Skill Competency of Badminton Athletes: Basis for Training Design

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Abstract*— The study targeted assessing athletes' badminton skills in terms of strength and conditioning. The researcher utilized the descriptive technique to help answer questions. The respondents to this study are badminton players and coaches from three (3) universities in Urdaneta City. In addition, purposive sampling will be employed for respondents. Coaches and athletes who responded received 3 to 4 years of instruction and 2 to 3 years of training and seminars in badminton. This study looked at how coaches and athletes perceived their efficacy in badminton skill performance across strength components. Both cohorts have strong beliefs in athletes' speed, power, and muscle strength, which is the descriptive equivalent of high agreement between coaches and players. Furthermore, the study found that athletes consistently rated their skill competency in conditioning components as high, including cardiovascular endurance, speed training, muscular strength, and flexibility. Coaches also saw their athletes as particularly effective in these areas. These findings highlighted the significance of focused conditioning training in increasing performance across key facets of badminton.

***Indexed Terms*— Badminton, Coaches, Players, Performance, Skills**

I. INTRODUCTION

Badminton became an Olympic sport in 1992 as a result of greater global participation in the Olympics. It is played by two or four players and has a similar temporal structure to other sports (squash, tennis, and volleyball), with brief repeating motions, high speed, and technical skill on the court, but also tremendous tension. Hidayat, et al (2023) have been focused on the biomechanical properties of badminton. By investigating the effects of footwork and racket techniques on performance, we shed light on the importance of proper biomechanics in optimizing play. Furthermore, playing badminton requires speed, power, agility, flexibility, strength, and technical expertise. In badminton, agility is the ability to move to the oncoming shuttle with proper footwork. Numerous agility performance tests have been developed based on the characteristics of various sports, such as rugby, netball, and football, that stress change-of-direction speed and perceptual/decision-making abilities. Along with all other abilities, service is critical to the outcome of the game. Furthermore, badminton, a sport that combines speed, agility, power, and precision, places a significant physical strain on athletes. In badminton, physical conditioning is just as vital as technical ability for success. Strength and conditioning programs are vital for developing the physical traits required for effective badminton performance. Numerous studies have analyzed badminton players' movements in recent years utilizing kinesiological research approaches, and they have discovered that footwork is an important predictor of a badminton player's athletic performance and a basis for measuring their risk of injury (Ghosh, et al, 2022; Hambali, et al., 2023; and Putra, et al., 2023). According to Ghosh, et al (2022), the lower limbs account for a higher proportion of badminton injuries than other parts of the body. Hidayat, et al (2023) can understand the unpredictability of a player's general trend by examining quantitative data on agile reactions. In addition, a badminton court is divided into two halves, each measuring 6.7 meters long and 6.1 meters broad. The three main movement directions in the forecourt, midcourt, and rear court are left and right. The motions in these six directions, which include the cross-step in the forecourt and backcourt and the lunge in the middle court, influence how one responds to an opponent and executes footwork. Badminton players with faster feet have a better average and maximal pace. Similarly, quick direction changes in badminton motions are required for tournament-winning performances. Lower limb joint loads also had an impact on the athletic performance of badminton players. Studies of Putra, et al (2023) have revealed that poor footwork movements impair the condition of the lower limb joints and lead to injuries. The body compensates for faulty footwork actions involving the lunges by modifying the angle of

the lower limb joints' trunk inclination, reducing shot effectiveness and leading to injuries. Furthermore, the same author (Putra, et al., 2023) stated that to increase muscular strength while appropriately and effectively lowering the link between injury risk and muscle-controlling neurons, neuromuscular theories and research findings have been widely implemented in many types of sports training in recent years. As a consequence, increasing one's footwork and movement is an essential component of badminton training. Badminton has grown in popularity in the Philippines as the number of amateur and professional players has increased. This increase is due to the sport's growing popularity and accessibility. It is vital to understand how strength and conditioning programs may help Filipino badminton players progress as the sport grows. Republic Act No. 10699 of 2015 was enacted to demonstrate the Philippines' commitment to the promotion of sport. Understanding how strength and conditioning might promote badminton skill proficiency in this setting aligns with the country's overall sports development goals. Additionally, Filipino badminton players have unique benefits and challenges. Thus, it becomes essential to optimize training strategies. Opportunities are presented by a sizable pool of young talent, but challenges include limited funding and limited access to state-of-the-art training facilities. Effective strength and conditioning programs suited for the Philippine climate can fill in these deficiencies. Furthermore, the discipline of strength and conditioning is essential for improving athletic performance in a variety of sports, including badminton. The sport of badminton requires a special blend of power, endurance, speed, and agility. It's critical for athletes to comprehend the special requirements for strength and conditioning in badminton, as they always strive to obtain a competitive advantage. The significance of specialized training regimens to meet the complex physical demands of the sport has been highlighted by Asistio, et al (2023). highlight the need for thorough fitness for badminton players to avoid injuries and maintain top performance. Given the physical demands of badminton, the nexus of science and sport is one that is eagerly awaiting investigation. It has the potential to improve training methods and develop the general state of athlete performance. Furthermore, physical fitness—particularly strength and conditioning—is crucial for children's healthy growth and development. According to UNICEF, children's physical, mental, and emotional health improves with physical activity (UNICEF, 2021). It is critical to understand how young athletes' physical fitness and skill level can be improved through badminton strength and conditioning programs. In addition, UNICEF has been a strong advocate for promoting sports and physical exercise among children and teenagers in order to support children's overall development. Physical activity is seen as crucial for children's health, wellbeing, and cognitive development, according to UNICEF (2018). In this sense, sports like badminton can play a major role in helping young people develop their skills and physical condition. This UNICEF-funded study aims to give a thorough understanding of how well-designed strength and conditioning programs may enhance the performance of badminton players and support the overall physical development of young athletes. Additionally, this study explores the critical connection that exists between the development of badminton skill competency in the Philippines and the design of strength and conditioning exercises. It aims to give a thorough understanding of how individualized strength and conditioning programs could improve the performance of Filipino badminton players, thereby contributing to the growth of the sport in the nation, with a focus on the unique context of the Philippines. Further, it seeks to offer significant insights into how strength and conditioning training plans, particularly those customized for the Philippine environment, might enhance badminton skill competency. This is a result of the Philippines' dedication to the growth of sports and the sport's rising popularity there. This promotes badminton nationally and aligns with the objectives of youth empowerment, sports development, and physical fitness promotion, all of which are endorsed by the Philippine government and related organizations.

II. METHODOLOGY

In the study of Belandres (2028), to ascertain goals in the study, aim to achieve, as well as to assist in responding to inquiries and pique the researcher's curiosity. Hence, the researcher employed the descriptive approach. The study's participants include badminton players and coaches from three (3) universities in Urdaneta City, Pangasinan. A weighted mean was used to assess the strength and conditioning skill competency of badminton athletes. The respondents' profile factors on age, number of years playing badminton, number of years coaching badminton, number of relevant prizes obtained, and number of relevant trainings and seminars were analyzed using an analysis of variance (ANOVA) to find any significant differences. Also, a t-test was applied to see whether there was a significant variation in the respondents' sex.

III. RESULTS AND DISCUSSION

Table 1. Level of Skill Competency of Badminton Athletes on Strength Components Along Speed

Speed	ATHLETES		COACH	
	WM	Description	WM	Description
1. The speed training sessions I participated in significantly improved my overall quickness and agility.	3.52	Highly Agree	3.5	Highly Competent
2. I feel more capable of moving swiftly and reacting quickly in various activities after completing the speed training.	3.51	Highly Agree	3.67	Highly Competent
3. The speed-focused drills positively impacted my ability to perform tasks that require quick responses and movements.	3.43	Highly Agree	3.61	Highly Competent
4. The speed training has positively influenced my performance in sports and physical activities.	3.53	Highly Agree	3.50	Highly Competent
5. I believe that improved speed is valuable for my physical activities and overall well-being.	3.57	Highly Agree	3.66	Highly Competent
OVERALL WEIGHTED MEAN	3.51	Highly Agree	3.59	Highly Competent

Legend:

Athletes	Coach
3.50-4.00 Highly Agree	3.50-4.00 Highly Competent
2.50-3.49 Agree	2.50-3.49 Competent
1.50-2.49 Slightly Not Agree	1.50-2.49 Slightly Not Competent
1.00-1.49 Not Agree	1.00-1.49 Not Competent

According to the weighted mean of athletes' assessments of their speed competency, which is 3.51, athletes generally think of themselves as having a high level of speed agreement. Athletes often assessed their performance and speed progress as highly agreeable, with weighted means ranging from 3.43 to 3.57 across the five statements used to judge speed competency. With a rating of 3.51, the aggregate weighted mean for athletes indicates that they think highly of their own speed. Coaches generally view their athletes as very competent in terms of speed, as evidenced by the weighted mean of 3.59 for their assessment of players' speed competency. Similar to players, coaches assigned weighted averages ranging from 3.50 to 3.67 to athletes' speed competency across the five assertions, rating them as extremely competent and agreeable. With a rating of 3.59, the coaches' overall weighted mean indicates that they think their players are quite cooperative when it comes to speed. Overall, the high overall weighted averages and consistent evaluations across all assertions indicate that coaches and athletes alike view athletes' speed competency as extremely competent. Athletes' agility, change of direction ability, and sprinting speed were all greatly increased by speed training interventions, which improved their on-court performance in sports like badminton (Nugroho, et al., 2022). The benefits of speed-focused exercises for athletes' economy and efficiency of movement, which enhance performance overall,

Table 2. Level of Skill Competency of Badminton Athletes on Strength Components Along Power

Power	ATHLETES		COACH	
	WM	Description	WM	Description
1. The power training sessions I participated in significantly improved my overall strength and explosiveness.	3.69	Highly Agree	3.67	Highly Competent
2. I feel more powerful and explosive in my movements after completing the power training.	3.43	Highly Agree	3.17	Highly Competent
3. The power-focused exercises positively impacted my ability to generate force and power in various physical activities.	3.47	Highly Agree	3.50	Highly Competent
4. The power training has positively influenced my performance in sports and activities that require explosive movements.	3.52	Highly Agree	3.17	Highly Competent

5. The power training has positively affected my ability to execute explosive movements in sports events.	3.47	Highly Agree	3.33	Highly Competent
OVERALL WEIGHTED MEAN	3.52	Highly Agree	3.37	Highly Competent

Legend:

Athletes	Coach
3.50-4.00 Highly Agree	3.50-4.00 Highly Competent
2.50-3.49 Agree	2.50-3.49 Competent
1.50-2.49 Slightly Not Agree	1.50-2.49 Slightly Not Competent
1.00-1.49 Not Agree	1.00-1.49 Not Competent

With an overall weighted mean of 3.52, the athletes' scores for each statement range from 3.43 to 3.69, suggesting that they think quite favorably of themselves in terms of power. Athletes stated that power training improved their general strength, explosiveness, and ability to execute explosively in sports and other physical activities. With a weighted average of 3.37 overall, the coaches' scores for each statement range from 3.17 to 3.67, showing that they believe their athletes to be extremely skilled in terms of power. The majority of coaches concurred with the athletes' evaluations, recognizing the benefits of power training for athletes' strength, explosiveness, and performance in sports. In general, power training is viewed as extremely pleasant and effective in improving athletes' strength, explosiveness, and performance in sports requiring explosive movements by both coaches and athletes. As stated by Kaur, et al (2024), lower training is important for athletes, especially badminton players, according to several studies. Quick force generation, explosive movement execution, and enhanced overall athletic performance all depend on power.

Table 3. Level of Skill Competency of Badminton Athleteson Strength Components Along Muscular Strength

Muscular strength	ATHLETES WM	Description	COACH WM	Description
1. The muscular strength training sessions I participated in significantly improved my overall strength.	3.56	Highly Agree	3.67	Highly Competent
2. I feel physically stronger after completing the muscular strength training.	3.61	Highly Agree	3.33	Highly Competent
3. The muscular strength training has positively influenced my performance in sports and activities that require strength.	3.74	Highly Agree	3.00	Highly Competent
4. The muscular strength training has positively affected my ability to endure longer during physical activities.	3.65	Highly Agree	3.50	Highly Competent
5. I feel more confident in my physical strength and ability to handle challenging physical tasks.	3.65	Highly Agree	3.33	Highly Competent
OVERALL WEIGHTED MEAN	3.64	Highly Agree	3.37	Highly Competent

Legend:

Athletes	Coach
3.50-4.00 Highly Agree	3.50-4.00 Highly Competent
2.50-3.49 Agree	2.50-3.49 Competent
1.50-2.49 Slightly Not Agree	1.50-2.49 Slightly Not Competent
1.00-1.49 Not Agree	1.00-1.49 Not Competent

Muscular strength training has been shown to improve athletes' overall strength, endurance, strength-related sports performance, and self-assurance in doing physical tasks (Kaur, et al., 2024). With an overall weighted mean of 3.37 and coaches' ratings ranging from 3.00 to 3.67 for each statement, it is clear that coaches believe their athletes to be extremely skilled in terms of muscular strength. The majority of coaches concurred with the athletes' evaluations, recognizing the benefits of muscular strength training on athletes' general strength, athletic performance, and self-assurance. Muscular strength training is often regarded by athletes and coaches as being very pleasant and effective in improving athletes' strength, endurance, performance, and self-assurance when performing physical tasks. For the purpose of producing force, enhancing movement efficiency, and avoiding accidents, muscular strength is crucial. Interventions including muscular strength training markedly increased athletes' maximal strength, power output, and performance in movements unique to their sport, which improved their on-court performance in badminton and other sports.

Table 4. Level of Skill Competency of Badminton Athletes on Conditioning Components Along Cardiovascular Endurance

Cardiovascular Endurance	ATHLETES		COACH	
	WM	Description	WM	Description
1. The cardiovascular endurance training sessions I participated in significantly improved my overall endurance.	3.78	Highly Agree	3.500	Highly Competent
2. I feel that my stamina has increased after completing the cardiovascular endurance training	3.52	Highly Agree	3.51	Highly Competent
3. The cardiovascular endurance exercises positively impacted my ability to sustain physical activities for longer durations.	3.70	Highly Agree	3.50	Highly Competent
4. The cardiovascular endurance training has positively influenced my performance in sports and activities that require sustained effort.	3.57	Highly Agree	3.33	Highly Competent
5. I feel more confident in my ability to endure longer during physical activities requiring sustained effort.	3.70	Highly Agree	3.17	Highly Competent
OVERALL WEIGHTED MEAN	3.65	Highly Agree	3.40	Highly Competent

Legend:

Athletes	Coach
3.50-4.00 Highly Agree	3.50-4.00 Highly Competent
2.50-3.49 Agree	2.50-3.49 Competent
1.50-2.49 Slightly Not Agree	1.50-2.49 Slightly Not Competent
1.00-1.49 Not Agree	1.00-1.49 Not Competent

With an overall weighted mean of 3.65 and values ranging from 3.52 to 3.78 for each statement, the athletes rate their cardiovascular endurance as extremely agreeable. Cardiovascular endurance training has been shown to improve athletes' overall endurance, stamina, capacity to maintain physical activity, performance in sports requiring prolonged effort, and self-assurance in enduring extended periods of time. With a weighted average of 3.40 overall, the coaches' scores for each statement range from 3.17 to 3.50, showing that they believe their players to be extremely skilled in terms of cardiovascular endurance. In general, coaches concurred with athletes' evaluations, recognizing the beneficial effects of cardiovascular endurance training on athletes' general endurance, stamina, confidence, and performance. Cardiovascular endurance training has been shown to be highly beneficial in improving athletes' endurance, stamina, sports performance, and confidence in their ability to endure extended periods of time, according to both athletes and coaches. Cardiovascular endurance training is crucial for athletes, especially badminton players, according to several studies (Liu, et al., 2020). Cardiovascular endurance is essential for maintaining performance during extended matches, recovering quickly in between rallies, and maintaining high-intensity efforts.

Table 5. Level of Skill Competency of Badminton Athletes on Conditioning Components Along Speed Training

Speed Training	ATHLETES		COACH	
	WM	Description	WM	Description
1. The speed training sessions I participated in significantly improved my overall speed.	3.52	Highly Agree	3.50	Highly Competent
2. I feel more capable of moving swiftly and reacting quickly in various activities after completing the speed training.	3.65	Highly Agree	3.67	Highly Competent
3. The speed-focused drills positively impacted my ability to perform tasks that require quick responses	3.47	Highly Agree	3.51	Highly Competent

and movements.				
4. The speed training has positively influenced my performance in sports and activities that require quick movements.	3.57	Highly Agree	3.50	Highly Competent
5. The speed training has positively affected my ability to compete in sports events that require quick movements.	3.52	Highly Agree	3.33	Highly Competent
OVERALL WEIGHTED MEAN	3.55	Highly Agree	3.50	Highly Competent

Legend:

Athletes	Coach
3.50-4.00 Highly Agree	3.50-4.00 Highly Competent
2.50-3.49 Agree	2.50-3.49 Competent
1.50-2.49 Slightly Not Agree	1.50-2.49 Slightly Not Competent
1.00-1.49 Not Agree	1.00-1.49 Not Competent

The weighted mean (WM) of conditioning competency ratings for badminton players, as assessed by coaches and athletes, with regard to speed training is shown in Table 5. The competency level is described alongside the ratings, with extremely competent and highly agreeable receiving the highest ratings. With an overall weighted mean of 3.55 and ratings ranging from 3.47 to 3.65 for each statement, the athletes believe they are very pleasant coaches when it comes to speed training. The benefits of speed training on an athlete's overall speed, capacity to move rapidly and react, ability to complete tasks quickly, performance in sports demanding quick movements, and ability to compete in sports events requiring quick movements have all been repeatedly observed by athletes. With an overall weighted mean of 3.50 and ratings ranging from 3.33 to 3.67 for each statement, coaches believe their athletes are very skilled in speed training. While acknowledging the beneficial effects of speed training on athletes' overall speed, ability to move quickly and react, ability to complete tasks quickly, performance in sports requiring quick movements, and ability to compete in sports events requiring quick movements, coaches largely agreed with athletes' assessments (Robertson, et al., 2022).

Table 6. Level of Skill Competency of Badminton Athletes on Conditioning Components Along Flexibility

Flexibility	ATHLETES		COACH	
	WM	Description	WM	Description
1. The flexibility training sessions I participated in significantly improved my overall flexibility.	3.57	Highly Agree	3.50	Highly Competent
2. I feel that my range of motion has increased after completing the flexibility training	3.61	Highly Agree	3.49	Highly Competent
3. The flexibility exercises positively impacted my ability to move more freely and comfortably.	3.78	Highly Agree	3.33	Highly Competent
4. The flexibility training has positively influenced my performance in sports and activities that require a wide range of motion.	3.43	Highly Agree	3.34	Highly Competent
5. I believe that improved flexibility is valuable for my physical activities and overall well-being.	3.65	Highly Agree	3.51	Highly Competent
OVERALL WEIGHTED MEAN	3.61	Highly Agree	3.43	Highly Competent

Legend:

Athletes	Coach
3.50-4.00 Highly Agree	3.50-4.00 Highly Competent
2.50-3.49 Agree	2.50-3.49 Competent
1.50-2.49 Slightly Not Agree	1.50-2.49 Slightly Not Competent
1.00-1.49 Not Agree	1.00-1.49 Not Competent

Athletes' weighted mean scores show strong consensus regarding the value of flexibility exercise.

Athletes gave flexibility training an efficacy rating above 3.57 for all claims; the weighted average was 3.61 overall. This shows that flexibility training is highly helpful in helping athletes perform better overall in sports and physical activities, as well as increase their range of motion, comfort level, and flexibility. In a similar vein, coaches evaluated flexibility training as extremely good as well, albeit with slightly lower scores than athletes. Although there was a minor variance from the athletes' point of view, the overall weighted mean for coaches was 3.43, indicating a good assessment. The agreement in evaluations between coaches and athletes' points to a common knowledge of the value and efficacy of flexibility training in improving badminton players' health and game. The little disparity in scores between coaches and athletes, however, can be the result of divergent viewpoints, experiences, or assessments of the usefulness of flexibility exercise.

Table 7. Significant Difference in the Level of Badminton Skill Competency of the Athletes on Strength and Conditioning Across their Profile Variables

Profile of the Respondents	Strength		Conditioning	
COACH	Stat	P-Value	Stat	P-Value
Sex	1.649	0.209	0.067	0.849
Highest Educational Attainment	2.735	0.076	1.268	0.292
Years in Coaching Badminton	2.218	0.121	3.407	0.043
Number of Relevant Trainings and Seminars	1.649	0.209	0.037	0.849
ATHLETES	Strength		Conditioning	
	Stat	P-Value	Stat	P-Value
Age	74.089	0.000*	41.315	0.000*
Sex	16.701	0.003*	27.263	0.000*
Number of Years of Playing Badminton	38.378	0.000*	20.986	0.000*
Number of Relevant Awards Received	10.015	0.000*	7.890	0.001*
Number of Relevant Trainings and Seminars	14.295	0.000*	4.053	0.011*

*Sig.

Table 7 displays the statistically significant variation in the profiles of participants, particularly coaches and athletes, concerning their strength and conditioning attributes. Numerous variables are analyzed, including sex, years of experience, relevant accolades obtained, and attendance at pertinent seminars and trainings. After interpreting and debating the results for coaches and athletes alike, let's examine relevant research on these variables in relation to sports coaching and athletic performance. This demonstrates significant differences between the profiles of coaches and athletes with regard to strength and conditioning attributes, including things like sex, years of experience, relevant awards, and participation in relevant training and seminars. This is consistent with the results of a large body of research in coaching and sports science. Take into account, for example, how important coaching tenure is in determining training strategies and athlete growth. Coaches must pursue ongoing education in order to improve athlete outcomes and stay current with emerging techniques. Furthermore, the observed variations between the sexes are consistent with physiological variances that have been documented. Studies like the ones that were conducted emphasize the need for training approaches that are customized based on physiological responses that are distinct to each gender. Together, these results highlight the complexity of sports coaching and athlete development, emphasizing the need for a tailored strategy based on personal traits and environmental variables.

CONCLUSION

When it pertains to badminton players' ability competence across strength components, coaches and athletes mutually assess the same level of efficacy. Weighted scores between 3.51 and 3.64 show how confident athletes are in their abilities to move quickly, exert force, and build muscle. The weighted averages of their players, which range from 3.37 to 3.59, also give coaches confidence in their effectiveness. These findings are consistent with earlier studies that demonstrate the positive impacts of targeted training interventions on athletes' performance in skills unique to badminton. Lin, et al (2020) emphasize the importance of speed, power, and muscle strength to enhance on-court performance, agility, and endurance. The analysis reveals significant differences in the badminton skill proficiency of the athletes and coaches in terms of strength and conditioning across many profile parameters. Years of coaching show a significant relationship with conditioning, suggesting that various tactics are used depending on expertise. An athlete's level of strength and fitness is highly connected with age, gender, years of sports experience, relevant awards won, and participation at relevant workshops and seminars (Dieu, et al., 2022).

These findings support earlier studies and highlight the importance of individualized training programs based on personal characteristics. In order to adapt to evolving techniques, coaches require continuous education, and athletes require customized programs to fulfill their specific needs and reach their full potential.

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