Effects of the FIFA11+ warm-up program on speed, agility, and vertical jump performance in adult female amateur soccer players

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Study Protocol

Objective:

The purpose of this study is to investigate the effects of the 11+ on speed, agility and vertical jump height in adult female amateur soccer players when compared to a traditional time-matched soccer warm-up.

Design:

Parallel, two-group, pre-post, single-blind comparative trial.

Methods:

The pilot study was approved by the North Shore Girls Soccer Club (NSGSC) in March, 2018 and by the University of British Columbia's Clinical Research Ethics Board (H18-00383) in May, 2018. Participants were informed orally and via written consent regarding study procedures one week prior to the initial performance testing session.

Thirty-two female amateur soccer players from two NSGSC Selects "A" teams were contacted to participate in the pilot study. Eligible participants had to be between the ages of 18 and 45 and play on one of the identified NSGSC Selects "A" amateur soccer teams. Participants were excluded from the study if they had any one of the following: played goal keeper, missed a PM testing session, missed three or more consecutive warm-ups due to injury or other cause, were pregnant or became pregnant during the study. Goal keepers were omitted due to the drastically different training and in-game demands of the position relative to other player positions. Missing three or

more consecutive warm-ups resulted in exclusion as a training cycle break of this length may lead to de-conditioning and therefore an inaccurate influence on testing results.

Potential participants were pursued through convenience sampling based on previous experience one of the authors (MW) had with the NSGSC. Participant recruitment was carried out by AE and MW during the first week of the 2018-2019 soccer season. Recruitment was delegated based on the assurance that the recruiting author had no prior involvement with their assigned team. Participant allocation to the intervention (11+) and control group was predetermined and team-based before participant recruitment commenced to avoid contamination by having players from the same team get exposure to both warm-up programs. One of the authors (MW) had regular paramedical involvement with one of the teams, thus allowing him to administer the 11+ warm-up for this team. Participants provided their number of years of soccer experience and their number of hours of moderate to high intensity activity per week. All participants were encouraged to maintain their regular eating, exercise and sleep habits throughout the duration of the study.

The intervention group was familiarized with the 11+ program one week before the performance testing commenced to ensure players were comfortable with performing the warm-up exercises correctly. The 11+ was led by MW three times per week for 8 weeks. The 11+ is approximately 25 minutes in length and is comprised of 27 exercises that challenge the user's balance, speed, agility, strength and jumping ability. The 11+ offers difficulty level progressions for a number of exercises so that the warm-up consists of 15 exercises at any one time and can be made more or less challenging, depending on the capacity of the athlete. Week 1 and 2 consisted of Level

1 exercises, Weeks 3 to 5 consisted of Level 2 exercises and Weeks 6 to 8 consisted of Level 3 exercises as described in the open access 11+ Manual (www.f-marc.com/11plus).

The control group was asked to continue with their regular warm-up which was time-matched with the 11+. The control warm-up included stretching, running and ball-oriented drills.

Before performance testing commenced, participants were allocated a study number via a random number generator. The random study number was the only identifier documented on each PM testing sheet. PM testing was administered by three blinded testers.

Participants received identical instructions on how to complete each test and were given an opportunity to ask questions to ensure they understood each task. Participants completed a 5 minute warm-up prior to the testing consisting of three 1 minute jog intervals, separated by two 30-second-per-side lateral shuffles at a comfortable pace. Testing was performed in an indoor soccer facility, allowing for identical pre- and post-testing conditions.

The 10-meter (10m) sprint has been touted as a relevant soccer test since it measures both acceleration and short distance speed.[17] Testing was performed with Brower TC Timing gates setup at a height of 1m above field-level and at a distance of 10m. Participants were positioned behind a piece of tape marked 50cm in front of the start gate. Sprint times were digitally recorded by the timing system to one hundredth of a second. Participants could choose their start position but were required to use the

same start position for all testing trials. Participants were asked to run as fast as possible between both timing gates.

The T-test is a valid, reliable and commonly used agility test amongst soccer populations.[18,19] Participants were asked to sprint forward from a stationary position (cone 1) to a cone 10 yards away (cone 2), side shuffle to a cone 5 yards to the left (cone 3), side shuffle to a cone 10 yards to the right (cone 4), side shuffle back to the central cone to the left (cone 2), and then back-peddle to the start position (cone 1) as fast as possible. A Brower TC Timing System was used to measure agility times to one hundredth of a second.

The squat jump (SJ), using a contact mat has been shown to be a valid and reliable measure of vertical jump height[20] and is an integral soccer skill for demands such as heading a ball. SJ testing was performed using a Probotics Just Jump System with contact mat. Participants were asked to stand on the contact mat with their feet shoulder width apart and their hands on their hips. Participants were then asked to lower their center of mass until 90 degrees of knee flexion was achieved, pause for 1 second, then maximally propel themselves vertically with their hands remaining on their hips.

Each participant had three trials for each test with a 2-minute rest interval between trials. All trial times and heights were recorded with the best pre-post times and jump height selected for the statistical analysis.

Statistical Analysis Plan

The R software (Version 3.5.1) was used for within-group and between-group data analyses. Demographic characteristics (e.g. age, weight) were summarized by group using mean(standard deviation).

The Mann-Whitney U test was used to test the null hypotheses that the % mean change in 1) 10m sprint, 2) agility T-test and 3) squat jump were not statistically different between groups. A secondary sensitivity analysis was performed for each PM which re-ran the Mann-Whitney U test for the sample of participants who attended at least 75% of the practices. The Wilcoxon signed-rank test was used to determine within-group statistical significance for all PMs. A level of significance was accepted using a 95% confidence interval for all statistical parameters.