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*Original Research*

# Using a Walking Test to Assess Firefighter Fitness

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ABSTRACT

***International Journal of Exercise Science 17(4): 285-297, 2024.*** Tactical populations face increased risk on the job, and it is known that firefighters have high levels of cardiac-related death. Aerobic fitness is a modifiable cardiac risk factor, but many fire stations lack the proper equipment to easily assess aerobic fitness levels of their firefighters. Additionally, many fire stations lack wellness programs to hold firefighters accountable for maintaining their fitness levels. Purpose: We assessed the validity of the submaximal 6-minute walk test (6MWT) as a measure of aerobic capacity compared to a maximal treadmill test and the submaximal Gerkin protocol. Methods: Twenty-four firefighters (19 male, 5 female, 34.8 ± 9.7 years; 38.1 ± 3.6 kg·m$^{-2}$) completed the 6MWT, the submaximal Gerkin protocol, and a maximal treadmill test. Data were analyzed with Bland-Altman plots and correlation analysis. Results: We found equivalence between the 6MWT and directly measured VO2max and between the 6MWT and Gerkin protocol using Bland-Altman plots. In our cohort, the 6MWT underestimated VO2max (31.57 ml·kg$^{-1}$·min$^{-1}$) compared to directly measured VO2max (38.1 ml·kg$^{-1}$·min$^{-1}$) by 17% and to the Gerkin (40.48 ml·kg$^{-1}$·min$^{-1}$) by 22%. Conclusion: Considering its equivalence, using the 6MWT could be a more accessible way to quantify aerobic capacity in firefighters. Despite underestimation, having an easy to administer protocol may encourage more fire stations to assess pre- and post- fitness levels regularly.

KEY WORDS: Firefighter, aerobic capacity, fitness assessment, maximal fitness, submaximal fitness

## INTRODUCTION

Firefighting is an essential component of public safety in the United States and around the world. While the job is inherently dangerous, injury is not the leading cause of death in firefighters. In fact, the most common cause of line of duty death among firefighters is sudden cardiac death (14). While some risk factors for cardiovascular disease (CVD) are unable to be modified, such as, age, race and genetics, by the individual, risk factors such as inactivity, poor nutrition, and smoking can be modified. When firefighters are provided adequate programming and encouragement to live a healthier lifestyle, they can significantly reduce their risk for CVD

by increasing their cardiorespiratory fitness levels (5, 21). Thus, assessing firefighter's physical fitness and health regularly is important.

The National Fire Protection Association (NFPA) created a standard for the health and fitness of firefighters. The NFPA 1583 standard suggests that within fire departments nationwide, there should be a health-related fitness program that encourages members to develop and maintain a level of health and fitness to safely perform their assigned functions (17). Despite this, there appears to be a high number of firefighters who are unfit, use tobacco, and are hypertensive and hypercholesterolemic, which puts them at an increased risk for developing CVD (15, 27).

Although the NFPA recognizes the benefits of exercise on overall health, it does not mandate fire departments to have fitness programs for their crews, in fact, less than 30% of stations have incorporated fitness programs as a requirement for their department (8). When firefighters are first hired, they are required to complete academy training. Most undergo the rigorous candidate physical ability test, a nationally established firefighting simulation test often used to screen applicants (23). Many firefighters are only required to pass this test once upon their initial hiring, so this may be why firefighters have inadequate fitness levels (24). In fact, in several studies, municipal firefighters have been shown to have lower aerobic capacity (31.5 ml·kg$^{-1}$·min$^{-1}$) when compared to the average 40-year-old male (37.8 ml·kg$^{-1}$·min$^{-1}$) (1, 16, 24). Aerobic fitness in firefighters is as important as it is in civilians.

Overall fitness has a strong inverse relationship with all-cause and CVD-related mortality (13). Fitness might even be a stronger predictor of mortality beyond traditional risk factors, such as hypertension, diabetes, cholesterol levels, and smoking (22). Predicted levels of VO2max have been reported in the firefighter population using a variety of protocols such as the 1.5 mile run test (5), Queen's College Step Test (19), cycle ergometry (24), the Forestry step test (11), and the Balke-Ware protocol (6). The NFPA 1583 outlines requirements for aerobic fitness testing and states that VO2 levels can be quantified using the Gerkin submaximal treadmill protocol. This ramp protocol increases alternatively in speed or incline to a submaximal predicted heart rate, and requires a heart rate monitor, experienced technicians, and a treadmill to administer.

However, many fire stations do not have easy access to the necessary equipment to conduct this test. Therefore, it would be advantageous to validate another aerobic fitness test that requires limited equipment so that fire stations anywhere could quantify aerobic fitness.

Historically the Bruce protocol has been one of the main protocols used to directly measure VO2max in the civilian population (9). The Bruce protocol could be seen as high risk since it is a higher overall workload, and the Gerkin could be considered a lower risk test to administer in the fire station, since it is submaximal (9). Both tests require a treadmill and heart rate monitor. The barrier to direct measurement of VO2max is that it requires additional sophisticated equipment, such as a metabolic cart, to measure gas exchange. Alternately, the 6-Minute Walk Test (6MWT) is a simple, easy to administer test that only requires a 30-m walkway and a tape measure to measure distance walked. The 6MWT has been used around 40 years and has been

found to be a valid and reliable method for measuring the functional capacity within both pediatric and adult populations (26). When the 6MWT was first developed it was primarily used for patients with respiratory diseases, but since then the protocol has been used to assess fitness in older adults and most recently, in healthy adults (12). Using a fitness test that requires little time and equipment, such as the 6MWT, to predict fitness levels could allow more groups of people to assess the fitness status in different populations, in a more approachable manner. Specifically, the 6MWT has never been used to assess fitness levels in firefighters, therefore validating a more accessible fitness test for firefighters, could be beneficial to this populations overall cardiovascular health.

Since fitness testing is not routine in many fire stations due to the lack of proper equipment, the purpose of this study was to assess the validity of two submaximal tests, the Gerkin and 6MWT protocols, to predict firefighter's VO2max in comparison to the directly measured VO2max from the Bruce protocol. We hypothesized that the Gerkin protocol formula would predict closer VO2max values to the measured Bruce protocol than the 6MWT formula since they both are incremental ramp protocols. Ultimately, this study was intended to demonstrate that it may be possible to measure aerobic fitness in firefighters while using minimal equipment with the 6MWT. Due to the underreporting of data in female firefighters, we performed and report here a pilot sub-analysis based on sex to assess directly measured VO2max compared estimated measures (6MWT & Gerkin).

## METHODS

*Participants*

Twenty-eight firefighters were recruited from fire stations throughout the Seacoast area of New Hampshire, USA, by word of mouth, email, and phone calls. Out of the 28 firefighters recruited, two did not receive medical clearance for a maximal cardiovascular fitness test, and two did not follow up for scheduling, resulting in 24 firefighters completing the study. Firefighters volunteered to participate and were included if they met the following criteria: regular participation in physical activity (defined as at least 30 minutes of moderate intensity exercise at least 3 days per week for the past 3 months); no current diagnosed cardiovascular, metabolic, or renal disease; and no current musculoskeletal injury. Any firefighter that did not meet these criteria were required to obtain medical clearance prior to enrollment. Each firefighter gave informed consent and completed a general health history form. This protocol was approved by the Institutional Review Board at the University of New Hampshire. This research was carried out fully in accordance to the ethical standards of the International Journal of Exercise Science (18).

*Protocol*

We used a within-subject repeated measures study design to assess the validity of two submaximal tests at predicting VO2max compared to the direct measurement of VO2max utilizing the Bruce Protocol (3). Firefighters were randomized to the order of their fitness tests by block randomization. Each reported to the laboratory for testing with a minimum of 48 hours

of recovery between visits. Before completing the 3 fitness tests, the firefighters were asked to refrain from rigorous training for 24 hours prior to testing and avoid caffeine or alcohol for 4 hours prior to testing. During the first visit, basic anthropometric data, including height, weight, and body fat percentage (InBody770) were collected. Blood pressure and heart rate were measured using a sphygmomanometer (McKesson HCS) following 5 minutes of quiet rest.

Direct VO2max was performed on a calibrated treadmill (Fitnex Fitness Equip Inc. Serial #3020). Body weight was measured upon arrival, and the firefighter was connected to a portable ECG system (Norav Medical, PC-ECG) as well as being fitted with a facemask (Hans Rudolph, INC USA). Direct VO2max was measured through 15 second averaging of breath-by-breath analysis with an indirect calorimeter (Parvomedics TrueOne 2400). Throughout the duration of the Bruce protocol test, blood pressure was measured by the same technician (SD) in the last minute of each stage, and heart rate was monitored each minute using the portable ECG. At the end of each stage, we asked the firefighter for their rating of perceived exertion using the Borg 6-20 scale (1). VO2max was considered achieved when two of the following criteria were met: respiratory exchange ratio > 1.1; heart rate > 90% of age-predicted maximum heart rate (Maximum heart rate = 208 – (0.7 x age)); Rating of perceived exertion > 18; or if the firefighter reached volitional fatigue. All data included in the analysis were from tests where the firefighter reached VO2max.

The submaximal Gerkin Protocol was performed on the same calibrated treadmill as the direct VO2max test. First the firefighter was fitted with a heart rate monitor. The test started with a warm-up period of 3 minutes at a speed of 4.8 kph and 0% grade. The workload increased incrementally each minute of the test alternating between an increase in speed (1.6 kph) or an increase in incline (2%). The test was terminated when the firefighter reached 85% of their maximal heart rate using this formula (208 – (0.7 x age) x 0.85). Once the test was terminated, the firefighter walked at 2.7 kph until their heart rate returned to baseline. We predicted VO2max using this formula (7):

$$\text{VO2max (ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}) = 56.981 + (1.242 \cdot \text{TT}) - (0.805 \cdot \text{BMI})$$

TT = test time in minutes

The submaximal 6MWT was administered on a flat, 30 m long, hallway. Two bright colored pieces of tape were placed 30 m apart in the hallway, and the firefighter was positioned at the starting line. Before the test started, we instructed firefighters to walk as far and as fast as possible, without running, for 6 minutes until we called stop. The total distance walked in 6 minutes was measured and we predicted VO2max using this formula (12):

$$\text{VO2max (ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}) = 61.1 - (11.2 \cdot \text{sex}) - (0.4 \cdot \text{age}) - (0.2 \cdot \text{weight (kg)}) + (0.2 \cdot \text{distance walked (m)} \cdot 10^{-1})$$

Sex: male = 1, female = 2

*Statistical Analysis*

*A priori* power analysis (G*Power 3.1, University of Kiel, Germany) determined that 24 participants were needed to observe an estimated effect size of 0.8, $\beta$ = 0.9, with $\alpha$ set to 0.05. Data analyses were conducted using Microsoft Excel 2016 and SPSS (v 28.0.1.0, IBM Corp.). Continuous data are presented as the mean ± standard deviation. Bland-Altman plots were constructed with mean bias error, mean square error, and Lin concordance correlation coefficients to compare measured VO2max and the predicted VO2max values for equivalence analysis. Bland-Altman analysis was used to compare agreement between the tests, due to its ability to distinguish differences from calculating the limits of agreements based on the difference scores (10, 11). The differences between directly measured and predicted VO2max were further analyzed by paired *t*-test. Additionally, as part of a pilot sub-analysis, paired t-tests were performed to compare directly measured to predicted VO2max in male and female firefighters.

Pearson's correlation analyses were performed to assess the relationship between measured and predicted VO2max from the Gerkin and 6MWT and a *P*-value of < 0.05 was used to determine significance. Data included in this study adhered to the assumption of normality. The scale used for Pearson's correlation was: high degree / strong correlation if the coefficient value falls between ± 0.50 and ± 1; moderate degree / medium correlation when between ± 0.30 and ± 0.49; and low degree / small correlation if below ± 0.29.

## RESULTS

Twenty-four firefighters completed all fitness tests. Table 1 presents the sample mean demographic and anthropometric measures. We had a population of firefighters that gave representation to different types of firefighting, multiple levels of experience, and included 20% females. Twenty-two of the firefighters were municipal firefighters and two were wildland firefighters. Twenty firefighters reported working as paid crew (16M, 4W) and four were volunteer (3M, 1W) firefighters. The average years of service for the entire group was 12 ± 8.9 years. Using the definition of overweight categorized as a BMI > 25 $kg \cdot m^{-2}$, the firefighters in this study had an average BMI in the overweight category based on their InBody measurements. Overall average blood pressure levels were elevated. In fact, six of the 24 firefighters had observed blood pressure readings in the hypertensive range but did not report hypertensive medication.

Figure 1 shows that the 6MWT tends to predict a lower VO2max compared to both the directly measured VO2max and calculated VO2max from the Gerkin protocol. We observed the VO2max values to be within the Bland-Altman limits, therefore suggesting equivalence between the fitness tests. VO2max values calculated from the 6MWT prediction formula were an average of 6.53 $ml \cdot kg^{-1} \cdot min^{-1}$ lower than directly measured VO2max. (Figure 1a) Additionally, VO2max values calculated from the 6MWT prediction formula were an average of 8.91 $ml \cdot kg^{-1} \cdot min^{-1}$ lower than the VO2max values from the Gerkin protocol prediction formula. (Figure 1b) The Gerkin protocol tended to over-predict VO2max at an average of 2.38 $ml \cdot kg^{-1} \cdot min^{-1}$ higher than directly measured VO2max. (Figure 1c).

**Table 1.** Firefighter Characteristics.

| Variable ($n$ = 24) | |
|---|---|
| General characteristics | |
| Age (yr) | 34.8 (9.7) |
| Gender (male/female) | 19/5 |
| Years as a firefighter | 12 (8.9) |
| Type of firefighter (career/volunteer) | 20/4 |
| Height (cm) | 175.0 (7.5) |
| Weight (kg) | 96.1 (15.1) |
| BMI (kg·m²) | 28.1 (3.6) |
| Body fat (%) | 23.9 (6.3) |
| Blood pressure measures | |
| Brachial SBP (mmHg) | 121.8 (8.6) |
| Brachial SBP (mmHg) | 71.4 (7.0) |

Mean (± SD). BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure

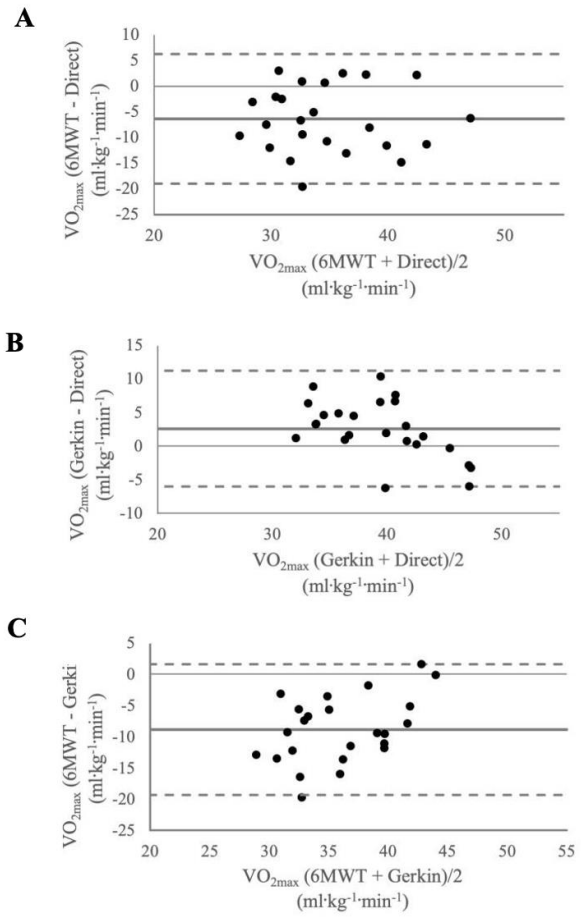


**Figure 1.** Bland-Altman plot between **(a)** VO2max (6MWT) and directly measured VO2max; **(b)** VO2max (Gerkin) and directly measured VO2max; **(c)** VO2max (6MWT) and VO2max (Gerkin); the solid line horizontal to the X-axis represents the mean difference value, the dotted lines horizontal to X-axis represent the upper and lower limits of agreement (mean difference ± SD of differences).

Table 2 presents the comparison between directly measured VO2max and predicted values from the 6MWT and the Gerkin protocol. Data were reported as full group and separated by gender. Gerkin protocol predicts higher VO2max in females when compared to the directly measured VO2max value ($p$ = 0.04), although in our male firefighter cohort, it did not reach statistical significance ($p$ = 0.06). The 6MWT predicted VO2max values were significantly lower in male and females ($p$ < 0.05, for both).

**Table 2.** Comparison between directly measured and estimated $VO_{2max}$.

| | Full Group | Male | Female |
|---|---|---|---|
| *N* | 24 | 19 | 5 |
| Age (yr) | 34.8 (9.7) | 35.8 (10.0) | 31.0 (8.3) |
| $VO_{2max}$ (Direct) ml·kg$^{-1}$·min$^{-1}$ | 38.10 (6.14) | 38.06 (6.73) | 38.26 (3.54) |
| $VO_{2max}$ (Indirect) ml·kg$^{-1}$·min$^{-1}$ | 31.57 (5.97) | 32.84 (5.89) | 26.73 (3.44) |
| Distance walked (m) | 725.52 (42.08) | 730.41 (43.32) | 706.93 (34.53) |
| Ratio | 0.84 (0.16) | 0.87 (0.15) | 0.71 (0.12) |
| Cohen's *d* | 1.016 | 0.822 | 2.143 |
| *P* value | < 0.001 | 0.001 | 0.011 |
| $VO_{2max}$ (Gerkin) ml·kg$^{-1}$·min$^{-1}$ | 40.48 (3.96) | 40.22 (4.34) | 41.48 (2.05) |
| Ratio | 1.08 (0.12) | 1.07 (0.13) | 1.09 (0.07) |
| Cohen's *d* | 0.555 | -0.489 | -1.419 |
| *P* value | 0.012 | 0.060 | 0.042 |

Figure 2 shows the positive relationships found between the test measures. We found a medium relationship between the 6MWT VO2max and the directly measured VO2max ($r$ = 0.437, $p$ = 0.033, $t$ = 2.28). There was also a medium relationship between the 6MWT and Gerkin protocol predicted VO2max values ($r$ = 0.483, $p$ = 0.017, $t$ = 2.59). Finally, we report a strong relationship between the VO2max from the Gerkin protocol and directly measured VO2max ($r$ = 0.719, $p$ < 0.001, $t$ = 5.06).

## DISCUSSION

The main findings of this study were that the 6MWT under-predicted and the Gerkin protocol over-predicted firefighter's VO2max; however, both submaximal prediction values did fall within the limits of agreement on the Bland-Altman plots, suggesting equivalence, thus they both could be useful tools in monitoring fitness levels of firefighters. We hypothesized that the Gerkin protocol formula would predict a closer VO2max value to the measured Bruce protocol than the 6MWT formula. Our hypothesis was supported even though the Gerkin protocol over predicted VO2max by 6%, it was closer to the actual gas analysis measurement.

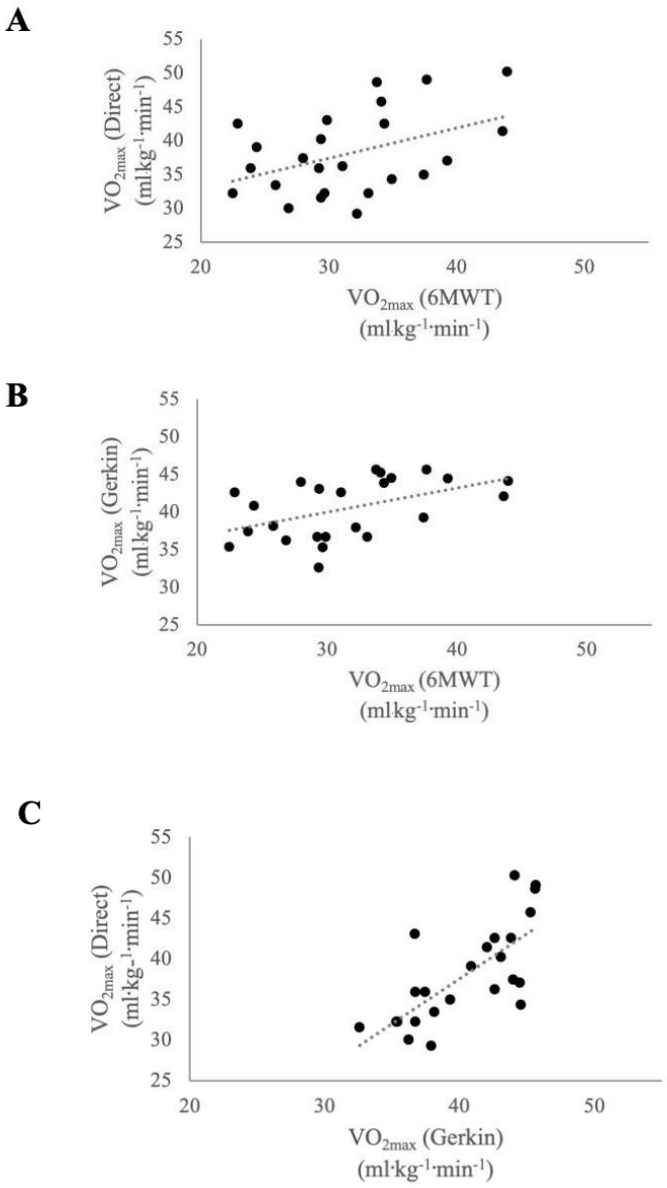


**Figure 2.** Relationship between **(a)** VO2max (6MWT) and directly measured VO2max ($r$ = 0.437, $p$ = 0.033, $t$ = 2.28); **(b)** VO2max (6MWT) and VO2max (Gerkin) ($r$ = 0.483, $p$ = 0.017, $t$ = 2.59); and **(c)** VO2max (Gerkin) and directly measured VO2max ($r$ = 0.719, $p$<0.001, $t$ = 5.06).

It has been estimated that the work involved with firefighting requires a VO2max of 42 ml·kg$^{-1}$·min$^{-1}$ (20). We confirm what others have reported, as the firefighters who participated in our study had lower VO2max levels than required by NFPA (8, 15, 21). Many fire stations nationwide are lacking proper equipment for regular cardiorespiratory fitness testing (2); therefore, these findings have value demonstrating a field test that uses minimal equipment as a means of monitoring fitness. It could be argued that a more accessible modality (the 6MWT) to quantify aerobic fitness can be an easy and helpful way to ensure firefighters are able to maintain and/or improve their fitness level. Firefighters are often required to pass a vigorous

fitness test upon their initial employment; however, they are not mandated to have routine fitness assessments throughout their career to ensure they maintain an adequate level of cardiorespiratory fitness.

Using the 6MWT regularly to track progress of aerobic fitness levels in firefighters could enable testing in fire stations that currently do not conduct aerobic capacity tests. This, in theory, could decrease the risk of CVD and reduce the number of CVD-related deaths, since we know that increasing cardiorespiratory fitness levels decreases overall mortality (13).

Currently, the 6MWT has not been further utilized to predict VO2max levels in healthy adults. The 6MWT has been primarily used for adolescent populations, or clinical populations for individuals with chronic diseases such as heart failure, or COPD (12). Since the 6MWT was initially developed to estimate fitness levels of individuals with bronchitis (12), this could contribute to the underprediction of VO2max levels in the healthy population. Hong et al. tested the validity of the 6MWT by comparing the values to the 3-minute step test at 30-cm box height and the 3-minute step test at 20-cm box height (12). This group noted that the 6MWT was a valid estimation of VO2max after running regression analysis. Using the 6MWT in firefighter population to estimate VO2max can hopefully be a catalyst for this test to be used in other tactical athlete populations to monitor cardiorespiratory fitness levels using an accessible method.

Within our group of firefighters, the average BMI was 28.1 $kg \cdot m^{-2}$ which confirms previous research. The prevalence of overweight and obesity among firefighters has been reported to be higher than that found in the general male population (27). A recent study by Chen et al. derived an equation to predict VO2max in Chinese adults, and they did this by comparing prediction equations from Norway, Canada, and the United States, and ran regression analysis using age, height, sex, BMI, and weight as variables (4). An important finding of their study was that the equation derived showed a consistent and accurately predicted VO2max for men with a healthy BMI, and predicted a higher VO2max for overweight, and taller men (4). Given that the Gerkin protocol prediction formula uses BMI as a variable, this may contribute to a higher prediction of VO2max than the 6MWT prediction equation, which only uses weight as an anthropometric variable. It is important to note, that since many firefighters are overweight based on BMI measures (15), prediction equations that use BMI as a variable, may predict higher VO2max values compared to directly measured VO2max.

Other fitness tests such as the submaximal Forestry step test and the Balke-Ware Protocol have previously been used in firefighters (6, 11). The researchers in these studies also noted that the Forestry step test and the Balke-Ware tended to predict higher VO2max levels when compared to direct measurement of VO2max (6, 11). This is similar to the current study, where the Gerkin Protocol overestimated VO2max, however, in this study it was noted that the 6MWT underpredicted VO2max of firefighters. The Forestry Step Test is another submaximal test lasting only 5 minutes that requires little equipment. This test requires a heart rate monitor, a platform that is 40 cm tall, and a consistent stepping cadence. In a recent study by Hale et al.,

they found the Forestry step test over predicts VO2max by an average of 13% (11). It is possible that in our study the 6MWT under predicts VO2max levels because it is a self-paced test. When the firefighters completed the 6MWT they were instructed to walk as fast as possible but had no metric to gauge their speed. The 6MWT equation used considers gender, age, weight, and distance walked, but it does not account for pace.

We also ran a pilot sub-analysis to examine the 6MWT by sex and found that it underestimated VO2max by an average of 11.5 $ml \cdot kg^{-1} \cdot min^{-1}$ for females and by 5.22 $ml \cdot kg^{-1} \cdot min^{-1}$ for males. This is an interesting finding. This may be because of a multitude of factors, such as females were overall shorter than the male participants by an average of 13.5 cm, and therefore, may have had a shorter stride length, or it may have been because of their differences in BMI, which was on average 3.4 $kg \cdot m^{-2}$ less than their male counterparts. Based on data from the University of Oklahoma's Health Science department, they found that women tend to have a shorter stride length, and therefore cannot cover the same distance in the same amount of time as their male counterparts (25). This could account for the more apparent underestimation of VO2max in female fighters when using the 6MWT. Further research in female firefighters is needed to examine this and perhaps validate a new prediction equation.

There were several strengths and limitations within the study. First, the firefighters from the surrounding area volunteered to participate in the study. Therefore, it is not representative of the entire firefighter population. There were five female firefighters (21%) who participated in the study, which is higher than the average percentage of female firefighters in the overall firefighter population. However, female firefighters are often under-represented in firefighter research, therefore, including them in this study offers valuable data on their fitness levels as well since female firefighters are required to have the same level of physical fitness when they are first hired. However, given the limited number of females participants in this study, and the small sample size, the results may not be applicable to all female firefighters. We also recognize that due to the nature of this study, requiring a maximal fitness test, our population may have bias since most likely more fit firefighters volunteered to participate. Finally, the 6MWT prediction formula can lead to error by measurement of distance walked, since it is possible that the firefighters did not immediately stop walking at the 6-minute mark. Despite this, the methods followed were consistent and to the best of our ability were accurate. The under prediction of VO2max may also be due to the higher level of fitness in healthy working adults compared to the clinical population that 6MWT was originally used on.

Of note, there may be a concern that given the under prediction of VO2max if fire stations were to use the 6MWT as part of their physical fitness testing procedures, some firefighters may be considered to fail the standards needed to work as a firefighter. However, the 6MWT is valid, has been used for decades, and could be a beneficial tool to assess initial fitness level in firefighters starting on a new training program. The 6MWT is easy to administer and could therefore be a valuable pre- and post-testing metric used to show potential improvements in cardiorespiratory fitness. This could empower firefighters and motivate them further towards improving their fitness. We found that during the testing for this study, firefighters who were

not participating would rally around and observe with interest the fitness test. Subjectively it seems that this type of test could become a valuable mainstay in the fire station fitness programming.

In conclusion, the 6MWT prediction was found equivalent to the Gerkin protocol prediction. The 6MWT data predicted lower VO2max in firefighters when compared to the directly measured VO2max by Bruce protocol and to the Gerkin protocol prediction. Moving forward, to protect our firefighters, it will be necessary to develop a protocol to accurately predict cardiorespiratory fitness levels of firefighters, that requires little equipment, and can be easily conducted at a fire station. This initial study shows that a submaximal walking test could be used as an equivalent aerobic capacity test in fire stations that do not have a treadmill or lack adequate funding to pay for aerobic testing of the crew. Additionally, finding a balance to make fitness testing a priority and enjoyable in fire stations, even adding some friendly competition between crews, to promote the importance of maintaining healthy aerobic fitness levels will be beneficial to the health and wellness of firefighters. Using simple walking tests could be one way to increase motivation to improving fitness. Ultimately, helping improve and maintain firefighter fitness and health should be a community priority.

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