (Wisbach et al., 2018). A policy change to mitigate BCA failures and increase the physical performance of Sailors is beneficial to both the Navy and to Sailors. The cost to administratively separate a Sailor for PFA failures is high. The goal is to retain the talented trained Sailors the Navy has already recruited. Adapting a policy that will have Sailors striving to physically excel to maintain their current weight vice resorting to any means necessary to make weight and avoid tape will make for a heartier more fit force.

In addition, I consider several courses of action as policy alternatives. They are maintain status quo, adapt a BCA exemption for outstanding PRT score, add an additional PRT, or eliminate height-weight standards and increase physical fitness standards. The decision criteria I chose to evaluate the alternatives were cost, efficiency, simplicity, and fairness. I conclude that the best course of action the Navy can take to maximize performance is a BCA exemption for overall outstanding category.

B. RECOMMENDATION

The focus of my thesis is to provide analysis of policy adaptation to maximize physical performance. The best course of action to increase physical performance is to add a BCA exemption for an outstanding PRT score. This creates a performance initiative much like the PRT validation. It gives Sailors a performance initiative to score higher on the PRT while not penalizing Sailors who have higher body fat percentage but are able to perform at a high level.

According to my study, less than 10 percent of females and males scored in the outstanding category. If the Navy had an incentive to achieve higher performance scores or a culture to exceed minimum standards, the mentality and culture surrounding the PRT would change from being an administrative check in the box to a challenge of physical ability. The policy would cultivate the culture of fitness that encouraged and supported heathy weight gain and rewarded PRT performance.

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