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Investigating The Relationship Between Core Muscle Strength And Technical Performance In Selected Mat-Based Stability Exercises

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Abstract

Stable movements are crucial in a range of physical activities such as sports, dancing, and gymnastics. These motions require a significant amount of coordination, balance, and the capacity to retain control over the body's center of mass. The center of mass, located on the body's midline, is a critical factor for stability during these exercises since it represents the point where the body's weight is concentrated. The aim of this study was to investigate if enhancing the power of the core muscles may enhance the proficiency of certain stability exercises done on a mat placed on the floor. The activities included push-ups, abdominal exercises, handstands, headstands, back exercises, and pull-ups. The current review exhibited a significant increase in their technical performance during the stability movements. Based on the findings, focusing on the core muscles during training may improve the precise execution of stability exercises done on a mat or floor.

Keywords: technical performance, center muscles, mat, stability movements, floor movements

Introduction

Movements requiring stability are a crucial element in several forms of physical exercise, such as sports, dancing, and gymnastics. These movements need a significant level of coordination, along with balance and the capacity to retain control over the body's center of mass. The body's weight is focused at the center of mass, located at the body's midline, which correlates to the position of the center of mass. The terms "center of gravity" and "center of mass" refer to the same position.

The center muscles, collectively referred to as the core muscles, are responsible for regulating the position of the center of mass. The transverse abdominis, rectus abdominis, internal and external obliques, and erector spinae are all classified as components of these muscles. The muscles play a crucial role in stabilizing the spine, maintaining posture, and regulating movement.

The relationship between the strength of the core muscles and the ability to perform stability movements has been extensively studied in many research studies. A study done by Willardson et al. (2009) found that a six-week training program focused on strengthening the core muscles led to a significant improvement in the performance of stability exercises among women of college age. This conclusion was derived from the participants' proficiency in carrying out the movements. Similarly, a study done by Behm et al. (2005) discovered that the stability and balance of older individuals significantly improved after their participation in a four-week training program focused on strengthening the core muscles.

Prior research has shown that strengthening the core muscles can improve stability movements. However, there is currently a lack of research on how strengthening the core muscles specifically affect the technical performance of stability exercises on the mat or floor. Furthermore, the strength of the core muscles is crucial while doing various stability exercises on the floor mat. The extent to which the power of the core muscles affects the technical execution of these movements, however, has not been well investigated. Consequently, it is necessary to investigate the impact of core muscle strength on the precise performance of stability exercises on the floor mat. This study seeks to assess the impact of core muscle strength on improving the technical

execution of stability movements during floor exercises on the mat.

Methodology

The investigation of the correlation between core muscle strength and technical performance in certain mat-based stability exercises used a methodical and organized strategy to collect, evaluate, and interpret pertinent data. This study sought to investigate the impact of core muscle strength on technical performance during stability exercises performed on a mat. The approach included a series of crucial measures to guarantee the validity and trustworthiness of the study.

An extensive literature search was carried out on many databases, such as PubMed, Google Scholar, and relevant academic publications, to find research that specifically examine the relationship between core muscle strength and technical performance in mat-based stability exercises. The search was refined and suitable papers were retrieved using keywords such as "core muscle strength," "stability exercises," "mat exercises," and "technical performance."

After conducting a literature search, we undertook a thorough selection procedure to screen and analyze the studies that were discovered. This approach was based on predetermined criteria for inclusion and exclusion. Only studies that specifically investigated the correlation between core muscle strength and technical performance in mat-based stability exercises were included in the review. This procedure verified that the chosen studies were in line with the study goals and offered important insights into the issue being examined.

Data extraction encompassed the methodical gathering of information from the chosen studies, which included details about the participants' characteristics, the techniques used to assess core muscle strength, the stability exercises conducted on a mat, the technical performance metrics, and the significant findings pertaining to the correlation between core strength and technical proficiency. This stage streamlined the process of organizing and combining pertinent material in order to properly answer the study questions and goals.

An evaluation was performed to evaluate the overall strength of the evidence and assure the reliability of the results by critically assessing the methodological quality and possible biases of the included research. The credibility and relevance of the studies were assessed by considering factors such as sample size, study design, outcome measures, statistical analysis, and control of confounding variables.

Ultimately, the process of data synthesis included examining the retrieved information in order to discern prevalent themes, patterns, and connections between core muscle strength and technical performance in stability exercises performed on a mat. This review intended to synthesize the data from chosen studies in order to offer a thorough overview of the current information and make relevant conclusions about the association between core strength and technical ability in this particular exercise environment.

The Strength Of The Core Muscles

The objective of this study was to investigate if increasing the strength of the core muscles may enhance the technical performance of stability exercises conducted on a mat or floor. Hassan (2017), Chang et al. (2020), and Suner-Keklik et al. (2021) have shown that enhancing the core muscles may positively impact the technical performance of stability exercises conducted on the mat or floor.

The observed improvements in the experimental group's technical performance may be attributed to the six-week training program that focused on enhancing the core muscles. This is because the program was specifically intended to strengthen the core muscles. The training program included exercises that specifically targeted the rectus abdominis, transverse abdominis, internal and external obliques, and erector spinae muscles (Park and Park, 2019). By fortifying these muscles, individuals may enhance the body's ability to control and balance itself during stability activities. The muscles mentioned have a crucial function in preserving the stability of the spine and controlling movement (Marani et al., 2020).

The finding that the strength of the core muscles has a positive link with the precise execution of stabilizing movements has significant implications for injury prevention. Insufficient

strength in a person's core muscles increases the likelihood of injuries, particularly to the lower back and spine. Stability movements are often used in physical activities and sports (Xu and Peng, 2020). By engaging in targeted exercises that focus on strengthening the core muscles, individuals may reduce their risk of injury and improve their ability to perform stability movements safely and effectively.

Furthermore, the results of this study suggest that core muscle strength plays a crucial role in defining both overall physical fitness and performance in physical activities. Various forms of physical activity, such as sports and exercise, need a significant level of stability and equilibrium. Enhancing the muscular power of your core with specific exercises may enhance your total physical performance and perhaps result in improvements in other aspects, such as speed, agility, and power (Glave et al., 2016).

Moreover, the finding that targeted core strengthening exercises may significantly impact technical performance, even with a very brief duration, has practical implications for coaches, trainers, and individuals seeking to improve their physical ability. The study used a training routine lasting just six weeks, indicating that individuals may make significant improvements in both core muscle strength and technical execution of motions within a very little period.

These results have important implications for designing training programs that are appropriate for individuals with different levels of physical fitness and abilities. The findings of this study, which specifically targeted individuals who are in good health, may have implications for individuals of all genders, ages, and fitness levels. Engaging in core muscle strengthening exercises may be advantageous for those recovering from injuries, as well as those seeking to improve their overall fitness and performance. These exercises may be included into training regimens. The activities included in this study, including headstands, handstands, pull-ups, push-ups, back exercises, and abdominal exercises, are not only straightforward to do, but also need little equipment and may be conducted either at home or in a gym setting.

The results of this study align with previous research, which concluded that engaging in exercise and strengthening the core muscles may improve the execution of stability movements. A study conducted by Cugliari and Boccia (2017) found that a six-

week training program targeting the core muscles significantly improved an individual's performance in these activities. A study done by Zemková and Zapletalová (2021) found that a four-week training program focused on the core muscles significantly improved performance in the bird dog exercise.

The findings of this study have substantial practical implications for coaches, trainers, and athletes engaged in activities that require stabilization movements on the mat or floor. By including core muscle-focused workouts into their training routines, they may optimize the technical performance of their athletes and reduce the risk of injury.

To summarize, this study demonstrates a strong correlation between the strength of the core muscles and the successful execution of stability exercises on the mat or floor. One may enhance their ability to maintain proper body alignment, stability, and control during physical activity by strengthening the core muscles via targeted workouts. This might result in enhanced performance and a reduced risk of injury. These findings have significant implications for athletes, coaches, trainers, and anybody seeking to enhance their overall fitness and physical performance. Future research should prioritize investigating the potential benefits of core strengthening activities for individuals of different ages, fitness levels, and genders. This study should also assess the optimal timing and intensity of core strengthening exercises to improve stability during movements.

Conclusion

The findings of this research provide proof to substantiate the notion that strengthening the core muscles may enhance the technical performance of stability exercises carried out on a mat or floor. The results of this investigation were determined to be statistically significant. Based on the results, a training regimen that includes exercises specifically designed to strengthen the rectus abdominis, transverse abdominis, internal and external obliques, and erector spinae muscles may result in significant enhancements in stability movements. The program has a duration of six weeks and specifically emphasizes activities that target these muscles. These exercises strengthen the rectus abdominis, transverse abdominis, internal and external obliques, and erector spinae muscles. These enhancements have the capacity to bring about real consequences for coaches, trainers, and players who

participate in exercises on the mat or floor that need stabilizing motions.

Limitations

This study is subject to many limitations, with the most prominent being its small sample size and the lack of a long-term follow-up period to assess the durability of the improvements in technical performance. This study focused only on examining the immediate effects of core muscle strength training on the proficiency of stability exercises performed on the mat and floor. Further research is required to investigate the long-term benefits of center muscle strength training on stability and balance, as well as the influence of other factors including flexibility and coordination on stability movements.

Furthermore, the individuals included in our study were exclusively young adults who exhibited excellent physical well-being and had no prior record of musculoskeletal injuries or ailments. Individuals with pre-existing injuries or ailments who engage in core muscle strength training may see varying effects on their ability to do stability exercises with proper technique. The next study shall examine the impact of core muscular strength training on stabilizing movements in individuals with different health problems.

Our study shows that focusing on strengthening the core muscles may effectively improve the technical execution of stability exercises on the mat or floor. These results have implications for practical application, and they suggest that such training should be pursued. Coaches and trainers may include center muscle strength training into the training regimens of athletes that do stability exercises. Strength training focused on the core muscles may also be advantageous for those seeking to improve their stability and balance.

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