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Modified Training Circuit: an Effective Solution to Improve Handspring Skills in Floor Gymnastics

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Abstract. This study aims to analyze the effect of circuit training modification on improving handspring ability in floor gymnastics in students of the Jayapura City Special Sports School (SKO). The background of the study was based on the low mastery of handspring (only 30% of students were able to perform the technique correctly) which was indicated by weak arm push, hip flexibility, and balance. The method used was an experiment with a true experimental design, involving 30 students who were divided into experimental groups (provided with modified circuit training) and control (comparator). The intervention was given for 12 meetings, focusing on explosive arm muscle power training, hip flexibility, and balance. The results showed a significant increase in the experimental group (average 1.673) compared to the control (0.687), with a P value <0.05. These findings prove that circuit training modification is more effective in improving handspring ability because of its holistic and specific approach. This study recommends the integration of this method into the physical education curriculum to optimize floor gymnastics learning.

Keywords: Circuit Training; Handspring; Floor Gymnastics; Physical Education.

INTRODUCTION

Sports are fundamental activities to maintain health and fitness (Pranata 2022). In the context of education, sports through Physical Education, Sports, and Health (PJOK) subjects play an important role in the physical, mental, emotional, social, and spiritual development of students (Mustafa 2022). Mulyana et al (2024) also argue that educational sports have a very important role in supporting the learning process and self-development.

The Jayapura City Special Sports School (SKO) as an institution based on sports excellence, has had various good achievements in non-academic fields, this indicates that students are able to compete and master various sports. However, it is different from the floor gymnastics sport, the ability in this sport is still relatively low. In floor gymnastics, handspring is one of the basic movements that must be mastered by every student. However, in practice, many students still have difficulty in mastering this movement. Based on observations that have been carried out, it shows that only 30% of students are able to do handspring with the correct technique, while most make mistakes which are stated due to weak arm push, sending messages in the hips is limited, and instability in sounding.

To master the handspring technique well, it is important to first analyze the factors that influence this ability. According to Yulianto (2018), there is a significant correlation between arm muscle power, flexibility, and back muscle strength with handspring ability in floor gymnastics. There is also a relationship between arm muscle strength and hip flexibility with handspring skills (Rizky et al. 2023). This condition indicates the need for a more effective and targeted training method.

Conventional training, although it has an important role, is often less than optimal in improving handspring ability. According to Hakim & Ishak (2025), conventional training such as repetition of movements without a structured approach has been shown to be less effective in improving performance. As a result, students have difficulty achieving an adequate level of mastery, and are even at risk of injury due to incorrect technique. This condition emphasizes the need for a more targeted and holistic training method.

Circuit training is present as a potential solution. The circuit training method has been shown to be effective in improving various components of physical fitness (Mutaqin

2018). However, conventional circuit training does not fully meet the specific needs to improve handspring ability. Therefore, modifications to the training circuit are essential to maximize the effectiveness of handspring abilities.

This study focuses on circuit training modifications with an emphasis on explosive arm muscle strength training, hip flexibility, and balance. These modifications include selecting relevant types of exercises, setting appropriate intensity, and structured exercise sequences to optimize transfer of training to the handspring movement. These modifications are designed to target the muscles involved in the handspring movement, increase the range of motion required, and train the ability to maintain balance in the handspring movement. Previous studies have shown that a combination of plyometric and dynamic stretching exercises can improve vertical jump performance by up to 25% (Thattarauthodiyil and Shenoy 2022). This is a strong basis for designing a modified training circuit specifically for handspring needs.

The purpose of this study was to determine the effect of circuit training modifications on improving the handspring ability of SKO Kota Jayapura students in floor gymnastics. This study is important because it can provide empirical evidence regarding the effectiveness of exercise modifications in improving handspring ability, can contribute to the development of more effective and efficient floor gymnastics training and teaching programs, and help students master handspring skills better. In addition, these findings can be applied widely, not only in SKO but also in public schools, to improve the quality of floor gymnastics learning as a whole. Thus, this study has strategic value both from academic and practical aspects in the world of sports and physical education.

METHOD

The This study used an experimental method with a true experimental design, involving two groups, namely the experimental group (given circuit training treatment) and the control (comparator). The sample consisted of 30 SKO Kota Jayapura students, selected through purposive sampling with the criteria of male class X, having studied floor gymnastics, and not in an injured condition.

Handspring ability was measured using the front handspring test assessment instrument (Handayani 2018), before (pre-test) and after (post-test) the intervention. After conducting the pre-test, the experimental group will be given a modified circuit

training treatment that has gone through a feasibility validation test by three experts consisting of one physical trainer, one provincial gymnastics trainer, and one sports lecturer. The validation results showed an average feasibility percentage of 90%, which is included in the "very feasible" category.

Modified circuit training exercises were given for 12 meetings, with a total of 9 posts in each meeting that focused on explosive arm muscle power training (plyometric push-ups, tricep dips, burpes), hip flexibility training (superman, kayang, back-up), and balance training (plank with one leg & hand, single leg squat to box/bench, airplane pose). Meanwhile, the control group continued to do conventional training in each meeting.

Figure 1. Circuit Modification Training
(Source: Wiguna 2023)

RESULT AND DISCUSSION

Result

The As an initial overview of the research data, the following is a presentation of descriptive statistical analysis of all observed variables.

Table 1. Descriptive Statistics

Group	Test	N	Minimum	Maximum	Mean	Std, Deviasi
Experiment	Pre test	15	5,0	6,8	5,640	0,4911
	Post test	15	5,8	8,2	7,313	0,6512
Control	Pre test	15	5,0	6,4	5,600	0,3703
	Post test	15	5,4	7,2	6,287	0,5222

Table 2. Normality Test Shapiro-Wilk

Group	Test	Significant Value	Description
Experiment	Pre test	0,278	Normal
	Post test	0,360	Normal
Control	Pre test	0,475	Normal
	Post test	0,827	Normal

Table 2. Shows the significance values for the pre-test and post-test in both groups are all above 0.05, namely 0.278 (experimental pre-test), 0.360 (experimental post-test), 0.475 (control pre-test), and 0.827 (control post-test). These results indicate that the data meets the assumption of normality, so parametric analysis can be used.

Table 3. Homogeneity Test

	Levene Statistic	df1	df2	Sig.
Handspring ability of SKO Jayapura City students	.810	1	28	.376

In Table 3, the results of the homogeneity test obtained a significance value of 0.376, which is greater than 0.05. This indicates that there is no significant difference in variance between the two groups, or in other words, the data is homogeneous.

Table 4. Influence Test (paired sample t test)

Group	Test	Mean	Difference	Significant Value	Description
Experiment	Pre test	5,640	1,673	0,000	There is Influence
	Post test	7,313			
Control	Pre test	5,600	0,687	0,000	There is Influence
	Post test	6,287			

Table 4. Shows the results of both groups have a significance value of 0.000 < 0.05. Thus, the results obtained by both groups have a significant effect on improving handspring ability.

Table 5. Difference Test (Independent Sample Test)

Group	Difference in Improvement	Significant Value	Description
Experiment	1,673	0,000	There is a Difference
Control	0,687		

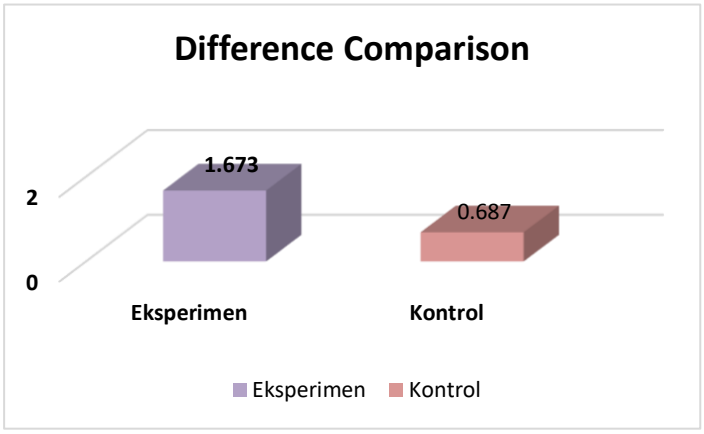

Figure 2. Comparison Chart of Differences

Based on Table 5 and Figure 2, it shows an increase of 1.673 in the experimental group, while the control group is only 0.687. The significance value of 0.000 <0.05 confirms that this difference is statistically significant. Thus, it can be concluded that circuit training modification is more effective in improving handspring ability than conventional training. This finding strengthens the hypothesis that a structured and specific training approach can provide more optimal results in mastering floor gymnastics movements.

Discussion

The results of this study indicate that circuit training modifications have a significant effect on improving the handspring ability of SKO Jayapura City students, compared to conventional training. The experimental group experienced an average increase of 1.673, while the control group only 0.687, thus the control group also showed an increase, although lower. This can be explained by the fact that conventional training given to the control group still involved repetition of basic floor gymnastics movements, which can naturally improve students' abilities through repeated practice, so that the control group still has an effect. In line with that, the results of research conducted by Yudho (2025) showed that basic gymnastics physical activity that is carried out repeatedly can have an effect on increasing flexibility, concentration, and postural stability, which are important components in the performance of gymnastics skills.

According to Galang Pratama et al (2025), conventional training has been shown to have a positive effect on muscle development and motor coordination, although the benefits are relatively limited. However, this approach is often less structured and does not specifically target critical physical components such as arm muscle explosive power, hip flexibility, and balance, which are determining factors for the success of the handspring movement. Research by Guo et al (2024) also confirmed that repetitive practice without variation only provides minimal improvement in complex motor skills, due to the lack of progressive stimulus.

The advantage of circuit training modification lies in its holistic and targeted approach. This exercise is designed to specifically improve the physical components that have the most influence on the handspring movement, such as plyometric push-ups for arm muscle explosive power, back-ups for hip flexibility, and balance exercises such as single leg squats. This combination not only improves muscle strength but also improves neuromuscular coordination, which is very important for complex movements such as handsprings. In line with the results obtained, research by Thattarauthodiyil & Shenoy (2022) showed that plyometric and dynamic stretching exercises can improve explosive movement performance by up to 25%. In addition, a regular circuit structure with progressive intensity allows for faster physiological adaptation, as stated by Mutaqin (2018) that circuit training is effective in improving physical fitness multidimensionally. Shlool et al (2025) added that the circuit approach with measured rest can maximize muscle recovery and training efficiency, so that the results are more optimal. This is reinforced by the findings Saeterbakken et al (2019) which stated that the integration of stability training in the circuit can reduce the risk of injury while improving athletic performance.

The significant difference between the experimental and control groups can also be attributed to the principle of exercise specificity. The modified training circuit was designed to mimic the biomechanical demands of the handspring movement, resulting in more optimal transfer of training. In contrast, conventional training tends to be general and places less emphasis on specific technical aspects. Jamaludin et al (2023) emphasized that training that does not match the needs of the target movement only has minimal impact. This finding is also in line with the results of a study by Brazil et al (2020) which

showed that biomechanical specificity-based training can increase movement accuracy by up to 30% compared to general training.

In addition to the physical aspect, circuit training modification also has the potential to increase students' motivation and self-confidence. Varied, structured, and challenging exercises can create a more enjoyable and competitive learning atmosphere, so that students are more motivated to practice and try new movements. Ryan & Deci (2018) in the Self-Determination theory emphasizes that variations in exercises and measurable challenges meet basic psychological needs (competence, autonomy, and relatedness), which are the keys to intrinsic motivation.

The practical implication of this study is the need for a reevaluation of floor gymnastics training programs in schools, especially those based on sports excellence such as SKO. Circuit training modifications are not only effective in improving handspring abilities, but can also reduce the risk of injury due to incorrect techniques, because they train the supporting muscles in a balanced manner. For public schools, circuit training modifications can be integrated into the PJOK curriculum as part of floor gymnastics learning, as well as other sports that require complex movement components. Teachers can adjust the intensity and variation of the exercises according to the conditions of the facilities and the characteristics of the students, so that this program can be applied widely and flexibly.

However, this study has limitations, such as the sample size was limited to male students in grade X and the relatively short duration of the intervention (12 meetings). Further research is expected to expand the scope of the sample, test the effectiveness of this method in different age groups or genders, and explore the combination with mental training to optimize results. This recommendation is in line with the findings of Mustafa (2022) who emphasized a multidisciplinary approach in physical education. These findings comprehensively support the development of a more systematic and measurable floor gymnastics training framework, which can be applied effectively in school environments as well as in competitive athlete training.

CONCLUSION

The results of the study showed that both groups, both experimental and control, had a significant effect on improving handspring ability ($p < 0.05$). However, the

experimental group that received the wind circuit training modification intervention showed a statistically greater increase (1.673) than the control group (0.687), with a significant difference ($p < 0.05$). These findings indicate that a structured and specific training approach in the experimental group produces a more optimal effect in developing the physical components of starting the handspring movement. The results of the study support this integration method into the floor gymnastics training program, although it needs wider testing on different groups and durations. These findings provide practical solutions for educators to improve gymnastics learning efficiently and safely.

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