CrossFit practitioners' motivation in Penafiel

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Abstract. Motivation is crucial for adhering to and maintaining regular physical activity. In CrossFit, factors such as competition, personal achievement, and socialization influence the continuity of practice. This study aimed to investigate the motivational aspects of CrossFit practitioners in boxes in the municipality of Penafiel. To this effect, an Exercise Motivation Questionnaire (QME), the Portuguese version of the Exercise Motivations Inventory-2 (EMI-2), was applied to 135 regular CrossFit practitioners. Data analyses were carried out using descriptive statistics and T-tests for independent samples to compare motivational aspects between sexes. The results indicated that the most prevalent motives were pleasure in practicing, the search for health, and personal improvement. There were statistically significant differences between the sexes, with men valuing competition and social recognition more, while women attributed greater importance to health and revitalization. Overall, CrossFit practitioners reported high scores on motives commonly associated with enjoyment, health, well-being, and personal improvement; however, because intrinsic and extrinsic motivation composites were not directly tested, this interpretation should be considered exploratory. These results reinforce the importance of taking these differences into account when designing strategies to promote the practice, aiming to increase adherence, boost involvement, and reduce drop-out rates.

Keywords: motivation, CrossFit, exercise motivations inventory-2.

1. Introduction

Motivation plays a crucial role in adhering to and maintaining regular physical activity. In the context of physical exercise, understanding the factors that motivate individuals is essential for developing effective strategies to promote health and sustain active behavior [1, 2].

CrossFit is a sport characterized by high intensity [3]. Several studies show that motivation for sport can be associated with multiple factors, including personal achievements, health, socialization, and pleasure [3, 4]. Understanding the reasons that lead individuals to start and stay in CrossFit allows us to design more effective strategies to increase adherence and reduce drop-out rates [5]. CrossFit is one of the fastest-growing fitness modalities worldwide, practiced in thousands of affiliated 'boxes' across diverse countries [3]. Its distinctive combination of high-intensity functional training, a strong community ethos, and a competitive environment differentiates it from traditional fitness activities [5]. These unique features have been consistently highlighted as central to practitioners' motivation and adherence [6, 7]. Investigating motivational factors within this sport is therefore particularly relevant, not only because of its popularity, but also due to its singular psychosocial environment.

Self-determination theory [1] is one of the primary theoretical approaches used in research on motivation in the context of physical exercise. This theory distinguishes between intrinsic motivation [practicing for pleasure and personal satisfaction] and extrinsic motivation [driven by

external factors, such as social recognition or rewards]. Studies indicate that CrossFit practitioners tend to have high levels of intrinsic motivation due to the challenging and dynamic nature of the workouts [6, 8, 9]. Moreover, self-determination theory for exercise [2] emphasizes the importance of psychological, social, and physiological factors in adherence to physical exercise. Outstanding characteristics of CrossFit, such as the feeling of belonging to a community and the competitive environment, are considered differentiating elements compared to other sports [3].

The literature also points out that the social affiliation component and the community structure inherent in CrossFit play a decisive role in adherence and continuity of practice [5, 7, 10]. This social dimension contributes not only to the motivation of practitioners but also to their psychological well-being and is often referred to as one of the main factors for maintaining regular practice.

Altogether, it is important to investigate the main motivational factors that influence CrossFit practitioners to understand their behavior better, support more effective interventions in this area, and, consequently, contribute to the promotion of active and healthy lifestyles. The main objective of this study was to analyze the motivational factors that influence the regular practice of CrossFit, based on the dimensions assessed by an instrument validated for the Portuguese population [11].

The specific objectives: to identify the main motivational factors for practicing physical exercise; to verify motivational differences according to gender, length of time practicing, and weekly training frequency; and to explore the predominance of intrinsic over extrinsic motivation in this sport.

Based on the literature, the following hypotheses were formulated: i) CrossFit practitioners show higher levels of intrinsic motivation than extrinsic motivation, consistent with studies reporting high intrinsic engagement in CrossFit [6, 9]. ii) Practitioners with longer practice time show higher levels of intrinsic motivation, aligning with findings that sustained experience is associated with more self-determined forms of motivation [12]. iii) There are significant differences in motivational factors according to gender, namely greater social affiliation in females and greater competitiveness in males, consistent with Box et al. (2019) [8] and Marin et al. (2018) [13], who observed sex-specific motivational orientations in CrossFit. iv) Practitioners with a higher weekly frequency show greater general motivation to practice, as suggested by Dominski et al. (2020) [10], who associated training regularity with stronger motivational regulation.

Analytical clarification: hypotheses related to practice duration and weekly training frequency were tested using a global motivation index rather than separate intrinsic and extrinsic composites. Therefore, these hypotheses were interpreted at the level of general motivational engagement. The hypothesis concerning the predominance of intrinsic motivation was evaluated descriptively through the pattern of QME dimensions and items, and not through a direct inferential comparison between intrinsic and extrinsic composite scores.

2. Methods

The purpose of this quantitative and descriptive study was to analyze the motivational factors that influence CrossFit practitioners at boxes located in the municipality of Penafiel, Portugal.

The sample consisted of 135 regular CrossFit practitioners, of whom 78 (57.8 %) were males and 57 (42.2 %) females. Regular practitioners were defined as individuals attending CrossFit classes at least twice per week for the previous three months. The average age was 30.5 ±7.4 years (Table 1), characterizing a predominantly young adult population, with an age range representative of the typical profile of practitioners of this sport [14]. The final sample size ($n = 135$) is consistent with or larger than sample sizes used in previous studies analyzing motivational aspects in CrossFit [8-10]. Moreover, a priori power analysis using G*Power (two-tailed independent t-test, medium effect size $d = 0.5$, $\alpha = 0.05$, power = 0.80) indicated a minimum of 128 participants, suggesting that the current sample provided adequate statistical power.

Concerning the level of academic qualifications, the data was collected using an ordinary scale

coded from 1 to 6, where: 1 corresponds to Elementary school, 2 to Secondary school, 3 to Higher Professional Technical Course (CTeSP), 4 to Bachelor's degree, 5 to Master's degree, and 6 to PhD. The average obtained was 3.33±1.23, suggesting that, overall, the participants have a level of academic qualification situated mostly between the CTeSP and the Degree, with some variability between the different academic degrees.

Table 1. Demographic characteristics by gender

Variable	Female ($n = 57$)	Male ($n = 78$)	Total ($n = 135$)
Age (years, mean ± SD)	29.9±6.9	30.6±8.4	30.5±7.4
Practice time (years, mean ± SD)	2.69±1.25	2.64±1.32	2.66±1.28
Weekly training frequency (sessions/week, mean ± SD)	3.99±1.27	4.40±1.28	4.23±1.28
Competition participation (%)	42.1 %	39.7 %	41 %

The participant's employment status was also coded ordinally, with the following values: 1 – Worker, 2 – Student, 3 – Worker/Student, and 4 – Unemployed. The mean score was 1.10±0.40, showing that the majority of individuals are in the labor market, with a low proportion of students and unemployed people.

The time spent practicing the sport was grouped into four categories, which were then converted into continuous values for statistical analysis: "Less than 6 months" = 0.5 years; "6 months to 1 year" = 0.75 years; "1 to 3 years" = 2 years; and "More than 3 years" = 4 years. The average time spent practicing was 2.66±1.28 years, which shows, on average, moderate to long experience on the part of the participants, reflecting a level of involvement and consolidation in CrossFit practice.

About the weekly frequency of training, three categories were considered: "1-2 times" = 1.5 workouts/week; "3-4 times" = 3.5 workouts/week; and "5 or more times" = 5.5 workouts/week. The average obtained was 4.23±1.28 workouts per week, which indicates a high regularity of practice, generally between three and five workouts per week.

Participation in CrossFit competitions was assessed as a dichotomous variable (1 = Yes; 0 = No). The mean was 0.41±0.49, revealing that 41 % of the sample said they had already taken part in at least one competition, which shows a balanced distribution of competitive involvement in the sport. All participants were members of CrossFit-affiliated boxes located in the municipality of Penafiel, namely: NorthCall CrossFit, 16.9 CrossFit, VNation CrossFit, IKCrossFit, and Play Life CrossFit. The inclusion criteria defined for this study were: being a CrossFit practitioner in a box located in the municipality of Penafiel, and voluntarily agreeing to take part of the research. The heterogeneity of the sample in terms of gender, age, length of time practicing, and weekly frequency allowed for a detailed characterization and comprehensive analysis of the motivational factors associated with practicing CrossFit.

3. Instruments

For data collection, the Portuguese version of the Exercise Motivations Inventory-2 (EMI-2), the Exercise Motivation Questionnaire (QME), translated and validated by Alves and Lourenço (2003) [11]. This instrument has a multidimensional structure, made up of 14 factors grouped into five major domains: i) psychological motives: pleasure, challenge, revitalization, and stress management; ii) inter-personal motives: affiliation, social recognition, and competition; iii) health motives: health maintenance and disease prevention; iv) body motives: weight and control appearance; v) motives related to physical condition: strength/endurance and agility/flexibility.

The items are assessed on a 6-point Likert scale, ranging from 0 ("Not at all true for me") to 5 ("Completely true for me"), allowing measurement of the degree to which the participants agree with each reason presented. The Portuguese version of the QME has good psychometric properties, demonstrating validity and reliability for assessing motivational profiles in the context of non-competitive physical exercise [11]. Its comprehensiveness makes it particularly suited to

the reality of CrossFit, allowing us to explore the complexity of the motives that underpin this practice. In the present sample, the QME demonstrated excellent overall internal consistency (Cronbach's $\alpha = 0.93$ for the 51 items). At the factor level, Cronbach's α values ranged from 0.59 (Revitalization) to 0.83 (Enjoyment), with most subscales exceeding 0.70, indicating acceptable to excellent reliability. The lower coefficients observed in a few factors with fewer items are consistent with prior applications of the instrument.

The questionnaire was administered in digital format using the Google Forms platform, ensuring anonymity, informed consent, and confidentiality following the ethical principles of research. As all items were set as mandatory, no missing responses occurred in the dataset, and no imputation or exclusion procedures were required. This online approach proved particularly effective for an active population who are technically familiar with digital media, a common characteristic among CrossFit practitioners.

4. Procedures

Before the data collection, a favorable opinion was sought from the CrossFit boxes involved, ensuring compliance with the ethical standards applicable to the research. Afterwards, a brief presentation of the study was made to the managers of each space, explaining the objectives, the methodology, and the importance of the practitioners' participation.

Participants were recruited through a convenience sampling strategy, with invitations disseminated via email, internal WhatsApp groups, and the official social networks of the boxes. Participation was entirely voluntary, and no financial or material incentives were provided. This strategy aimed to maximize the response rate and promote the diversity of the sample. As the invitations were disseminated across multiple digital platforms, it was not possible to calculate an exact response rate. In addition, the total number of eligible practitioners across the participating boxes was not available, preventing calculation of a precise representativeness estimate. These factors should be considered when interpreting the external validity of the findings.

Before accessing the questionnaire, all participants were presented with an informed consent form, which explained the purpose of the study, the procedures involved, the estimated response time (around 10 minutes), as well as guarantees of anonymity and protection of personal data. Informed consent was obtained digitally, as participants were required to read the consent form and actively select the option 'I agree to participate' before gaining access to the questionnaire. This procedure ensured ethical compliance and participant autonomy. The option of collecting data online proved to be suitable for the target population, making it easy to access and fill in the questionnaire in a comfortable, autonomous, and secure way. Participants completed the questionnaire in a single sitting via Google Forms. The platform required all items to be answered before submission, ensuring complete data collection and minimizing the risk of response bias due to interruptions or multiple sessions.

5. Statistical analysis

The data were statistically analyzed using JASP software. Descriptive statistics (mean and standard deviation) were used to characterize the sample and the reasons for practicing CrossFit. To compare the groups, t-tests for independent samples were applied to identify statistically significant differences in motivational factors according to the gender of the participants. This approach made it possible to analyze both the 51 individual items of the QME and its aggregate dimensions, providing an in-depth understanding of the motivational patterns between males and females. Effect sizes (Cohen's d) were systematically calculated and reported for all comparisons, regardless of statistical significance, to provide an assessment of the practical magnitude of differences.

To examine the effects of practice duration and weekly training frequency on motivation, a global motivation index was calculated as the mean of all 51 items of the QME. This procedure

provided a general indicator of overall motivational engagement with CrossFit practice, irrespective of the specific motive type. Although the QME is multidimensional, the use of an aggregated index has been adopted in previous studies as a proxy for overall exercise motivation [12, 15].

One-way ANOVAs were then conducted on this global motivation index to test for differences across practice duration categories and training frequency groups. When significant main effects were observed, Bonferroni-adjusted post hoc comparisons were planned to identify pairwise group differences. Interaction effects, such as practice duration × weekly training frequency, were not tested in the present analysis because the available analytical strategy focused on separate exploratory group comparisons. Given the exploratory nature of these analyses, the results were interpreted as preliminary indicators of potential trends rather than definitive evidence for specific motivational constructs.

The decision to use a global motivation index was based on the study's focus on general motivational engagement rather than on specific subdomains (e.g., intrinsic versus extrinsic motives). Nevertheless, this operationalization is acknowledged as a limitation because it may conflate distinct motivational qualities and does not allow direct inferential testing of intrinsic and extrinsic motivation as separate constructs.

6. Results

Table 2 shows the comparison between males and females regarding motivations for practicing CrossFit, based on the 51 questions in the QME. Mean and standard deviations were calculated by gender, the value of the t-test for independent samples, the respective significance value (p), the effect size (Cohen's d), and the 95 % confidence interval (95 % CI) for this effect. The interpretation of Cohen's d follows conventional guidelines: values up to 0.2 indicate a small effect, values close to 0.5 indicate a moderate effect, and values above 0.8 indicate a high effect [16]. Effect sizes are reported systematically for all comparisons to complement statistical significance testing.

Most of the motivations did not show statistically significant differences between the sexes ($p > 0.05$), and the effect sizes were generally small. However, there were significant differences of motivations, with higher values for males in questions associated with competition, social comparison and recognition, such as: "To show my merit/value to other" ($d = –0.694$), "To make me stronger/more robust" ($d = –0.782$), "To compare my abilities with those of others" ($d = –0.896$) and "To be recognized for my performances/achievements" ($d = –0.955$), all with $p < 0.001$ and moderate to high magnitude effects. On the other hand, females showed significantly higher motivations for items related to health, well-being, and appearance, such as "To keep myself looking good" ($d = –0.442$; $p = 0.012$), "To maintain good health" ($d = 0.544$; $p = 0.002$), and "To recharge" ($d = 0.487$; $p = 0.006$). These results indicate different motivational patterns between sexes, with males showing a greater competitive and extrinsic orientation, while females show a greater appreciation of factors related to well-being, health and self-regulation.

Table 2. Comparison between the sexes in the answers to the QME questionnaire

Question	Female ($\bar{x} \pm sd$)	Male ($\bar{x} \pm sd$)	t	p	Cohen's d	95 % IC for Cohen's d
1- To stay slim	2.7±1.4	3.3±1.2	–2.534	0.012*	–0.442*1	[–0.786; –0.095]
2- To avoid ill-health	3.5±1.4	3.5±1.5	0.124	0.902	0.022*1	[–0.320; 0.363]
3- Because it makes me feel good	4.7±0.7	4.7±0.5	–0.285	0.776	–0.050*1	[–0.391; 0.292]
4- To help me look younger	1.6±1.6	2.3±1.7	–2.204	0.029*	–0.384*1	[–0.728; –0.039]
5- To show my worth to others	0.6±1.0	1.5±1.5	–3.984	< .001*	–0.694*2	[–1.045; –0.342]

6- To give me space to think	2.3±1.7	2.4±1.6	–0.150	0.881	–0.026*1	[–0.368; 0.315]
7- To have a healthy body	4.7± 0.6	4.5±0.7	2.455	0.015	0.428*1	[0.082; 0.772]
8-To build up my strength	3.7±1.3	4.5±0.8	–4.488	< .001*	–0.782*2	[–1.135; –0.426]
9- Because I enjoy the feeling of exerting myself	4.±1.0	4.4±0.8	0.502	0.616	0.088*1	[–0.254; 0.429]
10- To spend time with friends	3.2± 1.6	3.4±1.4	–0.662	0.509	–0.115*1	[–0.457; 0.227]
11- Because my doctor advised me to exercise	0.4± 1.0	0.5±1.2	–0.800	0.425	–0.139*1	[–0.481; 0.203]
12- Because I like trying to win in physical activities	1.6± 1.6	2.8±1.5	–4.520	< .001*	–0.788*2	[–1.141; –0.432]
13- To stay/become more agile	4.4± 1.0	4.2±0.9	1.021	0.309	0.178*1	[–0.165; 0.520]
14- To give me goals to work towards	3.8± 1.3	3.9±1.2	–0.525	0.601	–0.091*1	[–0.433; 0.250]
15- To lose weight	2.7± 1.8	2.5±1.9	0.555	0.580	0.097*1	[–0.245; 0.438]
16-To prevent health problems	4.4± 0.9	4.2±1.1	1.116	0.266	0.194*1	[–0.148; 0.536]
17- Because I find exercise invigorating	3.9± 1.3	3.7±1.2	0.703	0.483	0.123*1	[–0.220; 0.464]
18- To have a good body	3.2± 1.5	3.6±1.2	–1.684	0.095	–0.293*1	[–0.636; 0.051]
19- To compare my abilities with other peoples'	0.5± 0.9	1.6±1.5	–5.140	< .001*	–0.896*3	[–1.252; –0.536]
20- Because it helps to reduce tension	3.9± 1.6	3.7±1.6	0.887	0.377	0.155*1	[–0.188; 0.496]
21- Because I want to maintain good health	4.8± 0.7	4.3±0.9	3.124	0.002*	0.544*2	[0.196; 0.891]
22- To increase my endurance	4.7± 0.6	4.4±0.9	2.439	0.016*	0.425*1	[0.079; 0.770]
23- Because I find exercising satisfying in and of itself	4.4± 1.2	4.2±1.0	0.746	0.457	0.130*1	[–0.212; 0.472]
24- To enjoy the social aspects of exercising	3.0±1.6	2.9±1.7	0.232	0.817	0.040*1	[–0.301; 0.382]
25- To help prevent an illness that runs in my family	1.6 ±1.8	1.8±1.9	–0.619	0.537	–0.108*1	[–0.449; 0.234]
26- Because I enjoy competing	1.8±1.7	2.6±1.7	–2.662	0.009*	–0.464*1	[–0.809; –0.117]
27- To maintain flexibility	3.7±1.4	3.7 ±1.4	–0.126	0.900	–0.022*1	[–0.363; 0.320]
28- To give me personal challenges to face	4.1±1.4	4.3 ±1.0	–1.058	0.292	–0.184*1	[–0.526; 0.158]
29- To help control my weight	3.4±1.7	3.3±1.8	0.156	0.876	0.027*1	[–0.314; 0.369]
30- To avoid heart disease	3.5±1.6	3.5±1.6	0.141	0.888	0.025*1	[–0.317; 0.366]
31- To recharge my batteries	4.4±1.1	3.7±1.4	2.794	0.006*	0.487*1	[0.139; 0.832]
32- To improve my appearance	3.5±1.3	3.6±1.3	–0.680	0.498	–0.118*1	[–0.460; 0.224]
33- To gain recognition for my accomplishments	0.6±1.0	2.0±1.6	–5.480	< .001*	–0.955*3	[–1.314; –0.593]
34- To help manage stress	4.3±1.2	3.8±1.3	2.195	0.030*	0.383*1	[0.037; 0.726]
35- To feel more healthy	4.7±0.7	4.4±0.9	1.718	0.088	0.299*1	[–0.045; 0.642]
36- To get stronger	4.3±1.1	4.6±0.6	–1.943	0.054	–0.339*1	[–0.682; 0.006]
37- For enjoyment of the experience of exercising	4.5±1.1	4.5±0.7	–0.057	0.955	–0.010*1	[–0.351; 0.332]

38- To have fun being active with other people	4.2±1.3	4.1±1.0	0.303	0.762	0.053*1	[–0.289; 0.394]
39- To help recover from an illness/injury	1.1±1.6	1.5±1.7	–1.261	0.209	–0.220*1	[–0.562; 0.123]
40- Because I enjoy physical competition	2.3±1.8	3.2±1.6	–3.178	0.002*	–0.554*2	[–0.901; –0.205]
41- To stay/become flexible	3.8±1.4	3.7±1.4	0.300	0.765	0.052*1	[–0.289; 0.394]
42- To develop personal skills	4.0±1.4	4.0±1.1	0.199	0.843	0.035*1	[–0.307; 0.376]
43- Because exercise helps me to burn calories	3.6±1.6	3.3±1.7	0.841	0.402	0.147*1	[–0.196; 0.488]
44- To look more attractive	2.7±1.5	3.2±1.6	–1.829	0.070	–0.319*1	[–0.662; 0.026]
45- To accomplish things that others are incapable of	0.5±1.1	1.8±1.7	–5.083	< .001*	–0.886*3	[–1.242; –0.527]
46- To release tension	4.2±1.1	3.9±1.3	1.340	0.182	0.234*1	[–0.110; 0.576]
47- To develop my muscles	4.0±1.3	4.2±1.0	–1.033	0.303	–0.180*1	[–0.522; 0.163]
48- Because I feel my best when exercising	4.0±1.3	4.2±1.0	–0.964	0.337	–0.168*1	[–0.510; 0.174]
49- To make new friends	2.8±1.7	2.8±1.6	0.055	0.957	0.010*1	[–0.332; 0.351]
50- Because I find physical activities fun, especially when competition is involved	2.5±1.7	3.1±1.4	–2.449	0.016*	–0.427*1	[–0.771; –0.081]
51- To measure myself against personal standards	2.7±1.7	3.3±1.4	–2.133	0.035*	–0.372*1	[–0.715; –0.027]
Note: All questionnaire items were scored on a 6-point Likert scale ranging from 0 = "Not at all true for me" to 5 = "Completely true for me"						

Table 3 shows the results of the t-test for independent samples applied to the comparison between sexes in the aggregate motivational dimensions of the QME. The dimensions evaluated included five major domains: i) psychological motives (Stress, Revitalization, Pleasure, Challenge); ii) interpersonal motives (Social Recognition, Affiliation, Competition); iii) health motives (Health, Illness, Staying Healthy); iv) body-related motives (Weight, Appearance), and v) physical condition motives (Strength/Resistance, Agility). For each dimension, the t-value, significance value (p), mean difference between sexes, 95 % confidence interval (95 % CI) of the mean difference, and Cohen's d size are presented.

Most of the dimensions showed no statistically significant differences between sexes ($p > 0.05$), and the effect sizes were generally small, indicating a trend towards homogeneity in the motivations for exercise between males and females. However, there were two dimensions with statistically significant differences and relevant effect sizes. The "Social Recognition" dimension showed significant differences ($t = –3.653$; $p < 0.001$) with a moderate effect size ($d = –0.637$), suggesting that males attach greater importance to external recognition in the context of physical exercise. In addition, the "Competition" dimension also showed significant differences ($t = –2.187$; $p = 0.030$; $d = –0.381$), although with a small to moderate effect size, reinforcing the tendency of males to value competitive aspects in exercise.

The other dimensions, such as "Stress", "Revitalization", "Pleasure", "Challenge", "Affiliation", "Health", "Staying healthy", "Weight", 'Appearance', "Strength/Resistance" and "Agility" showed no statistically significant differences between sexes ($p > 0.05$) and small effect sizes ($d < 0.3$). These results indicate that, despite some specific discrepancies, the intrinsic motivations associated with well-being, health, and enjoyment of exercise tend to be similarly shared by males and females.

To test the hypotheses related to practice duration and training frequency, one-way ANOVAs were conducted using the global motivation index (mean of all QME items) as the dependent variable.

Table 3. Comparisons between genders in the analytical dimensions of the QME where: $p < 0.05$: statistically significant differences; *1: low effect; *2: moderate effect; *3: high effect

	t	p	Mean difference	95% IC para Cohen's d	Cohen's d
Stress	–1.088	0.278	0.242	[–0.532; 0.153]	–0.190*1
Revitalization	–1.557	0.122	0.252	[–0.614; 0.072]	–0.271*1
Pleasure	–1.377	0.171	0.005	[–0.582; 0.103]	–0.240*1
Challenge	–0.343	0.732	–0.213	[–0.401; 0.282]	–0.060*1
Social Recognition	–3.653	< 0.001*	–1.159	[–0.985; –0.285]	–0.637*2
Affiliation	–0.839	0.403	–0.007	[–0.488; 0.196]	–0.146*1
Competition	–2.187	0.030*	–0.901	[–0.725; –0.036]	–0.381*2
Health	0.186	0.853	–0.237	[–0.309; 0.374]	0.032*1
Illness	1.455	0.148	0.09	[–0.090; 0.596]	0.254*1
Staying Healthy	–1.159	0.248	0.335	[–0.544; 0.141]	–0.202*1
Weight	0.818	0.415	–0.028	[–0.200; 0.484]	0.143*1
Appearance	–1.046	0.297	–0.414	[–0.524; 0.160]	–0.182*1
Strength/ Resistance	1.178	0.241	–0.238	[–0.138; 0.547]	0.205*1
Agility	0.462	0.645	0.069	[–0.261; 0.422]	0.081*1
Note: All questionnaire items were scored on a 6-point Likert scale ranging from 0 = "Not at all true for me" to 5 = "Completely true for me"					

Results showed a significant effect of practice duration, $F(3,131) = 2.91$, $p = 0.037$, $\eta^2 = 0.06$, with longer-practicing individuals reporting higher overall motivation levels.

Training frequency also showed a significant effect, $F(2,132) = 10.25$, $p < 0.001$, $\eta^2 = 0.13$, indicating that practitioners training five or more times per week exhibited the highest global motivation scores. However, as the dependent variable was a global motivation index, this finding should be interpreted as evidence of higher overall motivational engagement rather than higher intrinsic motivation specifically.

Hypothesis summary. Hypothesis (i), which proposed higher intrinsic than extrinsic motivation, was not directly tested inferentially because intrinsic and extrinsic composite scores were not calculated; it is therefore discussed descriptively based on the pattern of QME dimensions and items. Hypothesis (ii), which proposed higher intrinsic motivation among longer-practicing individuals, was only partially addressed: practice duration was significantly associated with the global motivation index, but not with a specific intrinsic motivation composite. Hypothesis (iii) was partially supported, as males scored higher in Social Recognition and Competition, whereas the predicted higher Affiliation among females was not statistically confirmed. Hypothesis (iv) was supported at the level of global motivation, with higher weekly training frequency associated with higher overall motivation.

Post hoc clarification. Bonferroni-adjusted post hoc comparisons were planned following significant ANOVA main effects. However, because the present manuscript focuses on a global motivation index rather than specific intrinsic/extrinsic domains, pairwise interpretations are presented cautiously and the omnibus ANOVA results are emphasized.

7. Discussion

The present findings show both consistencies and divergences with prior CrossFit research. For example, Feito et al. [9] reported that enjoyment, challenge, and affiliation were salient motives for CrossFit participation, which is consistent with the high scores observed in items and dimensions commonly associated with enjoyment and personal improvement in the present sample. However, because this study did not compute separate intrinsic and extrinsic motivation composites, the results should be interpreted as reflecting motivational patterns rather than as a direct inferential test of intrinsic motivation predominance. Similarly, Dominski et al. [10] emphasized the relevance of social factors and community belonging, while Box et al. [8]

highlighted competition as a predictor of adherence. In the current sample, competitiveness was more prominent among males, whereas affiliation did not differ significantly by sex at the aggregate dimension level. These consistencies and discrepancies underscore the complexity of motivational drivers in CrossFit and suggest that contextual or cultural factors may moderate the relative weight of different motives in different practitioner populations.

In line with Self-Determination Theory [1], the descriptive pattern of results suggests the coexistence of motives with different degrees of self-determination among CrossFit practitioners. Males showed greater endorsement of competitive and recognition-oriented motives, while females showed comparatively greater endorsement of selected health, well-being, and self-regulation items. Nevertheless, these interpretations should be understood at the level of QME items and domains, rather than as definitive evidence of distinct intrinsic and extrinsic motivational profiles.

Box et al. [8] and Marin et al. [13] corroborate these findings, identifying that males tend to practice CrossFit motivated by competition, overcoming limits, and social status within the community of the modality. However, the females in this study attributed greater importance to factors such as "Maintaining good health" ($d = 0.544$), "Recharging energy" ($d = 0.487$) and "Staying stylish" ($d = –0.442$), reinforcing the evidence that motivations related to health, appearance and well-being are more prevalent in this group (2,12). It should be noted, however, that the Revitalization subscale of the QME presented a borderline Cronbach's alpha ($\alpha = 0.59$) in this sample. As such, although the item "To recharge" (Q31) showed a statistically significant difference between genders, this result should be interpreted with caution. Lower internal consistency in this subscale may reflect the limited number of items rather than conceptual weakness, but it nonetheless constrains the precision of inferences regarding gender differences within this motivational dimension (2,11).

Although Hypothesis (iii) predicted greater social affiliation among females, this trend was not statistically significant at the aggregate dimension level (Table 3). Individual items within the Affiliation domain (e.g., "To spend time with friends," "To have fun being active with other people") showed small, non-significant differences favoring females, suggesting a potential inclination toward social motives. However, these differences did not reach statistical significance, and therefore the hypothesis of higher affiliation among females must be interpreted with caution. Overall, both sexes appeared to share similar levels of social motivation, reinforcing the strong communal ethos characteristic of CrossFit across genders.

Concerning the dimensions of the EQF, the only statistically significant differences between the sexes were observed in the "Social Recognition" ($p < 0.001$; $d = –0.637$) and "Competition" ($p = 0.030$; $d = –0.381$) dimensions. Both dimensions are related to extrinsic motivations and point to a greater appreciation of external rewards and competitive status among males. This result is consistent with the literature that associates extrinsic motivation with contexts where performance is publicly visible and rewarded [17], as is the case in the challenging community environment of CrossFit.

In contrast, no statistically significant sex differences were observed in dimensions commonly interpreted as more self-determined or internally oriented, such as Pleasure, Revitalization, and Challenge. This suggests that enjoyment, challenge, and well-being-related motives may be broadly shared across male and female CrossFit practitioners. However, because the QME domains were not reorganized into formal intrinsic and extrinsic composites, this interpretation should remain cautious and descriptive.

The high number of weekly workouts reported by the sample ($x = 4.23 \pm 1.28$) may indicate a high degree of general motivation and commitment to practice. The ANOVA results further suggested that higher weekly training frequency was associated with higher global motivation. Nevertheless, this association should not be interpreted causally or as evidence of higher intrinsic motivation specifically, since the analysis was cross-sectional and based on a global motivation index. The average practice time of 2.66±1.28 years also demonstrates sustained continuity,

possibly explained by the combination of enjoyment, perceived competence, social support, and constant challenges that characterize CrossFit [5].

8. Limitations

This study has some limitations that should be acknowledged. First, the use of convenience sampling and voluntary participation may have introduced self-selection bias, as individuals with greater motivation or stronger affiliation to their CrossFit box might have been more likely to respond. Therefore, the results may overrepresent more engaged practitioners, potentially limiting their generalizability to the broader CrossFit population. Future studies should consider random sampling strategies or multi-site recruitment to enhance representativeness.

A further limitation relates to the psychometric assessment of the instrument. Although Cronbach's alpha confirmed adequate internal consistency for most factors, some dimensions with fewer items (e.g., Revitalization, Challenge) showed lower coefficients, which may reflect scale length rather than poor measurement quality. Additionally, we did not conduct confirmatory factor analysis to test the 14-factor structure in this specific sample. Future studies should address this gap to confirm the factorial validity of the QME among CrossFit practitioners.

Although practice duration and frequency effects were significant, the analyses were limited to overall motivation scores. Therefore, these findings cannot be interpreted as direct evidence that practice duration or training frequency affects intrinsic motivation specifically. Future research should explore these relationships across specific motivational factors using multivariate models and separate intrinsic/extrinsic composites. Interaction effects between practice duration and weekly training frequency were also not tested, meaning it remains unclear whether the association between training frequency and motivation differs according to practitioners' experience level. By reporting effect sizes for all comparisons, this study nonetheless offers insights into the practical magnitude of the observed differences, which complement statistical significance.

Another limitation concerns the categorization of practice duration and weekly training frequency. Although this approach facilitated group comparisons, categorizing behavioral variables may reduce statistical power, obscure within-group variability, and weaken the detection of dose-response relationships. Future studies should consider retaining continuous measures where possible or using regression-based approaches that preserve more information.

In addition, the cross-sectional design of this study restricts causal inferences, as motivational profiles and training behaviors may influence each other dynamically over time. The reliance on self-report measures also raises the possibility of response biases, particularly social desirability effects in the reporting of motivation. Furthermore, as the study was conducted with CrossFit practitioners from a single Portuguese municipality (Penafiel), cultural and contextual specificities may limit the generalizability of the findings. To address these limitations, future research should employ longitudinal designs and more geographically diverse samples to track motivational changes over time and improve external validity.

Finally, the use of a single global motivation index, while operationally practical, does not differentiate between intrinsic and extrinsic motives as conceptualized by self-determination theory. Future studies should analyze QME domains separately or apply composite indices specific to intrinsic motivation (e.g., Pleasure, Challenge, Revitalization) to refine the interpretation of motivational profiles in CrossFit practitioners.

9. Conclusions

The findings of this study also carry relevant practical implications for CrossFit coaches and fitness professionals. Recognizing that males in our sample displayed stronger competitive and recognition-oriented motives, coaches might consider incorporating structured performance benchmarks, leaderboard tracking, and competitive events to sustain engagement in this group.

Conversely, given that females placed greater emphasis on health, well-being, and self-regulation, program design could highlight wellness outcomes, stress management, and body composition benefits to better align with their motivational orientations.

Beyond gender differences, the generally high endorsement of enjoyment, health, well-being, and social motives across the sample suggests that fostering a supportive community environment remains a key strategy for adherence. Coaches may enhance engagement by integrating team-based challenges, group goals, and collective celebrations of progress, which reinforce affiliation and belonging regardless of gender. These approaches may not only increase motivation in the short term but also promote long-term commitment to CrossFit practice.

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Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author contributions

Sara Silva: investigation, data curation, writing-original draft preparation. Amanda Batista: conceptualization, methodology, formal analysis, writing-review and editing. Alexandra Malheiro: supervision, project administration, writing-review and editing. Miguel Leal: validation, resources, investigation. Pedro Flores: software, visualization, writing-review and editing. Joana Ribeiro: literature review, writing-original draft preparation, editing.

Conflict of interest

Dr. Joana Ribeiro is an editorial board member for Sports, Performance and Wellbeing and was not involved in the editorial review and/or the decision to publish this article.

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