**Original Article**

# VALIDADE DE CRITÉRIO DA ESCALA DE AUTOAVALIAÇÃO DO SAQUE DO VOLEIBOL: RELAÇÃO ENTRE EFICÁCIA, EFETIVIDADE E AUTOAVALIAÇÃO DO SAQUE DE ATLETAS BRASILEIRAS INFANTIS

## CRITERION VALIDITY OF A VOLLEYBALL SERVE-SPECIFIC CORE SELF-EVALUATIONS SCALE: RELATIONSHIP BETWEEN SERVE EFFICACY, EFFECTIVENESS AND SELF-ASSESSMENT IN INFANT FEMALE BRAZILIAN ATHLETES

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**RESUMO**

O objetivo deste estudo foi relacionar a auto avaliação do saque, efetividade e eficácia deste fundamento. Participaram do estudo duas equipes femininas de voleibol da categoria infantil, com média de idade 14,63 ± 0,5 anos e tempo de prática 4,92 ± 1,87 anos. Aplicou-se a Escala de Auto avaliação do Saque no Voleibol e realizado escalte técnico do saque. Os resultados apontaram diferenças na efetividade da Equipe "A" (37,26 ± 19,38) e Equipe "B" (53,89 ± 14,18) (p=0,02) e eficácia da Equipe "A" (91,50 ± 5,51) e Equipe "B" (96,21 ± 4,46) (p=0,02). Na auto avaliação houve diferença entre a Equipe "A" 45,20 ± 5,11 e a Equipe "B" 41,78 ± 3,19 (p=0,05). Houve correlação moderada (r= 0,65 p=0,00) entre a auto avaliação e o tempo de prática de ambas as equipes. Conclui-se que a equipe que conquistou a melhor colocação foi a que se apresentou mais efetiva e eficaz na execução do saque.

**Palavras-chave**: Voleibol. Efetividade. Eficácia.

**ABSTRACT**

The aim of this study was to evaluate the relationship between self-assessment of volleyball serves and the effectiveness and efficacy of this skill. Two female volleyball teams of the infant category, with a mean age of 14.63 ± 0.5 years and a playing experience of 4.92 ± 1.87 years, participated in the study. A Volleyball Serve-Specific Self-Assessment Scale was applied and technical scout of the serve was performed. The results showed differences in effectiveness between team A (37.26 ± 19.38) and team B (53.89 ± 14.18) (p = 0.02) and in efficacy between team A (91 50 ± 5.51) and team B (96.21 ± 4.46) (p = 0.02). There was also a difference in self-assessment between team A (45.20 ± 5.11) and team B (41.78 ± 3.19) (p = 0.05). A moderate correlation (r = 0.65, p = 0.00) was observed between self-assessment and years of practice in both teams. In conclusion, the team that won first place was more effective and efficacious in executing the serve.

**Keywords:** Volleyball. Effectiveness. Efficacy.

## Introduction

Since its creation in 1895, volleyball has undergone several changes due mainly to the standardization of the rules established by the Fédération Internationale de Volleyball (International Volleyball Federation)[1]. These changes have altered the structure of the sports in order to obtain a better balance between defense and attack and to provide a more modern game to be transmitted by telecommunication media[2]. Technical proficiency began to have more influence on the result obtained since technical errors are regularly punished. In this respect, the diagnosis of the causes of errors made in the execution of motor skills is of the utmost importance for the application of techniques[3]. The changes in the rule and scoring systems has also reduced the time the ball remains in the game, provoking actions and disputes over ball possession of maximum intensity and speed in order to overcome the

opposing team[4]. As a consequence, one skill in particular, the serve, has become a powerful weapon of attack and, at the same time, of defense in both male and female teams. As an offensive action when a point is scored or the opponent's reception is impaired, and as a defensive action when the opposing team is hindered to organize a perfect attack[5]. Thus, improving the serve is intended to prevent the opposing team from executing perfect receptions and, consequently, to perform a larger number of plays and attacks with passes[5].

The serve is defined as the action of putting the ball into play, i.e., the starting point of the game. It is a closed motor skill and its execution is under the domain of the athlete[6]. Under these conditions, the decision-making about the execution of the action should be made in advance so that the player can execute this action as programmed without contextual interferences. Thus, good serve performance depends on the athlete's ability to make effective decisions in order to maintain control of the action[7].

When the athlete has refined technical, physical, tactical and psychological conditions, his actual performance can be predicted by his capacity to solve problems that arise throughout a game[8]. Possible variations in the serve performance of athletes during games are often due to cognitive fluctuations, which is not only associated with changes in the level of motor skills and physiological or mechanical performance capacity, but also with the athlete's mental control, influencing the equilibrium of his performance[9,10]. A possible explanation for this fluctuation in an athlete's performance is the fact that his behavior is influenced by thought-feeling-action during sports practice. When a problem of cognitive or emotional nature occurs, the athlete finds it difficult to work with emotions that surround him during competitions[11].

Thus, the athlete's belief to perform accomplish courses of actions necessary to successfully achieve a specific sports activity is directly related to cognitive, motivational and emotional processes, which are important indicators of future action[12]. In addition to exerting an important influence on how individuals act and behave, as well as on the regulation of their patterns of thought and emotional reactions that they experience in situations of realization, beliefs determine the effort and future persistence of an individual against barriers in the pursuit of better performance and of a given objective[13]. In this respect, positive self-assessment increases the willingness and motivation of an individual, resulting in a performance that manifests in the best possible expression of one's skills[14].

However, self-assessment should be consistent with objective performance data (efficacy and effectiveness) since an unrealistic self-assessment can compromise the preparation of the athlete and, consequently, the improvement of his performance[15]. The efficacy of an action corresponds to the success of the result obtained through the execution of the fundamental skills of the game and is related to the achievement of the result according to the proposals of the action[3]. On the other hand, effectiveness can be understood as the quality of actions that permit to achieve the intended objective[16] and that can be evaluated by technical scouting considering the most successful actions executed by the athletes during serving.

Considering the importance of the above considerations, the objectives of the present study were to analyze the relationship between self-assessment of volleyball serves and the result of technical scouting of serves of two infant female volleyball teams during a national competition, to correlate serve self-assessment with years of practice, and to compare the years of practice between teams.

## Methods

*Sample*

Twenty-six female athletes of the infant category, with a mean age of 14.63 ± 0.5 years and a playing experience of 4.92 ± 1.87 years, who had competed in the 11th Paraná Volleyball Cup, an annual competition held in the city of Curitiba, PR in which the best teams from the Brazilian base categories compete, participated in the study. In that year (2012), 18 teams participated in this category. Of the two teams participating in this study, one reached 7th position and the other became champion of this edition of the competition.

*Procedures*

For this study, we contacted the Paraná Volleyball Federation and subsequently the organizer of the Paraná Volleyball Cup and coaches of the participating teams, who authorized the data collection by signing the free informed consent form. The study was approved by the Ethics Committee of Universidade Federal do Paraná, Setor de Ciências da Saúde, Hospital de Clinicas (HCUFPR) (Protocol 01309012.7.0000.0096).

A Volleyball Serve-Specific Core Self-Evaluations Scale was applied to the athletes at the hotel where the teams were staying, minutes before the players were transported to the site of the first game of the competition, by informed consent term. The serve scouts were obtained by two researchers experienced in volleyball, who were sitting at a strategic site on the stand (on the side of the court) for observation and scouting of all games in which the two teams participated.

*Instruments*
*Volleyball Serve-Specific Core Self-Evaluations Scale*
The "Escala de Autoavaliação do Saque do Voleibol", translated and validated for the Portuguese language by Machado[14] from the English version (Volleyball Serve-Specific Core Self-Evaluations Scale) developed by Shoenfelt and Griffith[17], was used for serve self-assessment. This instrument shows good psychometric properties, including adequate internal consistency with an overall Cronbach alpha value and per item of 0.87. Evaluation of the stability of the scale demonstrated an intraclass coefficient of 0.95, kappa index of 0.93 and Pearson's correlation coefficient of 0.96, values considered to be excellent for reliability.
The scale consists of 12 questions regarding self-esteem, locus of control, neuroticism and generalized self-efficacy, which are rated on a 5-point Likert-type scale from 1 to 5 (1 = strongly disagree and 5 = strongly agree). There are positive and negative indicators, reversed scoring of paired items is necessary. A single score is obtained by summing the points of each item, with a minimum of 12 and maximum of 60[14]. The higher the score obtained, the better the self-assessment of the athletes regarding the execution of this action.

*Technical Scout of Serve*

For technical scouting of the serve in the present study, content validation of this instrument for technical evaluation of serving was performed according to the procedures proposed by Cassepp-Borges et al.[18] for content validation. For this purpose, the technical scout was sent to 10 volleyball experts who evaluated each of the 4 items comprising the scout (point of service, serve that difficult the opponent's reception, serve that did not difficult the opponent's reception, and service error), considering the clarity of language (if the language and terms are in accordance with the indicator), practical pertinence (if what the instrument proposed to evaluate has importance), and theoretical relevance (level of association between theory and the indicator). The evaluators answered the questions on a 5-point Likert-type scale, where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor

disagree, 4 = agree, and 5 = strongly agree. For items rated less than 3, suggestions for changes were requested[18]. The mean corrected content validity coefficients found were 0.82 for clarity of language, 0.87 for practical pertinence, and 0.86 for theoretical relevance, with a mean overall content validity of 0.85, suggesting that the instrument is valid and applicable.

*Efficacy and Effectiveness*

For the calculation of serve efficacy and effectiveness, the technical scouting data obtained for each athlete and team were entered into an Excel spreadsheet (2013) and the formulas proposed by the Technical Committee of the two-time beach volleyball Olympic gold medalist during their preparation for that competition were applied.

$$Efficacy = Score\ obtained\ x\ 100 \div Total\ actions$$

*Effectiveness = (3 x Total score 3) + (2 x Total Score 2) + (1 x Total score 1) - Total errors x 100 ÷ 3 x Total actions,*

where score obtained = the sum of all serves that result in a point, serves that impaired the opponent's reception, and serves that did not impair the opponent's reception; total actions = total number of serves executed; total score 3 = total number of serves scoring a point; total score 2 = total number of serves that impaired the opponent's reception; total score 1 = total number of serves that did not impair the opponent's reception; total errors = total number of service errors multiplied by 100 and divided by the total number of serves executed.

*Statistical analysis*

The data were analyzed with the SPSS 17.0 program, adopting a level of significance of $p<0.05$. The independent *t*-test was used to compare serve self-assessment between the two teams. Non-normally distributed data were analyzed using the nonparametric Mann-Whitney test. Spearman's correlation test was used to evaluate whether self-assessment by the athletes was correlated with efficacy, effectiveness and years of practice.

**Results**

The analyses of the scout, reported as the results of efficacy and effectiveness of each team, are shown below. It should be noted that team A finished in 7th place, participating in seven games, with the last being won by W.O. This team finished the competition with 4 wins and 3 losses, while team B became champion of the competition, participating in eight games and finishing the tournament undefeated with 8 wins.

Team A executed 276 serve actions, with an efficacy of 91.67% and effectiveness of 49.31%. Team B executed 473 serve actions, with an efficacy of 94.5% and effectiveness of 52.82%.
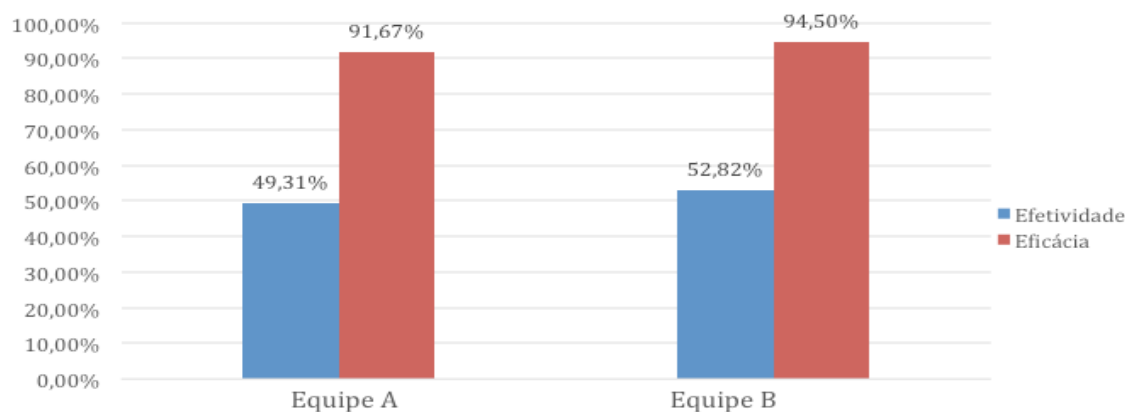
**Figure 1.** Relative frequency of the service result (efficacy and effectiveness) obtained by each team throughout the competition.
Source: The authors.

Dividing the total number of actions by the four items evaluated by the scout, point of service (SP), serve that impaired the opponent's reception (SD), serve that did not impair the opponent's reception (SF) and service error (SE), the percentages were SP = 11.59%, SD = 36.23%, SF = 43.84 and SE = 8.64% for team A, and SP = 11.42%, SD = 42.28, SF = 40.8% and SE = 5.49% for team B.



**Figure 2.** Percentage obtained for each type of serve executed by teams A and B.
Source: The authors.

Analysis of the self-assessment of the two teams revealed a significant difference ($p=0.05$) between teams A and B, with a mean of $45.20 \pm 5.11$ and $41.78 \pm 3.19$, respectively.

Comparison of serve effectiveness between the two teams showed a significant difference ($p=0.02$), with team B being more effective than team A.

There was also a significant difference ($p=0.02$) in serve efficacy between teams, with team B being more efficacious.

**Table 1.** Results of the *t*-test for self-assessment, effectiveness and efficacy

| Item | *t* | *Mσ* | *p* |
|---|---|---|---|
| Self-assessment | 1.72 | | 0.05* |
| Team A | | 45.20 ± 5.11 | |
| Team B | | 41.78 ± 3.19 | |
| Effectiveness | -2.11 | | 0.02* |
| Team A | | 37.26 ± 19.38 | |
| Team B | | 53.89 ± 14.18 | |
| Efficacy | -2.03 | | 0.02* |
| Team A | | 91.50 ± 5.51 | |
| Team B | | 96.21 ± 4.46 | |

* Statistically significant difference; Mσ = mean.
Source: The authors.

Nonparametric statistics was used to compare the years of practice between teams since the data were not normally distributed. No significant difference was observed between teams ($p$=0.31 and z=-1.06).

No correlation was found between serve self-assessment and effectiveness or between self-assessment and efficacy. On the other hand, a moderate correlation was detected between self-assessment and years of practice (r=0.65 and $p$=0.00).

**Discussion**

The objectives of the present study were to analyze the correlation between self-assessment, efficacy and effectiveness in executing the serve, to compare the years of practice between two infant female volleyball teams, and to correlate serve self-assessment with years of practice.

The hypothesis of this study was that the team showing the best serve self-assessment would finish in a better position in the competition and would be more effective and efficacious in this action. The results found did not confirm this hypothesis since team A showed better serve self-assessment than team B, but was not the most efficacious or effective in executing this action. These findings may be explained by the fact that athletes could underestimate their serve performance when answering questionnaires or assessment scales[19], which may have occurred in the infant female category evaluated in the present study. Another possible reason is that serving is an important skill for scoring points, since its objective is no longer only to put the ball into play, but also to impair the opponent's reception, reducing the possibility of attack and of obtaining a direct point[5], as indicated in the study of Katsikadelli[20]. This author demonstrated the influence of the serve on reception and on the option of setting, with jump float serves causing a significantly larger number of poor receptions than floaters. Although our study did not evaluate the type of serve (jump float serve, floater serve, serve stagnant) but rather the consequence of this action, a relationship could be noted between the difficulty imposed by the serve and the attack roll.

A result similar to that of the present study has been reported by Beattie[21] who investigated possible negative effects of self-efficacy on the performance of golf players and concluded that the reciprocal relationship between self-efficacy and performance is not as strong as previously thought. In contrast, Ortega[22], analyzing the relationship between the level of self-efficacy and several performance indicators, obtained different results, with players with high levels of self-efficacy showing higher values of the different performance variables than players with low levels of self-efficacy.

On the other hand, significant differences were observed when serve efficacy was compared between the two teams, i.e., team B was more efficacious since it executed a larger number of service points and especially a larger number of serves that impaired the opponent's reception. These data agree with the results reported by Arias et al.[7], who analyzed volleyball serves in the categories of formation and found a higher percentage of serves that impaired the construction of the opponent's attack, not permitting first-try attacks. The large number of serves executed by team B (473 actions) compared to team A (276 actions) should be highlighted. This number may explain in part the results obtained in the present study since team B competed in one more match until reaching the final.

Comparison of serve effectiveness between the two teams showed that team B was more effective since it made fewer errors, i.e., the team executed fewer serves that culminated in a point for the opposing team (service error). In addition, although it was not the one that showed the best self-assessment, this team (the winner of the competition) obtained the best results in terms of serve effectiveness and efficacy.

The moderate correlation found between self-assessment and years of practice may be explained based on the study of Porath et al.[23], which analyzed the technical-tactical performance of volleyball players (categories of formation level) and compared it with the level of experience in the modality. The authors concluded that more experienced athletes had better technical-tactical performance in the modality.

## Conclusion

The results of the present study demonstrate that team B, which finished first place, was more effective and more efficacious in executing the serve. When self-assessment was compared between teams, the team finishing in 7th position showed better self-assessment than the winning team, indicating that self-assessment may not always be a good predictor of performance.

It is suggested that volleyball coaches attribute greater importance to serving during the process of teaching-learning since this action has been shown to be a skill of major relevance during games. Further studies evaluating the association of self-assessment with effectiveness and efficacy and the type of serve executed in different categories and in male athletes should be conducted.

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