

Acute Effects of Static and Dynamic Stretching Exercises on Jump Performance in Rhythmic Gymnastics (RG)

Han Shan Rong Cheryl Anne

Physical Education and Sports Science Academic Group

National Institute of Education, Nanyang Technological University, Singapore

ABSTRACT

Background: Dynamic stretching has been found to improve jump performance compared to static stretching.

Aim: To evaluate the effect of static and dynamic stretching on jump performance in rhythmic gymnasts using a biomechanical approach.

Methods: 17 rhythmic gymnasts underwent static and dynamic stretching interventions. They performed a series of jumps, including countermovement jumps, split leaps and stag leaps. Jump performance was evaluated using 2-D video analysis of joint angles (split angle, knee angles, backbend angle) and flight time.

Results: Static stretching resulted in significant outcome measures, especially for split angles and backbend angles.

Conclusion: Static stretching improves RG jump performance compared to dynamic stretching.

INTRODUCTION

Flexibility is a critical component in rhythmic gymnastics jumps. Traditionally, static stretching techniques are implemented in RG training to reduce injury risk and increase range of motion. However, prior studies suggest that static stretching may cause reductions in strength and power production, hindering jump performance (D'Anna & Paloma, 2015). Dynamic stretching has been proposed as an alternative and is hypothesised to show greater improvements in jump performance.

METHODOLOGY

Study design: Randomised, repeated measures

PARTICIPANT RECRUITMENT

Characteristics of participants (n=17):



DEVELOPING BIOMECHANICAL METHODS OF ASSESSING JUMP PERFORMANCE

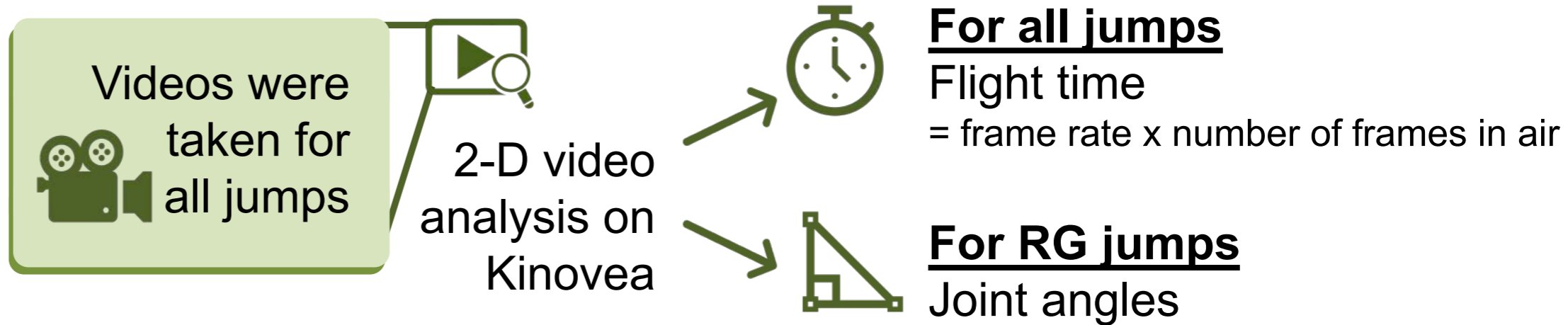
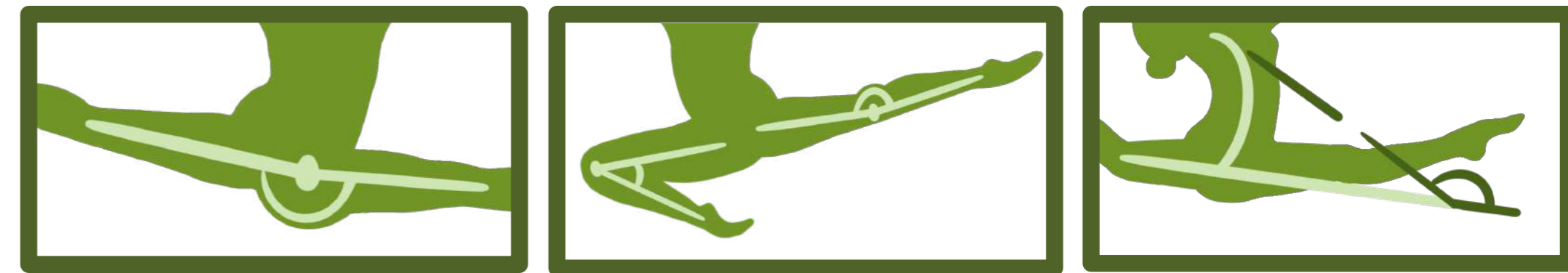


Fig 1. Split angle

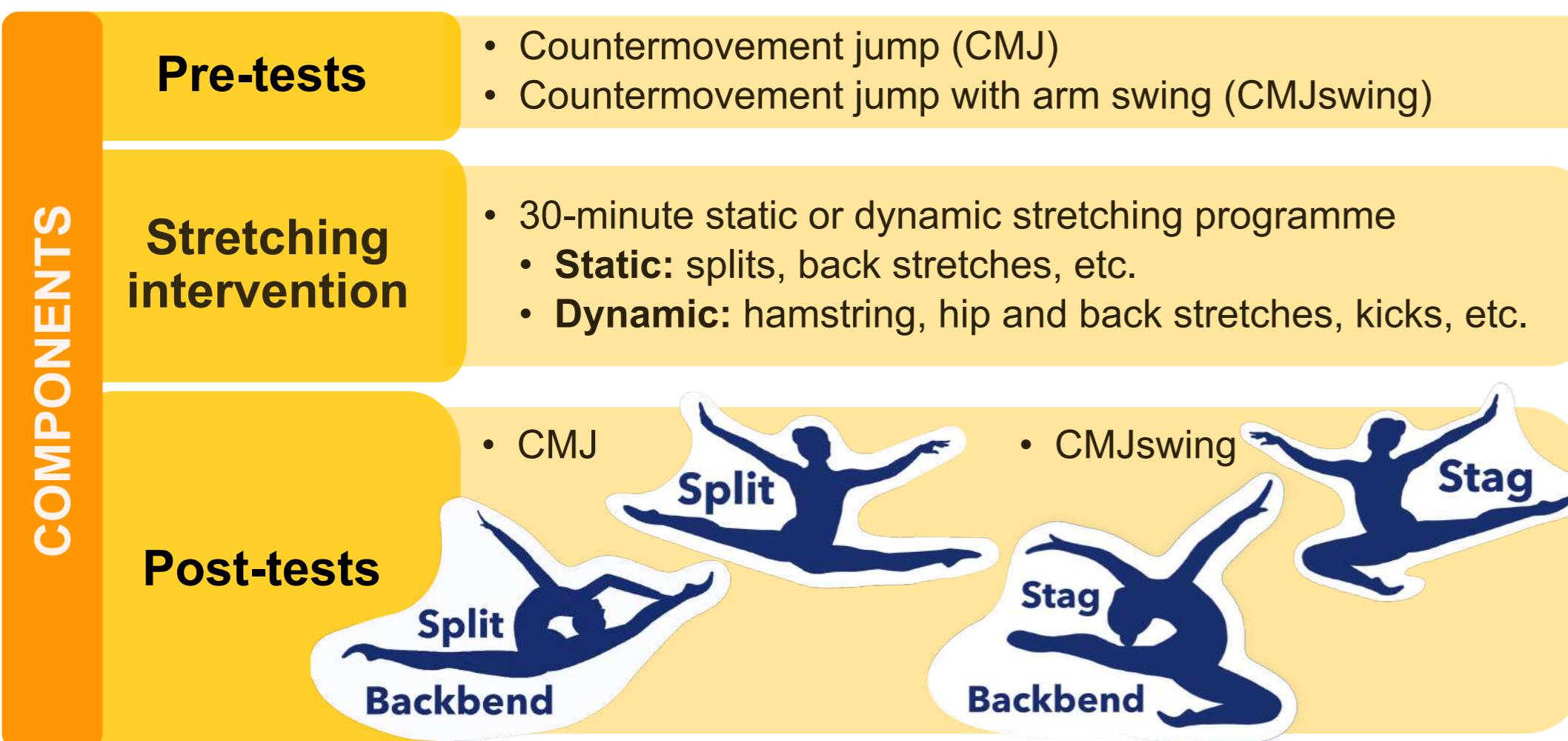
Fig 2. Front/back knee angle

Fig 3. Backbend angle



INTERVENTION OUTLINE

Each participant went through 2 intervention sessions – static or dynamic stretching. Each session was conducted as follows:



Are these measures a suitable assessment in RG?

3 judges assessed RG jump videos. Correlation analysis → Significant correlation of judges' Execution (E) deduction with most measures. Split angle and back knee angle were correlated for all jumps. These measures can therefore be used to assess jump performance.

DATA PROCESSING

Pre vs post CMJ and CMJswing → Repeated measures ANOVA

Static vs dynamic → Paired t-test

RESULTS

ANOVA: No significant effect of time (pre vs post) or condition (static vs dynamic) on flight time

T-Test: Static stretching showed significantly greater improvements in measures as highlighted in Table 1

Table 1: T-values for all measures comparing static to dynamic stretching

Measure	Flight time	Split ∠ /°	Front knee ∠ /°	Back knee ∠ /°	Backbend ∠ /°
Split	2.708*	6.548*	-0.487	0.579	
Split backbend	0.709	4.051*	0.443	-1.084	3.217*
Stag	1.975	1.641	-0.863	1.403	
Stag backbend	1.047	4.186*	-2.182*	-0.36	4.113*

Significant results are marked with *

DISCUSSION

Conclusion: Static stretching is associated with better jump performance in RG, especially in increases in split angles and backbend angles.

Since split angles are shown to correlate to judges' E deductions, this is likely to result in better scores.

Possible consideration: Psychological effects

Participants are more accustomed to static stretching, thus more willing to push their range of motion. Future studies may implement a longer intervention period to allow participants to adapt to new stretching programmes.

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