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Grace Wunderlich
Hope College

Madeline Walter
Hope College

Amelia Bont
Hope College

Alyssa Hettel
Hope College

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The Acute Effects of Incorporating Lower Limb Foam Rolling into a Dynamic Warmup for Men’s Soccer Player Aerobic Endurance and Muscular Power



Amelia Bont, Alyssa Hettel, Madeline Walter, Grace Wunderlich
Faculty Mentor: Paula-Marie M. Ferrara, Ph.D.
Kinesiology, Hope College



Abstract

Foam rolling is known to reduce delayed onset muscle soreness, loosen fascia, and promote blood flow when used post-exercise. Warming up before exercise increases muscle metabolism and reduces the risk of injury. Soccer players are prone to lower limb injuries, therefore a warmup that reduces injury and improves performance is ideal. Current research has not examined the relationship between combining foam rolling with a dynamic warm up on endurance. The purpose of this study is to determine if foam rolling combined with a dynamic warmup will improve aerobic endurance and muscular power more than a dynamic warm up alone. Men’s collegiate soccer players will be recruited for this study. All participants will complete a familiarization trial. Subjects will be fitted with a heart rate monitor, complete a Vertec vertical jump test, an interval shuttle run test (ISRT), and learn the foam rolling and dynamic warm up protocols. After familiarization, participants will be randomly assigned to a dynamic warm up with foam rolling or a dynamic warm up alone. After completing the assigned warm up condition, subjects will rest for two minutes then complete a vertical jump test three times, with the best jump recorded as their score. Data from the familiarization ISRT will be used to find the ISRT pace that corresponds to 85% of the participants’ maximum heart rate. Then the participants will run as many ISRT laps as possible at this pace. The number of laps will be recorded. Participants will return to the testing facility exactly one week later to complete the opposite condition. The data will be analyzed using a within subjects paired samples t-test. Significant results will allow the men’s soccer team to have a more effective warmup that would give them a competitive advantage during games. The effects of the foam rolling intervention in this study did not yield significant results regarding vertical jump $T(5) = -0.32$, $p=0.78$ and number of laps ran $T(5)=-1.75$ $p=0.14$; however, participants reported positive psychological effects.

Introduction

A dynamic warm up (DW) prior to an exercise bout is crucial for injury prevention and preparation for play. The components of an effective warm up include targeting muscle strength, neuromuscular control, and body kinesthetic awareness (1). There have been many studies conducted on what the most effective warm up should be comprised of, but the F-MARC 11+ protocol has been shown to be most beneficial to soccer athletes specifically (1).

Foam rolling, a common form of self myofascial release (SMFR), has been shown to promote healing and prevent soreness when used post exercise by loosening muscles, increasing blood flow, and aiding in lactic acid removal (2). This technique is most often used post-exercise as a recovery tool, but there is potential benefits to foam rolling pre-exercise as well.

Male collegiate soccer players require high aerobic endurance and muscular power to be successful. Previous research has shown that foam rolling incorporated with a dynamic warm up can improve agility as well as decrease time to finish of a short sprint (3). However, to date, research in this area is limited required further exploration.

Purpose

The purpose of the study is to determine if a brief dynamic warm-up when paired with foam rolling will improve lower-limb power in male collegiate soccer players during a vertical jump test, as well as aerobic endurance during the interval shuttle run test (ISRT, also known as the “beep test” or PACER test).

Methods

Recruitment: Participants were recruited from the Hope College Men’s Soccer team through the use of emails, announcements from researchers, and announcements from the men’s head soccer coach.

Data Collection: Participants took part in a baseline session where they were familiarized with the dynamic warm up, vertical jump test, ISRT, and foam rolling procedures (Figures 1-5). They then completed two, randomized data collection sessions where they completed the mentioned exercises with the addition or absence of foam rolling included in the warm up.

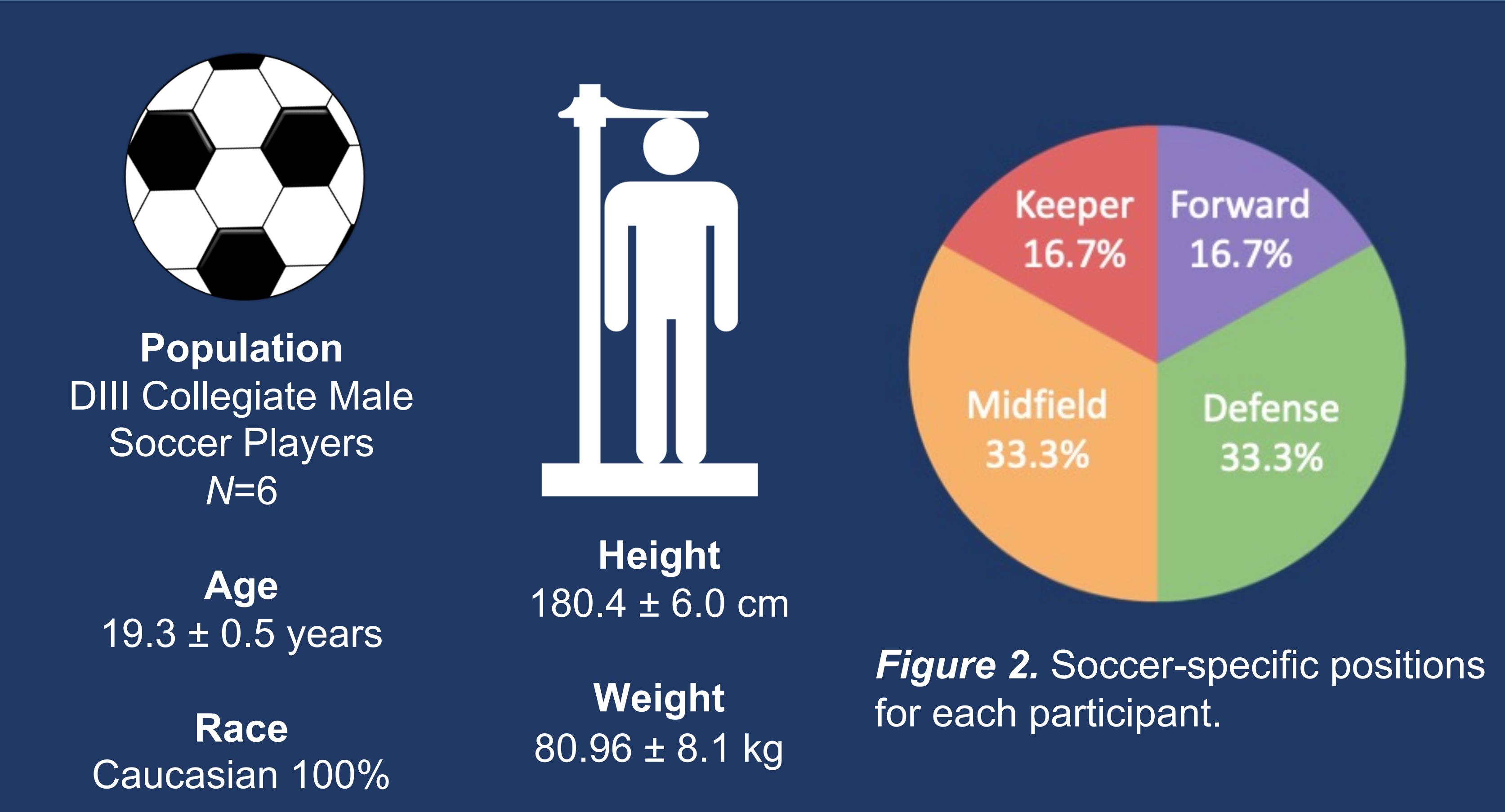
Subjects were randomly assigned to FR or NFR protocols. The subjects completed the dynamic warm up protocol. Those assigned to the FR protocol then completed the FR protocol. Then all subjects completed a vertical jump test, followed by completion of a modified ISRT protocol; however, subjects ran at a constant ISRT level that corresponded to 85% of their max heart rate achieved in the baseline ISRT. The other treatment was completed 1 week later.



Figure 1. Foam rolling in the front of the thigh (a), inner thigh (b), outer thigh (c), posterior lower leg (d), and posterior thigh (e).

Data Analysis: Descriptive statistics were utilized to describe subjects’ demographics. A within-subjects, paired sample t-test was used to assess vertical jump test and total number of modified ISRT laps between the two experimental conditions, with significance set at 95% with $p=0.05$.

Results



Results

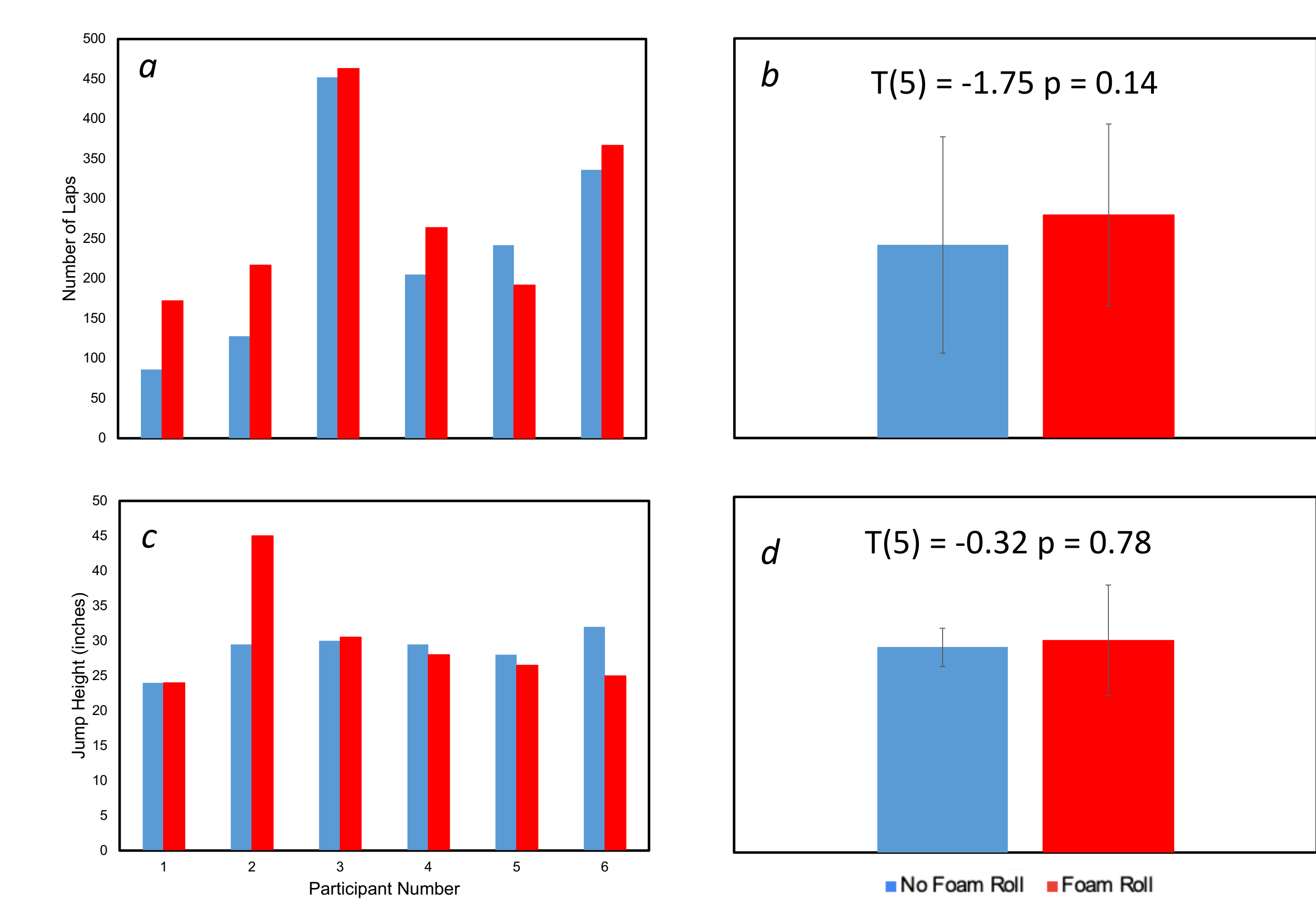


Figure 3. A comparison of number of laps ran with and without foam rolling (a), the mean number of laps ran with and without foam rolling (b), vertical jump height with and without foam rolling(c), and mean vertical jump height with and without foam rolling (d).

Table 1. Participant preferences about incorporating foam rolling into their warmup.

88% Indicated foam rolling positively altered their exercise experience	<i>“On my second run, I felt less tight and the run wasn't as taxing on my legs. Running without the foam rolling made my legs feel sore after starting run”</i> (Participant 2)	100% Indicated they would include foam rolling in future warmups	<i>“I think I will because it allows me to get to my best performance level quicker and not take as much energy to get there if I had to warm up more”</i> (Participant 4)
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Discussion

Foam rolling before exercise does not significantly improve muscular power. Visually, there was an increase in aerobic endurance after foam rolling for most participants. A psychological benefit was seen from foam rolling since most participants found that foam rolling positively impacted their exercise experience, and all participants wanted to include foam rolling in their future warmups. Our results could be applied to Hope College’s Men’s Soccer Team’s existing warm-up by improving performance in games and training sessions. Additionally, our results could be applied to sports with similar energy systems and muscle groups such as lacrosse, hockey, and some football positions. Weaknesses in the study include a small population and lack of diversity in terms of race, age, and sport. Further studies could examine this same protocol on a larger population as well as the effects of foam rolling vs a massage gun before exercise.

Bibliography

1. Grooms R, Palmer T, Onate A, Myer D, Grindstaff T. Soccer-specific warm-up and lower extremity injury rates in collegiate male soccer players. J Athl Train. 2013;48(6):782-789.
2. Macdonald GZ, Button DC, Drinkwater EJ, Behm DG. Foam rolling as a recovery tool after an intense bout of physical activity. Med Sci Sports Exerc. 2014;46(1):131-142.
3. Peacock CA, Krein DD, Solter JA, Sanders GJ, Von Karlowitz KA. An acute bout of self-myofascial release in the form of foam rolling improves performance testing. Int J Exerc Sci. 2014 Jul 1;7(3):202-211.