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ORIGINAL ARTICLE

Is drive for muscularity related to body checking behaviors in men athletes?

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KEYWORDS
Body image;
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Abstract The aim of this study was to analyze the relationship between drive for muscularity and body checking behaviors in men athletes. Two hundred and twelve Brazilian athletes over 15 years of age participated. We used the Drive for Muscularity Scale (DMS) to evaluate the drive for muscularity. The Male Body Checking Questionnaire was used to assess body checking behaviors. The findings demonstrated a relationship between the ''body image-oriented muscularity'' subscale of the DMS and body checking behaviors ($p = 0.001$). The results indicated differences in body checking among athletes with high and low levels of drive for muscularity. We concluded that drive for muscularity was related to body checking behaviors in men athletes.

PALAVRAS-CHAVE
Imagem corporal;
Atletas;
Psicologia;
Esportes

A busca pela muscularidade está relacionada aos comportamentos de checagem corporal em atletas do sexo masculino?

Resumo O objetivo foi analisar a relação entre a busca pela muscularidade e os comportamentos de checagem corporal em atletas do sexo masculino. Participaram 212 atletas com

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mais de 15 anos. Usou-se a *Drive for Muscularity Scale* (DMS) e o *Male Body Checking Questionnaire* para avaliar a busca pela muscularidade e os comportamentos de checagem corporal. Encontrou-se relação entre a subescala ''imagem corporal orientada para a muscularidade'' da DMS e os comportamentos de checagem corporal ($p = 0{,}001$). Os resultados revelaram diferenças da frequência de checagem corporal entre atletas com altos e baixos níveis de busca pela muscularidade ($p = 0{,}001$). Concluiu-se que a busca pela muscularidade esteve relacionada aos comportamentos de checagem corporal em atletas do sexo masculino.

PALABRAS CLAVE
Imagen corporal;
Atletas;
Psicología;
Deportes

¿La búsqueda de la musculatura se relaciona con el comportamiento de comprobar el cuerpo en los atletas masculinos?

Resumen El objetivo fue analizar la relación entre la búsqueda de musculatura y los comportamientos de comprobación del cuerpo en los atletas masculinos. Participaron 212 atletas mayores de 15 años. Se utilizó la *Drive for Muscularity Scale* (DMS) y el *Male Body Checking Questionnaire* para evaluar la búsqueda de musculatura y los comportamientos de comprobación del cuerpo. Se encontró una relación entre la «imagen corporal orientada a la musculatura» y los comportamientos de comprobación del cuerpo ($p = 0{,}001$). Los resultados revelaron diferencias entre los atletas en la frecuencia con que comprobaban el cuerpo con elevados y bajos niveles de búsqueda de musculatura ($p = 0{,}001$). Se concluyó que la búsqueda de musculatura estaba relacionada con los comportamientos de comprobación del cuerpo en atletas masculinos.

Introduction

Body dissatisfaction is related to a preoccupation with weight and physical appearance (Rodgers et al., 2011). The population usually shows depreciation mainly with body fat (Flament et al., 2012). In assuming such a finding is due to concerns over health and esthetics, this may drive an individual to consider an athletic lifestyle to pursue the ideal model (Didie et al., 2010; Morgado et al., 2013).

Recent investigations have shown that body dissatisfaction in males is more associated with muscularity (Flament et al., 2012; Frederick et al., 2007). Drive for muscularity refers to the desire to be more beefy and the adoption of behaviors to achieve the desired body (Campana et al., 2013; McCreary et al., 2004). Evidence indicates more desire for muscularity in males than females (Flament et al., 2012). More specifically, these levels may be even higher in men athletes (Frederick et al., 2007; Gapin and Petruzzello, 2011; Steinfeldt et al., 2011).

Results of a scientific investigation show that drive for muscularity is closely related to body checking behaviors (Walker et al., 2009). According to Walker et al. (2009), some of behaviors of male body checking are: comparing one's body with another man's body, groping or pinching one's muscles, checking the size of one's muscles in the mirror and asking others to confirm the rigidity of muscles. Body checking behaviors may predispose males to the onset of muscle dysmorphia (Didie et al., 2010), which is considered a mental problem associated with changes in body perception (Azevedo et al., 2012; Walker et al., 2009).

Muscle dysmorphia is a newly described disorder and is not yet listed in the diagnostic manual of psychiatry; further, the clinical condition has not been well defined. There are few epidemiological studies of the disorder, and most scientific data were obtained from athletes or bodybuilders, thus undermining generalizations about the prevalence of this framework. Researchers have suggested that muscle dysmorphia commonly manifests when individuals receive social pressures to achieve a particular body ideal (Didie et al., 2010). Therefore, athletes may be regarded as a risk group for developing muscle dysmorphia.

Athletes follow routines of physical training for the purpose of perfecting their performance in competitions (Fortes et al., 2015). Besides, they are often pressured by coaches, parents (in the case of athletes in training) and sponsors to maximize athletic performance in a short time. In some sports, men athletes tend to associate an improvement in competitive performance to the increase of muscles (Silva et al., 2011), it is possible that they develop feelings of concern and desire to be more beefy, which can lead to behaviors aimed at the development of sudden muscle volume, for example, through the use of steroids. It is noteworthy, however, that the use of anabolic steroids not is related only with esthetics, but better physical performance in sports.

In addition, if body perception after checking the muscles is not positive, the athlete can increase the magnitude of the drive for muscularity, which increases the susceptibility to muscle dysmorphia. Researchers stress that young athletes are more susceptible to problems related to body image (Fortes et al., 2014). Soon, these same authors recommend statistically controlling for age in studies evaluating athletes from different age group. It should be noted, though, that although female athletes are more concerned with body image than male athletes (Fortes et al., 2014), there are few body image studies with male athletes, which can slow the advancement of knowledge with this population. Thus, we highlight the importance of investigating the relationship between drive for muscularity and body checking behaviors in men athletes. The lack of scientific studies using sampled males is also highlighted. Furthermore, surveys conducted in Brazil with athletes that completed instruments targeting muscularity did not provide information on sex. Based on these issues, the objective of this study was to analyze the relationship between drive for muscularity and body checking behaviors in men athletes.

Therefore, considering the notes of Walker et al. (2009), a hypothesis was formulated for this research: there is a relationship between the drive for muscularity and body checking behaviors in men athletes.

Materials and methods

Participants

This cross-sectional study was conducted in 2013 with male athletes over 15 years of age. According to the Brazilian Olympic Committee, in 2013, the population of male athletes (basketball, swimming and volleyball) aged over 15 years in the Rio de Janeiro and Minas Gerais States was in the order of 3800 individuals. We carried out the sample size calculation, considering a 95% confidence interval, 5% sampling error, 0.8 power of the sample and 20% increase for possible sample loss, totaling 187 athletes needed to be included in the survey.

Two hundred and twenty-four athletes (basketball [$n = 69$], volleyball [$n = 63$] and swimming [$n = 92$]) participated and belonged to clubs in the cities of Belo Horizonte/MG, Juiz de Fora/MG, São Lourenço/MG, Leopoldina/MG, Ipatinga/MG, Rio de Janeiro/RJ and Três Rios/RJ, Brazil. The athletes trained in their respective sport an average of 2 h per day, with a frequency of 5 times per week. To be included in the study, athletes were required to (a) be an athlete for at least 2 years, (b) systematically train in a sport for at least 6 h per week, (c) have played in a competition in 2013 and (d) have the availability to answer questionnaires. It is noteworthy that none of the evaluated athletes participated of mental training program over the last six months.

Three basketball athletes, two volleyball players and seven swimmers were excluded due to incomplete questionnaires. Therefore, the research study included a final sample of 212 athletes [competitive level: national ($n = 163$) and international ($n = 49$)], as shown in Fig. 1.

The project was approved by the Ethics and Human Research of the Faculty of Philosophy, Sciences and Letters of the University of São Paulo (CAE – 05166712.8.0000.5407). All participants provided informed consent. We guaranteed anonymity to the participants.

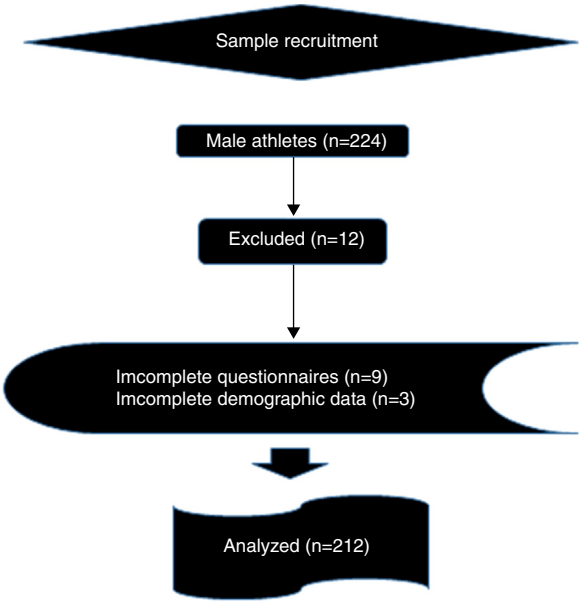

Figure 1 Sample recruitment.

Instruments

To evaluate drive for muscularity, we administered the Drive for Muscularity Scale (DMS) in the version validated for the Brazilian population (Campana et al., 2013). It consists of a 12-item questionnaire that uses a Likert scale (1 = never to 6 = always). The higher the score, the greater the concern and desire to be more muscular. The instrument consists of two factors: body image oriented to muscularity includes 5 items and behavior oriented muscularity includes 7 items. The validation study of the DMS showed good psychometric properties for Brazilian men (Campana et al., 2013). The present study identified a Cronbach's alpha of .80, representing adequate internal consistency of the DMS. To conduct statistical analyses, we used the median DMS score (32.00 points) of the participants to split the athletes into two groups: athletes with a score <32.00 were included in the ''lower drive for muscularity'' group, and athletes with scores ≥32.00 formed the ''high drive for muscularity'' group.

Body checking behaviors were assessed using the Male Body Checking Questionnaire (MBCQ). The MBCQ consists of four subscales: (1) compared to other people – refers to the frequency that the subject compares the size of the muscles or the amount of body fat with others; (2) use of reflective surface – concerns the frequency with which the subject looks in the mirror to see any part of the body; (3) check by ''clamping'' – reflects the frequency with which the subject ''tweaks'' or stretches the skin to check or highlight parts of the body; and (4) review of body by others – indicates checking or comments related to the subject's muscles (e.g., size and resolution) by others. The MBCQ was validated for the Brazilian population of young males and had good psychometric properties (Carvalho et al., 2012). For this sample,

the calculated internal consistency was represented by a Cronbach's alpha = 0.94.

Anthropometric data were always collected by the same evaluator, who was considered experienced with this evaluation. Body mass was measured using a portable digital scale (Tanita) with 100 g precision and a maximum capacity of 200 kg. We used a portable stadiometer (Welmy) with an accuracy to 0.1 cm and a maximum height of 2.20 m to measure the stature of athletes. Body mass index (BMI) was obtained using the following formula: BMI = body mass (kg)/height (m^2).

Body fat was estimated by skinfold thickness measurement. Skinfold thickness was measured to the nearest 0.1 mm on the right side of the body with a Lange caliper (Cambridge Scientific Industries, Inc., Cambridge, MA, USA). Tricipital and subscapular skinfolds were measured for athletes under the age of 18, while the chest skinfold was included for athletes aged 18 years or older. Body fat was estimated by the equations of Slaughter et al. (1988) and Jackson and Pollock (1978) for adolescents (<18 years old) and adults (≥18 years old), respectively. For all of these measurements, the International Society for the Advancement of Kineanthropometry (2013) standards was adopted. In our laboratory, the intra-observer technical errors of measurement for skinfold thickness are <5%, measured in triplicate.

Procedures

First, the researchers responsible contacted the coaches in swimming, basketball and volleyball of fifteen clubs in the cities of Juiz de Fora/MG, Belo Horizonte/MG, São Lourenço/MG, Ipatinga/MG, Leopoldina/MG, Rio de Janeiro/RJ and Três Rios/RJ. The procedures and the objectives of the study were properly explained, and authorization was sought for the team to participate in the research. However, only eleven coaches expressed interest that their athletes participate in the research.

After the consent of the coach, a meeting with the athletes was conducted to inform potential participants about the ethical procedures of the research. This meeting provided the ICF to the parents or guardians (if the athlete was less than 18 years) that authorized, in writing (by signing the term), the participation of their children.

Data collection was conducted in two stages. The testing was always conducted by the same researcher and in suitable rooms available within the participating clubs. A questionnaire containing demographic data (age and weekly training regimen) was also administered to the athletes.

Thus, the athletes received the same verbal orientation and any doubts were clarified. Written guidelines were also contained in the questionnaires on how to complete them. During the application, there was no communication between the athletes, and there was no time limit for completion. The weight and height of each athlete were then measured individually.

Data analysis

The Kolmogorov–Smirnov test was used to evaluate the distribution of the scores of questionnaires. Given the parametric non-infringement, we used measures of central tendency (mean) and dispersion (standard deviation) to describe the research variables (age, weekly training regimen, BMI, DMS and MBCQ). We conducted the Stepwise Multiple Regression to analyze the relationship between the of DMS subscales with the total score of MBCQ. This same test was used to analyze the relationship of body fat with total score of DMS and MBCQ. In addition, we used multivariate analysis of covariance (MANOVA) to compare the scores of the MBCQ subscales according to groups established from the median of the DMS. The post hoc Bonferroni test was used to identify the location of statistical differences. In addition, we calculated the effect size using a Cohen's d coefficient (Cohen, 1992) to highlight the importance of differences in the practical point of view. The effect size was used with the following threshold values: <0.2: trivial; 0.2–0.6: small; 0.6–1.2: moderate; >1.2: large (Cohen, 1992). We emphasize particularly that the variables ''age'' and BMI were controlled in all statistical tests. All data were processed using Statistical Package for Social Science (SPSS) 20.0 software, adopting a significance level of 5%.

Results

Table 1 shows the descriptive data (mean and standard deviation) for the demographic variables (age, weekly training regimen, BMI and body fat) of the sample.

The regression model indicated a relationship between the ''body image oriented for muscularity'' subscale and body checking behaviors ($F_{(1,\ 211)} = 6.12$; $p = 0.001$). Similarly, the ''behavior oriented for muscularity'' subscale, inserted in block 2, also demonstrated a relationship with body checking behaviors ($F_{(1,\ 211)} = 9.87$; $p = 0.0001$), as shown in Table 2.

Table 1 Mean and standard deviation of age, weekly training regimen, BMI and body fat (%) in the sample investigated (according to sport).

Sport/variable	Age (years)	WTR (h)	BMI (kg/m^2)	Body fat (%)
Swimming	16.88 (2.60)	2.5 (0.93)	21.37 (3.62)	21.54 (7.31)
Basketball	17.00 (1.03)	5.00 (0.86)	28.33 (2.69)	22.04 (6.29)
Volleyball	24.42 (3.64)	5.35 (0.85)	25.12 (1.73)	20.83 (6.04)
All	18.12 (2.93)	2.56 (1.14)	21.92 (3.07)	21.61 (7.77)

Source: Authors.
Note: WTR, weekly training regimen; BMI, body mass index.

Table 2 Stepwise multiple regression using subscales of the DMS as explanatory variables of the MBCQ scores in men athletes.

DMS subscale	Block	*B*	R^2	R^{2*}	*p* Value
BIOM	1	27.87	0.09	0.08	0.001
BOM	2	22.81	0.15	0.15	0.0001

Source: Authors.
Note: B, Beta; R^{2*}, R^2 adjusted; DMS, *Drive for Muscularity Scale*; MBCQ, *Male Body Checking Questionnaire*; BIOM, body image oriented to muscularity subscale; BOM, behavior oriented muscularity subscale.

Table 3 Mean and standard error of the MBCQ subscales according to the groups established by the DMS in men athletes.

Subscale	Low DFM (<32.00)	High DFM (≥32.00)	*p* Value
COP	13.92 (0.86)	15.61 (0.86)	0.17
URS	16.53 (1.11)	20.08 (1.12)	0.01
CBC	3.79 (0.28)	4.27 (0.29)	0.25
RBO	3.05 (0.23)	3.54 (0.25)	0.03

Note: DMS, Drive for Muscularity Scale; DFM, drive for muscularity; COP, compared to other people; URS, use of reflective surface; CBC, check by ''clamping''; RBO, review of body by others.

The results indicated a relationship between the body fat and DMS score ($F_{(1,\ 211)} = 18.76$; $R^2 = 0.16$; $p = 0.001$). Similarly, the body fat also demonstrated a relationship with MBCQ score ($F_{(1,\ 211)} = 31.40$; $R^2 = 0.23$; $p = 0.0001$).

The findings from the MANOVA (Table 3) showed higher scores for the ''use of reflective surface'' ($F_{(7,\ 205)} = 7.84$; $p = 0.01$; $d = 0.5$) and ''review of body by others'' subscales ($F_{(7,\ 205)} = 4.51$; $p = 0.03$; $d = 0.4$) in athletes with scores greater than or equal to 34.32 on the DMS. In contrast, the results indicated no differences on the ''compared with others'' ($F_{(7,\ 205)} = 1.48$; $p = 0.17$; $d = 0.1$) or ''check by means of clamping'' ($F_{(7,\ 205)} = 1.14$; $p = 0.26$; $d = 0.1$) subscales due to the established classifications for the DMS (low and high Drive for Muscularity).

Discussion

This study aimed to analyze the relationship between drive for muscularity and body checking behaviors in men athletes. Scientific reports suggest that drive for muscularity has a close relationship with body checking behaviors in males (Didie et al., 2010; Walker et al., 2009). From a practical standpoint, men who show some level of desire to be more muscular can compare their bodies with those of other men, i.e., looking in the mirror, checking the size of body parts (e.g., arms and abdomen) and using supplements and/or anabolic steroids to increase/tone muscles. It should be noted that the reasons that generate increased of drive for muscularity and body checking behaviors in athletes maybe not the same as for the general population. However, no study with athletes was found, indicating the novelty of this research.

The findings of Block 1 of the regression model showed that 9% of the variance in body checking behaviors was explained by the ''body image oriented for muscularity'' subscale. This result demonstrates that the frequency of checking the size of one's muscles to compare the physical self with other athletes and looking at reflective surfaces are related to concerns about being more muscular. According to some authors in the area of body image (Lambrou et al., 2012), concern for the body has a close relationship with body checking, confirming the results shown in Block 1 of the regression model. Didie et al. (2010) also confirmed that the higher the level of concern with the muscles, the greater the frequency of checking body parts. Moreover, these same authors emphasize that pinches and pinching the muscles can generate even more depreciation for the body in men. In an experimental study, Walker et al. (2012) found that a single session of body checking decreased satisfaction with the body. Regardless of the temporal precedence, these authors note the relationship between drive for muscularity and body checking, which can become a vicious cycle.

Block 2 of the multiple regression model increased compared with the behaviors of checking when entering the ''behavior oriented for muscularity'' subscale of the DMS. The results indicated that 6% of the MBCQ scores were explained by behaviors directed at physical exercise and the use of dietary supplements. Thus, the athletes who engaged in exercise and/or enjoyed food supplements to build muscle also engaged in comparing their body shape with other athletes, checking the tone of their muscles through taps on their own bodies and flexing their muscles in mirrors. These findings are in agreement with the investigation conducted by Quick et al. (2013). Although these researchers did not conduct studies using young men athletes, they also found that the behaviors of checking weight and body parts were associated with an increase in muscle conduits.

Fairburn et al. (1999) explained that individuals use body checking as a form of body verification (evaluation). The information obtained is used in decision making (adoption of behaviors). In the case of athletes, for example, after checking the body (e.g., body weight) and verifying a reduction in body weight, the athlete can increase their food consumption, use anabolic steroids or even intensify the muscle workout. Although this process seems straightforward, it should be noted that the adoption of harmful behaviors is generally implemented, i.e., in the previous example (body weight), if the athlete checked weight gain (expected objective), he could strengthen his adopted strategies to ensure the maintenance or weight gain. As reported by Fairburn et al. (1999) and Shafran et al. (2007), excessive body checking leads to decreased satisfaction with the body and the adoption of deleterious health behaviors (e.g., dietary restriction, use of anabolic steroids and excessive exercise practice).

It is worth noting, however, that neither always this process [after checking the body (e.g., body weight) and verifying the reduction in body weight, the athlete can Increase their food consumption, use anabolic steroids or even intensify the muscle workout] may be true for athletes. For example, esthetic (gymnastics, diving, etc.) or with division by weight class (judo, taek-won-do, boxing, etc.) sports athletes cannot adopt behaviors targeted to increase muscle mass after verifying the reduction in body weight.

In relation to body fat, the findings showed relationship statistically significant with the drive for muscularity and body checking behaviors. These results indicate that 16% and 23% of the drive for muscularity and body checking behaviors variance, respectively, were explained by body fat. According to Walker et al. (2009), men with higher body fat tend to check more often your body parts, which may explain these findings.

Concerning the comparison of the MBCQ subscales between the athletes with a high and low drive for muscularity, our results indicated a higher frequency of the use of reflective surfaces to evaluate one's own body in athletes with a high drive for muscularity. These data demonstrate that athletes most concerned with muscles look in the mirror more often than athletes less concerned with muscularity. According to Walker et al. (2009), the behavior of checking the size, shape and definition of muscle in reflective surfaces is more common in subjects with extreme concerns related to achieving a certain muscular shape.

The MANOVA showed that the athletes with a high drive for muscularity most frequently asked others to touch or comment about their muscles, as evidenced through the difference found in the ''review body by others'' subscale. Researchers noted that individuals with concern and desire to be more muscular like that friends or acquaintances provide positive comments concerning their muscular appearance (Walker et al., 2009), which explains the results above.

In contrast, no differences for the ''compared to other people'' and ''check by clamping'' subscales between athletes with a high and low drive for muscularity were found. Therefore, the frequencies of comparing one's own body with other men and pinching and touching the muscles themselves were similar between athletes with a high and low desire to be muscular. It may be that athletes with a high drive for muscularity prefer to be touched or receive feedback from others about their muscles (results shown for the ''review of body by others'' subscale) rather than self-comparing muscular appearance with other athletes. Likewise, body check by pinching the muscles and pinching behavior is no longer used by athletes with a high drive for muscularity. According to these findings, the athletes concerned with developing muscles seem to adopt behaviors of body checking oriented by extrinsic success. This means that these athletes seek approval from other individuals depending on the size, shape and definition of their muscles because they use mirrors, which also reflect their images for other individuals. Moreover, based on the findings for the ''review body by others'' subscale, it seems that athletes concerned with muscularity like to receive compliments directed at their muscle morphology.

Although the present study shows interesting and new results, it has limitations. One limitation is the use of questionnaires. Fortes et al. (2013) argue that athletes cannot truthfully answer the questionnaires. However, Rodgers et al. (2011) emphasize that questionnaires, if they have good psychometric properties for the target population of the survey, can be considered the gold standard. In addition, the low sample size ($n = 212$) can also be considered a limitation. However, other studies have used sample sizes that were smaller or similar in size (Fortes et al., 2014; Krentz and Warschburger, 2013). Another limitation that should be mentioned is the wide age range of the sample. But, it noted that age was statistically controlled in this study, removing thus their effect on DMS and MBCQ scores. Finally, the cross-sectional design did not allow causal inference, i.e., there is no way to evaluate the direction of these associations.

Above all, there is a lack of studies with men athletes. To address this issue, this investigation sought to cover a small portion of the knowledge gap in this area, which indicates the importance of the findings from this study.

Conclusions

The results of this study showed that drive for muscularity was related to body checking behaviors in men athletes. Considering this finding, athletes who demonstrate some level of concern about their muscles use body checking behaviors more often. However, if the perceptions of the size, shape and definition of muscle after checking are not optimal to the athlete, the feeling of concern with muscularity may deteriorate. Longitudinal studies that seek to investigate the causal relationship between drive for muscularity and body checking in men athletes are suggested.

Conflicts of interest

The authors declare no conflicts of interest

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