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# Do Changes in the Navy Physical Readiness Test Impact Performance?

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# Do Changes in the Navy Physical Readiness Test Impact Performance?

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DO CHANGES IN NAVY PHYSICAL READINESS TEST IMPACT PERFORMANCE?

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DO CHANGES IN THE NAVY PHYSICAL READINESS TEST PROTOCOLS IMPACT PERFORMANCE?

Alison Colao April 2022 Pages

Directed By: Rachel Tinius, Kayla Baker, and Sarah Scali

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The fitness level of our service members is of utmost importance due to the nature of their occupation. This study investigated whether changes to the Navy's Physical Readiness Test (PRT) impact performance on the fitness test. Participants were college-aged males between the ages of 18 and 29 (n=20; 21.05±2.01 years; BMI 24.85± 2.74). Participants performed both the New PRT and Old PRT at two separate randomized visits. Protocols included push-ups, curl-ups (old version) or a forearm plank hold (new version), and a 1.5-mile run. At the end of each exercise, the participant's heart rate and rating of perceived exertion (RPE) were recorded. There was a significant difference in points awarded for the plank (54±12.02) protocol compared to the curl-up (32.75±31.30) protocol (p=0.002). A paired samples t-test was run to compare the overall average of points rewarded on the Old PRT versus New PRT was found to be significant with participants scoring higher on the New PRT (37.80±16.01 points; 44.70±14.40 points, p=0.01). Based on the results, the curl-up and forearm plank standards are not equivalent; therefore, the Navy should consider increasing the minimum standard for the forearm plank hold to maintain the same rigor as the Old PRT. The findings of this study provide support for necessary modifications to the Navy PRT, and this could include a separate Navy combat fitness test along with a physical fitness test.

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Lastly, I would like to thank my brother Alex for asking a question he thought was pointless that started this whole project. I could not have completed this project without you asking that question and answering me every time I called or texted with a new question or concern.

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## Introduction

Sports athletes follow strict strength and conditioning programs to keep them prepared to perform at their best. Other types of "athletes" need to be more than game ready; they need to be war or work ready. Unlike sports athletes, their occupations deal with life-or-death situations. Training to prepare for job-related responsibilities is referred to as tactical training. Professionals in the strength and conditioning community identify tactical athletes as those who are in law enforcement, the military, or rescue professions that require unique physical training to optimize occupational performance (Scofield & Kardouni, 2015).

Tactical and sports athletes, regardless of age, sex, sport, or profession all share the requirement of general physical preparedness (GPP). Within GPP, athletes develop technical and tactical skills, which are required to excel in the sport or profession. GPP is an all-encompassing term that describes an athlete's overall physical fitness which includes muscular strength and endurance, cardiorespiratory endurance, power, anaerobic endurance, flexibility, and mobility (Scofield & Kardouni, 2015). Together, GPP and technical and tactical skills provide athletes with general and sport-specific movements used to overcome a physical challenge to outperform an opponent (Scofield & Kardouni, 2015).

The tactical population poses unique challenges for strength and conditioning professionals. Unlike elite or collegiate sports athletes, their training timelines are not clear-cut. With sports athletes, there are in-person, in-season, and post-season training periods where different fitness goals are targeted. The tactical population training timelines and schedules look drastically different, and these individuals spend more time gaining technical and tactical skills after establishing GPP. For example, after initial training or bootcamp, individuals in the

military may go begin specialty training for things like water survival or hand-to-hand combat, and police and firefighters may complete more specialized emergency response training.

Although the broad programming timelines for a tactical population are different, many of the same fitness goals for the sports athlete population are used, including the strength and conditioning principles of overload, progression, specificity, and periodized training cycles (Scofield & Kardouni,2015). Additionally, unlike sports athletes, the tactical population does not have a set "game time." This means they do not know when they will start and stop different physically demanding events; they simply need to always be prepared for optimal functioning. In other words, tactical athletes are always considered to be "in-season," which makes programming for this population very difficult.

Similarly, to working with sports athletes, tactical athletes need a properly designed strength and conditioning program with an overall goal to enhance occupational and physical performance. Poor fitness levels among tactical athletes have been associated with a higher risk of training-related injuries (Orr et al., 2021). Since military personnel, such as Navy Sailors, have very physically demanding jobs, it is of the utmost importance that they are ready to perform at their best while also minimizing the risk of injury.  In both sports and tactical athletes, a poorly designed program that does not allow for GPP can lead to fatigue and increased injury. Therefore, tactical athletes complete a physical fitness test several times per year, to ensure physical fitness and freedom from injury. This is vital information in professions where physical performance and occupational duties are related to one another such as in the case of the tactical athlete; therefore, along with training, fitness testing can be used to predict or determine the injury rate among this population.

Although fitness testing is important for the tactical athlete, there is a lack of tools and testing protocols to base performance on. There are well-established characteristics that athletes within the tactical population should have such as high levels of aerobic fitness, endurance, quick reaction time, and aerobic power. These characteristics are beneficial so that tactical athletes are able to successfully perform their mission, while in hostile environments and climates (Maupin et al., 2018). Even with the general characteristics of a tactical athlete defined, the testing protocols to challenge their abilities are limited, since many fitness tests are made for the general populations with norms that can be applied to sports athletes.

According to a 2018 review by Maupin et al., there is a high variety in the measures of fitness testing and protocols within the tactical population (2018). This study also stated that "fitness is a critical part of research and practice, [and] currently there is no standardized measure in this population" (Maupin et al. 2018). Even with a lack of a "gold standard" measure of fitness within the tactical population, there is still a need to perform fitness testing within this population; therefore, this review will investigate research on fitness testing and fitness levels in this population, the importance of fitness among this population, and recent changes made to fitness testing around the branches of the armed forces.

In the Navy specifically, the Physical Readiness Test (PRT) is used to provide pass/fail criteria for acceptance into the fleet. The goal of the PRT is to give Commanding Officers a way to assess the overall general fitness of those in their command (U.S. Navy Guide 5, 2019). The components of the PRT are listed as cardio-respiratory fitness and muscular strength and endurance, and the test consists of push-ups, curl-ups, and a 1.5 mile run. It is unknown of any other literature that states the rationale for why the Navy would change curl-ups to planks. This gap in the literature is evidence that this issue needs to be studied further before any conclusions

are drawn. This study will examine which PRT protocol elicits better performance scores and less fatigue based upon heart rate and RPE. For the 2021 Physical Readiness Test cycle, the Navy introduced one major change: the sailors will now complete a plank hold for time instead of completing as many curl-ups as possible in two minutes (U.S. Navy Guide 5, 2021). The rationale for the changes to the PRT is difficult to find, and the change is being met with some resistance from the fleet. Therefore, the purpose of the proposed project was to compare performance between the two tests, which will allow for a heightened understanding of how the changes in the PRT protocol could impact the safety and on-the-job performance of Navy Sailors.

**Research Question**

How do changes in the Navy Physical Readiness Test protocols impact performance?

**Hypothesis**

The old Navy physical readiness protocol will yield better performance and decreased RPE scores when compared to the new protocol.

## Review of Literature

### Importance of Fitness Testing in the Armed Forces

Unlike sports athletes, service members in the tactical population are unaware of when their physical fitness will be called upon to help them complete mission-critical tasks like running, jumping, and loaded carries. Since there is no start time to a tactical athlete's task, this means their fitness level is of the utmost importance to ensure they are occupation-ready while also reducing the risk of disease and injury among this population. According to a paper by Roy et al. published in the Journal of Military Medicine, "military physical fitness is the ability to

physically accomplish all aspects of the mission while remaining healthy and uninjured" (2010). Military fitness is very complex due to the different occupations that service members might have. Each of these occupations also comes with different occupationally relevant tasks which require different training to be able to execute. Training tactical athletes is important because a service member with suboptimal or poor physical fitness is at an increased risk of injury or death due to the nature of their occupation (Roy et al., 2010). Not only are there many different jobs within the military but each of these jobs will have different missions with different objectives that also require different training regiments for these service members to perform well. This is where fitness testing becomes important among the tactical athlete population.

Fitness testing can be used to gather data on the physical fitness of a person or group, to make predictions on fitness levels based upon age and gender norms. For a testing battery to effectively measure fitness, it must be made up of valid and reliable tests, be cost-effective, feasible, and operationally relevant (Peterson, 2015). Peterson states that operational relevance, also known as face validity, refers to the extent to which a particular test mimics actual occupational and or battlefield tasks (2015). Many of the current and previous military physical fitness tests lacked operational relevance due to the military utilizing assessments that were health-related components while not assessing skill-related fitness. Health-related tests are those that measure body composition, flexibility, muscular strength, muscular endurance, and cardiovascular endurance; while a testing battery designed for measuring skill-related fitness would include tests of power, speed, agility, coordination, reaction time, and balance. Designing a testing battery that is made up of tests that measure skill-related fitness is more important in the tactical population since skill-related fitness is more important for operational relevance (Peterson, 2015).

*Fitness Testing in the Tactical Population and Risk of Injury*

There is no question the service members in the armed forces need to be physically fit to be able to complete their occupational tasks. One way to measure the fitness of the service members is through fitness testing. Within the general population, fitness testing can be conducted in the lab or the field, but it is more complicated within the tactical population. When it comes to fitness testing in tactical populations the test must be easy to conduct on large groups of people while also being reliable and valid. Not only do the tests have to be valid and reliable but the large number of different tasks that are within a service member's occupation can make the number of fitness tests to measure all these tasks unsustainable (Orr et al., 2021). A 2021 study by Spiering et al. found that many job-related tasks in the military can be characterized by load carriage and heavy lifting. The paper also stated that "performance on these tasks is strongly associated with aerobic capacity and strength" (Spiering et al., 2021).

With most of the jobs in the military including load carriage and heavy lifting, the selection of fitness tests should aim to challenge these tasks and predict injury. A systematic review by Tomes et al. (2020) examined if tactical fitness testing could effectively predict injury risk. In the systematic review, it is stated that "muscular endurance tests were less conclusive in their injury prediction risk, but functional strength and power tests are effective predictors of injury" (Tomes et al., 2020). Although studies have illustrated that muscular endurance tests are poor predictors of injury among tactical fitness testing, most branches of the armed services utilize these assessments in their physical fitness testing protocols for active-duty service members. It is also important for military personnel to undergo fitness testing to ensure they are fit to serve while, keeping in mind that many of the fitness measures are not related to specific

job requirements making fitness testing among the tactical population problematic (Orr et al., 2021).

## Evolution of Fitness Testing in the Military

### *Combat Fitness Testing*

The importance of fitness testing military service members was established in 1908 when President Roosevelt suggested that the Navy needed to test the physical fitness of its officers (Stilwell, 2021). In the time following the original suggestion of fitness testing the current Navy Fitness test has undergone several changes, however, Navy fitness testing has not undergone any major changes since the push-up was added in 1986 (Peterson, 2013). Some professionals in the strength and conditioning and tactical fitness worlds are pushing toward more combat-and occupational-based fitness tests, instead of the "one size fits all" approach that the Navy is currently using.

In an article titled *Modernizing the Navy's Physical Readiness Test (PRT)*, Commander Peterson discusses two harsh realities about the fitness of the service members and the current fitness testing protocols and the need for fitness testing to be more occupationally specific. Peterson also states that service members need to be better prepared for the demands of combat and that the military cannot rely on the outdated physical training programs that prepare the service members for their semi-annual fitness testing (Peterson, 2013). The Navy physical fitness test has remained relatively unchanged, with a few more cardiorespiratory fitness modalities added since 1986. According to the Navy, the PRT assesses health-related fitness components of muscular endurance, muscular strength, and cardiovascular fitness (U.S. Navy Guide 5, 2020); however, Peterson defines basic battlefield tasks as "the ability to jump, crawl, roll, stop, start,

bound, climb, push, pull, sprint, and carry heavy loads over long distances" (Peterson, 2013). Neither the current nor old Navy PRT protocols test any of these basic battlefield movements demonstrating the need for a revision to the current physical fitness testing and training programs.

*The Marine Combat Fitness Test*

Research has shown that there is a large gap between the current Navy PRT and battlefield movements and combat fitness testing (Peterson, 2013). The Marine Corps established a combat fitness test (CFT) in 2008 in an effort to better assess a Marine's ability to perform specific battlefield tasks in preparation for combat situations (Keefer & DeBeliso, 2020). The Marine CFT is taken every six months in preparation for combat situations. The CFT is composed of three separate scored events that test and challenge the Marine in basic battlefield movements. The CFT requires Marines to run 880 yards to simulate them moving toward a target to engage, lift a 30-pound ammunition can overhead from shoulder height for two minutes, and perform a maneuver-under-fire simulated event. In the simulated event Marines perform the following tasks: sprints, agility, crawls, buddy drag/carry, ammunition resupply, and grenade throw (Keefer & DeBeliso, 2020).

Since the Navy has a greater number of occupations within the service, they cannot make a one-size-fits-all CFT, so Peterson suggests that the Navy create an Operational Fitness Test. According to Peterson the modalities for the Operational Fitness Test are valid, require minimal equipment, include health-related and performance-related components of fitness, and mimic basic battlefield and operationally relevant movements. This proposed Operational Fitness Test would include tests such as a 40-yard dash, standing long jump, kneeling power ball toss, and a 50-yard loaded carry (Peterson, 2013). This type of fitness testing would close the gap between

the Navy PRT and the lack of combat fitness tests in the Navy, because, above all, service members need to not only be able to pass a general fitness test but also need to be able to perform basic battlefield movements.

*The New Army Combat Fitness Test*

The Army recently came out with the Army Combat Fitness Test also known as the ACFT. This new fitness test is a part of the Holistic Health and Fitness System or H2F, which is the Army's primary investment in the health and fitness of its soldiers. The H2F system was designed to optimize both a soldier's physical and non-physical performance. Along with trying to improve performance this system is the Army's attempt to mitigate injury, improve rehabilitation efforts after injury, and increase the overall effectiveness of the Army's personnel (U.S. Army, 2022).

According to the Army, "the ACFT is an assessment for the physical domain of the Army's Holistic Health and Fitness System". There are four main goals that the Army proposed with this new combat fitness test: improve soldier and unit readiness, transform the Army's fitness culture, reduce preventable injuries and attrition, and enhance mental toughness and stamina (U.S. Army, 2022). The ACFT is made up of six events which include three rep maximum deadlift, standing power throw, hand-release push-ups, sprint-drag-carry, leg tuck or plank, and a two-mile run. Like the Marines, the Army also has both a general fitness test and a combat-fitness test. The Navy has not followed suit and added a more occupational or combat fitness test giving the Navy a less complete picture of the overall health and fitness levels of the fleet.

*Former Navy Physical Readiness Test*

The Navy uses the Guide 5 to outline the general goals and specific details about how to conduct and score the Physical Readiness Test. The Guide 5 states that the goal of the PRT is to give Commanding Officers a way to assess the overall general fitness of those in their command (U.S. Navy Guide 5, 2019). The components of the PRT are listed as cardio-respiratory fitness and muscular strength and endurance. The language in the Guide 5 states that "muscular strength and endurance is the ability to sustain muscle contraction over a period of time without undue fatigue" (U.S. Navy Guide 5, 2019). The Guide 5 then goes on to state that the curl-up test is used as a measure of abdominal muscle endurance while the push-up test serves as a measure of upper body muscle endurance. Neither test listed is a test of muscular strength, so the wording of the Guide 5 is misleading since both curl-ups and push-ups are described as tests of muscular endurance, not muscular strength. The Guide 5 also states that "the curl-up, when performed properly, can help develop abdominal strength and endurance which are important factors for preventing low-back injuries" (U.S. Navy Guide 5, 2019). This wording is contradicted in many articles later published by the U.S. Navy that stated that curl-ups were causing low-back pain.

The Guide 5 also lays out the following event sequence:1) curl-ups, 2) push-ups, and 3) run. These events are completed on the same day at least two minutes but not more than fifteen minutes apart (U.S. Navy Guide 5, 2019). The Guide 5 proceeds to describe the events in detail providing information on proper form, instructions on what to say during tests, and when a test is terminated or completed. The first event described is the curl-ups which states that "curl-ups are repeated as many times as possible in two minutes" and to only count correct curl-ups" (U.S. Navy Guide 5, 2019). The next test described in detail is the push-ups test which states that "push-ups are repeated correctly as many times as possible in two minutes while counting only the correct number of push-ups completed" (U.S. Navy Guide 5, 2019). The last event described

is the run and other cardiovascular modalities that can be used instead of running. The Guide 5 states that this "event consists of running or walking 1.5 miles as quickly as possible", and that any combination of running or walking is allowed to complete this event" (2019). This test can also be completed on a treadmill if the command sees is appropriate. Service members with a medical wavier may also be allowed to complete alternate methods including a 500-yard or 450-m swim, elliptical, and a stationary bike test (U.S. Navy Guide 5, 2019). This literature review is only concerned with the 1.5 mile run since it is the Navy's testing standard (U.S. Navy Guide 5, 2019).

*Proposed Changes to the Navy Physical Fitness Test*

The Navy states that the Physical Readiness test is supposed to test muscular strength and endurance as well as cardiovascular fitness. The former PRT was composed of a standardized warm-up, maximum curl-ups in two minutes, maximum push-ups in two minutes, and a one-and-a-half-mile run. The Navy describes the curl-ups as a test of muscular strength and endurance, and if this exercise is performed properly, it can help develop abdominal strength and endurance which are important factors in preventing low-back injuries (U.S. Navy Guide 5, 2019).

The proposed modalities each replace a test on the current PRT or add to what the current PRT is testing. The curl-up portion of the test will be replaced with a forearm plank. According to Peterson, the plank is better because it utilizes core musculature that are more frequently used to stabilize the torso during lift, push, pull or carry movements (2015). This would make the plank a more operationally relevant task when compared to the curl-ups that were previously the test of core endurance. The 300-yard shuttle was proposed since it is less time-consuming than running a mile and a half and it has also been shown to correlate well with $VO_2$max prediction

equations (Peterson, 2015). Peterson finally suggests that a standing long jump be used during the testing battery since this exercise has been shown to correlate with lower body muscular strength, which has not been tested in any of the current or past PRT protocols or cycles (2015). According to the article, the changes to the Navy Physical Fitness Test would significantly improve the validity, feasibility, and operational relevance of the Navy's physical readiness program (Peterson, 2015). Despite this rationale, the Navy has yet to introduce a combat fitness test, and the current test has remained practically unchanged since the start of the modern PRT. However, when the new PRT was released in 2021, the only test that was modified was the curl-up test (as it was changed to a plank), and the push-up test and 1.5-mile run remained unchanged.

*The Rationale for Changes to the Navy PFT*

For the 2021 Physical Readiness Test cycle, the Navy introduced one major change: the sailors will now complete a plank hold for time instead of completing as many curl-ups as possible in two minutes (U.S. Navy Guide 5, 2021). The rationale for the changes to the PRT is difficult to find, and the change is being met with some resistance from the fleet. Some sailors feel the old test was an adequate measure of fitness due to how the Navy describes the components of fitness that the PRT was supposed to test. Another reason there is some push-back to changing the test is that the curl-up test was added back in 1982 because of its proven validity and reliability (Peterson, 2013). In addition, curl-ups are the only test of core muscular endurance that was used by all the branches of the military (Peterson, 2013).

The newest Guide 5 from the Navy discussing the new plank standard gives the same explanation on muscular strength and endurance but with a plank instead of a curl-up. This fitness guide states, "the forearm plank, when performed properly, can help develop abdominal strength and endurance, which are important factors in preventing low-back injuries" (U.S. Navy

Guide 5, 2021). Since there is minimal information on why the Navy changed the PRT from curl-ups to a forearm plank hold, literature on this topic was difficult to locate. In an article on Modernizing the Navy's PRT, Commander Peterson cites from a Roy et al study in 2010, that "core strength is essential for load carriage capacity, reduced risk of injury, and proper body alignment and biomechanics." In a different article in the Journal of Strength and Conditioning, Peterson, states that the "benefits of replacing the curl-ups with the plank are improved operational relevance and the prevention of low back injuries" (Peterson, 2013).

It is unknown of any other literature that states the rationale for why the Navy would change curl-ups to planks. This gap in the literature is evidence that this issue needs to be studied further before any conclusions are drawn. This study will examine which PRT protocol elicits better performance scores and less fatigue based upon heart rate and RPE.

## Methods

### Participants

This study consisted of college-aged males who were recreationally active (similar to most military athletes (i.e., exercised at least three times per week)). This study was conducted at Western Kentucky University and the participants had to be within the United States Navy height and weight standards. According to the U.S. Navy's official recruiting website, a male sailor must be between 57 and 80 inches tall and weigh between 127 and 241 pounds (Table 1).

**Table 1: Demographic Information of Study Participants**

| | Total (N=20)<br>Mean ±SD or # (%) |
|---|---|
| Age | 21.05±2.01 yrs. |
| Height | 71.95±1.82 in |
| Weight | 182.85±24.44 lbs. |
| BMI | 24.85±2.74 |
| Ethnicity | |
| *Caucasian* | 19 (95%) |
| *African American* | 1 (5%) |
| Education Level | |
| *Some High School* | 0 (0%) |
| *High school/GED* | 1 (5%) |
| *Bachelors* | 18 (90%) |
| *Master's* | 1 (5%) |
| *Ph.D. or Higher* | 0 (0%) |
| Major | |
| *Exercise Science (11)* | 11 (55%) |
| *Business (4)* | 4 (20%) |
| *Broadcasting (1)* | 1 (5%) |
| *Recreation Administration (1)* | 1 (5%) |
| *Criminology (1)* | 1 (5%) |
| *Biology (1)* | 1 (5%) |
| *Prefer not to say (1)* | 1 (5%) |
| Military Service | |
| *None* | 18(90%) |
| *Army ROTC* | 2 (10%) |

**Materials**

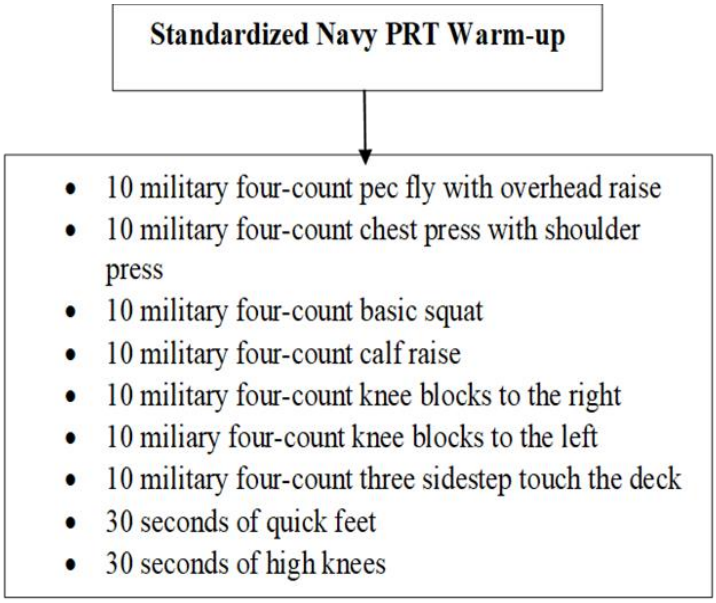
All study procedures took place at WKU outside of Smith Stadium East and in compliance with the university's Healthy on the Hill COVID-19 protocols. Equipment required included a stopwatch, gym mats or yoga mats, reference photos, RPE scale, lap counter, and Polar heart rate monitor.

**Procedures**

On the day of testing, the participant came into the Exercise Physiology Lab in Smith Stadium East and signed the consent forms as well as had baseline measurements taken by the researcher including height, weight, and blood pressure. Along with the consent from the participant completed forms regarding their demographic information and readiness to participate via the Physical Activity Readiness Questionnaire (British Columbia Ministry of Health Department of National Health and Welfare, Canada, Revise 1992).

Each participant came in on two separate days, at least one week apart. They either completed the Old PRT (push-ups, curl-ups, 1.5-mile run) or the New PRT (push-ups, plank, 1.5-mile run). The order of the protocol was randomized; however, the exercises were all completed in the above-stated order, as described in the Navy Guide 5. On both days of testing the participant underwent a hydration check using a urine-specific gravity dipstick to ensure were hydrated enough to work out. Participants also completed a 24-hour dietary recall to ensure their diet was sufficient to participate and also that alterations in dietary practices between sessions did not alter performance. Once paperwork and baseline measurements had been collected the participant was taken outside and their mask was removed to start the standardized Navy PRT warm-up (Figure 1; U.S. Navy Guide 13, 2019).

**Figure 1: Navy Standardized PRT Warm-up (U.S. Navy Guide 13, 2013)**




Once the standard warm-up was completed the participant had five minutes to complete any additional warm-up needed. During the additional warm-up period time, the researcher demonstrated a proper Navy push-up form. Both the Old and New PRT protocols started with push-ups so both days of testing also started with the push-up test. The participant was then given the instructions for the push-up portion of the study. The participant had two minutes to complete as many push-ups as possible. The protocol is similar to The American College of Sports Medicine, which recommends the push-up test in fitness testing in the general population because it is convenient, easy to learn, requires little to no equipment, and are adaptable to differing fitness levels (Augustosson et al., 2009). The participant was able to take rest periods, but it had to be while they were in the up position. The push-up test was terminated at the end of 2-minutes, or when the participant could not complete any more repetitions successfully. The participant began the test in the up position and started on the "go" command from the researcher. After this test was completed, the researcher recorded the number of successful

repetitions, RPE, and heart rate. For the present study, all tests ended when the participant could no longer complete reps successfully.

The next test on the PRT was either the curl-up test (old protocol) or the forearm plank hold test (new protocol). During the five-minute rest period following the push-up test, the researcher demonstrated whichever test the participant was completing on that day of testing. Once the rest period was over the participant was given the instructions for the test. If the participant was completing the Old Navy PRT, the curl-up test was next. For this test, they were told to complete as many successful repetitions of a curl-up as possible in two minutes, while also being allowed to rest in the up position. The curl-up test was terminated when the two minutes had passed or when the participant could no longer complete any repetitions successfully.

If the participant was completing the New Navy PRT, the instructions for the forearm plank test were given. These included, that the participant should hold the forearm plank for as long as possible. This test was terminated when any part of the participant's body besides the feet, hands, and forearms touches the ground, the participant received more than two corrections on the form, or the participant could no longer hold the correct form. Once the instructions for either test were given the participant was instructed to get into the starting positions and start the test on the researchers' "go". After the second part of the PRT, the researcher recorded the number of repetitions completed or time of plank hold, RPE, and heart rate. The participant was then given a five-minute rest period before the last event of the study, the 1.5-mile run. Throughout all the tests the participants were given similar amounts of verbal encouragement by the researcher. The verbal encouragement included the number of reps completed, time remaining in the tests, and pace during the 1.5-mile run.

During the rest period, the researcher and participant walked to the starting point of the 1.5-mile run. The researcher explained to the participant the route and showed them a map of the route they would run around Smith Stadium. The route for this study was a 0.75-mile loop that was completed twice to make up the total 1.5-mile route (Figure 2). Once the rest period was over the participant was told to take a starting position and started on the researcher's command. After the run, the researcher recorded the run time, RPE, and heart rate of the participant. After a five-to-ten-minute cool down in the lab, the participants were paid $25 in cash and were allowed to leave.

The participants returned to the lab at least one week later to complete whichever protocol they did not complete on day one. After the second session, the participant cooled down for 10 minutes in the exercise physiology lab where they filled out two open-ended questions about which testing protocol they liked better and why. After these questions were answered, the participants received their second $25 payment, and study visits were completed. The study outline can be viewed in Figure 3.

**Figure 2: 0.75 mile Run Route (2 laps completed for 1.5-mile run)**

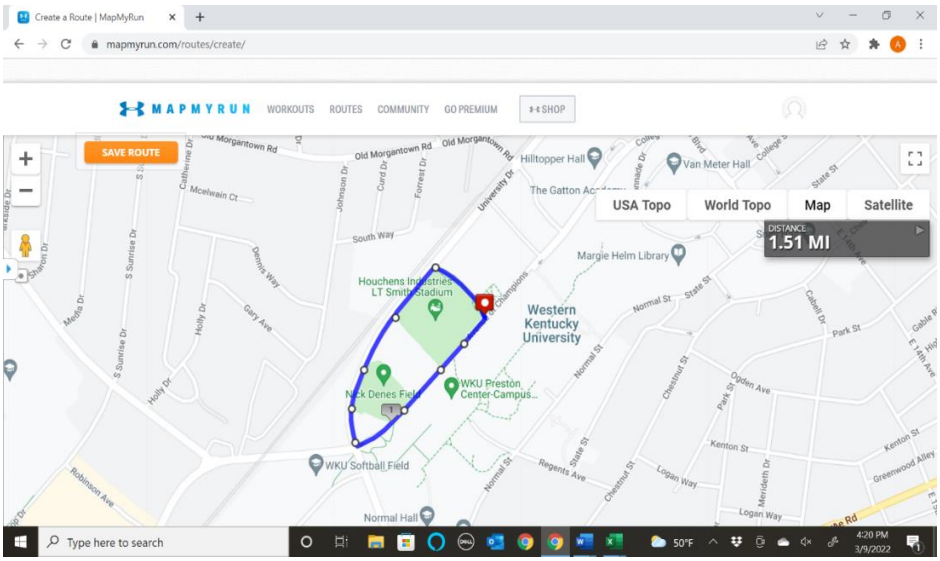
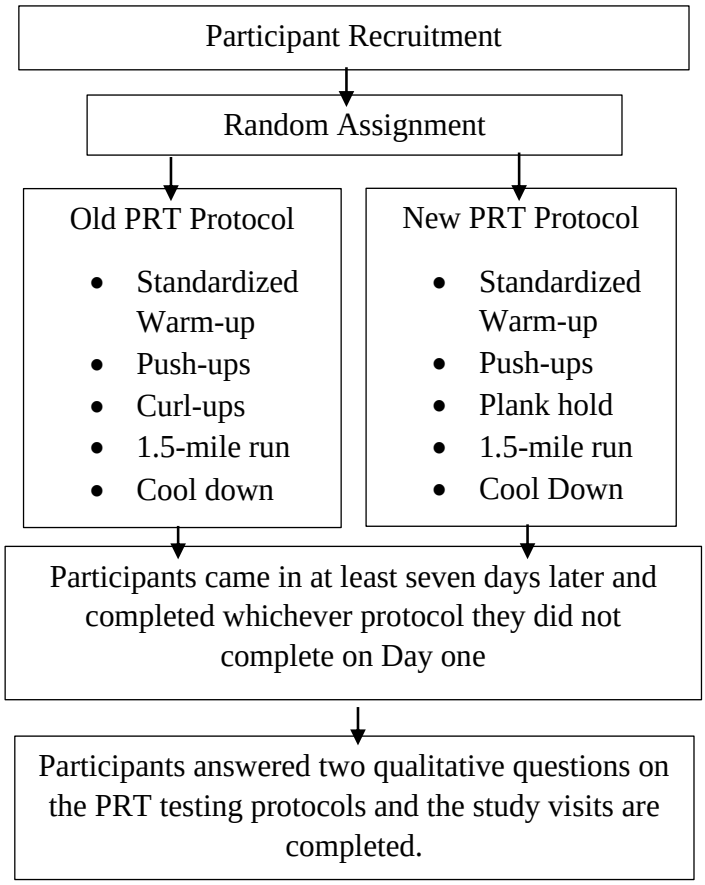


**Figure 3: Study Flow Chart**

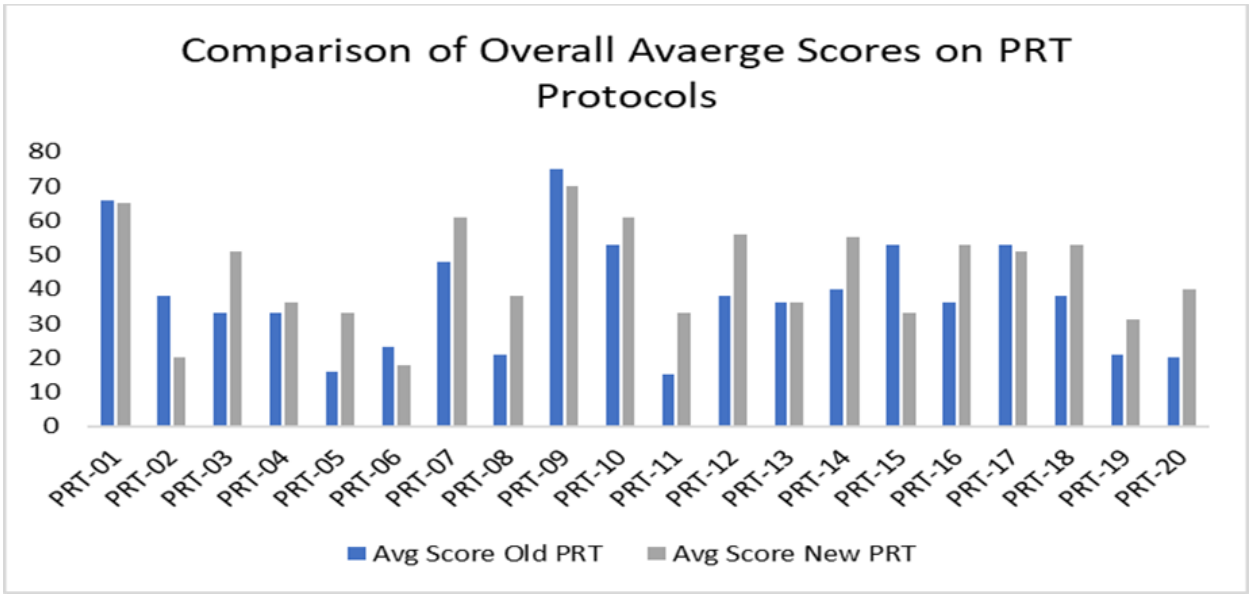



## Results

*Pass/Fail Rate*

Five participants passed the Old PRT while 10 participants passed the new PRT. In this study, on average, only one out of four participants passed the Old PRT while two out of every four participants passed the New PRT protocol (Figure 4). The overall pass/fail rate of the protocols supports that the New PRT protocol is easier than the Old PRT protocol.

**Figure 4: Comparison of Overall Average Scores on PRT Protocols**




*PRT Protocols*

To ensure there was not a learning effect on push-ups on day two of testing, a Friedman's test showed no significant difference in push-up performance between testing days. There was also no significant difference in the pass/fail rate of push-ups between the testing days (p=0.59). Total points awarded for plank compared to curl-up was significantly different between protocols (New PRT Protocol: 54.50± 12.02 points; Old PRT Protocol: 32.75±31.30 points; p=0.002) (Figure 5). Run times were also compared between the Old and New PRT with no significant difference seen (p=0.92). Finally, a paired samples t-test was used to compare the overall average of points rewarded on the Old (37.80±16.01 points) versus New (44.70±14.40 points) was found to be significant with participants scoring higher on the New PRT (p=0.01) (Figure 6).

**Figure 5. Points Awarded for Plank (New PRT) and Curl-up (Old PRT)**

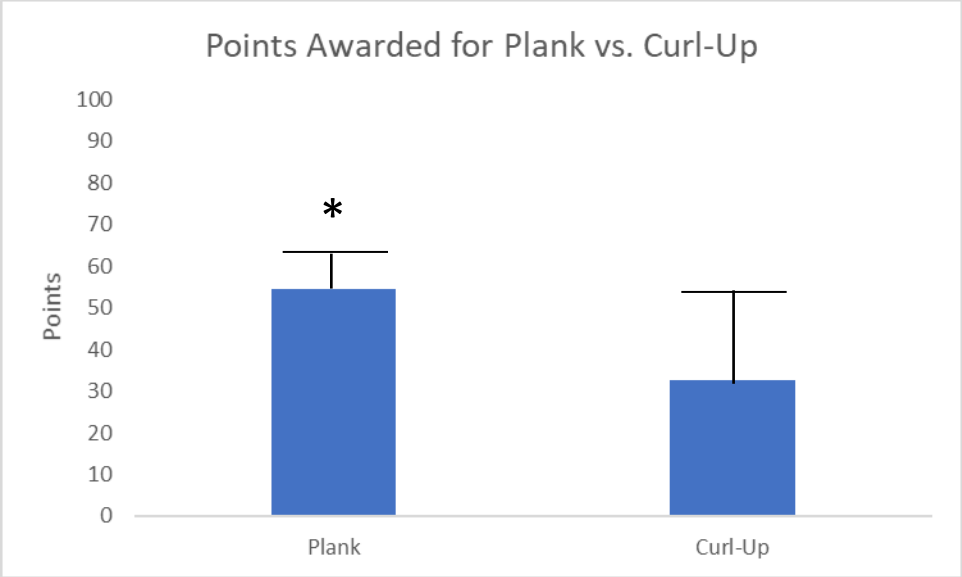
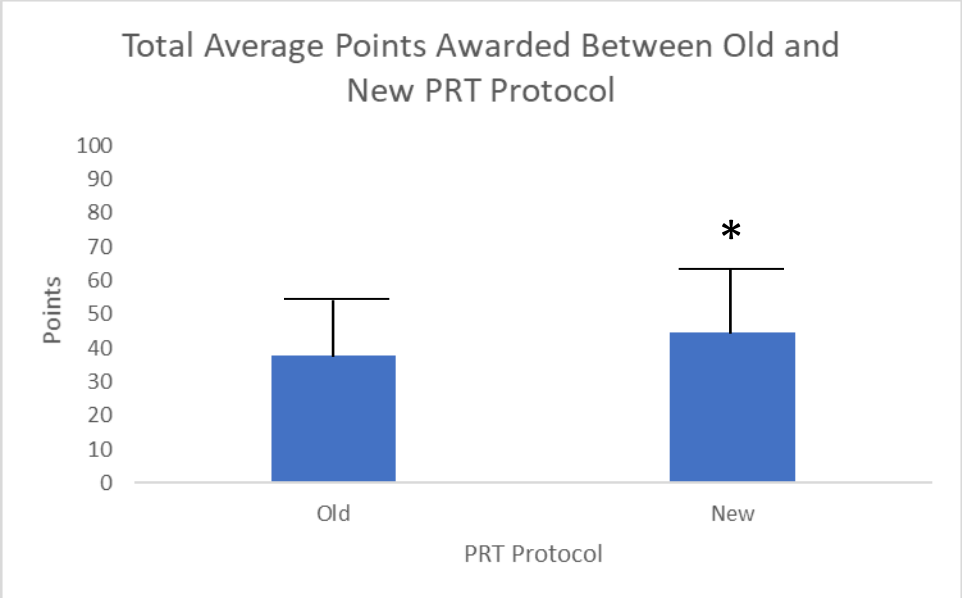


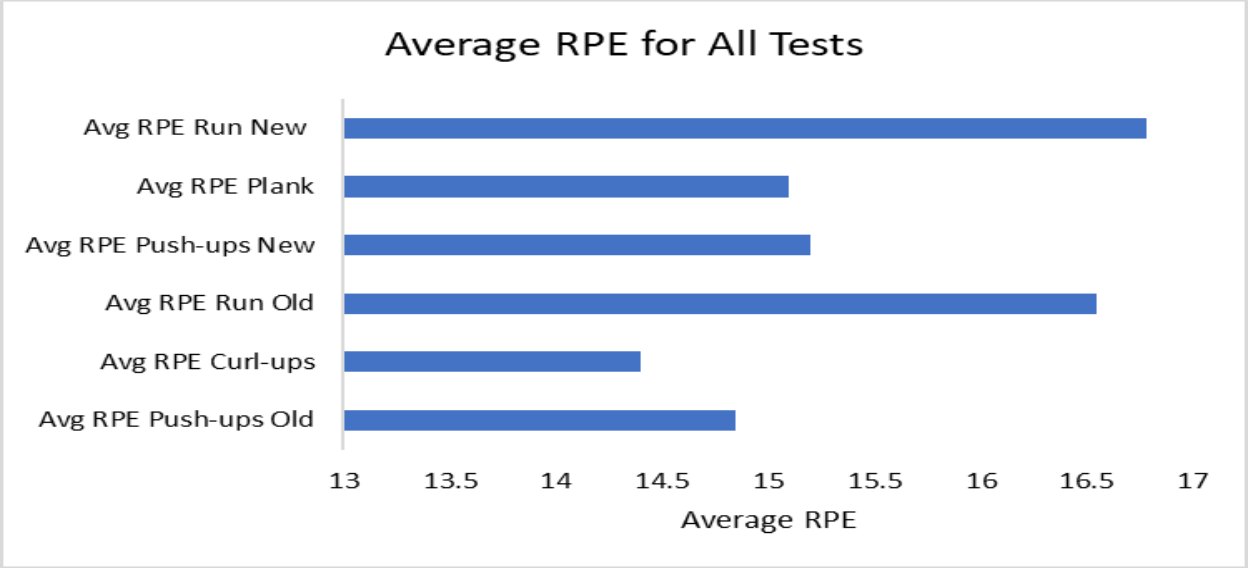

**Figure 6. Total Points Awarded between Old PRT Protcol and New PRT Protocol**




*RPE and Heart Rate*

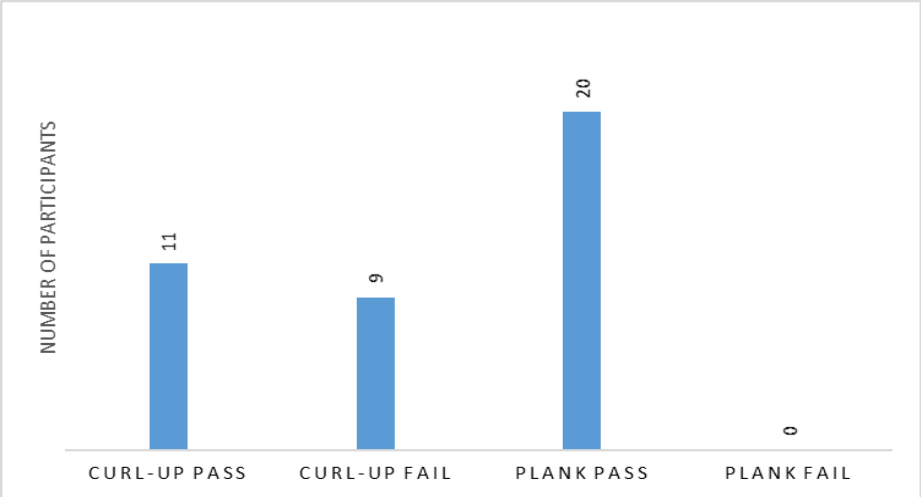
No significant difference was seen between the mean RPE for plank versus the mean RPE for curl-ups (p=0.218; Figure 7).

**Figure 7: Average Participant RPE for All Tests**




The study found that the minimum curl-up and forearm plank standard were not equivalent. This is supported by the number of participants who passed each test. All 20 participants completed the minimum plank hold requirement of one minute and ten seconds. On the old PRT, only 11 participants passed the curl-up portion of the test (Figure 8).

**Figure 8: Plank vs. Curl-Up Pass/Fail with Current Standards**



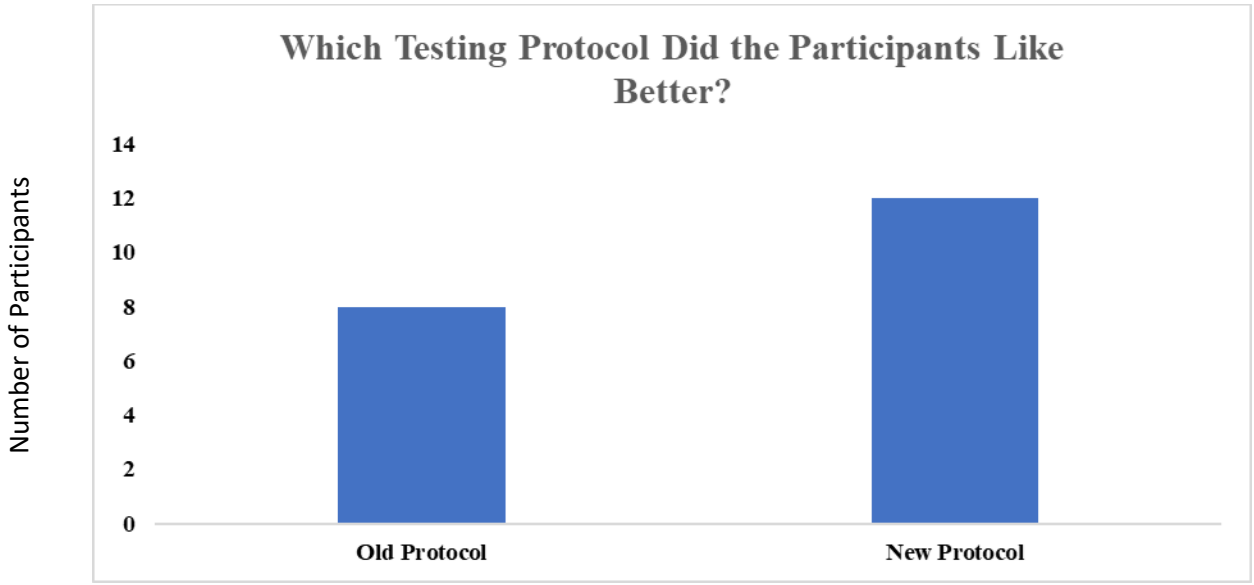
By asking two simple qualitative questions after the second testing session the researcher was able to gather information on which protocol the participants liked better and why. Table 2 illustrates common themes among the answers participants gave to the qualitative questions after completing both the Old and New PRT protocols. There were several reasons that the participants gave for their rationale, but the most common themes are as follows new protocol was easier while the other caused more fatigue, the participants trained planks more than curl-ups, and planks are a more practical test option for the military. The participants also preferred the New PRT protocol more than the old protocol.

This is also seen in Figure 9, with 11 participants preferring the New PRT protocol with the forearm plank hold and 9 preferring the Old PRT with the curl-ups. The qualitative data collected also supports quantitative data demonstrating the New PRT was easier than the Old PRT. Participants scored significantly higher on the New PRT when compared to the scores on the Old PRT. These tables and the statistics support the provided evidence that the New PRT protocol is easier and less rigorous than the Old PRT protocol.

**Table 2: Qualitative Questions, Common Themes, and Quotes**

| Question | Theme | Quote |
|---|---|---|
| | | |
| Which Protocol did you Like Better? | Old PRT Protocol | "I preferred the old protocol better than the new one." |
| | New PRT Protocol | "The new protocol was less difficult." |
| Why? | Less Fatigue | "The new test caused less fatigue on my abdomen."<br><br>"I enjoy planks better." |
| | Planks Less Difficult / Challenging | "The old protocol was less challenging but caused leg pain during crunches which made running harder to do."<br><br>"The sit-ups caused more core engagement making the exercise to exert more energy. The plank was a tough exercise, but it allowed for more energy for the rest of the exercises."<br><br>"The planks were easier than the crunches. The crunches hurt my sides when I ran." |
| | More Practical | "I think they were on the same level of difficulty, but the plank hold is a more practical method for the military." |
| | Planks more Challenging | "I preferred the new protocol; the plank was a harder minimum."<br><br>"New because it was more challenging."<br><br>"The planks were the most draining exercise. I could do sit-ups much easier than I could hold a plank." |

**Figure 9: Testing Protocol Preference**




## Discussion

As demonstrated by the results of this study the Navy should consider increasing the minimum standard for the forearm plank hold in order to maintain the same rigor as the old PRT. If the Navy were to increase the minimum forearm plank standard to one minute and twenty-two seconds (based on the score that correlates to the 25$^{th}$ percentile cutoff for failing), there would only be four participants who passed the New PRT and not the Old PRT which is an adjustment from the nine participants that passed before the adjustment. This adjustment is a possible solution to the New PRT being of less rigor and intensity compared to the Old PRT test. Less rigor could potentially result in more injuries while working or deployed. To elaborate, the Navy created a test that was easier to pass without changing the level of fitness amongst its members. This means a sailor who struggled to pass the PRT with curl-ups may now pass the PRT with the plank hold even though there has not been a change in that sailor's overall fitness levels. Given

that the tactical demands are equally challenging once in the Navy, the requirements for pass/fail need to maintain the same level of rigor or there could be major repercussions for sailors and the fleet at large.

Lower scores on the PRT are to be expected due to a break in PRT cycles due to the COVID-19 pandemic in which sailors may have had a decrease in fitness. Decreasing the rigor of the test after the break-in PRT cycles could not only be determinantal to the overall fitness levels of the fleet but also the type and incidences of injury among the Navy's members. Along with lowering the fitness standard could come less productivity at work due to the sailors being less physically fit. This can be problematic with many occupations in the armed forces on a strict schedule. If the sailors are not fit enough to work their shifts it could also lead to a potential increase in work-related injuries which would then also decrease the productivity of the overall fleet.

This study not only provides support for a different plank minimum to increase rigor, but it also demonstrates a gap between physical fitness test performance and job ability. The Marines operate by the phrase "every Marine is a rifleman" created by General Alfred Gray, the 29th Commandant of the Marine Corps. This term was coined by Gray post-Vietnam and exemplifies how this branch of the armed forces became America's ready to deploy force ready to head into combat at any time (Athey, 2021). To operate at this standard the Marines have both a general physical fitness test and a combat fitness test. Creating these tests for the Navy is more complex than just creating two separate tests to ensure that all sailors are ready to fight and serve like what both the Marine Corp and Army have done. Unlike the other two branches of service listed, in the Navy, there is a wide range of careers and occupations that a sailor can hold which makes trying to create a test to challenge occupationally relevant and combat skills difficult. The

findings of this study demonstrate that there is a gap in understanding and practice in physical fitness testing within the Navy. As noted in the review of literature there has been a push for the Navy to change both its physical readiness test as well as to add combat fitness tests like both the Marines and Army have done.

The changes to the physical readiness test do not make the test any more operationally relevant. The ability to complete these fitness tests does not correlate to specific abilities relative to completing occupational tasks. The Navy emphasizes their sailor's physical fitness and performance on the PRT but performing well on the PRT does not relate to a sailor's ability to do their job (U.S. Navy Guide 13, 2019). The findings of this project as well as other projects and papers on the topic of fitness testing within the tactical athlete population should be used as evidence to change the Navy's current approach to physical fitness and readiness testing.

The findings of this study could be replicated to determine if the Navy needs to change the PRT standards and/or if the military needs to take a different approach to fitness testing.

*Limitations*

Several limitations might have impacted this study. One limitation is that each test relies on the participant to provide maximal effort which is contingent on personal motivation. The study team did our best to provide encouragement to all (and equally) participants; however, the study could not control for each person's individual effort. RPE and HR were collected to demonstrate that the participants did their best during each protocol.

The other major limitation to this study is the fact that testing occurred outside, although the researcher tried to control for temperature the range was still larger than they wanted. The original acceptable temperature range was 65 to 75 but due to some participants having to cancel

due to sickness and no-shows the actual testing temperature range was 60 to 78; however, this is still a well-controlled range. The study team was also not able to account for differences in wind, humidity, and/or sun. However, these elements are all important to encounter as most sailors will have to perform their tactical duties in outdoor settings. All testing days were within the Navy's "Black Flag" weather conditions so testing outdoors was appropriate (U.S. Navy Guide 5, 2021). Also, it is less likely that the weather conditions would impact plank and curl-up testing outcomes given the short duration of these tests. The 1.5-mile run was most likely to be impacted, however, scores for the run remained similar from session one to two, suggesting the impact of the weather was minimal.

Another limitation to this study was the course that was run was not perfectly flat, the researcher did not have access to the track, since the athletic teams get first use, and COVID-19 protocols would have required masking for indoor facilities, this might have increased the participants run times compared to if they would have been run on a track. However, all testing was done on the same route, which normalized the comparison of the two testing days. An additional limitation of the study is that only males participated so there is no data to determine if the plank or curl-up standard needs to be changed among female sailors. Another limitation is the small sample size of 20 participants. Future studies should consider replicating results with a larger cohort.

Despite the limitations, the study has notable strengths. The study had a homogenous group of participants. The study protocol was consistent with Navy standards and carried out with extreme rigor to ensure high-quality data. Since all participants were within Navy height and weight standards the findings can be applied to this population. Results from this study can

be applied to the fleet at large and demonstrate that there are some possible issues with the current Navy physical fitness testing and standards.

This study is the first study, to our knowledge, which addresses the changes in the Navy PRT and how it many impacts performance. The study exposed the gaps in logic and rationale for the changes made to the PRT. The PRT was changed due to low-back pain and low operational relevance but by changing the test, this study found that the same rigor was not established when the norms for the forearm plank hold test were determined.

### *Future Research Considerations*

Since the completion of this study, the Navy has created separate plank standards for men and women. Not only did the Navy introduce different standards for men and women they also reduced the plank hold time for a sailor to max out or achieve a perfect score on the event (i.e. they made the passing standard even easier). According to the Military Times article, the Navy found a "minor gender performance difference on the plank" (Correll, 2022). The data used to determine and analyze the gender difference was the 26.000 forearm plank records from the 2021 cycle of the PRT (Correll, 2022). When this study was completed under Guide 5 during 2021 there was only a universal standard for the forearm plank hold minimum and maximums. The findings of the present study, in conjunction with the changes to the standard further suggest this study, should be replicated in a larger sample size and careful decisions should be made about the plank hold time that equated to passing scores.

## Conclusion

The results of this study suggest that the New PRT is not at the same level of rigor as the Old PRT protocol. These results are important due to the nature of the occupations that sailors hold within the U.S. Navy. By changing the curl-ups to a forearm plank hold and not carefully

determining plank minimum that matches the difficulty level of the previous curl-up minimum, the Navy could be placing its service members at risk for injury on the job. After completing both protocols many participants favored the New PRT protocol since it was easier, which is seen in the increased scores on the New PRT when compared to the Old PRT. The Navy should consider creating a harder plank minimum or new fitness test that has more operationally relevant tasks to test service member fitness. Both the Old and New PRT protocols lack operationally relevant movements like loaded carries, pulling, and lifting heavy weights which are a few tasks that are seen in tactical occupations.

## References


Athey, P. (2021). "Every Marine a Rifleman" Still Relevant, Says Sergeant Major of the Corps. *Marine Corps Times*

Bouffard, J., Yang, C., Begon, M., & Côté, J. (2018). Sex differences in kinematic adaptations to muscle fatigue induced by repetitive upper limb movements. *Biology of sex differences*, *9*(1), 17. https://doi.org/10.1186/s13293-018-0175-9

Chase, KA; Brigham, CE; Peterson, JT FACSM; and Coste, SC (2014) "FITNESS NORMS FOR THE PLANK EXERCISE," *International Journal of Exercise Science: Conference Proceedings*: Vol. 8: Iss. 2, Article 14.
Available at: https://digitalcommons.wku.edu/ijesab/vol8/iss2/14

Keefer M, Debeliso M. A Comparison of United States Marine Corps Physical Fitness Test and Combat Fitness Test Results. *Int J Exerc Sci*. 2020;13(4):1741-1755. Published 2020 Dec 1.

Lentz, L., Randall, J. R., Guptill, C. A., Gross, D. P., Senthilselvan, A., & Voaklander, D. (2019). The Association Between Fitness Test Scores and Musculoskeletal Injury in Police Officers. *International journal of environmental research and public health*, *16*(23), 4667. https://doi.org/10.3390/ijerph16234667

Marcus K. Taylor, MSC USN, Amanda E. Markham, MPH, Jared P. Reis, Ph.D., Genieleah A. Padilla, BA, Eric G. Potterat, MSC USN, Sean P. A. Drummond, Ph.D., Lilianne R. Mujica-Parodi, Ph.D., Physical Fitness Influences Stress Reactions to Extreme Military Training, *Military Medicine*, Volume 173, Issue 8, August 2008, Pages 738–742, https://doi.org/10.7205/MILMED.173.8.738

Molloy, J. M., Feltwell, D. N., Scott, S. J., & Niebuhr, D. W. (2012). Physical training injuries and interventions for military recruits. *Military medicine*, *177*(5), 553–558. https://doi.org/10.7205/milmed-d-11-00329

Myers, J. B., Guskiewicz, K. M., Schneider, R. A., & Prentice, W. E. (1999). Proprioception and neuromuscular control of the shoulder after muscle fatigue. *Journal of athletic training*, *34*(4), 362–367.

Oliva-Lozano, J. M., & Muyor, J. M. (2020). Core Muscle Activity During Physical Fitness Exercises: A Systematic Review. *International journal of environmental research and public health*, *17*(12), 4306. https://doi.org/10.3390/ijerph17124306

Orr, Robin M. Ph.D., TSAC-F*D[1,2]; Lockie, Robert Ph.D., TSAC-F*D[1,3]; Milligan, Gemma PhD[4]; Lim, Cheryl BSc (Sport Science and Management), TSAC-F[5]; Dawes, Jay Ph.D., CSCS,*D, NSCA-CPT*D, TSAC-F, FNSCA[1,6] Use of Physical Fitness Assessments in Tactical Populations, Strength and Conditioning Journal: June 18, 2021 - Volume - Issue - DOI: 10.1519/SSC.0000000000000656

Peterson, David. (2013). Proposed Performance Standards for the Plank for Inclusion Consideration Into the Navy's Physical Readiness Test. Strength and Conditioning Journal. 35. 22-26. 10.1519/SSC.0000000000000003.

Peterson, David & Usn, Msc. (2015). Modernizing the Navy's Physical Readiness Test: Introducing the Navy General Fitness Test and Navy Operational Fitness Test. The Sport Journal.

Peterson, David D. CSCS*D, EdD The Navy Physical Fitness Test, Strength, and Conditioning Journal: August 2015 - Volume 37 - Issue 4 - p 60-68 DOI: 10.1519/SSC.0000000000000122

Ryman Augustsson, Sofia & Bersås, Ellen & Thomas, Elin & Sahlberg, Margareta & Augustsson, Jesper & Svantesson, Ulla. (2009). Gender differences and reliability of selected physical performance tests in young women and men. Advances in Physiotherapy. 11. 64-70. 10.1080/14038190801999679.

Roy, Tanja C. SP USA; Springer, Barbara A.SP USA; McNulty, Vancil. SP USA; Butler, Nikki L. SP USA, Physical Fitness, *Military Medicine*, Volume 175, Issue suppl_8, August 2010, Pages 14–20, https://doi.org/10.7205/MILMED-D-10-00058

Scofield, Dennis E. MAEd, CSCS; Kardouni, Joseph R. DPT, Ph.D. The Tactical Athlete, Strength and Conditioning Journal: August 2015 - Volume 37 - Issue 4 - p 2-7 DOI: 10.1519/SSC.0000000000000149

Spiering, Barry A.[1]; Mujika, Iñigo[2,3]; Sharp, Marilyn A.[1]; Foulis, Stephen A.[1] Maintaining Physical Performance: The Minimal Dose of Exercise Needed to Preserve Endurance and Strength Over Time, Journal of Strength, and Conditioning Research: May 2021 - Volume 35 - Issue 5 - p 1449-1458 DOI: 10.1519/JSC.0000000000003964

Stilwell, B. (2021, August 29). *Teddy Roosevelt is the reason for military PT tests*. We Are the Mighty . Retrieved from https://www.wearethemighty.com/popular/first-military-pt-test/

Tomes CD, Sawyer S, Orr R, *et al*

Ability of fitness testing to predict injury risk during initial tactical training: a systematic review and meta-analysis

*Injury Prevention* 2020; 26:67-81.

Tong TK, Wu S, Nie J. Sport-specific endurance plank test for evaluation of global core muscle function. Phys Ther Sport. 2014 Feb;15(1):58-63. DOI: 10.1016/j.ptsp.2013.03.003. Epub 2013 Jul 11. PMID: 23850461.

U.S. Army, 2022, Army Combat Fitness Test (ACFT), https://www.army.mil/acft/

U.S. Navy, 2019, Guide 5: Physical Readiness Test (PRT), https://nrotc.asu.edu/sites/default/files/physicalreadinesstest.pdf

U.S. Navy, 2020, Guide 5: Physical Readiness Test (PRT), https://www.mynavyhr.navy.mil/Portals/55/Support/21stCenturySailor/Physical/Guide%205-Physical%20Readiness%20Test%20%20(JUN%202021).pdf?ver=AmCDZzpYG1NKct4v3LtviA%3D%3D

U.S. Navy, 2019, Guide 13 Command Fitness Guide: Command/Unit Physical Training (PT) and Fitness Enhancement Program (FEP), https://www.mynavyhr.navy.mil/Portals/55/Support/21stCenturySailor/Physical/Guide%2013-%20Command%20PT%20and%20FEP%20Guide%20(AUG19).pdf?ver=dP4oSuLGnpSHF-eLYyz3Rw%3D%3D

Whitehead, P. N., Schilling, B. K., Peterson, D. D., & Weiss, L. W. (2012). Possible new modalities for the Navy physical readiness test. *Military medicine*, *177*(11), 1417–1425. https://doi.org/10.7205/milmed-d-12-00127

# APPENDIX A
IRB Approved Consent Document

**INFORMED CONSENT DOCUMENT**

**Project Title:** Testing the Effectiveness of the Old and New Navy Physical Readiness Test Protocols.

**Investigator:** Alison Colao, Kinesiology, Recreation, and Sport, (240)-587-9314, alison.colao691@topper.wku.edu

You are being asked to participate in a project conducted through Western Kentucky University The University requires that you give your signed agreement to participate in this project.

**You must be 18 years old or older to participate in this research study.**

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

If you then decide to participate in the project, please sign this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

1. **Nature and Purpose of the Project:**

The purpose of the study is to determine which U.S. Navy Physical Readiness Test protocol elicits better performance and less fatigue.

2. **Explanation of Procedures:**

As part of this study, you will complete the old and new Navy PRT protocols. This study will involve two visits to the WKU exercise Physiology Lab (Smith Stadium East 1052) The first visit you will complete the old PRT protocol (2 minutes of curl-ups followed by 2 minutes of push-ups, and a 1.5-mile run). After a week of rest, you will come back to the lab for your second visit when you will complete the new PRT protocol (2 minutes of push-ups followed by a forearm plank hold, and a 1.5-mile run).

Study Visits: Prior to each visit you will be asked to make sure you have consumed enough food and water to participate in exercise. Upon arrival to the lab during the first visit you will asked to fill out an informed consent form, a 24-hour diet recall, and perform a hydration check. After signing the consent form and having any questions answered you will be fit with a heart rate monitor and will undergo a warm-up followed by the exercise test outside so you can work out without a mask. After the test you will be allowed a cool down period and then you are free to go. This visit will take around 45 minutes. The second visit will occur after resting for one week. The second visit will be the same warm-up followed by the new testing protocol. This day will be about 45 minutes outside. After the second day of testing you will be asked to answer a few questions about the different testing protocols. After this you will be free to go.

3. **Discomfort and Risks:**

Likely/Common

- Feeling fatigue or soreness during or after the testing protocol

Less likely/Less Common

- Musculoskeletal injury as a result of the exercise protocol

Rare

Life Threating

- Life threating heat rhythm during exercise

WKU IRB# 21-171
Approved: 9/10/2021
End Date: 2/10/2022
EXPEDITED
Original: 2/10/2021

4. **Benefits:**
The direct benefit is learning valuable information about your fitness levels and where you fall relative to others your age and gender. You will also earn a total of $50 cash for your participation ($25 at each visit).

The knowledge gained will help inform military personnel on which mode of testing should be used for best determining fitness levels.

5. **Confidentiality:**
To help protect your confidentiality, we will do everything we can to keep your information private and protected. Your information will be assigned a Patient ID# and will be protected in a locked document on a locked computer. All hardcopy data records are stored in locked file cabinets. If we write a report or article about this study or share the study data set with others, we will make sure that you cannot be identified. If any photos are taken (with your consent), any identifying information will be removed expect facial features or profiles.

6. **Refusal/Withdrawal:**
Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

*You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.*

_____ _____
Signature of Participant Date

_____ _____
Witness Date

☐ I agree to the audio/video recording of the research. ***(Initial here)*** _____

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Robin Pyles, Human Protections Administrator
TELEPHONE: (270) 745-3360

WKU IRB# 21-171
Approved: 9/10/2021
End Date: 2/10/2022
EXPEDITED
Original: 2/10/2021

## APPENDIX B

24 Hour Food Recall Log

### 24-hour Dietary Recall

**Participant ID#: _____**

**Date: _____**

**Session #: _____**

**MEAL TYPE: 1 = Morning 2 = Mid-Morning 3 = Noon 4 = Afternoon 5 = Evening 6 = Late evening**

**What did you eat and drink in the last 24 hours?**

| **Be detailed. List one food/drink per line** | **Amount Eaten** | **Meal Type** |
|---|---|---|
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**APPENDIX C**

Physical Activity Readiness Questionnaire

**Subject ID#_____**

**Physical Activity Readiness Questionnaire (PARQ)**

Now I am going to ask you a few questions to determine if you are eligible to participate in the study.

1. Has your doctor ever said that you have a heart condition and that you should only so physical activity recommended by a doctor?

   No____ Yes_____ If yes, specify: _____

2. Do you feel pain in your chest when you do physical activity?

   No ____ Yes_____ If yes, specify: _____

3. In the past month, have you had chest pain when you were not doing physical activity?

   No _____ Yes _____ If yes, specify: _____

4. Do you lose your balance because of dizziness, or do you ever lose consciousness?

   No _____ Yes _____ If yes, specify: _____

5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?

   No _____ Yes _____ If yes, specify: _____

6. Is your doctor prescribing drugs (for example, water pills) for a blood pressure or heart condition?

   No _____ Yes _____ If yes, specify: _____

7. Do you know of any other reason why you should do physical activity?

   No _____ Yes _____ If yes, specify: _____

**APPENDIX D**

Qualitative Questions

**Subject ID# _____**

**Date:**

## Qualitative Questions

Now that you have completed both testing protocols, please answer the following questions.

1. Which testing protocol (old or new) did you like better?

2. Why? (Example: was one less difficult than the other or did one cause less fatigue than the other?)

**APPENDIX E**

Demographic Form

Participant ID#_____ Date: _____

Age: _____

Gender: _____

Height: _____

Weight: _____

Prior/Current Military Service: _____

**APPENDIX F**
**Data Collection Sheet**

Participant ID#:_____

Height: _____ft _____ in  Weight: _____ lbs

---

**OLD PRT TESTING: VISIT 1 VISIT 2** *CIRCLE ONE* **DATE:_____**

**Baseline Measurements:**

Resting HR: _____bpm  Resting Blood Pressure:_____ / _____ mmHg

Outside temp: _____  Hydration level:_____

**Completed curl-ups:_____**  **Completed push-ups:_____**

**HR After curl-ups:_____bpm**  **HR after push-ups:_____**

**Recovery HR after curl-ups:_____**  **RPE After push-ups:_____**

**RPE After curl-ups:_____**  **Recovery HR after push-ups:_____**

**Run time: _____**  **HR after run:_____**

**Split lap 1:_____**  **RPE after run:_____**

**Split lap 2: _____**  **5 min Recovery HR after run:_____**

---

**NEW PRT TESTING: VISIT 1 VISIT 2** *CIRCLE ONE* **DATE: _____**

**Baseline Measurements:**

Resting HR:_____  Resting Blood Pressure: _____/_____ mmhg

Outside temp:_____  Hydration level:_____

**Completed push-ups:_____**  **Plank Hold:_____**

**HR After push-ups:_____bpm**  **HR After plank:_____ bpm**

**RPE After push-ups: _____**  **RPE After plank: _____**

**Recovery HR after push-up:_____**  **Recovery HR after plank:_____**

**Run time:_____**  **RPE after run:_____**

**Split lap 1:_____**  **HR after run:_____**

**Split lap 2:_____**  **5 min recovery HR:_____**