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Effects of Stability Ball Training on Flexibility in Adolescents: A School-Based Intervention Study

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Abstrac: This study aims to determine the effect of gym ball training on improving the bridge ability of students at SMPN 3 Gambut. This study employed a quantitative approach with a pre-experimental method using a one-group pretest and posttest design. The study sample consisted of 24 eighth-grade A students selected using purposive sampling. Data were collected through bridge ability tests administered before and after the treatment. The data were then analyzed using descriptive statistics, the Shapiro-Wilk normality test, and the Wilcoxon Signed-Rank Test. The results showed that the mean pretest score of 49.79 increased to 66.88 on the posttest, representing an increase of 17.09 points. The Wilcoxon Signed-Rank Test showed a significance value of 0.000 < 0.05. Therefore, it can be concluded that gym ball training has a significant effect on improving the bridge ability of students at SMPN 3 Gambut.

Keyword: Ball Training, Flexibility, Intervention Study, Stability.

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INTRODUCTION

Physical education, sports, and health are an important part of the learning process in school because they play a role in developing students' physical abilities, motor skills, physical fitness, and psychological well-being. Physical education provides students with the opportunity to develop knowledge, physical skills, aesthetic appreciation, social skills, and self-confidence, while taking individual differences into account (Rosdiana, 2021). Physical education instruction aims not only to improve motor skills but also to foster courage, self-confidence, discipline, and students' ability to control their bodies. Haffyandi, Akhmad, and Kahri (2024) state that physical education can play a role in developing students' life skills, particularly through activities that require active participation, cooperation, and problem-solving.

According to Erliana (2023), gymnastics is a sport that involves coordinated body movements requiring speed, strength, and fluidity. Floor gymnastics not only focuses on motor skills but also emphasizes creativity in movement and physical expression among students. Therefore, floor gymnastics instruction must be designed to be engaging, safe, and tailored to students' needs so that learning objectives can be optimally achieved.

One of the elements taught in floor gymnastics is the bridge. The bridge is a movement in which the body arches backward, supported by both hands and both feet. According to Muhajir (2020), the bridge is a position in which the body lies on its back and arches, supported by both hands and feet with straight elbows and knees; it is a basic floor gymnastics technique at the high school level used to measure flexibility. According to Roji (2021) , it is defined as a body posture resembling a bow, supported by the feet and hands, with straight knees and elbows, which simultaneously trains the flexibility of the shoulders, abdomen, and spine. This movement requires physical flexibility, muscle strength, balance, coordination, and courage on the part of the students. For junior high school students, mastering the bridge movement is often challenging because not all students have sufficient flexibility and physical strength. In addition, fear of falling, lack of self-confidence, and not yet being accustomed to performing backward somersaults are also factors that contribute to poor bridge movement ability. Akbar, Rahmadi, and Mulhim (2020) explain that the assessment of psychomotor aspects in Physical Education requires the use of appropriate instruments so that students' motor skills can be accurately evaluated. Therefore, students' flexibility should be assessed through motor skills tests based on the assessment indicators for floor gymnastics.

Based on initial observations of eighth-grade students at SMPN 3 Gambut, many students were still unable to perform the bridge movement using the correct technique, particularly in hand and foot positioning, body arch, and balance while maintaining the position. Conceptually, the ability to perform the bridge movement can be improved through gradual and targeted training. The bridge movement requires a combination of back flexibility, arm strength, core strength, balance, and body coordination. Therefore, the learning materials used in bridge movement training must help students understand body positioning, reduce fear, and provide support while performing the movement (Nurulita, 2026). One piece of equipment that can be used is a gym ball. A gym ball is a large, elastic ball that can help the body move gradually, provide support for the back, and help students perform spinal extensions with lighter, controlled pressure. The use of a gym ball in the bridge exercise is believed to help students improve their flexibility, balance, body control, and self-confidence when performing the movement.

Several previous studies have shown that the use of media or teaching aids can help improve motor skills in floor exercise instruction. Supriyanto (2023) demonstrated that the use of the "Iron Bends Backwards" teaching aid can improve students' performance in the bridge movement, with the learning achievement rate increasing from 70.8% in Cycle I to 80.4% in Cycle II. Gentana, Hermawan, and Jubaedi (2018) also showed that varying the use of aids such as balls, boxes, and peer assistance can help improve basic bridge movements. In addition, Hakim (2020) found that the use of gym balls in floor exercise instruction can improve students' flexibility. Maratis (2022) also showed that exercises using a gym ball can help improve students' fitness and skills. These findings indicate that the use of equipment in floor exercise instruction plays an important role in helping students master movements more effectively.

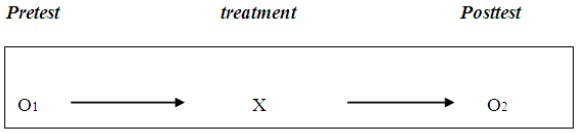
However, research on the use of gym balls to improve bridge movement ability remains limited, particularly among junior high school students. Some previous studies have primarily used conventional aids such as regular balls, boxes, additional mats, or assistance from peers. In addition, some studies still focus on final outcomes without specifically explaining the role of the media in improving students' flexibility, balance, muscle strength, and body control. Thus, there is a research gap that requires further investigation, namely the use of gym balls as a more modern, flexible, and safe learning aid that is suited to the characteristics of the bridge movement.

This study is important because it seeks to provide alternative solutions for physical education teachers to improve students' handstand skills through the use of gym balls. This tool is expected to create a safer, more engaging, and more gradual learning process, thereby helping students gain more confidence in performing bridge movement. In addition, this study is also expected to contribute to scientific research in the field of physical education, particularly regarding the use of learning media to improve basic floor exercise skills. Based on the explanation above, this study aims to determine the improvement in students' ability to perform the bridge movement at SMPN 3 Gambut after they were given training using a gym ball.

METHOD

Research Design

According to Sugiyono (2019), a research method is a scientific approach to collecting data for specific purposes and applications. This study employed a quantitative approach with a pre-experimental method using a one-group pretest and posttest design. In this design, one group of students was measured before and after receiving the gym ball training intervention. This study was conducted over 8 sessions; the choice of this duration was based on previous research showing that exercise programs conducted repeatedly over several weeks, with a frequency of more than once per week, are effective in improving students' motor abilities and movement skills (Rusmana, Mahardika, & Rahayu, 2024).



Note;
O_1 = pretest of bridge movement ability
X = treatment involving exercises using a gym ball
O_2 = posttest of bridge movement ability.

Participants

This study was conducted at SMPN 3 Gambut during the even semester of the 2025/2026 academic year. The population of this study consisted of all 75 eighth-grade students at SMPN 3 Gambut, divided into three classes: VIII A, VIII B, and VIII C. The study sample consisted of 24 students from class VIII A, selected using purposive sampling. Purposive sampling is a sampling technique based on specific considerations made by the researcher. Samples are selected because they possess characteristics that align with the research objectives, so that the data obtained are considered relevant to the research problem (Etikan, Musa, and Alkassim, 2016). This technique is used because sample selection is based on specific criteria that align with the research objectives, namely students who have lower flexibility based on the results of initial observations and flexibility tests.

Instruments

The instrument used in this study was a bridge movement ability test with an assessment rubric. The assessment was based on several movement stages, including the preparation stage, execution stage, and final stage. The scoring rubric used a scale of 1 to 5, with a maximum score of 100. The assessment categories consisted of excellent, good, fair, poor, and very poor. Students were considered successful if their score was above 70, while students who scored below 70 were considered not to have passed (Ersa, 2018).

Research Procedures

The research procedure was carried out in several stages: the preparation stage, the implementation stage, and the final stage. During the preparation stage, the researcher conducted an initial observation of the students' bridge movement ability, prepared the research instruments, designed a training program using gym balls, and gathered the equipment needed for the research process. In addition, the researcher prepared an assessment rubric for the bridge movement test to serve as a guideline for evaluating the students' abilities.

The implementation stage began with a pretest administered to 24 students to measure their initial ability to perform the bridge movement before the intervention. Afterward, the students underwent an intervention consisting of exercises using gym balls over the course of 8 sessions, held twice a week. Each practice session lasts 30–45 minutes, in accordance with the principle that an exercise program should be conducted regularly, gradually, and for an appropriate duration to improve students' motor skills (Oktadinata, 2022).

The exercises were conducted in stages, beginning with an introduction to the gym ball, followed by flexibility and balance exercises, body-positioning exercises on the gym ball, body-posture exercises, and bridge movement practice with the help of a gym ball. Throughout the training process, the researcher observed the students' attendance, their execution of the movements, and their engagement in the learning activities. The final stage involved administering a posttest to determine the improvement in students' ability to perform the bridge movement after completing the gym ball training program.

Data Analysis

The research data were analyzed using descriptive and inferential statistical techniques. Descriptive analysis was used to determine the mean, standard deviation, minimum value, maximum value, and distribution of students' bridge movement ability categories before and after the intervention. Percentages were calculated using the standard formula (1) cited by Sudijono (2017), namely:

$$P = (f / N) \times 100\% \quad (1)$$

Note:
P = percentage
f = frequensy
N = sample size
100% = constant

Before conducting the hypothesis test, the data were first tested using the Shapiro–Wilk test. This test was chosen because the study sample consisted of 24 students, which falls into the category of a small sample. According to Mishra et al. (2019), the Shapiro–Wilk test is more appropriate for small samples of fewer than 50. If the significance value is greater than 0.05, the data are considered to be normally distributed. Conversely, if the significance value is less than 0.05, the data are considered not normally distributed. Since the pretest and posttest data were not normally distributed, the hypothesis test was conducted using the Wilcoxon Signed-Rank Test to determine whether there was a significant difference between the scores before and after the intervention. The Wilcoxon Signed-Rank Test is used to determine differences in results between data collected before and after the treatment within the same group. The Wilcoxon Signed-Rank Test was used because the pretest and posttest data were not normally distributed based on the normality test results (Widiana, Sriwijayasih, & Aju, 2025). Decisions are made based on the significance value. In hypothesis testing, the significance value serves as the basis for decision-making. If the significance value is less than 0.05, the null hypothesis is rejected and the research results are deemed significant. Conversely, if the significance level is greater than 0.05, the null hypothesis is not rejected, and the research results are therefore deemed insignificant (Hazra & Gogtay, 2016).

RESULT

The data in this study were obtained through a bridge movement ability test using a motor skills assessment instrument. The test was conducted twice: a pretest before the intervention and a posttest after the intervention involving gym ball exercises. The results of the descriptive analysis of students' bridge movement ability are presented in Table 1.

Table 1. Results of the pretest and posttest on students' bridge movement ability

Data	N	Mean	Standard Deviation
Pretest	24	49.79	13.648
Posttest	24	66.88	11.811

Based on Table 1, it was found that the students' average pretest score for the bridge pose was 49.79, with a standard deviation of 13.648. This score indicates that the students' initial ability to perform the bridge pose was still relatively low. After receiving instruction in the form of exercises using a gym ball, the average posttest score increased to 66.88, with a standard deviation of 11.811. This increase in the average score indicates a change in the students' flexibility after participating in exercises using a gym ball.

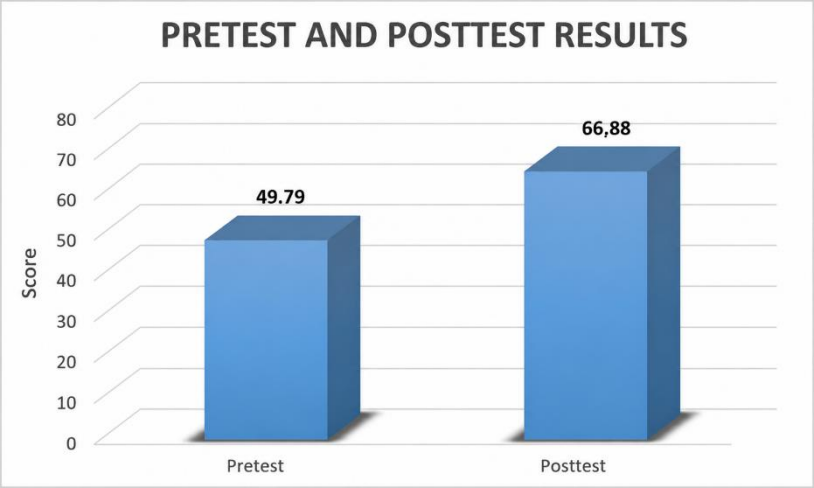


Figure 1. Comparison of the average pretest and posttest scores

As shown in Figure 1, the average posttest score is higher than the average pretest score. The average pretest score of 49.79 increased to 66.88 on the posttest. This indicates that exercises using a gym ball have a positive impact on improving students' handstand ability.

Pretest and Posttest Score Categories

The students' pretest and posttest scores on bridge movement ability were then classified into five categories: excellent, good, fair, poor, and very poor. The distribution of students' bridge movement ability scores before and after the intervention is presented in Table 2.

Table 2. Categories of Pretest Scores for Flexibility

Interval Value	Categories	f	%
80 – 100	Very Good	0	0
70 – 79	Good	3	12.5
55 – 69	Average	4	16.7
45 – 54	Poor	2	8.3
0 – 44	Very Poor	15	62.5
Total		**24**	**100**

Table 3. Categories of Posttest Scores for Flexibility

Interval Value	Categories	f	%
80 – 100	Very Good	4	16.7
70 – 79	Good	9	37.5
55 – 69	Average	6	25
45 – 54	Poor	5	20.8
0 – 44	Very Poor	0	0
Total		**24**	**100**

Based on Table 2, none of the students fell into the "very good" category in the pretest results. Three students (12.5%) were in the "good" category, four students (16.7%) were in the "average" category, two students (8.3%) were in the "below average" category, and 15 students (62.5%) were in the "very below average" category. The results show that before being trained using gym balls, most students were still in the "very poor" category when performing the bridge exercise.

After the gym ball intervention, the posttest results showed an improvement in the students' handstand ability. Four students (16.7%) were in the "very good" category, nine students (37.5%) were in the "good" category, six students (25.0%) were in the "average" category, and five students (20.8%) were in the "poor" category. No students fell into the "very poor" category. This indicates that the students' flexibility improved after they were given exercises using gym balls.

Normality Test

A normality test was conducted to determine whether the pretest and posttest data on students' bridge movement ability were normally distributed. The Shapiro-Wilk test was used for normality testing in this study because the sample size was less than 50.

Table 3. Results of the Normality Test

Data	Statistic	df	Sig.	Significance Level	Notes
Pretest	0.766	24	0.000	0.05	Non-Normal
Posttest	0.916	24	0.049		Non-Normal

Based on Table 3, the results of the Shapiro-Wilk normality test show that the pretest data yielded a significance value of 0.000, while the posttest data yielded a significance value of 0.049. Both significance values are less than 0.05. Thus, it can be concluded that the pretest and posttest data on students' bridge movement ability were not normally distributed. Therefore, hypothesis testing was conducted using a nonparametric test, namely the Wilcoxon Signed-Rank Test.

Wilcoxon Signed-Rank Test is a nonparametric test used to test for differences between two paired samples, particularly when the data are not normally distributed. The Wilcoxon Signed-Rank Test was used to determine whether there was a significant difference between students' pretest and posttest scores on the bridge movement ability test after they received gym ball training.

Table 4. Wilcoxon Rank-Sum Test

Notes	N	Mean Rank
Negative Ranks	0	0.00
Positive Rank	24	12.50
Ties	0	-
Total	24	-

Based on Table 4, the Negative Ranks value of 0 indicates that no students experienced a decrease in scores from the pretest to the posttest. The Positive Ranks value of 24 indicates that all students showed an increase in scores after participating in gym ball exercises. Meanwhile, the Ties value of 0 indicates that no students obtained the same scores on the pretest and posttest. These results indicate that all students showed improvement in their ability to perform the bridge movement after participating in gym ball exercises.

Table 5. Results of the Wilcoxon Signed-Rank Test

Test Statistics	Posttest and Pretest
Z	-4.287
Asymp. Sig. (2-tailed)	0.000

Based on Table 5, the results of the Wilcoxon Signed-Rank Test show a Z-value of -4.287 and an Asymp. Sig. (2-tailed) value of 0.000. Since the significance value is less than 0.05, H_0 is rejected and H_1 is accepted. This means that there is a significant difference between the pretest and posttest scores of students' bridge movement ability after they participated in gym ball exercises. Thus, it can be concluded that gym ball exercises can improve the bridge movement ability of students in Class VIII A at SMPN 3 Gambut.

DISCUSSION

Based on the research findings, it was found that the students' bridge movement ability improved after they were given training using a gym ball. This is evident from the increase in the average pretest score from 49.79 to the average posttest score of 66.88. The average increase of 17.09 points indicates that the use of gym balls can help students improve their ability to perform the bridge pose. In addition, the posttest standard deviation of 11.811 was smaller than the pretest standard deviation of 13.648, indicating that the students' abilities became more consistent after the intervention.

Improvements in flexibility were also evident in changes to the students' performance categories. Before the intervention, most students were in the "very poor" category—15 students, or 62.5%. After the exercise program using gym balls, no students were in the "very poor" category. There were 4 students (16.7%) in the "very good" category, 9 students (37.5%) in the "good" category, 6 students (25.0%) in the "average" category, and 5 students (20.8%) in the "poor" category. These changes in categories indicate that exercises using gym balls can help students gradually improve their handstand skills.

The results of the Wilcoxon Signed-Rank Test indicate that all students showed an improvement in their bridge movement ability scores from the pretest to the posttest. This is evident from the Positive Ranks value of 24 students, while the Negative Ranks value was 0 and the Ties value was 0. Furthermore, the Wilcoxon test yielded a Z-value of -4.287 with an Asymp. Sig. (2-tailed) value of 0.000. Since this significance value is less than 0.05, H_0 is rejected and H_1 is accepted. This means that there is a significant difference between the students' bridge movement ability before and after they were given exercises using a gym ball. Thus, gym ball exercises had a significant effect on improving the bridge movement ability of Class VIII A students at SMPN 3 Gambut.

In theory, the backbend is one of the skills in floor exercise that requires flexibility, muscle strength, balance, coordination, and courage. This movement requires students to be able to arch their bodies backward while supporting themselves on both hands and both feet. Haffyandi, Akhmad, and Kahri (2024) explain that floor exercise not only focuses on motor skills but also emphasizes creativity in movement and bodily expression. Therefore, floor exercise instruction should be designed to be active, safe, and engaging so that students can be directly involved in the process of learning movements.

The use of gym balls in this study served as a learning aid that helped students perform the backbend. The gym balls provided body support as students performed the backward arching movement, allowing them to perform the movement more safely and with greater control. With the help of a gym ball, students can understand the curvature of the back, adjust their hand and foot placement, and reduce their fear when performing the handstand. These findings are consistent with research results showing that all students' scores improved after being taught using gym balls

The results of this study are consistent with Supriyanto (2023), who showed that the use of the "Iron Bends Backwards" aid can improve students' learning outcomes in the bridge movement skill. That study demonstrated an increase in learning achievement from Cycle I to

Cycle II. The similarity between that study and this study lies in the use of a learning aid to improve bridge movement skills. The difference is that this study used a gym ball as an elastic learning aid that supports students' bodies while performing the bridge movement.

The findings of this study are also supported by research by Gentana, Hermawan, & Jubaedi (2018), which shows that the use of balls, boxes, and peer assistance can help improve basic bridge movement skills. That study indicates that varying the types of assistive equipment can influence improvements in students' bridge movement abilities. These findings are consistent with the present study, as the use of a gym ball also serves as a learning aid that helps students master the bridge movement step by step.

In addition, a study by Hakim (2020) showed that the use of gym balls in floor exercise instruction can improve students' handstand skills. These findings are highly relevant to this study because both studies used gym balls to improve bridge movement skills. The difference lies in the research subjects: Hakim's study was conducted with 11th-grade high school students, whereas the present study was conducted with 8th-grade students at SMPN 3 Gambut. Thus, this study strengthens previous findings that gym balls can be used as an effective teaching aid for bridge movement exercises at different educational levels.

Maratis (2022) study also supports the findings of this research, as it shows that exercises using a gym ball can help improve students' fitness and skills. This indicates that gym balls can be used not only for fitness training but also as a learning tool to enhance motor skills. In the context of this study, the use of a gym ball helped students improve their waist flexibility, balance, core strength, and confidence in performing the bridge pose.

The improvement in the students' backbend ability in this study occurred because the exercises using gym balls were conducted in a gradual and targeted manner. In the initial stage, the students practiced familiarizing themselves with body positions and points of support with the help of gym balls. Next, the students began performing backward bending movements with the support of the balls, thereby reducing the pressure on their backs and waists. Repeated practice helps students become more accustomed to the exercise, boosts their confidence, and enables them to improve their bridge movement technique. This demonstrates that using a gym ball can make the learning process safer, more engaging, and better suited to students' abilities.

Thus, the results of this study indicate that exercises using a gym ball are an effective alternative for improving students' handstand ability. This equipment can help students overcome obstacles in performing bridge movement, such as a lack of flexibility, poor balance, weak muscle strength, and fear of falling. In addition, the use of gym balls can also serve as a solution for physical education teachers in creating more varied and enjoyable floor exercise lessons. The findings of this study reinforce the idea that the use of appropriate teaching aids can help improve students' motor learning outcomes, particularly in the floor exercise module covering the bridge pose.

This study has several limitations. First, the research involved a limited number of participants and was conducted in only one school, so the findings may not be generalized to a wider population. Second, this study used a school-based intervention without a control group, which may limit the ability to compare the results with students who did not receive the intervention. Therefore, further research is recommended to involve a larger sample, include a control group, and conduct the intervention over a longer period. Future studies may also compare stability ball training with other flexibility training methods to determine which approach is more effective in improving adolescents' flexibility.

CONCLUSION

Based on the research findings, stability ball training was found to improve students' flexibility. The improvement was shown by the difference between the pretest and posttest results, indicating that students' flexibility increased after participating in the school-based intervention. The statistical analysis also confirmed that the improvement was significant. Therefore, it can be concluded that stability ball training has a positive effect on improving the flexibility of Class VIII A students at SMPN 3 Gambut. Based on these findings, stability ball

training can be used as a practical alternative in physical education learning, especially to help students improve flexibility through varied, safe, and enjoyable exercises.

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