

Disordered eating behaviors in young volleyball players: can be the coach's leadership style an intervenient factor?

Comportamentos de risco para os transtornos alimentares em jovens atletas de voleibol: o estilo de liderança do treinador é um fator interveniente?

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Abstract – The aim of this study was to analyze the influence of coach's leadership style on eating disorders (ED) in female volleyball athletes. This is a prospective study with 73 participants of sub-17 state of Pernambuco Championship. The *Eating Attitudes Test* was applied to evaluate ED. The perception of the coach's leadership style was evaluated with Leader Sport Scale subscales. Triceps and subscapular skinfolds were measured to estimate body fat percentage. The findings showed no influence of "Training-Instruction" on ED ($F_{(3,70)}=45.02$; $R^2=0.12$; $p=0.34$). The "Social Support" subscale showed statically significant influence on ED ($F_{(4,69)}=59.77$; $R^2=0.16$; $p=0.02$). However, the results indicated no statically significant relationship of "Reforce" subscale with ED ($F_{(5,68)}=52.40$; $R^2=0.13$; $p=0.17$). The "Democratic" subscale so showed no influence on ED ($F_{(6,67)}=49.08$; $R^2=0.10$; $p=0.21$). Finally, the "Autocratic" subscale showed influence on ED ($F_{(7,66)}=67.23$; $R^2=0.18$; $p=0.01$). We concluded that the coach's leadership style (social support and autocratic) influenced the adoption of DEB in young female volleyball athletes.

Key words: Athletes; Eating Disorders; Sport Psychology.

Resumo – O objetivo da investigação foi analisar a influência do estilo de liderança do treinador sobre os comportamentos de risco para os transtornos alimentares (CRTA) em atletas de voleibol do sexo feminino. Trata-se de uma investigação com delineamento prospectivo (follow-up de 3 meses) desenvolvida com 73 atletas participantes do campeonato Pernambucano da categoria sub-17. Para avaliar os CRTA foi aplicado o *Eating Attitudes Test*. A fim de se avaliar a percepção do estilo de liderança do treinador, foram utilizadas as subsescalas da versão percepção-atleta da Escala de Liderança no Desporto. Foram aferidas as dobras cutâneas tricéptal e subescapular para a estimativa do percentual de gordura corporal. Os achados não revelaram influência da subsescala "Treino-Instrução" sobre os CRTA ($F_{(3,70)}=45,02$; $R^2=0,12$; $p=0,34$). A subsescala "Suporte Social" demonstrou influência estatisticamente significativa nos CRTA ($F_{(4,69)}=59,77$; $R^2=0,16$; $p=0,02$). Todavia, os resultados não indicaram relação estatisticamente significativa da subsescala "Reforço" com os CRTA ($F_{(5,68)}=52,40$; $R^2=0,13$; $p=0,17$). Do mesmo modo, a subsescala "Democrático" também não demonstrou influência sobre os CRTA ($F_{(6,67)}=49,08$; $R^2=0,10$; $p=0,21$). Por fim, a subsescala "Autocrático" apontou influência sobre os CRTA ($F_{(7,66)}=67,23$; $R^2=0,18$; $p=0,01$). Concluiu-se que o estilo de liderança do treinador (suporte social e autocrático) influenciou na adoção de CRTA em jovens atletas de voleibol do sexo feminino.

Palavras-chave: Atletas; Psicologia do Esporte; Transtornos Alimentares.

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Received: 06 June 2016
Accepted: 20 February 2017



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INTRODUCTION

Long-term dietary restriction, vomiting self-induction, use of laxatives / diuretics / appetite suppressants, and strenuous exercise for the purpose of “burning calories” are considered disordered eating behaviors (DEB)¹. Studies have indicated that approximately 25% of female athletes adopt DEB²⁻⁴. According to Chapman and Woodman⁵, the pressure for maximizing sport performance and uniforms that emphasize body shape are the main explanations for triggering DEB in athletes.

In addition, according to Fortes et al.⁶, body fat and body dissatisfaction related to leanness are also related to the adoption of DEB in female athletes. It seems that athletes who wish to be thin or feel their body mass above ideal for their sporting modality usually adopt DEB as a strategy to reduce body mass⁷. It is noteworthy that one of the peculiarities of the sports area that can increase the magnitude of body dissatisfaction related to thinness is the uniform emphasizing body shape⁸, for example, in volleyball.

It is important to emphasize that in volleyball, both in training as in official games, coaches position themselves next to their athletes. Therefore, the coach's leadership style influences athletes' behavior and, according to the multi-dimensional model of sports leadership⁹, this influence is reciprocal. According to this model⁹, some factors may interfere with the environment and performance of a team, such as the coach's leadership style, since a sports leader can support athletes by providing strategies, resources or simply determining the obligations of each athlete to achieve team goals.

Sports leadership refers to the ability to influence athletes to work together to achieve goals and objectives in a harmonious way¹⁰. Coaches are responsible for the functioning of aspects associated with the team, for example, the behavior of athletes, which is why their decisions and actions can have a great influence¹¹. It is important to emphasize that the personality traits of each athlete (perfectionism and neurotism), the developmental age (childhood, adolescence and adulthood) and some social aspects (family and friends) can also influence the behaviors presented by athletes⁹. However, considering the coach's leadership style, it seems that this may influence the adoption of DEB by athletes^{7,12}. More specifically, Bratland-Sanda and Sundgot-Borgen⁷, Fortes et al.¹² and McArdle et al.¹³ emphasize that lack of social support and the coach's autocratic style can trigger unhealthy feelings and behaviors in athletes, for example DEB. On the other hand, according to other authors¹⁴⁻¹⁵, the coach's democratic behavior can have a positive influence against the triggering of DEB. However, it is noteworthy that although there are hypotheses regarding the influence of the coach's leadership style on the adoption of DEB by athletes, to the best of our knowledge, no scientific research on this topic has been carried out to date.

From the practical point of view, this type of investigation will be able to determine the influence of the coach's leadership style on the adoption of DEB. It should be noted that DEB is considered to be central to the

etiology of eating disorders¹⁶. In this sense, once the coaches' leadership styles that predict the adoption of DEB by young female volleyball players have been identified, prevention programs (lectures, conversations and / or informational material) can be implemented in volleyball teams with the premise of reducing the frequency coaches use leadership styles that are related to the triggering of DEB in their athletes, according to Stewart et al.¹⁴. Therefore, the findings may be extremely important for female volleyball coaches. According to the above, the aim of this investigation was to analyze the prediction of the coach's leadership style on DEB of female volleyball athletes.

Therefore, some hypotheses have been formulated according to the considerations of some researchers^{7, 12-15}: a) social support and democratic behavior have a protective influence against the triggering of DEB; b) autocratic behavior influences the adoption of DEB and; c) positive reinforcement and coach's technical-tactical instructions do not explain the adoption of DEB in female volleyball players.

METHODOLOGICAL PROCEDURES

Participants

This is a prospective design study (3-month follow-up) developed with female volleyball players. The sample was selected for convenience, being composed of 82 volunteers aged 15-17 years (15.94 ± 1.06 years) participants of the state of Pernambuco Volleyball championship of the u-17 category. Volleyball players trained on average 2 hours a day, five times a week. To be included in the survey, athletes should: a) have been a volleyball athlete for at least two years; b) systematically train volleyball for at least 6 hours per week; c) be enrolled in the state championship, organized by the Pernambuco Volleyball Federation and; d) be willing to answer questionnaires and participate in anthropometric assessments.

However, 9 athletes were excluded because they did not present any of the questionnaires fully answered or did not participate in the second evaluation (3-month follow-up). Therefore, the investigation had a final sample of 73 volleyball athletes.

After receiving information on the procedures to which they would be submitted, participants signed the informed consent form. Those responsible for athletes signed the informed consent form (TCLE), agreeing with the methodological procedures of the investigation. The procedures adopted in this study complied with the norms of Resolution 466/12 of the National Health Council for research on human beings. The project was approved by the Ethics Research Committee on Human Beings of the Federal University of Pernambuco (CAE - 46978515.6.0000.5208).

Measures

To evaluate DEB, the Eating Attitudes Test¹⁷ (EAT-26), validated for the Portuguese language by Bighetti et al.¹⁸, was applied. The questionnaire

consists of 26 questions distributed in three subscales: 1) diet - refers to the pathological refusal to food with high caloric content and concern with physical appearance; 2) bulimia and concern with food - refers to episodes of binge eating, followed by purgative behaviors for loss / control of body weight and; 3) oral self-control - reflects self-control in relation to food and evaluates the environmental and social forces that stimulate food intake. In each EAT-26 item, volunteers have six response options ranging from 0 (seldom, never and never) to 3 (always). The only question that presents score in the reverse order is 25. The EAT-26 score is made by adding up its items. The higher the score, the greater the risk for eating disorders. It is also possible to classify respondents as to the risk for eating disorders, that is, scores equal to or greater than 21 in the EAT-26 indicate risk for eating disorders. In the validation study, Bighetti et al.¹⁵ indicated internal consistency of 0.82. For the present sample, the internal consistency values were 0.87 and 0.89 (3-month follow-up), as assessed by Cronbach's alpha.

The Body Shape Questionnaire¹⁹ (BSQ), in its version validated for the Brazilian young population²⁰, was used to evaluate body dissatisfaction related to thinness. The instrument has good internal consistency (Cronbach's alpha [α] = 0.96). For the sample of the present study, α value equivalent to 0.96 was identified, demonstrating good consistency of the instrument. The self-report questionnaire is one-dimensional and consists of 34 questions on a Likert scale (1 = never 6 = always) related to weight and physical appearance, specifically concern about the amount of body fat. The subject indicates how often, in the last four weeks, experienced the events proposed by the alternatives and the final score is given by the total sum of items. The higher the score, the greater the body dissatisfaction related to thinness.

In order to evaluate the perception of the coach's leadership style, the perception-athlete version of the Sports Leadership Scale²¹ (SLS), adapted and validated for the Portuguese language by Serpa et al.²², was used. This instrument consists of 40 items that describe each type of behavior of the sports leader, which are grouped into five dimensions: Training-Instruction, Social Support, Reinforcement, Democratic and Autocratic. The items are answered on a 5-point likert scale ranging from "never" (1) to "always" (5). Higher scores mean higher values in each of the dimensions. Cronbach's alpha for SLS was $\alpha = 0.77$ in the validation of Serpa et al.²². For the present sample, internal consistency value of 0.79 was found, as assessed by Cronbach's alpha.

Body density was determined by the skinfold thickness technique using Lange © calipers (USA). Tricipital and subscapular skinfolds were used, adopting the protocol of Slaughter et al.²³, which takes into account ethnicity (white or black) and maturation stage according to chronological age (pre-pubertal - 7 to 10 years; pubertal - 11 to 12 years and post-pubertal - 13 to 17 years). In this sense, ethnicity was determined through self-assessment. The International Society for Advancement for Kineanthropometry²⁴ standards were used to measure skinfolds. Body fat percentage (BF%) was determined using the Siri equation²⁵.

Procedures

The researchers contacted four coaches of volleyball teams linked to the Volleyball Federation of Pernambuco. The procedures, as well as the aims of the study were duly explained and authorization was requested to collect data at the training sites of teams.

Therefore, a meeting was held with volleyball athletes in order to clarify all the ethical procedures of the investigation. At that meeting, the Free and Informed Consent Term was delivered to coaches to authorize the participation of their athletes. All athletes signed the consent term agreeing to their voluntary participation in the investigation.

Data collection was performed in two different moments (Figure 1) at the training site. At the first meeting, held on August 2015, athletes answered the BSQ and SLS questionnaires and then participated in the measurements of skinfolds. At the second meeting, held on November 2015, considering the 3-month follow-up, as recommended by researchers from the DEB area^{4,12}, athletes answered the EAT-26 questionnaire. It is noteworthy that only the EAT-26 was filled in the second meeting due to the prospective design, following recommendations from the scientific literature⁴. In this sense, only the dependent variable was reevaluated after the 3-month period, according to Figure 1. All athletes received the same verbal guidance and any doubts were clarified. Written guidelines were also included in the questionnaires on their completion. Only one evaluator, considered experienced in this type of evaluation, was responsible for the application of questionnaires. Completion of questionnaires was individually performed before the training session in a private room. Athletes took on average 20 minutes to complete the questionnaires.

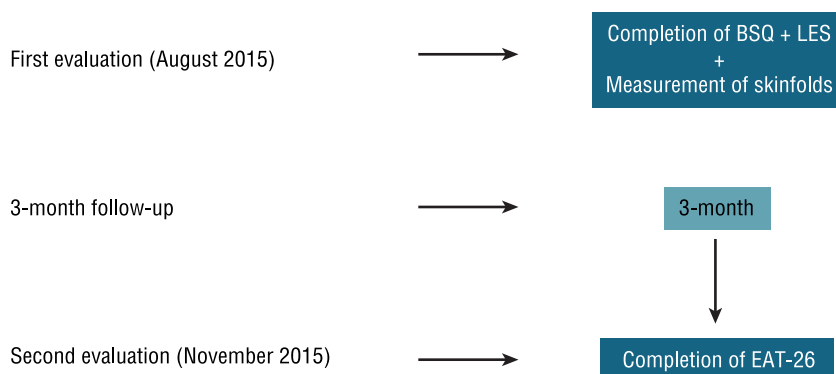


Figure 1. Research design.

Data analysis

The Levene test was used to test the homocedasticity, whereas data sphericity was verified by the Mauchly test. When this last assumption was violated, the Greenhouse-Geisser correction was adopted. The Kolmogorov-Smirnov test was conducted to analyze data distribution. Due to the non-parametric violation, central tendency (mean) and dispersion (standard deviation and standard error) measures were used in order to describe the study variables: EAT-26, BSQ, SLS, BF%, age and training regime

(weekly training frequency x hours of daily training). Hierarchical linear regression was used to evaluate the influence of the coach's leadership style (SLS subscales) on DEB (EAT-26 score), inserting age, BF%, and BSQ score in blocks 1, 2, and 3, respectively, with the premise of removing the effect of age, BF%, and body dissatisfaction in DEB. Hierarchical regression was chosen to analyze data because it was used in confirmatory studies. This type of analysis seeks to explain the relationship between variables described in a set of empirical propositions, but as already pointed out, it still lacks validation. In this case, the order of input of predictors in the regression equation is defined by the researcher, whose decision is based on other related studies. Finally, all data were processed in the SPSS 21.0 software, adopting significance level of 5%.

RESULTS

Descriptive data [EAT-26, BSQ, SLS, BF%, age and training regime (weekly training frequency x hours of daily training)] can be seen in Table 1. The results indicated mean of $15.94 \pm 1,06$ years and 10.32 ± 2.09 for age and BF%, respectively.

The research findings showed that 25% of athletes showed risk for the onset of ED according to the EAT-26 scores (≥ 21).

Table 1. Descriptive values (mean / standard deviation) of the study variables

Variables	Mean	Standard Deviation
EAT-26	13.23	5.95
BSQ	74.65	21.50
SLS	128.95	36.17
BF%	20.78	6.11
Age (years)	15.94	1.06
Training regime (hours)	10.32	2.09

EAT-26 = Eating Attitudes Test; BSQ = Body Shape Questionnaire; SLS = Scale of Leadership in Sport; BF% = body fat percentage.

The hierarchical regression model can be observed in Table 2. The findings did not reveal age influence on DEB ($F_{(1,72)} = 2.46$, Wilks' Lambda = 0.42, $R^2 = 0.01$, $p = 0.27$). The results indicated a significant influence of BF% ($F_{(2,72)} = 21.75$, Wilks' Lambda = 0.84, $R^2 = 0.08$, $p = 0.001$) inserted in block 2, on DEB. The magnitude of the relationship in block 3 was increased when BSQ was inserted into the model ($F_{(3,71)} = 61.05$, Wilks' Lambda = 0.93, $R^2 = 0.31$, $p = 0.001$). In contrast, "Training-Instruction" subscale inserted into block 4 showed no influence on DEB ($F_{(4,70)} = 45.02$, Wilks' Lambda = 0.56, $R^2 = 0.12$, $p = 0.34$). Therefore, "Social Support" subscale showed a statistically significant influence on DEB ($F_{(5,69)} = 59.77$, Wilks' Lambda = 0.71, $R^2 = -0.16$, $p = 0.02$). However, in block 6, when "Reinforcement" subscale was inserted, the model did not indicate a statistically significant relationship with DEB ($F_{(6,68)} = 52.40$, Wilks' Lambda =

0.64, $R^2 = 0.13$; $p = 0.17$). Similarly, the “Democratic” subscale, inserted into block 7, also showed no influence on DEB ($F_{(7, 67)} = 49.08$, Wilks’ Lambda = 0.55, $R^2 = 0.10$, $p = 0.21$). Finally, the “Autocratic” subscale showed an increase in the magnitude of the influence on DEB ($F_{(8, 66)} = 67.23$; Wilks’ Lambda = 0.73; $R^2 = 0.18$; $p = 0.01$).

Table 2. Hierarchical linear regression analyzing the influence of the coach’s leadership style on the DEB variance of volleyball athletes

Variable	Block	B	R	R ²	R ² *	p-value
Age	1	0.07	0.08	0.01	0.01	0.27
BF%	2	0.12	0.28	0.08	0.07	0.001
BSQ	3	0.19	0.56	0.31	0.30	0.001
Training-Instruction	4	0.15	0.34	0.12	0.10	0.34
Social Support	5	0.18	-0.40	-0.16	-0.15	0.02
Reinforcement	6	0.16	0.36	0.13	0.11	0.17
Democratic	7	0.14	0.31	0.10	0.08	0.21
Autocratic	8	0.19	0.42	0.18	0.17	0.01

BF% = body fat percentage; BSQ = Body Shape Questionnaire; R² * = R² adjusted.

DISCUSSION

The aim of the present investigation was to analyze the prediction of the coach’s leadership style on the DEB of female volleyball athletes. This is an investigation with an unprecedented theme in the scientific literature. Overall, the results showed that social support and autocratic style influenced the DEB of young female volleyball players, partially confirming the hypotheses of the present investigation.

It should be emphasized that in volleyball, pressures from the coach to optimize performance can be even greater when compared to other sports, considering the proximity of coach from athletes during matches and training. According to Chellandurai⁹, the greater the proximity of coach from athletes during training and competitions, the greater his influence on the behavior of athletes. Considering the multifactorial nature of the DEB in sports¹², perhaps the coach’s leadership style may explain part of its etiology.

The findings indicated that ¼ of athletes showed risks for the onset of eating disorders, corroborating other studies^{2, 6}. According to Thompson and Sherman⁸, there are some peculiarities of competitive sports that may explain the adoption of DEB by athletes, namely: pressure to maximize sport performance and uniforms that emphasize body shape. More specifically, uniforms that volleyball athletes wear during games usually expose body shape, which, in a way, can generate feelings of shame and, consequently, the adoption of DEB with the premise of losing weight¹. In addition, considering that athletes correlate performance improvement with body mass reduction²⁶, it is possible that some athletes adopt DEB in order to enhance sports performance, which explains the high prevalence

of DEB found in the present study (25%). It has been emphasized that muscle power can be reduced in athletes who adopt DEB²⁷. Fortes et al.²⁷ investigated male road cyclists and revealed that the adoption of DEB led to reduction in anaerobic performance. According to these authors, the decrease in anaerobic power can be explained as a function of the reduction in the speed of the recruitment of motoneurons inherent to high-power muscle fibers, as well as reduction in the speed of action of the creatine kinase enzyme. In addition, according to Durguerian et al.²⁶, muscle glycogen resynthesis may be compromised in athletes who adopt DEB with the idea of reducing body mass. Thus, considering that the anaerobic capacity requires high stock of muscular glycogen, it could be inferred that the adoption of DEB may lead to reduction in anaerobic capacity.

The results of the first regression block did not indicate age influence on DEB, corroborating the socioeconomic model of DEB¹², which indicates that age is not a risk factor for the adoption of DEB. According to this model, the adoption of DEB in athletes is independent of age. Fortes et al.¹² also point out that the onset of DEB in athletes occurs due to the peculiarities of the athletic environment (uniforms that expose body shape, coaching pressure for better results and conversations about body morphology) at any stage of the human development (childhood, adolescence or adulthood).

The results of the hierarchical regression indicated influence of BF% on DEB. This finding revealed that the amount of body fat explained 8% of the DEB variance of volleyball athletes. According to Fortes et al.¹², athletes have aversion to body fat and, therefore, adopt nutritional and / or behavioral strategies for fast weight loss, including DEB, which may explain the results of block 2 of the hierarchical regression model. Consequently (block 3), the findings demonstrated an increase in the magnitude of the influence on DEB of volleyball players. This result indicated that body dissatisfaction related to leanness explained 23% of the DEB variance, corroborating other findings²⁸⁻³⁰. In this sense, it seems that athletes with high magnitude of body dissatisfaction related to thinness are susceptible to the adoption of DEB in the medium term, corroborating the socio-sports model of DEB¹².

In the fourth block of the regression model, the findings demonstrated a reduction in the magnitude of influence on DEB. This result revealed that the coach's technical-tactical instructions during the training sessions did not impact the adoption of DEB by young volleyball players. Thus, it could be inferred that the amount of information and / or technical / tactical corrections made available to volleyball athletes may not generate an increase in DEB frequency. According to Haase³, the level or amount of instruction from the coach to the athlete has no relation with the adoption of DEB in the sporting context, which, in a way, can explain the findings for the "Training-Instruction" subscale.

The results for block 5 of the hierarchical regression model, which used the "Social Support" subscale, showed influence on DEB. This finding indicated that 4% of the DEB variance was explained by the affective-

social support that the coach made available to volleyball athletes, which corroborates the findings of Bratland-Sanda and Sundgot-Borgen⁷, Fortes et al.¹² and McArdle et al.¹³. Considering that the relationship revealed a negative magnitude, it could be assumed that the greater the social support from coach to the athlete, the lower the susceptibility to the adoption of DEB. Francisco, Narciso and Alarcão³⁰ have pointed out that social support that the coach provides to athletes is essential to minimize the risks for eating disorders, thus explaining the results of the fifth block of the hierarchical regression.

Concerning the sixth block of the hierarchical regression, the findings showed that the “Reinforcement” subscale did not influence the adoption of DEB in volleyball athletes. This means that the coach’s positive praise and comments about athletes’ technical-tactical skills did not explain the variance in the adoption of DEB, contrary to findings of Papathomas and Petrie¹. According to these authors, positive reinforcement can be used as a strategy to combat the onset of eating disorders in athletes, although the present study is the first to investigate this relationship. Therefore, further studies are needed to clarify the possible association between positive reinforcement and DEB.

Likewise, the results of the seventh block did not reveal influence of the “Democratic” subscale on DEB, contrary to the hypotheses of some researchers¹⁴⁻¹⁵. This finding indicated that the coach’s permission for athletes to equally participate in team-related decisions did not explain the DEB variance in young female volleyball athletes. Krentz and Warschburger⁴ reported that the participation of athletes in discussions concerning their team’s style of play does not protect athletes from adopting DEB, which may explain the results of the seventh block of the regression model. Moreover, according to Plateau et al.¹⁵, although this relationship was not analyzed, they pointed out that the coach’s democratic behavior may favor an increase in group cohesion. However, according to these authors, democratic behavior does not seem to influence adoption or protection against DEB in athletes.

Findings regarding the last block of the regression model have indicated that the “Autocratic” subscale influenced the adoption of DEB. This result revealed that the concentration behavior and imposition of decisions by the coach explained 8% of the DEB variance. According to Plateau et al.¹⁵, team leaders who are rigid in team decisions may indirectly stimulate the onset of psychopathologies in athletes, for example, eating disorders. McArdle et al.¹³ emphasize that athletes who receive impositions and orders from their coaches, without even discussing the subject, increase the risk of developing DEB, which corroborates the findings of the last block of the hierarchical regression model. Maybe the coach’s autocratic behavior creates a negative mood state (tension, depression, subjective fatigue, etc.) in athletes, which in turn can lead to the adoption of DEB. However, it should be mentioned that the mood state was not used as a mediator variable in the present study. Therefore, such arguments must be interpreted with caution.

Although the design of the present study with female volleyball players is new in literature, the results should be analyzed with caution, since the study has some limitations. Questionnaires were used to measure the main variables. Since responses are subjective, athletes may not have indicated total truthfulness in their responses. In addition, it is noteworthy that the BSQ and EAT-26, although presenting acceptable psychometric indexes for the Brazilian female population, are not specific for athletes. However, there is still no scientifically validated psychometric tool seeking to evaluate DEB and body dissatisfaction related to thinness in athletes. The lack of evaluation of personality traits (anxiety and perfectionism) in athletes is also a limitation. Another limitation that should be mentioned was the use of a double indirect method to evaluate BF%.

CONCLUSION

In short, the results of the present study allowed the conclusion that the coach's leadership style (social support and autocratic) influenced the adoption of DEB in young female volleyball players. Thus, psychological and nutritional support for young volleyball players of Pernambuco should be provided.

From the practical point of view, the findings indicated that the increase in social support, as well as the reduction of the coach's autocratic behavior, may attenuate the susceptibility of the adoption of DEB by young volleyball athletes.

Finally, future studies with longitudinal or prospective design with male volleyball athletes should be conducted in order to investigate the possible influence of the coach's leadership style in the adoption of DEB.

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