How Does Stretching Help Us Do Sport?

Abstract

Over the past few years, long held beliefs regarding the value of pre-event stretching have been questioned, and increased attention has centred on the performance of higher-intensity movements during the warm-up period. The purpose of this investigation was to examine the acute effects of two different warm-up protocols on selected fitness measures in Brompton Academy students. Specifically, we compared the effects of two different warm up techniques using either static or dynamic stretching on the standing jump test, the agility t-test and a 20 metre sprint. We found that dynamic stretching was more effective, particularly for exercise involving power and strength.

Funding Statement

Royal Society Partnership Grant provided us with funding for sport science equipment to be used during the investigation and for future use.

Introduction

Before performing, training or competing, athletes must performing stretching exercises, as they help make sure the chance of injury is lower and prepare muscles for exercise[1]. There are two common stretching techniques, dynamic and static (shown in figure 1). Dynamic stretching is movement that stretches the muscles and keeps them moving at the same time, while static stretches are stretches that are held in a still position and include no movement[2]. Most athletes mix the two stretches up when warming up but the stretches have different effects so they might not be as useful and might even limit performance. We hypothesised that dynamic stretching would result in superior performance because, as it involves more movement, it must increase blood flow to the muscles.

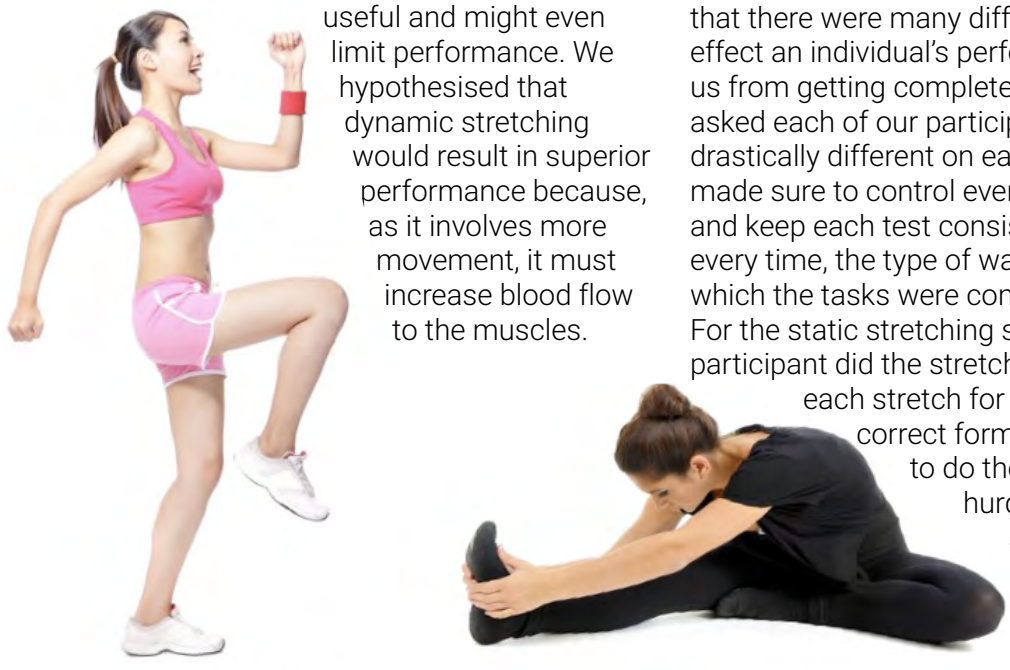

Figure 1: examples of dynamic and static stretches

Method

To work out which set of stretches were more beneficial, we tested the effect of each with tests based on agility, power and speed. For **agility** we used the t-test which is a small course that is timed how long it takes for the participant to complete (see figure 2 for an example). For **power** we used the standing jump test, in which participants must jump from a standing position and the height they jump is measured. For **speed**, the amount of time participants took to sprint 20 metres was measured.

When planning our experiment we had to consider several different factors. We were aware that our participants were doing multiple tests and that this could affect our results. Because of this, we made sure that all participants completed exactly the same warm-ups and tests, in the same order. We also knew that there were many different things that could effect an individual's performance, so to prevent us from getting completely anomalous results we asked each of our participants not to eat anything drastically different on each day of the sessions. We made sure to control every factor we possibly could and keep each test consistent, e.g. the same order every time, the type of warm-up and the facilities in which the tasks were completed.

For the static stretching session we made sure each participant did the stretches in the same order, held each stretch for 8-10 seconds and had the correct form. In the warm-up they had to do the adductor stretch, modified hurdles stretch, hip rotator stretch, bent-over toe raise, quadriceps stretch and a calf stretch. Similarly, for the dynamic stretching session, we checked they were doing the stretches correctly and that they

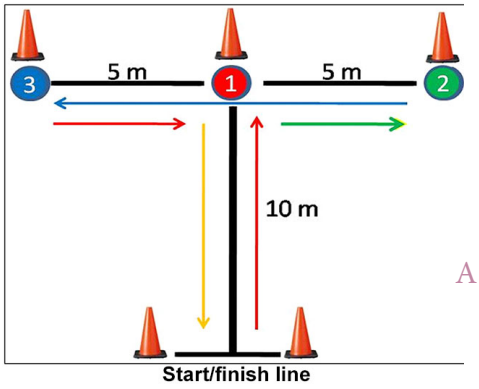

Figure 2: A typical t-test

all did the same stretches in the same order. The stretches they had to complete were a high knee walk, straight leg march, hand walk, lunge walks, backwards lunge, high knee skip with arms, lateral shuffle, back pedal, by flicks and a high knee run. When doing the warm-up two members of the team helped participants by telling them what to do and ensuring they were doing it correctly. Participants also walked for 5 minutes before each warm-up.

Results

For the standing jump test the mean height jumped was 187.50cm when the participants completed the static stretch warm-up and 199.75cm for the dynamic stretch warm-up. The dynamic value is 12.25cm more than the static, about 6%, which is a significant amount. This shows that dynamic stretching was more beneficial.

For the t-test the mean for static stretching was 13.48 seconds and for dynamic it was 12.96 seconds, meaning the difference between them was 0.52 seconds, or 4%, not as significant as the results for the standing jump test.

Finally, the results for the sprint test were a mean of 4.26 seconds for the static stretching and 4.14 seconds for the dynamic stretching. This was only a difference of 0.12 seconds, or 3%.

These results show that dynamic stretching was more beneficial for the participants when completing the tests. The standing jump test had the most significant result, and while the other two tests had smaller differences, they still showed that the dynamic stretching was more effective. The results could also suggest that dynamic stretching is best used when participating in sports that rely on power and strength because they improve your ability in these areas more.

Limitations of the study

There were some limitations to the study. One was that we had a small sample size, which reduced the strength of our statistical analysis. For more accurate results we would have to find a larger group of participants. Another limitation was that the order of the tests was the same for all participants and a different order may have suited some people better. A final limitation was that a familiarisation trial was not completed, so the results could have been affected by the fact that some participants were doing these tests for the first time.

Conclusion

Our results showed that dynamic stretching significantly improved the participants' results in the standing long jump, which shows that if you are competing in a sport where power is vital then it is better to have a warm-up consisting of dynamic stretches. The results for speed and agility showed that dynamic stretching had only a small effect, although it still resulted in some improvement in the both tests even if it was only by a small amount. These results are in agreement with previous research that suggest that static stretching has the opposite effects on muscle strength and power[3].

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The group first met together at the Sport Science workshops which took place at the University of Kent. The project took place over five months in a series of phases.
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