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ORTHOREXIA, MUSCLE DYSMORPHIA AND EXERCISE ADDICTION: COMPARISON BETWEEN AMATEUR RUNNING, FITNESS FUNCTIONAL AND BODYBUILDING ATHLETES

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Abstract: This study aimed to compare the degree of exercise addiction (EA), muscle dysmorphia and signs of orthorexia according to the type of exercise, age, practice time and weekly training frequency. It was a cross-sectional study with 159 (running = 38, Fitness Functional = 85 and bodybuilding = 35), amateur athletes of both sexes, aged over 18 years and with at least 3 months of practice in the exercise. The following instruments were used: Dedication to Exercise Scale, Ortho-15 and Complex in Adonis Questionnaire. Data analysis was conducted through Analysis of Covariance (ANCOVA), using age as a covariate ($p<0.05$). The main finding of the present investigation was that individuals who practiced exercise more than 5 times per week presented higher total score of EA, muscle dysmorphia and orthorexia ($p<0.05$). However, no differences were observed in the total score of EA between sex and type of exercise. It can be concluded that recreational athletes who exercise more than five times per week showed higher EA, orthorexia and muscle dysmorphia.

KEYWORDS: Addiction to exercise; Body dissatisfaction; Eating disorders; Orthorexia; Exercise

Afiliação

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ORTOREXIA, DISMORFIA MUSCULAR E DEPENDÊNCIA AO EXERCÍCIO: COMPARAÇÃO ENTRE ATLETAS AMADORES DE CORRIDA DE RUA, FUNCTIONAL FITNESS E BODYBUILDING

Resumo: Este estudo teve como objetivo comparar o grau de dependência de exercícios (DE), dismorfia muscular e sinais de ortorexia de acordo com o tipo de exercício, idade, tempo de prática e frequência semanal de treinamento. Foi um estudo transversal com 159 (corredores = 38, fitness funcional = 85 e musculação = 35), atletas amadores de ambos os sexos, com idade superior a 18 anos e com pelo menos 3 meses de prática no exercício. Foram utilizados os seguintes instrumentos: Escala de Dedicação ao Exercício, Questionário Orto-15 e o Questionário de Complexo em Adônis. A análise dos dados foi realizada por meio da Análise de Covariância (ANCOVA), utilizando a idade como covariável ($p<0,05$). O principal achado da presente investigação foi que indivíduos que praticavam exercícios mais de 5 vezes por semana apresentaram maior pontuação total de IA, dismorfia muscular e ortorexia ($p<0,05$). No entanto, não foram observadas diferenças no escore total da DE entre sexo e tipo de exercício. Pode-se concluir que atletas recreativos que se exercitam mais de cinco vezes por semana apresentaram maior DE, ortorexia e dismorfia muscular.

PALAVRAS-CHAVE: Vício em exercícios; Insatisfação corporal; Transtornos alimentares; Ortorexia; Exercício.

Introduction

Although literature points out that regular exercise provides physical, social and psychological benefits[1], it is highlighted that excessive exercise can lead to the development of dependent behaviors, causing several adverse effects on physical and mental health[1, 2]. One of these behaviors is exercise addiction (EA), which is characterized by an obsession with exercise[3].

In these situations, the dependent person places exercise as a priority, leaving aside social ties, such as family, friends, profession and health[1, 2]. EA develops as the time of practice and daily dedication to exercise increases[3], making the individual feel withdrawal symptoms, such as anxiety, depression and irritation, similar to those of chemical dependents when exercising is not possible[1, 2]. In this perspective, an aggregate of authors point out that EA can bring damage to physical and mental health for both athletes and non-athletes[4, 5], since the excessive exercise loads require a high technical, physical and psychological demand of the practitioner and the athlete[6].

In this scenario, literature has highlighted that EA seems to be associated with the development of risk behaviors for eating disorders (EDs) , such as anorexia nervosa, bulimia nervosa and orthorexia, which are psychiatric syndromes characterized by inadequate feeding, weight control and body image distortion (e.g. muscle dysmorphia) [7]. Studies show that these EDs and body image distortion are most evident in physically active individuals [5], however, an aggregate of authors have observed a higher prevalence of ED's and body image distortion in athletes when compared to the general population [8].

Muscle dysmorphia can be considered the most popular dysmorphic disorientation of the body among exercise practitioners[9]. It is observed especially in aesthetic sports and exercises (e.g. gymnastics and bodybuilding), where athletes and practitioners are under great pressure to exhibit perfect bodies and are influenced to restrict food intake[7, 9]. Such psychological disorder is related to suicidal intentions, worse life quality, dependent behaviors

(e.g. eating disorders), exercise dependence and a higher frequency of use of illegal substances, including anabolic steroid abuse[7,9.]

Another ED that has become popular in recent years is orthorexia, which is understood as a food disorder that consists of too much commitment to eating in a healthy way[10]. Orthorexia differs from other EDs because it is a compulsion for quality food and not for the amount of food ingested, or an obsession for the perfect body[10]. This ED has been the objective of a broad investigation in the sports field and, especially, when individuals present EA[1-3]. A range of authors have observed that 40-70% of people who suffer from some ED also suffer from EA, which is a very important subject for scientific research [1].

Thus, recent studies have investigated such variables mainly in athletes[8, 11], [12] due to the fact that they are constantly chasing the ideal physique, while few studies have been conducted with exercise practitioners[2]. Among the various forms of exercise that attract the attention of practitioners, bodybuilding, fitness functional and running have gained more and more fans in recent years[13]. Bodybuilding is characterized by activities performed against external resistance, using apparatus for specific muscle groups such as bars, dumbbells and machines[14]. Fitness functional is a physical conditioning method consisting of constantly varied functional movements performed at high intensity that include combined aspects of gymnastics, Olympic-style weightlifting, and cyclical exercises[15]. Running is characterized by running in free environments in different distances and its expansion is due to the fact that this modality offers health benefits, reduced cost and can be easily practiced, reaching practitioners of all social status[16].

Research has shown the association between orthorexia and exercise in bodybuilding practitioners[3], demonstrating that the younger the practitioner is, the greater is the tendency to develop EDs. The literature has shown a strong relationship of this behavior with age, and younger practitioners are more likely to develop high levels of EA and EDs[1, 17-19], but until now, it is not known how much the presence of this dependent behavior can vary according to other factors such as sex, frequency of training, time of practice and practiced modality. Lichtenstein and Jensen[15] observed that Functional fitness practitioners presented EA and possessed some EDs, findings that were also observed in yoga practitioners[12] and university students[11].

Although literature indicates a positive association between exercise and eating behaviors in the risk of developing EDs, not much is known about the occurrence of these behaviors, which depend on the practitioners of various forms of exercise, particularly in the modalities listed above, and require of the practitioner healthy eating, and the ideal of beauty

imposed by the media.

Given the exposed, the present study aimed to compare the degree of EA and signs of muscle dysmorphia and orthorexic behavior according to the modality, age, practice time and weekly training frequency in amateur athletes. Our first hypothesis is that that the most resistant modalities would present higher scores in relation to EA and signs of muscle dysmorphia and orthorexic behavior. The second hypothesis is that participants with more practice time and higher training frequency would have higher scores in relation to EA and signs of muscle dysmorphia and orthorexic behavior. The third hypothesis is that younger practitioners will demonstrate higher indications of EA, muscle dysmorphia and orthorexic behavior.

Methods

Participants

This is a cross-sectional study performed in the city of Petrolina-PE, Brazil, during January to June 2019. The research protocol was approved by the Ethics Committee of the Federal University of Vale do São Francisco (protocol 2.442.590) according to resolution (466/12) from the Brazilian National Health Council. A total of 159 amateur athletes (running = 38, Functional Fitness = 85 and bodybuilding = 35), of both sexes (male n = 77; female n = 81), with average age of 31.59 years and average practice time of 1.68 years, were selected by convenience in the local gyms facilities, in a non-probabilistic way. The inclusion criteria were: 1) > 18 years old; 2) to be a physical exercise practitioner at the gym for at least three months; and 3) to regularly attend the gym at least twice a week. Only the individuals who signed the informed consent were included in this study.

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Instruments

Dedication to Exercise Scale (DES). It was developed by Downs et al.[20] and validated for the Brazilian context by Alchieri et al.[21], focusing on evaluating the dependence on the exercise, its physical and psychological damages and the implications of these damages to the daily lives of individuals. DES it consists of 21 unidirectional items, answered on a six-point scale, ranging from 1 (Never) to 6 (Always), distributed in seven factors (three items per factor), to be described below: avoid withdrawal symptoms, continuity, tolerance, lack of control, reduction of other activities, time and intentionality and overall score is done by summing all items. The Cronbach's Alpha varied between 0.76 and 0.87, indicating strong reliability[22].

Ortho15. It was developed by Donini et al.[23] validated for the Brazilian population by Pontes, Montagner and Montagner[24]. The ORTO-15 proposes to evaluate the frequency of

concern with healthy eating and the level of pathological obsession with correct eating, which can lead to important food restrictions. ORTO-15 consists of 15 items with scale of four gradual responses, ranging from always (1) to never (4). The Cronbach's Alpha for the instrument was $\alpha = 0.70$, indicating strong reliability[22].

Complex in Adonis Questionnaire (CAQ). It was developed by Pope, Phillips and Olivardia[25], and aims to identify signs and symptoms related to muscle dysmorphia, it consists of 13 items, each with 3 (three) response options. The search participant should indicate the alternative that is closest to his/her reality. The result corresponds to the simple sum of the values of the questions, separating the group into 4 (four) distinct classifications, being: 1 – 2. Mild to moderate; 3. Serious problem; and 4. Serious Problem Big. The Cronbach's Alpha for the instrument was $\alpha = 0.71$, indicating strong reliability[22].

All questionnaires were assessed individually, in a private room. For avoid sources of bias in the application of the questionnaires, single evaluator applied the questionnaire.

Statistical Analysis

Data analysis, frequency and percentage were used for categorical variables. For numerical variables, data normality was initially verified by the Kolmogorov-Smirnov test. As data did show normal distribution, the data repots in media (x) and standard deviation (SD). Analysis of Covariance (ANCOVA), using age as a covariate, was conducted to compare EA among recreational athlete groups. Bonferroni post hoc was used to identify such differences. The significance adopted was $p<0.05$. All analysis were carried out in the SPSS 22.0 software.

Results

The sample consisted of 159 amateur athletes, it is noted the prevalence of female individuals (51.3%) and in the age range 18 to 30 years (51.3%). According to the modality, most respondents practiced Functional fitness (53.8%). Also, 44.3% of the participants practiced their modalities for less than 2 years and, regarding the frequency of training, the majority of participants trained more 5 times per week (56.3%).

Table 1 refers to the comparison of EA, orthorexic behavior and muscle dysmorphia of amateur athletes according to the modality (Functional Fitness; running; bodybuilding). Significant difference ($p<0.05$) was found in the dimensions of dependence on the exercise only intentionality ($p=0.043$), indicating that the athletes of bodybuilding presented lower scores in both dimensions when compared to the athletes of the other modalities. No difference was found for these variables in the comparison between the other groups the other groups through

the analysis of ANCOVA.

Table 1. Comparison of addiction to exercise, orthorexia and muscle dysmorphia among amateur Functional Fitness, Running and Bodybuilding athletes.

VARIBLES	Modality			*p*	Ancova (Age)		
	Functional Fitness	Runners	Bodybuilding				
	x (SD)	x (SD)	x (SD)		F	p	η2
Addiction to Exercise							
Intentionality	2.61 ±1.21	2.68 ±0.85	2.06 ±1.08[a.b]	**0.043***	0.000	0.984	0.040
Continuity	2.21 ±0.98	2.19 ±1.08	2.19 ±1.18	0.977	0.114	0.737	0.000
Tolerance	3.16 ±0.97	3.33± 0.89	3.08 ±1.01	0.138	3.118	0.079	0.020
Reduction of other activities	2.44 ±0.88	2.42 ±0.74	2.17 ±0.93	0.303	0.033	0.856	0.000
Lack of control	3.83 ±0.77	3.73 ±0.63	3.89 ±0.86	0.073	0.391	0.532	0.003
Avoid withdrawal symptoms	3.42 ±0.87	3.38 ±0.88	3.25 ±0.88	0.265	3.531	0.062	0.022
Time	2.63 ±1.11	2.57 ±0.70	2.17 ±1.00	0.055	0.682	0.410	0.004
Overall score EA	2.90 ±0.64	2.90 ±0.47	2.69 ±0.70	0.121	1.220	0.271	0.008
Orthorexia	34.11 ±3.50	33.71 ±3.49	32.62 ± 5.15	0.172	0.618	0.433	0.004
Muscle Dysmorphia	10.16 ±5.40	7.26 ±5.03	10.54 ±6.14	0.251	0.919	0.339	0.006

* Significant difference-p<0.05 to identify differences between groups: a) Functional Fitness and bodybuiling; b) runners and bodybuiling.

No significant difference (p<0.05) was found when comparing addiction to exercise, orthorexia and muscle dysmorphia subscales according to age group and practice time, indicating that age and practice time are not intervening in exercise dependence among recreational athletes.

When analyzing athletes according to sex (Table 2) A significant difference (p<0.05) was observed only in the dimensions of EA intentionality (p=0.030) and avoid withdrawal symptoms (p=0.008), this indicates that female athletes were more prone to exercise than male athletes. ANCOVA showed the difference between the muscle dysmorphia according to sex (Table 2), indicating that female recreational athletes have shown greater frequency of body image

disturbance compared to men (F=6,502 p=.012)

Table 2. Comparison of exercise addiction, orthorexia and muscle dysmorphia according to sex.

VARIABLES	Sex					
	Men	Women		Ancova (Age)		
	x (SD)	x (SD)	p	F	p	η2
Exercise Addiction						
Intentionality	2.32 ±0.97	2.69 ±1.23	**0.030***	1.274	0.261	0.008
Continuity	2.28 ±0.94	2.13 ±1.13	0.341	0.161	0.689	0.001
Tolerance	3.27 ±0.85	3.10 ±1.05	0.254	0.569	0.452	0.004
Reduction of other activities	2.35 ±0.83	2.41 ±0.90	0.624	0.316	0.575	0.002
Lack of control	3.83 ±0.75	3.81±0.77	0.839	1.096	0.297	0.007
Avoid withdrawal symptoms	3.18 ±0.78	3.56 ±0.92	**0.008***	1.159	0.283	0.007
Time	2.48 ±0.90	2.54 ±1.12	0.698	0.025	0.874	0.000
Overall score of EA	2.81 ±0.54	2.89 ±0.69	0.455	0.085	0.771	0.001
Orthorexia	33.94 ±3.52	33.44 ±4.31	0.527	1.780	0.497	0.003
Muscle Dysmorphia	9.18 ±5.64	9.90 ±5.58	0.574	6.502	**0.012***	0.040

* Significant difference-p<0.05

When comparing athletes (Table 3) according to training frequency, there was a significant difference (p<0.05) in the dimensions of exercise dependence intentionality (p=0.002), continuity (p=0.003), reduction in other activities (p≤0.001), lack of control (p=0.007), time (p≤0.001), overall score AE (p≤0.001), orthorexia (p=0.004) and muscle dysmorphia (p≤0.001), thus, indicating that athletes who train more 5 times a week showed more EA, orthorexia and muscle dysmorphia that the athletes who train up to 5 time a week. A ANCOVA it showed the difference between the muscle dysmorphia according to training frequency (Table 3), athletes training 5 times a week have shown greater frequency of body image disturbance compared up to 5 times a week (F=6,156 p=.014)

Table 3. Comparison of exercise addiction, orthorexia and muscle dysmorphia according to training frequency.

VARIABLE	Training Frequency					
	Up to 5x	More than 5x		Ancova (Age)		
	x (SD)	x (SD)	p	F	p	η2
Exercise Addiction						
Intentionality	2.36±1.07	3.00±1.18	**0.002***	1.279	.260	.008
Continuity	2.07±1.00	2.66 ±1.08	**0.003***	0.014	.907	.000
Tolerance	3.13 ±0.95	3.36 ±1.00	0.238	0.320	.573	.002
Reduction of other activities	2.25 ±0.83	2.79±0.85	**<0.001***	0.571	.451	.004
Lack of control	3.73 ±0.72	4.12 ±0.79	**0.007***	0.767	.382	.005
Avoid withdrawal symptoms	3.39 ±0.83	3.33 ±1.02	0.667	1.805	.181	.012
Time	2.35 ±0.94	3.04 ±1.10	**<0.001***	0.001	.973	.000
Overall score EA	2.75 ±0.61	3.19 ±0.55	**<0.001***	0.019	.089	.000
Orthorexia	34.18 ±3.71	32.02 ±4.28	**0.004***	0.372	.543	.002
Muscle Dysmorphia	8.63 ±5.44	12.63 ±5.09	**<0.001***	6.156	**.014***	.038

* Significant difference-P<0.05.

Discussion

The present investigation compared the degree of EA, muscle dysmorphia and the risk behavior for ED (orthorexia) among amateur athletes of different modalities. The main finding of the present investigation was that individuals who practiced exercise more than five times per week presented a higher total score of EA, muscle dysmorphia and ED. However, no differences were observed in the total score of between sex and practiced modality.

The main findings showed that athletes who trained more times per week presented a greater predisposition for the development of addictive and pathological behaviors, such as EA, ED and muscle dysmorphia (Table 3). The probable cause for the development of these factors in these populations is the high charge suffered by both internal and external athletes, which is a risk factor for the development of such additive and pathological behaviors[26]. These findings corroborate the findings of Clifford and Blyth[27], who noticed that the more the student athletes trained (weekly), the greater the trend towards development of EA, ED and muscle dysmorphia. In a systematic review, Di Lodovico, Poulnais and Gorwood[18] showed that sports modalities

are associated with different vulnerabilities of EA, with the most exhausting activities being the ones with the highest EA rates. Such rates may be associated with the intrinsic characteristics of resistance training, which seems to favor the development of physical and psychological tolerance[28].

Regarding the comparison of the scores of EA, ED and muscle dysmorphia, ANCOVA demonstrated differences in muscle dysmorphia between frequency training. In this scenario, the findings of this investigation corroborate with Alchieri et al.[21] and Clifford and Blyth[27] demonstrating that the athletes with greater weekly frequency of practice revealed a greater predisposition to exercise more than planned and with greater amount of time, to reduce social, occupational or leisure socialization to exercise, in addition to presenting greater inability to reduce their exercise load, even when they are contraindicated. This finding reveals that the frequency of training can be considered a harmful factor for physical and mental health, since it can lead to the adoption of dependent behaviors[18].

Another finding was that women demonstrated to be more likely to develop EA (Table 3), which can be explained by the fact that women suffer more from body changes, hormonal changes, and still suffer a greater influence of individual and sociocultural psychological factors[29]. Although the findings of this study point out that women suffer more from EA than men, there is no consensus in the literature regarding such evidence[30-32]. While Rudolph et al.[11] verified in gym practitioners that the EA was greater among women, corroborating the findings of this study, Lichtenstein and Jensen[15] verified higher prevalence in men. Other studies found no gender differences in other ways[30, 33].

However, comparison of scores the EA, ED and muscle dysmorphia, ANCOVA demonstrated differences in muscle dysmorphia between sexes. Our findings are not supported by the literature, which shows that men have a higher prevalence in developing muscle dysmorphia, by the obsessive goal of a maximum hypertrophy with minimal body fat[34, 35]. This result may be related to culture, habits, lifestyle and exercise mode to which people are inserted, which directly interferes with these factors related to sex [36, 37].

According to the scientific literature, the findings of this research do not corroborate with an aggregate of authors that show a higher prevalence of athletes practicing resistance exercise[18, 32]. Our findings show that athletes who practice modes that require greater endurance resistance (Fitness Functional and runners) have shown greater indications of intentionality when compared to the athletes of bodybuilding (Table 1). The probable cause for the development of these factors in these populations may be that recreational athletes report high

levels of loneliness and anxiety that can trigger uncontrolled behavior that, in turn, leads to an increase in the amount of exercise in this population[19]. Lukács et al.[19] observed that amateur runners use races as a source of pleasure and often increase the volume and intensity of training to achieve this feeling and end up developing greater EA. However, ANCOVA did not point to a significant relationship between the modality and the EA, ED and muscle dysmorphia.

Finally, no evidence was found to show that the age and time of practice were factors contributing to the EA, ED and muscle dysmorphia recreational athletes, since there was no difference in the dimensions of EA, ED and muscle dysmorphia due to age range and time of practice. These findings do not agree with the scientific community, in which it is argued that age may be an intermittent or non-intermittent factor for the development of dependent behaviors (e.g. exercise dependency, food disorder, distortion of body image)[38-41]. These facts may be related due to culture, habits, lifestyle and exercise mode to which people are inserted, interfere directly in these factors[36, 37].

Despite the relevant contributions obtained from the results of this study, some limitations need to be highlighted. First, we highlight the small number of participants who were practitioners of only three exercise modalities, which makes it impossible to generalize the results to practitioners of other modalities, although it brings relevant implications for the professionals involved with exercise prescription. Thus, future research should expand the study with practitioners from other regions of Brazil and other individual and group sports modalities. Another important limitation refers to the cross-sectional nature of this research, which does not allow making inferences of causality between the variables. Perhaps a longitudinal study would be able to point to the causal nature of the association between the variables.

Conclusion

It can be concluded that recreational athletes who exercise more than five times a week show greater EA, ED and muscle dysmorphia. Thus, it is very important that trainers and physical education professionals pay attention to individuals who exercise more than five times a week to provide favorable guidance so individuals exercise in a healthy way.

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