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CORE STABILITY TRAINING: ITS INFLUENCE ON THE BASKETBALL ATHLETES' PERFORMANCE

Jenelyn G. Balbido[1]*, Gineva Corpus[2], John Lloyd Cruda[3], Jemaima M. Malone[4], Louie P. Gula[5]

[12345]Institute of Human Kinetics, Visayas State University, Philippines.

Corresponding Author: jenelynbalbido@gmail.com

Abstract

This study assessed the Performance of the Basketball Athletes' who engaged Core Stability Training in Baybay City. The researcher used quasi-experimental research design to document and evaluate the respondents' performance correlated to the provided evaluation criterion. There are 30 respondents in the study that are basketball athletes in the school of Baybay City, and snowball sampling was utilized in selecting the participants respectively. There are two groups in all respondents. The first group was the respondents who engaged in core stability training, and the other group was those who did not engage in core stability training. They performed the core training exercises in the survey criterion: (push-ups, supine toe taps, shooting drills, sumo squats, quadruped opposite leg, and arm raise.) given standard time, the researcher will record only the attained repetition. Independent sample t-test, welch two-sample t-test, and Mann-Whitney t-test are used in analyzing the data, were utilized at a 5% significance level. Overall, the study's outcome reveals that there is an essential difference of the basketball athletes' performances who engaged in core stability training and those who did not. It infers that those who engage in core training perform better and have strong stamina. Thus, it is recommended to indulge in core stability training as part of a basketball athlete's training routine.

Keywords*: core, stability, Basketball athletes, core stability training, exercises*

INTRODUCTION

Popular sport of basketball calls for a variety of technical, tactical, psychological, and physical abilities. Speed, strength, stamina, agility, flexibility, leaping, sprinting, balancing, and changing directions all play a role in basketball performance (Molinuevo, et al., 2010). Core Stability Training includes the training exercises of athletes, such as push-ups, plunks, and sit-ups. It focuses on the body's core to promote strength and good health. Core stability training is becoming increasingly popular as more clinicians discover the link between injury and a poorly functioning heart. Core stability is the stability of the center part of our body, like the stomach and lower back. It is characterized as the capacity to generate movements in the extremities without compensating spine motions (Sydes, 2018). The benefits of core stability training have been undervalued towards its contribution to improving the athletes' performance in various sports. Despite its significance, this training is not commonly included in athletes' training routines due to some factors.

Core training improves the players' performance in "strength, sprinting, jumping, balance, agility, shooting, dribbling, passing, rebounding, and stepping." Additionally, exercises of the core combining static and dynamic movements can enhance basketball players' athletic skills and performance, especially on unsteady surfaces. This study shows

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that training for core muscles should be included in basketball training sessions despite the need for more research indicating its impact on stamina, flexibility, and defensive abilities (Lou et al., 2023). Additionally, McGill (2010) highlights how core training lowers the likelihood of accidents by preventing muscle fatigue and improper execution of movement patterns. Athletes' can conduct better dynamic exercises by improving feed-forward mechanisms. It has been suggested as an essential component in enhancing movement patterns and athletic performance.

Additionally, core strength training is a crucial and significant training work in basketball sports related to numerous technical activity levels. To ensure that basketball players. With good body posture, upper- and lower-limb coordination, and the best possible physical condition, core strength should be explicitly trained and effectively in this sport (Theodorou et al., 2022). This will encourage the efficient combination and coordinated development of the players' bodies. Moreover, developing one's core strength is an essential and fundamental training work in basketball sports and is related to various technical action levels. Therefore, core strength should be explicitly trained and effectively in basketball sports to help players have good body posture, perform good upper- and lower-limb coordination, and achieve the highest physical condition. Hence, this will encourage the efficient combination and coordinated development of each body link and significantly raise the overall level of basketball sports (Xie, 2014).

The purpose of this study is to determine the advantages and value of core stability training for athletes. We will also look into how this particular training improves the athletes' skills and how it can influence the athlete's overall fitness. This will give us an idea of how and why this training routine must be included in athletes training. The researchers believe this will add a new dimension and fill the research gap among various studies. Further, the result of this study will give relevant knowledge for recommendations to contribute more to athletes, coaches, and sports enthusiasts.

METHODS

The researcher used quasi-experimental research design to identify the influence of core stability training on basketball athletes in the school of Baybay City. Research that resembles experimental research but is unreliable is referred to as "quasi-experimental research" or "Experimental investigation," and the word "quasi" means "resembling.". Respondents are not affected by the manipulation of the independent variable. Conditions or orders of conditions are chosen at random (Cook & Campbell, 1979). Cambridge Dictionary defines "quasi," indicates that something is almost, but not. Additionally, as the name implies, quasi-experiments are nearly due to how they are carried out, experiments. What distinguishes this particular research design is that the respondents are divided for an investigation (Çobanoğlu, 2023).

The study was conducted within the school of Baybay City; since the respondents are basketball athletes, the instrument was printed out and given to the respondents during the survey. Their profile was kept at utmost confidentiality, which means that the research instruments do not contain any questions asking such. The location can be conducted both inside and outside the homes. Everything will be done personally during the conduct of the study.

Respondents of this study were exclusive only to Basketball athletes in the school of Baybay City. The allowed respondents are those still actively engaged in playing Basketball. There are 30 respondents in the study, and snowball sampling was used in selecting the participants. Snowball sampling was employed by recruiting respondents via other

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respondents the higher quantity of access to people you have when you interact with more individuals. The accuracy is also an issue because respondents depend on recruiting others. (McCombes, 2023).

The study utilized a smartly developed evaluation criterion tool to evaluate the respondent's performance. The researchers used a gathering tool that is an adaptation from (Şahiner & Koca, 2021), entitled "Core Training Program. "The evaluation criterion consists of 5 descriptors in which the basketball athletes will perform the exercises given a standard time. The researchers modified the tool, which will sufficiently match the respondents and the intent of the study. Thus overall, core training exercises included in the evaluation criterion are (push-ups, supine toe tap, shooting drills, sumo squat, quadruped opposite leg, and arm raise.). The survey criterion aims to identify the status of the basketball athletes by evaluating their performance, motivation, and availability of resources regarding core stability training. It also aims to determine what factors influence basketball athletes to engage in core stability training. This evaluation criterion was only limited to the basketball athletes in the school of Baybay City.

The study was conducted with the use of printed rubrics as a gathering tool of data through evaluation criteria. Nonetheless, the researchers modified the device, which sufficiently matched the participants and the purpose of the study. The evaluation criterion consists of 5 descriptors: supine toe tap, push up, sumo squat, quadruped opposite leg and arm raise, and shooting drills in which the basketball athletes were asked to perform given a standard time. Snowball sampling was used to select the participants of the study. Consequently, the researchers asked those selected participants to suggest names of basketball athletes that could potentially be respondents in the study. There were 30 respondents in the conducted research were basketball athletes in Baybay. The result from the evaluation criterion tool is one of the bases for interpreting the results.

The study is under quasi-experimental research design, which is quantitative research that aims to gather or collect data from the uncontrolled performance of basketball athletes. Survey criteria will be used to collect data and summarize the results in interpretable form. The data gathered were interpreted through the following statistical treatments: (1) Descriptive Statistics: Summary statistics (Mean/Median, Standard Deviation/IQR) and Data visualization (Boxplot); (2) Independent Samples T-test (Independence of samples, Normality, and Equal variances); (3) Welch Two Sample T-test (Condition: When equality of variances assumption in 2) is not met); (4) Mann-Whitney Test (Condition: When normality assumption in 2) is not met).

Respecting people is one of the most significant things in conducting research. In sharing the correct and enough information, participants have the right to make decisions, which must be respected. Additionally, protection and respect are necessary for the participants who still require guidance in making decisions. Before participating, people must be aware of the possible unknown events of harm before participating in physical activity. (Miracle, 2016). Similarly, the researchers obtained signed consent from respondents who belong to vulnerable groups, particularly those under 18. Additionally, the researchers secured the signed permission from the respondents that agreed to their parents/ guardian's consent. Moreover, the researchers ensured that the data collected from the study were treated with the utmost confidentially and that individuals were not pressured to participate. The researchers made sure that the principle of voluntary participation was observed in situations where there was interaction with subjects.

This study is highly centered on the factors influencing engaging core stability training. Core stability training was placed alone at the left rectangle because it is the main point of the study. Hence, this training plays a significant role in improving basketball varsity athletes'

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skills. The first factor that can influence engaging in the said training is the skills: jumping, sprinting, and balancing. More excellent core stability helps athletes effectively transfer strength into power for basketball abilities. Basketball abilities like jumping, running, and balancing are improved by core training. Basketball jumping is a crucial skill that affects rebounding and shooting. Due to the essential function that the muscles in the core area play in transmitting power to the extremities, core training may enhance jump performance. Additionally, because it regulates spine and pelvic stability, this exercise enhances basketball players' ability to balance. In addition to increasing core stability, it coordinates altering centers of gravity and posture adjustments during movement, which enhances overall balance ability. In Basketball, sprinting is essential. Strong core muscles are necessary for the lower limbs to be stabilized and for energy to be transferred. More energy is absorbed by the core muscles during squatting and running. This state enhances energy expenditure, sprint performance, upper and lower limb coordination, and muscular control. Another factor is the Physique, which includes the fitness and proper posture of the athletes. Engaging in these exercises enables the athletes to become fit holistically and maintain their adequate posture to gain confidence not only in executing right stance but also confidence on their physical appearance. The last factor is goal setting. In this training, athletes learn to keep their motivation high and set new goals. This goal setting will drive athletes towards mastering the skills that will eventually act as a springboard to their achievements.

RESULT AND DISCUSION

S-ToeTap

Athletes who engaged in core training (Median = 100, IQR = 8.5) have attained a higher average number of supine toe tap repetitions within a 3minute activity duration than those athletes who did not engage (Median = 74, IQR = 32) (Figure 1). This implies that half of the players who engaged in the said training have repetition values smaller or equal to 100, and half have values higher or similar to 100. On the other hand, 50% of the players who did not engage in the core training have values smaller or identical to 74, and the remaining 50% have values higher or similar to 74.

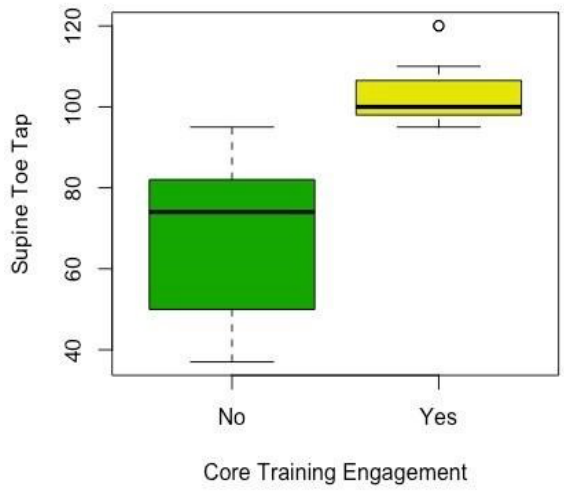

Figure 1. Several attained supine toe-tap repetitions of athletes by core training engagement within three minutes.

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Based on the two (2) interquartile ranges, the no-core engagement training group values have more variability (more spread out from the median value) than the other group. Since the normality assumption (p-value = 0.02011, trained group) is violated with supine toe tap as the response variable, Mann-Whitney Test was used instead of the classical independent samples T-test. At a 5% level of significance, it can be inferred that there is a significant difference in the number of attained supine toe tap repetitions between athletes who engaged and did not engage in core training (W = 0.5, p-value = 3.676e-06). Additionally, this study fills a gap by isolating a specific performance metric and detailing its response to core training, suggesting further investigation could benefit from exploring additional metrics and the factors influencing performance variability.

Push-Ups

Looking at Figure 2, the number of attained push-up repetitions is also higher for those athletes who have engaged in core training. It is highly visible about the difference between the two groups, with a median value of 38 (IQR = 9.5) repetitions for engaged athletes and 19 (IQR = 4.5) for those who did not. With the use of the Mann-Whitney Test (normality assumption not met, p-value = 0.03277), the distribution of the number of push-up repetitions for athletes engaged and not engaged in core training are different at a 5% level of significance (W=1.5, p-value = 4.23e-06).

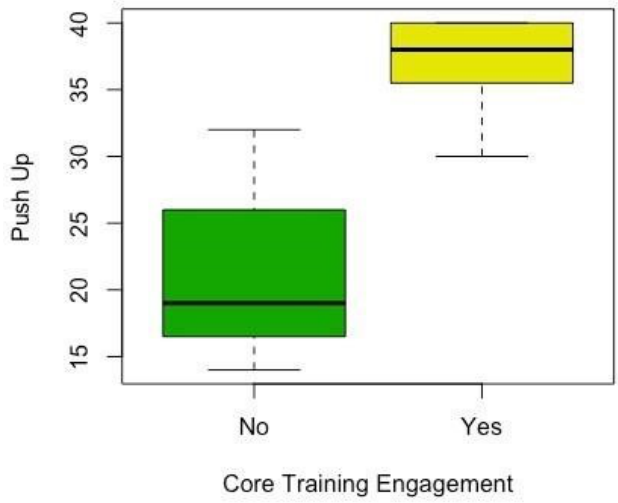

Figure 2. The number of attained push-up repetitions of athletes by core training engagement within five minutes.

Sumo Squat

Engagement in core training increased the number of attained sumo squat repetitions of athletes, with a mean value of 40.8 (SD=6.41) for those engaged and 23.3 (SD = 4.45) for those who did not (Figure 3). To test this claim, Independent Samples T-test was used with normality (engage, not engage) and equal variance assumptions p-values of 0.06985, 0.4234, and 0.4828, respectively. At a 5% significance level, the researcher may draw the conclusion that there is a considerable difference between the two groups of athletes in the mean value of sumo squat repetitions accomplished. (T = -8.673, p-value=2.02e-09).

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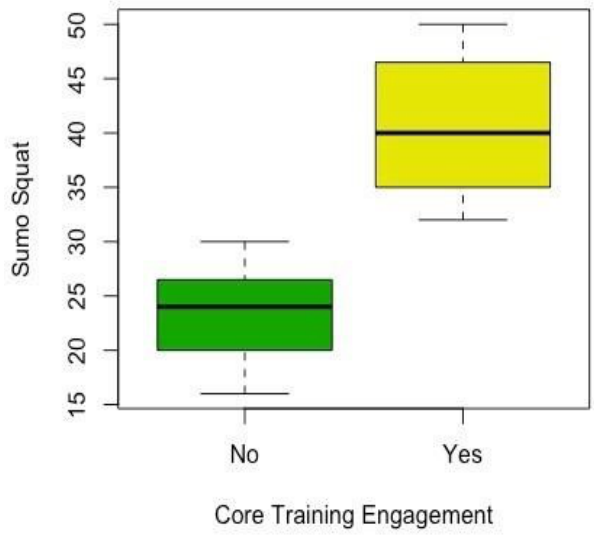

Figure 3. The number of attained sumo squat repetitions of athletes by core training engagement within three minutes.

Quadruped Opposite Arm and Leg Raise

As can be seen in Figure 4, same as in Figures 1-3, athletes who went through core training have a higher number of quadruped opposite leg and arm raise repetitions (Median = 32, IQR = 2.5) than those athlete players who didn't go through core training (Median = 16, IQR = 5). Two outlying data points were present for the disengaged group; however, they were kept since their influence is negligible. Since the normalcy assumption was broken for both the trained and untrained groups, the Mann-Whitney Test was once more employed to establish whether there is a significant difference between the two groups in terms of the median number of achieved 1. Quadruped Opposite Arm and Leg Raise repeats. (p-value = 0.0096, p-value = 0.0267). We can infer that core training engagement improved the number of QOLARaise repetitions of athletes based on the sample data at a 5% significance level (p-value = 4.796e-06).

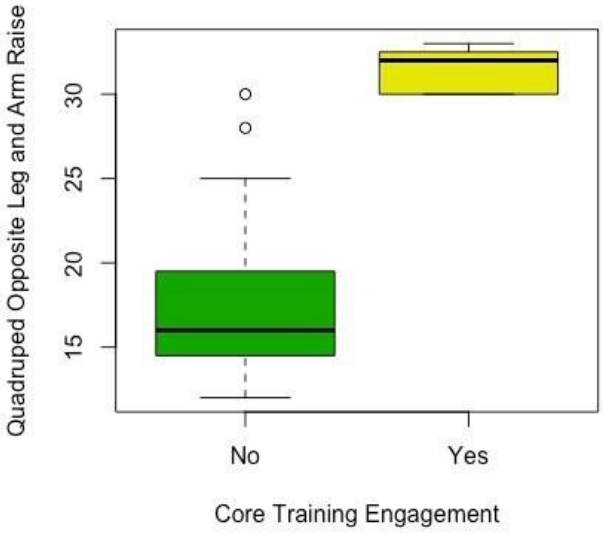

Figure 4. The number of attained quadruped opposite leg and arm raise repetitions of athletes by core training engagement within a three-minute duration.

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Shooting Drills

In figure 5 it shows that the number of shots of core-trained athletes in a shooting drill is higher than that of those athletes who did not have the same training, with mean values of 10.6 (SD = 1.30) and 6.07 (SD = 2.46) repetitions, respectively. With shooting drills as the response variable, the normality assumption was met, but not the equality of variance (p-value = 0.02254); hence it used the Welch Two Sample T-test. At a 5% significance level, there is a significant difference in the average number of attained shots between core-trained athletes and those who are not (T= -6.3059, pvalue = 2.833e-06).

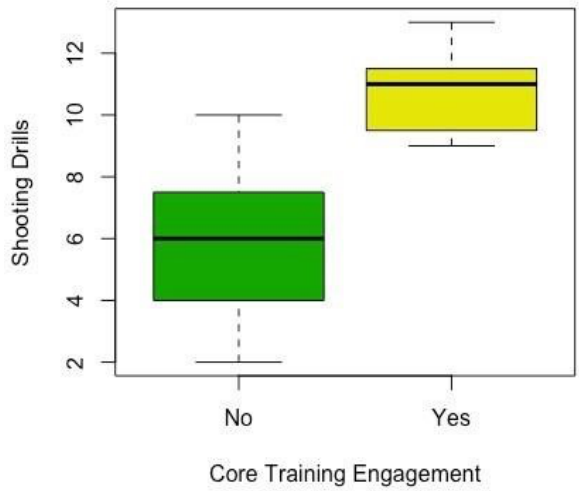

Figure 5. The number of attained shots of athletes by core training engagement in a shooting drill.

Supine Toe Tap, athletes who engaged in core training have attained a higher average number of supine toe-tap repetitions within a 3-minute activity duration than those athletes who did not commit. There is a significant difference in the number of attained supine toe tap repetitions between athletes who engaged and did not engage in core training. Push up, results show that the number of attained push-up repetitions is also higher for those athletes who have engaged in core training. The distribution of push-up repeats for athletes engaged and not involved in core training differs at a 5% significance level. Sumo Squat, results indicated that engagement in core training increased the number of attained sumo squat repetitions of athletes, with a mean value of 40.8 (SD=6.41) for those engaged and 23.3 (SD = 4.45) for those who did not. There is a significant difference in the mean value of sumo squat attained repetitions between the two groups of athletes. Quadruped Opposite Arm and Leg Raise, athletes who went through core training have a higher number of quadruped opposite leg and arm raise repetitions than those athlete players who didn't go through core training. We can infer that core training engagement improved the number of Quadruped Opposite Arm and Leg Raise repetitions of athletes based on the sample data at a 5% significance level. Shooting Drills, the number of shots of core-trained athletes in a shooting drill is higher than that of those athletes who did not have the same training repetitions respectively. There is a significant difference in the average number of attained shots between core-trained athletes and those who are not. Based on the data analyzed, core training significantly enhances athletes' performance across various physical exercises. Athletes who engaged in core training consistently achieved higher performance metrics compared to those who did not. Specifically, for supine toe taps, core-trained athletes had a

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median of 100 repetitions versus 74 for the non-trained group, with significantly lower variability in their results (p-value = 3.676e-06). Similarly, core-trained athletes performed better in push-ups and sumo squats, with median repetitions of 38 versus 19 and a mean of 40.8 versus 23.3, respectively, with statistically significant differences (push-ups: p-value = 4.23e-06; sumo squats: p-value = 2.02e-09). In the quadruped opposite arm and leg raise, core training led to higher median repetitions (32 versus 16) with significant differences in performance (p-value = 4.796e-06). Additionally, in shooting drills, core-trained athletes had a mean of 10.6 shots compared to 6.07 by the non-trained group, with a significant difference as well (p-value = 2.833e-06). These findings underscore the positive impact of core training on various physical performance metrics, highlighting its effectiveness in enhancing athletes' capabilities.

A strong core is necessary for injury prevention and optimal performance. The body comprises lumbar spine, abdominal wall muscles, back extensors, and lumborum quadratus. The multi-jointed muscles, such as the latissimus dorsi and psoas, connect thru the core, the pelvis, legs, shoulders, and arms (McGill, 2010). The relevance of core stability has been emphasized for injury prevention and performance improvement. It has been popularized over the years, though with little-supporting evidence. Although confined, including core stabilization exercises in injury prevention programs decreases injury, especially for the lower extremity. But there needs to be more studies on what core exercises are practical for enhancing core stability (Hubscher et al. al, 2010). Static control and dynamic control are both included in the concept of stability. This involves the system of neuromuscular capacity to keep (or restore) straight body posture and regulate trunk motion (dynamic). The quick postural response is the primary method used to do this, the neuromuscular system's postural reactions to both inner and outer disturbances (predicted or unpredicted). This also encompasses alterations brought on by forces produced or through-traveling the extremities. Mechanisms for response and feedback are combined to react to these stresses within the neuromuscular system (Borghuis et al., 2011).

Core weakness causes an ineffective energy transfer, which reduces sports performance and raises the possibility of injury. Therefore, core stability improves performance and encourages active, productive movement to dynamically control and transmit significant forces between the upper and lower extremities (Sharrock et al., 2011). High levels of sensitivity and specificity for the prediction of knee injury were found in core stability factors. Athletes that are female but not male have moderate specificity. The fundamental consistency of genders and athletes who disclosed injuries throughout their seasons and those who did not. Athletes who escaped injury had much greater hip adduction and external rotation strength, with the sole reliable indicator of injury status being external rotation. The writers concluded that core stability is crucial for preventing injuries and can be used to identify the danger of damage if a correlation is present between the performance of the athletes and the strength of the core. Higher core stability in athletes may also make them less prone to injury. Evidence of these relationships would significantly affect clinical practice and training particular to sports (Leetun et al., 2011).

By stabilizing the torso, one can attain core stability and enable optimal performance during an integrated kinetic chain; the force and motion are transferred to and under control bt the terminal segments in several events. The core stability in human movement contributes to developing, sharing, and managing forces or energy. Adequate trunk and limb movements are required during kinetic chain movements. (Okada, et al, 2011). Training specifically for core stability has a marginal impact on athletic performance. Conflicting discoveries, the absence of a framework for measuring results, and training focused on increasing core stability and strength are challenging. Therefore, additional study is crucial to ascertain this

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connection to comprehend how core strength and performance in sports are impacted by stability (Reed et al., 2012). Panjabi's concept incorporates three interrelated mechanisms for core stabilization subsystems, namely neural, active, and passive control. The static subsystem is part of the passive system, tissues, including ligaments, joint capsules, intervertebral discs, and vertebrae, including passive properties of muscles. (Barton et al. 2013). They are maintaining a neutral spinal alignment, achieving the ideal trunk position, and moving loads down the kinetic chain. Many different assessment tools can be used to check the stability of the core. It is advised to take a diverse strategy and use testing for essential muscle functional mobility, stamina, neuromuscular control, and recruitment patterns. Training for core stability should be progressive, starting with local muscle recruiting, then core stabilization in a range of positions before switching to dynamic motions of the entire body (Bliven, 2013).

A vital training duty related to basketball sports is core strength training to many degrees of technological action. Consequently, it is essential to train specifically for core strength and effectively in basketball competitions to ensure that basketball players have proper posture, are in good physical condition, and have good upper- and lower-limb coordination, encouraging the coordinated development of beneficial combinations of each body link and significantly raising the overall standard of basketball sports (Xie, 2014). The technical and medical staff must evaluate the sustainability of integrative programs and exercises in the process of introduction to the sport by the assessment of Core Stability Training and Jump Performance in Young Basketball Players prerequisites in young people to lessen the risk of causing harm (Sannicandro et al., 2015). All athletes should perform core exercises. When athletes neglect the fundamental movements, their level of athletic performance declines, and their risk of injury rises (Brumitt et al., 2016).

The “Core Stability Training and Jump Performance in Young Basketball Players" emphasize the effectiveness of a core stability program on the young basketball players' ability to jump. Nowadays, people choose and play sports; hence, they should work to safeguard the health of the young practitioner and lessen the risks of overloading training (Jayanthi et al.,2017). Over eight weeks, core stability training can improve college players' functional movement patterns and dynamic postural control. For not efficient movers, core stability training may be more beneficial, although further research is required (Bagherian et al., 2019). Similar to how basketball players with trunk dysfunction benefited from this core training program in terms of muscle strength and endurance—two qualities lacking in people with trunk dysfunction—basketball players with trunk dysfunction also benefited from it. Thus, to develop trunk core muscle strength and endurance, coaches in strength and conditioning and allied health professionals can utilize core stability exercises (Mohammad et al., 2020). According to recent research, core stability is crucial for productive functional movements and much more excellent athletic performance and is fundamental for force output in the limbs (Arora et al., 2021). Although there is still little information to aid, core stability training's relevance in athletics' growth is now receiving significant interest (Zemková et al., 2022).

CONCLUSION

The study's findings revealed a noticeable difference between basketball players who trained their core stability and those who did not. It infers that those who engage in core training perform better and have strong stamina as they can sustain their energy to endure many repetitions compared to those basketball athletes who did not engage in core stability training. In addition, this allows the basketball athletes to perform at their best without exerting too much energy throughout the game. Moreover, having a core training

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strengthened the core muscles of the basketball athletes which is very significant during game place specially when performing defense to the opponent. Further, the results revealed that those who engage in core stability training have better shooting skills. Those basketball athletes who had core engagement has a greater ability of performing one of the fundamental skills in basketball sports which creates gap to basketball athletes who had no core engagement.

Future researchers are encouraged to conduct similar studies and engage in a broader scope to replicate the findings. They may adapt the same scales for the same scales for the constructs used in this study. The study results must be disseminated to basketball athletes, coaches, and sports enthusiasts during the conference or meetings. Basketball coaches are recommended to include core stability training in their training routine as this can significantly improve the performance of the athletes. Basketball athletes are encouraged to engage in core stability training to help enhance their skills.

REFERENCES

Arora, C., Singh, P., & Varghese, V. (2021). Biomechanics of core musculature on upper extremity performance in basketball players. Journal of bodywork and movement therapies, 27, 127–133. https://doi.org/10.1016/j.jbmt.2021.02.023

Bagherian, S., Ghasempoor, K., Rahnama, N., & Wikstrom, E. A. (2019). The effect of core stability training on functional movement patterns in college athletes. Journal of sport rehabilitation, 28(5), 444-449. DOI: https://doi.org/10.1123/jsr.2017-0107

Borghuis, A. J., Lemmink, K. A. P. M., & Hof, A. L. (2011). Core Muscle Response Times and Postural Reactions in Soccer Players and Nonplayers. Medicine & Science in Sports & Exercise, 43(1), 108–114. DOI:https://doi.org/10.1249/MSS.0b013e3181e93492

Brenner, J. S., & COUNCIL ON SPORTS MEDICINE AND FITNESS (2016). Sports Specialization and Intensive Training in Young Athletes. Pediatrics, 138(3), e20162148. https://doi.org/10.1542/peds.2016-2148

Hessam, M., Fathalipour, K., Behdarvandan, A., & Goharpey, S. (2023). The Effect of McGill Core Stability Training on Movement Patterns, Shooting Accuracy, and Throwing Performance in Male Basketball Players: A Randomized Controlled Trial. Journal of Sport Rehabilitation, 32(3), 296-304. Retrieved Jul 31, 2024, from https://doi.org/10.1123/jsr.2022-0036

Throwing Performance in Male Basketball Players: A Randomized Controlled Trial. Journal of Sport Rehabilitation, 32(3), 296–304. DOI: https://doi.org/10.1123/jsr.2022-0036

Hübscher, M., Zech, A., Pfeifer, K., Hänsel, F., Vogt, L., & Banzer, W. (2010). Neuromuscular training for sports injury prevention: a systematic review. Medicine and science in sports and exercise, 42(3), 413–421. https://doi.org/10.1249/MSS.0b013e3181b88d37

Neuromuscular training for sports injury prevention: a systematic review. Medicine & Science in Sports & Exercise, 42(3), 413-421. doi:10.1249/mss.0b013e3181b88d37

Huxel Bliven, K. C., & Anderson, B. E. (2013). Core stability training for injury prevention. Sports health, 5(6), 514–522. https://doi.org/10.1177/1941738113481200

ISSN: 0216-9940

Jayanthi, N., Kleithermes, S., Dugas, L., Pasulka, J., Iqbal, S., & LaBella, C. (2020). Risk of Injuries Associated With Sport Specialization and Intense Training Patterns in Young Athletes: A Longitudinal Clinical Case-Control Study. Orthopaedic journal of sports medicine, 8(6), 2325967120922764. https://doi.org/10.1177/2325967120922764

Kartiko, D. C., & Tuasikal, A. R. S. (2020). The influences of foot run, brake runs, hop scotch, forward carioca for explosive power, agility, and speed in UNESA basketball male athlete. MEDIKORA: Jurnal Ilmiah Kesehatan Olahraga, 19(2), 120-131. https://doi.org/10.21831/medikora.v19i2.35137

Leetun, D. T., Ireland, M. L., Willson, J. D., Ballantyne, B. T., & Davis, I. M. (2004). Core stability measures as risk factors for lower extremity injury in athletes. Medicine and science in sports and exercise, 36(6), 926–934. https://doi.org/10.1249/01.mss.0000128145.75199.c3

Lesmana, G. I., & Nasrulloh, A. (2020). The effectiveness of kinesio tape toward the ability of legs muscle's power of amateur basketball players. Medikora, 19(2), 61-70. https://doi.org/10.21831/medikora.v19i2.34517

Mahrokh Moghadam, A., Zarei, M., & Mohammadi, F. (2018). The effect of core stability training on motor performance of elite goalball players. Studies in Sports Medicine, 10(23), 47-60. https://doi.org/10.22089/smj.2017.3605.1196

McCombes, S. (2019). Sampling Methods Types, Techniques & Examples. from https://www.scribbr.com/methodology/sampling-methods

McGill, S. (2010). Core training: Evidence translating to better performance and injury prevention. Strength & Conditioning Journal, 32(3) DOI: https://doi.org/10.1519/SSC.0b013e3181df4521

Okada, T., Huxel, K. C., & Nesser, T. W. (2011). Relationship between core stability, functional movement, and performance. Journal of strength and conditioning research, 25(1), 252–261. https://doi.org/10.1519/JSC.0b013e3181b22b3e

Paine, R., Johnson, R. (2009). Core Stability - an overview. Retrieved July 22, 2023, from https://www.sciencedirect.com/topics/medicine-anddentistry/corestability#:~:text=Core%20stability%20can%20be%20defined%0as%20the%
20ability%20to%20create,another%20body%20segment%20into%20motion.

Putro, K. H. (2020). Analisis perbedaan kemampuan bank shoot dari sisi kanan dan sisi kiri pada anggota ekstrakurikuler bolabasket putra usia 11-14 tahun di Yogyakarta. MEDIKORA: Jurnal Ilmiah Kesehatan Olahraga, 19(1), 24-32. https://doi.org/10.21831/medikora.v19i1.30918.

Refoyo Roman, I., Sampedro Molinuevo, J., & Sillero Quintana, M. (2009). The relationship between exercise intensity and performance in drills aimed at improving the proficiency, technical and tactical skills of basketball players. RICYDE. Revista Internacional de Ciencias del Deporte, V(14), 1-10. http://www.cafyd.com/REVISTA/01401.pdf

Şahiner, V., & Koca, F. (2021). Investigation of the effect of 8 weeks core training program on free shooting and vertical jump performance in basketball players aged 16-18. European Journal of Physical Education and Sport Science, 7(2). DOI:10.46827/ejpe.v7i2.3882

ISSN: 0216-9940

Sannicandro, I., & Cofano, G. (2017). Core stability training and jump performance in young basketball players. Int J Sci Res, 6(5), 479-82. DOI: 10.21275/ART20173282

Sharrock, C., Cropper, J., Mostad, J., Johnson, M., & Malone, T. (2011). A pilot study of core stability and athletic performance: is there a relationship?. International journal of sports physical therapy, 6(2), 63–74.

Theodorou, A. S., Rizou, H. P., Zacharakis, E., Ktistakis, I., Bekris, E., Panoutsakopoulos, V., Strouzas, P., Bourdas, D. I., & Kostopoulos, N. (2022). Pivot Step Jump: A New Test for Evaluating Jumping Ability in Young Basketball Players. Journal of functional morphology and kinesiology, 7(4), 116. https://doi.org/10.3390/jfmk7040116

Tyshchenko, V., Hnatchuk, Y., Pasichnyk, V., Bubela, O. O., & Semeryak, Z. (2018). Factor analysis of indicators of physical and functional preparation of basketball players. Journal of physical education and sport, 18, 1839-1844. DOI:10.7752/jpes.2018.s4269

Wieler, M. (n.d.). Quadratus Lumborum, the bigger picture. Retrieved July 22, 2023, fromhttps://www.ekhartyoga.com/articles/anatomy/quadratus-lumborumthebigger-picture

Xie, X. (2014, August). Research on Core Strength Training Practice in Basketball Sports. In 2014 2nd International Conference on Education Technology and InformationSystemshttps://www.atlantispress.com/proceedings/icetis-14/13805

Zemková, E., & Zapletalová, L. (2022). The role of neuromuscular control of postural and core stability in functional movement and athlete performance. Frontiers in Physiology, 13, 796097. https://doi.org/10.3389/fphys.2022.796097.

ISSN: 0216-9940