PURPOSE: To examine a modification on a standard step test allowing for the use of a pre-existing in-home step of variable height for cardiorespiratory fitness testing.
HYPOTHESIS: HR responses to step tests using the same oxygen consumption rate but different step heights and rates would be statistically reliable.
METHODS: 37 healthy subjects (age 24±5yrs; M 14, W 23) identified and measured a small and large object within their home that was suitable for step testing. Subjects met with researchers using virtual conferencing software to perform step tests on three occasions: 1) small step test 1; and 2 & 3) randomized small step test 2 and large step test. The step frequency for each test was determined so that the estimated exercising VO_2 (26 mL/kg/min) would be matched between tests. During each exercise visit subjects were asked to manually count their 60 s radial pulse 5 s after a 3 min step test.
RESULTS: Post exercise HR from the small step test 1 (avg±SD; 98±22BPM) and small step test 2 (avg±SD; 100±23BPM) were highly correlated (Pearson r=0.905, p<0.001) with excellent reliability (ICC=0.904). Post exercise HR from the small step test 2 vs large step test (avg±SD; 102±23BPM) (i.e. the randomized visits) were also highly correlated (Pearson r=0.862, p<0.001) with good reliability (ICC=0.862). The smallest worthwhile change across subjects (4.6 BPM), average within subject coefficient of variation (7.2%), and between test Cronbach's α (0.950) were calculated using all three tests and further suggest excellent reliability.
CONCLUSIONS: These preliminary results suggest that modifying step frequency to account for the varying heights of in-home steps will permit the use of previously developed step tests without the need for standardized steps. We also displayed the utility of this fitness test model for virtual exercise and telehealth sessions by performing all visits virtually.

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Exercise Participation Is More Important Than Exercise Environment For Enhancement Of Body Composition

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There are a variety of exercise environments and numerous modes of physical assessment (e.g., body fat percent, skeletal muscle mass, and visceral fat storage). Data are scarce comparing the characteristics of body composition change between exercise settings.
PURPOSE: To determine the effect of training environment on anthropometric outcomes.
METHODS: We performed baseline and follow-up tests on 114 collegiate athletes, 384 CrossFit members, and 12 commercial gym members using the InBody 770 device. We recorded BMI, body fat percent, skeletal muscle mass, total fat mass, trunk fat mass, and InBody scores for visceral fat and overall composition. Paired-samples t-tests measured changes in these variables over time; repeated measures ANCOVA and multiple linear regression analyzed explanatory factors for those changes.
RESULTS: At baseline, subjects (54.3% male) were 32.1±10.4 years old, had a BMI of 28.6±6.7kg/m^2, 25.7±12.3% body fat, 78.0±20.0lb muscle mass, 50.0±35.5lb fat mass, and 25.8±15.3lb trunk fat. InBody scores were 9.2±5.9 for visceral fat and 79.1±13.0 for overall composition. Between baseline and follow-up (140.4±131.6 days), subjects reduced BMI by 0.4±1.3kg/m^2 (p<0.001), body fat percent by 0.9±2.0 points (p<0.001), fat mass by 2.5±7.0lb (p<0.001), trunk fat by 1.4±3.5lb (p<0.001), and visceral fat score by 0.5±1.5 (p<0.001). InBody composition score improved by 0.8±4.2 (p=0.001). Skeletal muscle mass was unchanged (p=0.822). ANCOVA detected no differences in sex, training environment, or duration between tests when assessing fat mass, trunk fat, and visceral fat (p>0.100). Sex was a significant factor in body fat percent (p=0.017). Exercise setting exhibited trends in body fat percent (p=0.056) and InBody score (p=0.076). Regression models, holding constant sex, age, duration between tests, and baseline values, found no association between exercise setting and changes in BMI (p=0.618), body fat percent (p=0.343), fat mass (p=0.231), trunk fat (p=0.453), visceral fat (p=0.994), or InBody score (p=0.295). Baseline levels were the strongest predictors of improvement in BMI, fat mass, trunk fat, visceral fat, and InBody score (p<0.05).
CONCLUSIONS: Improvements in anthropometric outcomes were found in each exercise setting; no setting emerged as superior to the others.

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Acute Effects Of Different Warm-up Protocols On Maximal Treadmill Exercise Performance In Well-trained Adolescent Runners

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Dynamic warm-up protocols (DWP) consisting of developmentally appropriate moderate- and high-intensity exercises have been found to influence the cardiopulmonary responses to maximal exercise in healthy children; however, the effects of a DWP on maximal treadmill exercise performance in adolescent runners are unclear.
PURPOSE: To compare the effects of a DWP with a treadmill walking protocol (TWP) on maximal treadmill exercise performance in well-trained adolescent runners.
METHODS: 12 male high school cross country runners (age 15.9 ± 1.0 yrs) performed a maximal exercise test with respiratory gas analysis on nonconsecutive days in random order following 2 different 6-min warm-up protocols. DWP consisted of 9 progressive bodyweight movements including lunges, hip bridges, and jumps whereas the TWP consisted of walking at 2.2 mph and 0% grade. The Fitkids treadmill test which consists of 90 sec stages and incremental increases in speed and grade was used for exercise testing. Comparisons between trials were made with a paired t-test.
RESULTS: No significant differences between DWP and TWP trials were observed for peak oxygen uptake (62.1 ±5.0 vs 62.5 ±3.9 ml/kg/min, p = 0.40), maximal heart rate (195.2 ± 5.1 vs 194.1 ± 5.6 bpm, p = 0.23), maximal minute ventilation (118.7 ± 21.6 vs 117.9 ± 18.8 L/min, p = 0.42), maximal respiratory exchange ratio (1.13 ± 0.07 vs 1.15 ± 0.07, p = 0.23) and total exercise test time (780.5 ± 66.5 vs 798.0 ± 37.0 sec, p = 0.07), respectively.
CONCLUSIONS: These preliminary findings suggest that the DWP used in this study does not influence the cardiopulmonary responses to maximal treadmill exercise in well-trained adolescent runners.

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Reliability And Validity Of The Push And Gflight System For Vertical Jump Test

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Vertical jump tests are often used in sports to primarily measure the power of the lower body. There are several protocols and several measurement tools to record these types of results
PURPOSE: The purpose of the present study was to determine the validity of two devices (gFlight and PUSH) to measure the height of vertical jumps.
METHODS: 120 jumps were performed in total [60 Squat Jump (SJ) and 60 Countermovement Jump (CMJ)]. Three university students, two males and one female, [age: 28.33±2.08 years; height: 171.00±7.55 cm; weight: 70.00±9.90 kg] performed 20 jumps of each type (SJ and CMJ). Each participant took turns performing 20 SJ (paused 2 seconds at 90 degree) with both hands on their hips. A rest of 15-20 seconds was allowed between jumps. After a complete rest of 10 minutes, participants had to perform 20 CMJ with arm swing. The vertical jump heights of both devices (infrared vertimeter named the gFlight system, V2, Sterling, États-Unis, and an accelerometer placed at hip level named the PUSH system, built by PUSH, Toronto, Canada) were compared to the gold standard measurement obtained with the contact mat (Ergo Jump Bosco System). Values are reported as means±SD. A single factor (height) ANOVA and Pearson correlation analysis were performed using SPSS (Ver. 27).
RESULTS: Average jump heights were similar between gFlight (22.72±7.94 cm), PUSH (24.94±6.86 cm) and contact mat (24.94±7.78 cm), but gFlight was significantly lower ($F_{(2, 238)}$=56.88, p=.0001, η_P^2=.323) when compared to the other two measurements. The coefficient of determination (r^2) was 0.945 (r=0.972, p≤0.001) for gFlight and r^2= 0.875 (r=0.935, p≤0.001) for PUSH when compared to the contact mat, respectively. Bland-Altman analysis indicated a constant bias of -2.22 cm for the gFlight across the range measured (10-40 cm), but not for the PUSH indicating an increase in error with increasing height when compared to the contact mat, respectively.
CONCLUSION: Both devices measure vertical height similarly to the contact mat, but with inherent limitations than can be corrected. The gFlight vertimeter has a constant underestimation of 2.22 cm (within the range of 10-40 cm), while the PUSH reveals a progressive bias where the difference in height measurement becomes larger as height jump increases.