

## MOTIVATION TO PRACTICE CROSSFIT: VALIDATION OF A PSYCHOMETRIC INSTRUMENT

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### ABSTRACT

This research aimed to use self-determination theory to evaluate the motivational quality of Crossfit practitioners and search for correlations between the measured motivational quality and the self-reported satisfaction of the basic psychological needs of autonomy, competence and relatedness. Data were collected from a validated psychometric instrument (scale) and applied to 301 individuals practicing Crossfit in different boxes in the

States of Rio Grande do Norte, Rio Grande do Sul, Minas Gerais and Santa Catarina. Our results report that autonomous motivation had a higher overall mean among Crossfit practitioners (mean = 3.9, standard deviation = 0.6) on a scale ranging from 1.0 to 5.0. Furthermore, we observed that participants reported a high degree of satisfaction of the basic psychological needs of autonomy, relatedness and competence.

**KEYWORDS:** Motivation, Self Determination Theory, Crossfit

## MOTIVAÇÃO PARA A PRÁTICA DE CROSSFIT: VALIDAÇÃO DE UM INSTRUMENTO PSICOMÉTRICO

### RESUMO

Essa pesquisa teve como objetivo utilizar a teoria da autodeterminação para avaliar a qualidade motivacional em praticantes de Crossfit e buscar por correlações entre a qualidade motivacional medida e a satisfação autorrelatada das necessidades psicológicas básicas de autonomia, competência e pertencimento. Os dados foram coletados a partir de um instrumento psicométrico (escala) validada e aplicada a 301 indivíduos praticantes de Crossfit em diversos boxes dos Estados do Rio Grande do Norte, Rio Grande do Sul, Minas Gerais e Santa

Catarina. Nossos resultados informam que a motivação autônoma teve maior média geral entre os praticantes de Crossfit (média = 3,9, desvio padrão = 0,6) em uma escala que varia de 1,0 a 5,0. Revelou também que essa motivação é independente de sexo, idade e tempo de prática. Além disso, observamos que os participantes relataram um alto grau de satisfação das necessidades psicológicas básicas de autonomia, pertencimento e competência.

**PALAVRAS-CHAVE:** Motivação, Teoria da Autodeterminação, Crossfit

## 1 INTRODUCTION

Crossfit is a fitness and metabolic program that had its training method created in 1995 and formally instituted in the year 2000 by Greg Glassman, a former gymnast and coach from the Santa Cruz region of California, United States. Glassman was apprehensive about not agreeing with the models of traditional gyms, since, in his view, they did not develop all the physical capabilities of the body. The modality, over time, continues to conquer practitioners among athletes, military and arouses a growing interest in the general population (Bergeron, 2011).

According to Glassman (2003), Crossfit is a training method defined as "functional exercises, constantly varied, performed at high intensity." It is a training program created taking into account the ten domains of fitness or physical fitness, namely: cardiorespiratory endurance, muscular endurance, strength, flexibility, power, speed, coordination, agility, balance and precision (Glassman, 2021), developing a broad, general and inclusive fitness that best prepares practitioners with any pathology.

Each training session has unique characteristics by merging three completely different modalities: Olympic weightlifting (OW), Gymnastics (GYM) and Endurance (running, rowing, swimming and cycling), subdivided into three parts: strength and power training, gymnastic elements and metabolic conditioning (Tibana, 2017). Its main objective is to improve physical conditioning, making the practitioner fit for the challenges that require good physical preparation in everyday life (Ganancio, Cabral & Maoski, 2018).

According to the figures revealed by the Official CrossFit Affiliate Map, there are more than 11 thousand boxes affiliated with CrossFit in the world, with Brazil being the second country with the highest expressiveness of affiliates, with about 570 boxes registered (CrossFit, 2024). It is characteristic of the practice its challenging character and its well-established community where teamwork and competitiveness are encouraged daily (Heinrich et al., 2014). Adherence to this type of exercise is quite high, from fit and healthy individuals to people with special needs, since it is an inclusive modality that can be adapted to any pathology that the student may present, taking into account physiological, technical, psychological aspects and the level of motor learning of the practitioners.



Because it is a modality with only 23 years, there are still gaps to be filled involving acute and chronic aspects, physiological (Li et al., 2018; Rodrigues et al., 2021) or psychological. Thus, it is essential that the teacher has a theoretical framework based on scientific evidence for the development of a safe and effective class program, having the understanding as a whole of the modality thus increasing the adherence and longevity of the practitioner.

Among the psychological aspects that influence the practice of any activity – physical or cognitive – and, in our case, specifically, the practice of Crossfit, motivation is a determining factor for the quality of the practitioner's performance. Several theories about motivation have been developed, tested and validated over the years (by way of examples, we can mention: Impulse Theory (Bolles, 1975), Expectancy x Value Theory (Vroom, 1964), Cognitive Evaluation Theory (Deci and Ryan, 1985), Self-Determination Theory (Ryan and Deci, 2000) and Self-Efficacy Theory (Bandura, 1997)). Initially, motivation theorists intended to develop macrotheories that, based on a single construct, were capable of explaining all facets of motivation (Reeve, 2019). Examples of these macrotheories are: the Theory of Will (according to Descartes, “[...] the will initiates and directs the action; it is up to it to decide if and when to act. (Reeve, 2019, p. 15)), the Theory of Instinct (derived from Darwin's theory, this motivational concept “[...] was able to explain what the philosophers of will could not – that is, where the motivational force comes from in the first place (Reeve, 2019, p. 16 )) and the Impulse Theory (“Freud [...] believed that all behavior is motivated, and that the purpose of behavior would be to serve the satisfaction of needs” (Reeve, 2019, p. 17)).

The development and deepening of research eventually convinced researchers that motivation, being a multidimensional aspect of the subject's psychology, cannot be fully shaped, explained or predicted from a single construct. Thus, mini-theories of motivation arise (Reeve, 2019). Examples of some mini-theories are: Achievement motivational theory (Atkinson, 1964), Attributional theory of achievement motivation (Weiner, 1972), Effects theory of motivation (White, 1959; Harter, 1987), Flow theory (Csikszentmihalyi, 1975 ) and Goal Setting Theory (Locke, 1968). Some of these mini-theories end up coming together forming macrotheories, but which, unlike the initial macrotheories, seek to explain motivation from different strands. An example of



one of these macrotheories widely used in the area of education and also in the area of sports activities is the Self-determination Theory (Ryan & Deci, 2017).

It is important to make it clear that the objective of this study is not based on understanding or developing any of the theoretical constructs or principles of the theories mentioned. Our proposal here consists solely of using Self-Determination Theory as a way of understanding the motivated behavior of Crossfit practitioners.

## 2 MOTIVATION AND THE SELF-DETERMINATION THEORY

Motivation is a complex construct that involves internal motives - needs, cognitions, and emotions - and external motives - "[...] environmental incentives that have the ability to energize and direct behavior" (Reeve, 2019, P.4). The style, demands and benefits of a physical activity influence how the interest and motivation for its practice is shaped.

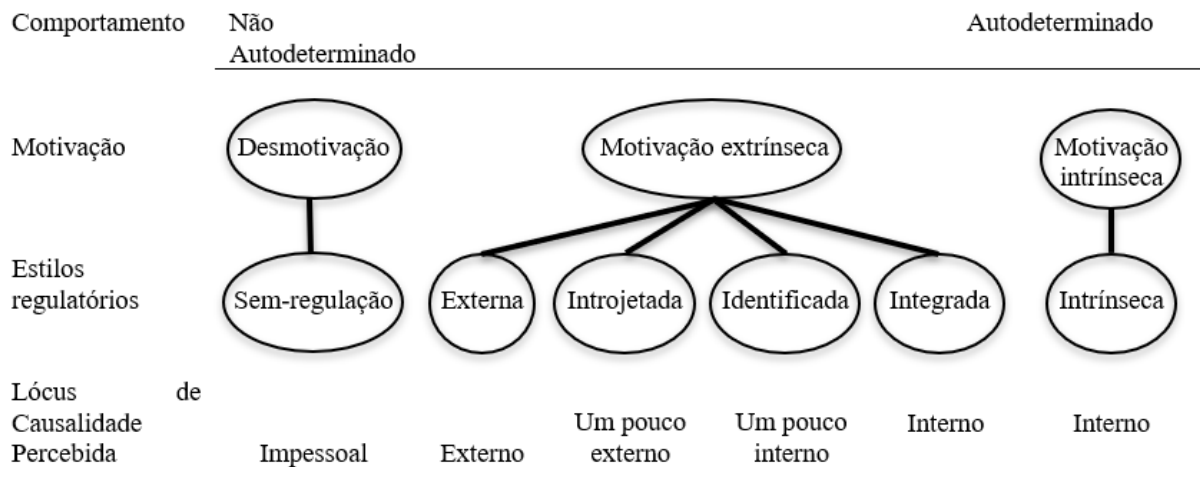
The approach that physical activity proposes plays a decisive role in the satisfaction of needs, in the self-perception of some cognitive aspects – for example, competence (Ryan & Deci, 2017) and self-efficacy (Bandura, 1997) - as well as in the strengthening of emotions. Ultimately, this significantly affects the motivation of the individual to practice the activity itself.

Motivation plays a vital role in how an individual utilizes their skills, impacting perception, attention, social and emotional behavior, learning, and performance. Among the various theories on motivation, the Theory Self-Determination (SDT) has gained prominence in recent studies on motivation in sports (Hsu & Valentova, 2020; Rodrigues et al., 2021; Wendt et al., 2021).

Within SDT, which is made up of six mini-theories, The Theory of Organismic integration (OIT) and the Basic Psychological Needs Theory (BPNT) are particularly relevant to our research. This relevance arises from the fact that it is from the constructs of these theories that it will be possible for us to specifically evaluate the motivational quality of the individuals studied, as well as which basic psychological needs are being nurtured and, therefore, are at the basis of the phenomenon we observe. OIT proposes the existence of a continuum of motivation, which ranges from demotivation (lack of intention, devaluation, lack of control) to intrinsic motivation (interest, joy, inherent satisfaction). This mini-theory highlights the presence of forms of extrinsic motivation



between demotivation and intrinsic motivation, including external regulation (obedience, external rewards and punishments), introjected regulation (self-control, ego, internal rewards and punishments), identified regulation (personal importance and conscious appreciation) and integrated regulation (awareness, congruence and goal hierarchy) (Coelho, Sousa and Neves Freire, 2023). Figure 1 shows a representation of the continuum of OIT.



**Figure 1. Representation of the motivation continuum proposed by OIT. Source: Adapted from (Deci & Ryan, 2000, p. 17)**

From the point of view of the OIT continuum, motivation can take on an impersonal locus (demotivation), external or internal (increasingly internal when moving from extrinsic motivation to extrinsic motivation in the continuum). Thus, it is possible to classify motivational quality as "demotivation", "controlled motivation" (when the perceived locus is external, encompassing extrinsic motivation by external and introjected regulation) or "autonomous motivation" (when the perceived locus is internal, encompassing extrinsic motivation by identified regulation, integrated regulation and intrinsic motivation).

Demotivation is associated with behaviors with no intention of seeking something. Controlled motivation occurs when the individual pursues a goal due to external pressures. On the other hand, autonomous motivation is characterized by behaviors in which the individual seeks a goal for internal reasons. Interactions between an individual and their environment can shape the evolution or involution of their motivation along this continuum.

BPNT proposes that human beings have basic psychological needs that must be nurtured in order to develop self-regulated motivation. They are the needs of autonomy, Relatedness and competence. These needs are considered universal, acting as essential nutrients and indispensable conditions for the healthy functioning of cognitive structures (Ryan & Deci, 2017; Deci & Ryan, 2000). In terms of the implications arising from the satisfaction of these needs, Ribeiro (2013, p. 55) highlights that the environment plays a crucial role:

"[...] the needs of individuals are met by the environment, and the environment can produce new forms of motivation. In this sense, environmental events can promote people's motivation (offering them challenges, positive feedback, opportunities for choice and social support). But at other times, they may ignore and frustrate all of these offers."

In this context, it is believed that the satisfaction of these three basic needs provides a sense of psychological well-being, allowing the full development of individual abilities. However, the frustration of these needs can result in feelings of unease, leading to a sense of failure and impairing development potential (Ryan; Deci, 2017; Deci; Ryan, 2000). Importantly, the subjective perception of the satisfaction or frustration of basic psychological needs plays a central role in our understanding and approach to these dynamics.

### 3 MOTIVATION AND THE PRACTICE OF PHYSICAL ACTIVITY

Interested in understanding how the Self-Determination Theory has been used in studies on motivation in the practice of sports/physical activities, we conducted a survey in the Scientific Electronic Library Online (SciELO), with the time frame between 2018 and 2023. The choice for this time frame aims solely to limit the number of studies analyzed, as well as to have a more in-depth understanding of the most recent ones. The search was performed using the following terms: ("Motivation in Sports" OR "Motivation in Crossfit") and took place on December 15 and 16, 2023. The survey process took into account only articles in journals with the Qualis CAPES "A" concept. Our interest was, therefore, to know only the studies published in the highest strata and, therefore, the most qualified.

With the descriptors chosen, the database presented a result of 90 studies. From these, all were in the database. However, among these, 48 works were left out because they did not fit into the time frame. Of the remaining 42 works, only 5 corresponded to works that involved the theme



“motivation in sport” and published in journals with the Qualis CAPES “A” concept.. Table 1 presents the information regarding these five publications.

**Tabela 1: Corpus de análise**

Author	Title	Year	Capes concept	Periódico
Rafael Ming Chin Santos Hsu Jaroslava Varella Valentova	Motivation for diferent physical activities: a comparison among sports, exercises and body/movement practices.	2020	A2	Psicologia USP
Andrea Wendt Luiza Isnardi Cardoso Ricardo Caroline dos Santos Costa Francine dos Santos Costa Thaynã Ramos Flores Rosália Garcia Neves Grégore Iven Mielke	Motivação para participação em esportes entre adultos brasileiros: Pesquisa Nacional de Amostras de Domicílios – 2015.	2021	A1	Ciência & Saúde Coletiva
Filipe Rodrigues Diogo Teixeira Rita Macedo Henrique Neiva Luís Cid Diogo Monteiro	O papel do divertimento e das determinantes motivacionais na persistência da prática de exercício físico.	2021	A1	Ciência & Saúde Coletiva
José Roberto Andrade do Nascimento Junior João Ricardo Nickening Vissoci Lenamar Fiorese Vieira	Propriedades Psicométricas da Versão Brasileira da Escala de Satisfação das Necessidades Básicas no Esporte (BNSSS).	2018	A1	Psicologia: Teoria e Pesquisa
Marcus Levi Lopes Barbosa Marcos Alencar Abaide Baibonitti Ricardo Pedroso Saldanha Aline Bonini Reis Pedroso Diehl	Validade do Modelo Hierárquico de Motivação Intrínseca e Extrínseca no Esporte Escolar	2019	A2	Psico-USF

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The work of Hsu & Valentova (2020) was the only article to investigate four distinct categories of physical activity and their possible effects related to sex and age, prioritizing individual and collective sports and body practices/movements. It explored a sample of 1,420 individuals of the states of the Rio Grande do Norte, Santa Catarina, Minas Gerais e Rio Grande do Sul, who had to respond to the Motivation for Physical Activities Measure-Revised, with the only requirement being 18 years or older. In this way, they obtained that intrinsic motives were greater for sports, while exercisers were motivated more extrinsically. Body/movement practices, although composed of several activities defined by previous studies as exercises, showed a motivational pattern closer to sport.

Wendt et al (2021), on the other hand, was the only article that did not use the Self-Determination Theory (Ryan & Deci, 2017) as a reference because it aimed to describe the reasons for the sports participation of the Brazilian adult population. The interviews were conducted through the National Household Sample Survey (SHSS) carried out by the Brazilian Institute of Geography and Statistics (IBGE) throughout the national territory. It took into account gender, age and education. They dealt with a sample of 71,142 participants aged 15 years and older. Participants answered a questionnaire with predetermined answers with sociodemographic and behavioral questions. Thus, it was verified that the prevalence of sports participation was higher in men than in women in all age groups, except in older population subgroups, where the most frequent reasons for sports participation were: fun and quality of life and performance.

Rodrigues et al (2021) aimed to use the Self-Determination Theory in the context of physical exercise proposed by Smith et al (2021). Thus, the authors analyzed the indirect effects of motivational determinants proposed by the self-determination theory on fun and persistence in





practitioners of regular physical exercise. It had the participation of 967 active individuals with at least 6 months of regular experience in physical exercise (all from the Covilhã region in Portugal). All participants completed questionnaires translated into Portuguese that examined the perception of interpersonal behaviors, basic psychological needs, regulation of motivation and fun. The results showed that enjoyment had the highest mean (5.87) compared to the motivational determinants. According to electronic records, 572 participants (59%) continued to perform a physical activity similar to that initially reported, thus supporting the role that enjoyment plays in the persistence of physical exercise practice and that exercise and health professionals should take into account the implications that interpersonal behaviors have on the quality of motivation, enjoyment and intention to continue exercising.

Who also made use of the Self-Determination Theory (Ryan & Deci, 2017), was Nascimento et al (2018). The authors investigated the psychometric properties of the Brazilian version of Basic Needs Satisfaction in Sport Scale (BNSSS). The instrument was translated by 3 experts in the field and answered by a total of 475 people coming from different regions of Brazil (the study does not give further details about this). Of these, 395 were adult athletes of collective and individual modalities (from the final phase of the Paraná Open Games) and, for the analysis of temporal stability, 80 athletes (non-probabilistic form) of different sports modalities were selected. With a satisfactory sampling, the results showed clear and relevant translations among the three experts, and satisfactory internal consistency of the items in Portuguese, and, for greater stability, the experts suggested the exclusion of eight items from the Basic Needs Satisfaction in Sport Scale (1,4,5,6,7,9,13 and 20), finishing the Brazilian version with questions (11,12,14 and 17) for Competence, (2,3,8,15 and 16) for Autonomy and (10,18,19) for Relationship.

One year after Nascimento et al (2018), Barbosa et al. 2019 brought the self-Determination Theory (Ryan & Deci, 2017), to evaluate the validity of the hierarchical model of intrinsic and extrinsic motivation proposed by Valerand (1997). They worked with a sample of 517 students practicing school sports aged 13 to 19 years regularly enrolled in public and/or private schools in the state of Rio Grande do Sul. The researchers accessed the "levels of self-determination". They used the "Inventory of self-determination for practitioners of sports activities" (Balbinotti &



Barbosa, 2008). They concluded that the results obtained indicated that the model presents adequate indices of validity in the sample studied.

#### 4 METHODOLOGY

Our study is configured as a quantitative approach, as it tries to develop and validate a tool for assessing the motivational quality of Crossfit practitioners (the Crossfit Motivation Scale - CMS) and then search for correlations between the measured motivational quality and the self-reported satisfaction of the basic psychological needs of autonomy, competence and Relatedness. All participants (those who participated in the semi-structured interviews, as well as those who answered the questionnaires) signed an Informed Consent Form in order to protect their physical and psychological integrity and to ensure their anonymity.

Seeking to know the reasons that lead a person to practice Crossfit, we initially conducted a semi-structured interview with 6 practitioners (The individuals who participated in this interview were randomly chosen from a sample of Crossfit practitioners in the city of Mossoró-RN. A four-digit number was assigned to each of them and then generated, with the help of Excel, a list of six random numbers). The objective of this interview was to gather information about the motivations to practice or not the modality. Based on this information, we developed a previous questionnaire with items on a five-point Likert scale. This pilot scale contained 29 items (10 for demotivation, 9 for controlled motivation, and 10 for autonomous motivation).

This previous questionnaire was subjected to face validity. We consulted three SDT experts about the correspondence of the proposed items with the construct we wanted to evaluate. There was an agreement rate of the three evaluators in more than 75% of the items. All other items were evaluated as adequate by at least two of the evaluators who also proposed adaptations that were taken. After all these corrections, we constituted the pilot version of the scale.

The pilot scale was initially applied to an audience of 29 Crossfit practitioners (a characterization of the individuals who participated in this stage will be presented in the description of the results). None of the practitioners suggested adjustments in the writing of the items, which testifies to an adequate degree of understanding of the statements. After application, we calculated Cronbach's Alpha for each of the constructs (demotivation – 0.80 –, controlled motivation – 0.80 –, autonomous motivation – 0.80 –).  
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motivation – 0.69 – and autonomous motivation – 0.61) separately. These values showed a reasonable internal consistency and that, therefore, the scale was able to evaluate what we intended: the motivational quality of Crossfit practitioners.

This version of the scale was then applied to 301 individuals practicing Crossfit from different boxes in the states of Rio Grande do Norte, Rio Grande do Sul, Minas Gerais and Santa Catarina (a characterization of the individuals who participated in this stage will be presented in the description of the results). The data collected with this instrument were submitted to factor analysis with extraction of the main components and Varimax rotation. This procedure allowed us to obtain the factors from which we selected those with an eigenvalue greater than 1. In addition, for a given item to load on a given factor, we used as criteria the cutoff value 0.30 and the theoretical coherence of the item for grouping. This procedure revealed some inconsistencies in the scale, which led us to exclude some items and redo the Factor Analysis and calculation of Cronbach's Alpha.

## 5 RESULTS AND DISCUSSIONS

The items of the scale that was applied to the public of 301 individuals are presented in Chart 1.

**Chart 1: Items that make up the scale in its first applied version**

Item	Statement
1	I practice Crossfit because I identify with the modality
2	I practice Crossfit for being useful in another sport modality that I practice
3	I don't know why I practice Crossfit. I don't like the competitive environment.
4	I practice Crossfit by having a sense of overcoming at all times
5	I practice Crossfit to be physically well for my spouse
6	I don't know why I practice Crossfit. I don't like how it leaves the aesthetics of my body
7	I practice Crossfit for the feeling of belonging to a "tribe"
8	I practice Crossfit because it gives me financial advantages now or in the future
9	I don't know why I practice Crossfit. I think, because it is too complex, it is not a sport for everyone
10	I practice Crossfit to improve my self-esteem and mental health
11	I practice Crossfit only because I like to prepare to participate in competitions
12	I don't know why I practice Crossfit. I don't like the class dynamics
13	I practice Crossfit to improve my fitness

14	I practice Crossfit just because it's a trendy sport and I see a lot of people participating.
15	I don't know why I practice Crossfit. It's not a sport that I see a lot of evolution in
16	I practice Crossfit by awakening a community purpose in me
17	I practice Crossfit just to meet new people
18	I don't know why I practice Crossfit. It gets in the way of the rest of my day
19	I practice Crossfit because I like to have a habit of some sports practice
20	I practice Crossfit for giving me the admiration of some people
21	I don't know why I practice Crossfit. I don't like the olympic weightlifting moves
22	I practice Crossfit for the feeling of not knowing what will be in the next workout
23	I practice Crossfit because I have the possibility to do it and I will feel bad if I don't
24	I don't know why I practice Crossfit. I don't like the gymnastic moves
25	I practice Crossfit for helping me in my area of work
26	I practice Crossfit because my closest friends practice it and I don't want to feel out of place
27	I don't know why I practice Crossfit. I don't like the Endurance movements.
28	I practice Crossfit just to improve my sex drive
29	I don't know why I practice Crossfit. I prefer to train alone

The data obtained with this scale were analyzed via Factor Analysis (FA). Table 2 presents the results of this analysis.

**Table 2: Distribution of items by factor with respective load factor. Initial version of the scale.**

item	Factor		
	1	2	3
1	-0.447		
2			0.369
3	0.570		
4	-0.310	0.318	
5			0.394
6	0.493		
7		0.566	
8			0.502
9	0.485		
10		0.336	
11			0.620
12	0.549		
13			
14	0.388		0.395
15	0.584		



16		0.606	
17			0.438
18	0.588		
19		0.322	
20		0.509	0.320
21	0.585		
22		0.438	
23		0.556	
24	0.580		
25		0.395	
26	0.364		
27	0.548		
28	0.379		0.346
29	0.423		

FA showed very clearly that the items are grouped into three factors. By theoretical coherence, we observed the following correspondence: Factor 1 – Demotivation, Factor 2 – Autonomous Motivation and Factor 3 – Controlled Motivation. From this analysis of theoretical coherence, we decided to eliminate items 26 and 28 that carried factors very different from those for which we predicted.

Note that item 1 negatively charged factor 1 (this item was excluded for representing, according to the analysis, a behavior opposite to what we expected). Item 4 loaded factors 1 (negative) and 2 (reason why it was kept within factor 2). Item 13 did not load on any factor (it was excluded for this). Item 14 loaded factors 1 and 3. However, it carried a greater weight in factor 3. Item 20 also loaded on two factors (2 and 3), with greater weight on factor 2. However, none of these factors was as theoretically expected. Because of this, it was also excluded.

Once this is done, with the remaining 24 items we performed FA again. The data are presented in Table 3.

**Table 3: Distribution of items by factor with respective load factor. Version of the scale after deleting problematic items.**

item	Factor		
	1	2	3
2			0.366

5			0.373
8			0.528
11			0.632
14			0.359
17			0.431
3	0.547		
6	0.506		
9	0.473		
12	0.594		
15	0.616		
18	0.596		
21	0.594		
24	0.568		
27	0.561		
29	0.435		
4		0.525	
7		0.526	
10		0.325	
16		0.604	
19		0.516	
22		0.487	
23		0.583	
25		0.358	

In this new analysis, it is possible to verify that the items loaded the appropriate theoretically expected factors. The calculation of the General Cronbach's Alpha gave the value 0.75. For the subscales, we obtained the values 0.80, 0.72 and 0.67 for factors 1 (demotivation), 2 (autonomous motivation) and 3 (controlled motivation) respectively. These data attest to the robustness of the scale and, therefore, we now proceed to analyze the motivational quality of the respondents.

Of the total respondents (301), 176 declared themselves female, 124 declared themselves male and 1 declared themselves non-binary . Information from other strata is presented in Table 4.

**Table 4: Number of participants by age group.**

Age		Crossfit practice time	
Less than 20 years	15	Less than 6 months	57



Between 20 and 25 years old	81	6 months to 1 year	47
Between 25 and 30 years old	32	1 to 2 years	61
Between 30 and 35 years old	104	2 to 3 years	65
Between 35 and 40 years old	39	3 to 4 years	32
Between 40 and 45 years old	23	More than 4 years	39
Over 45 years old	7		

The data obtained with the scale for each of these strata are presented in Table 5.

**Table 5: Mean and Standard Deviation of Demotivation, Autonomous Motivation, and General Controlled Motivation by strata (age group, Crossfit practice time, and gender).**

Motivational quality	Overall Average		Average SD	
Demotivation	1,3		0,4	
Autonomous	3,9		0,6	
Controlled	2,3		0,7	

Motivational quality	Men		Women	
	Mean	SD'	Mean	SD
Demotivation	1,3	0,4	1,3	0,4
Autonomous	3,8	0,6	3,9	0,6
Controlled	2,5	0,7	2,1	0,7

Motivational quality	Age							
	<20		20 to 25 years		25 to 30 years		30 to 35 years	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Demotivation	1,2	0,4	1,3	0,4	1,4	0,5	1,3	0,4
Autonomous	3,8	0,6	4,1	0,5	3,9	0,6	3,9	0,6
Controlled	2,1	0,7	2,4	0,8	2,2	0,7	2,3	0,7

Motivational quality	Age					
	35 to 40 years		40 to 45 years		>45 anos	
	Mean	SD	Mean	SD	Mean	SD
Demotivation	1,4	0,4	1,3	0,4	1,3	0,3
Autonomous	3,7	0,6	3,6	0,7	3,7	0,7
Controlled	2,2	0,7	2,1	0,7	1,7	0,6



Motivational quality	Tempo no Crossfit							
	<6 months		6 months-1 year		1-2 years		2-3 years	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Demotivation	1,4	0,5	1,3	0,4	1,3	0,4	1,3	0,4
Autonomous	3,8	0,6	3,8	0,6	3,9	0,6	4,0	0,6
Controlled	2,3	0,9	2,1	0,6	2,3	0,7	2,2	0,7

Motivational quality	Time in Crossfit			
	3-4 years		>4 years	
	Mean	SD	Mean	SD
Demotivation	1,3	0,4	1,2	0,3
Autonomous	3,8	0,5	3,9	0,6
Controlled	2,2	0,7	2,5	0,8

The data show an intense autonomous motivational quality (average 3.9) among Crossfit practitioners (the highest score on the scale is 5). Add to this the low standard deviation of 0.6. It is noteworthy that the values obtained for the general data are almost replicated in the various strata we analyzed. This configures Crossfit as a physical activity that, regardless of the time of practice, age and gender, gains adherents equally motivated to practice.

Only 32 respondents said they had stopped training since starting Crossfit. Of these, 11 claimed that they halted the practice as a result of the COVID-19 pandemic. Only 7 claimed retreating due to problems arising from injuries (shoulder, knee and lumbar). This data goes against common sense that claims Crossfit to be a modality that causes a lot of injuries. The rest of the research participants claim that they left due to personal problems (studies, work, accidents, etc.).

In parallel with the analysis of the motivational quality of Crossfit practitioners, we also made an analysis of how the practice promotes the satisfaction of the basic psychological needs of autonomy, competence and Relatedness. This analysis was based on an adaptation of the Brazilian version of the Basic Needs Satisfaction in Sports Scale - BNSSS (Júnior, Vissoci and Vieira, 2018). We used the same items proposed by BNSSS only specifying the word "Crossfit" every time an item on the scale mentioned "my sport".

Table 6 presents the results of mean and standard deviation for the three basic psychological needs analyzed by BNSSS in our participating public.



**Table 6: Mean and Standard Deviation of self-reported satisfaction of basic psychological needs for Autonomy, Relatedness and Competence (general and by sex).**

Basic Psychological Need	Mean	SD	Men		Women	
			Mean	SD	Mean	SD
Autonomy	4,7	0,4	4,6	0,5	4,7	0,4
Relatedness	4,4	0,7	4,3	0,8	4,5	0,6
Competence	3,9	0,8	3,9	0,8	3,9	0,8

As it is easy to see, the practice of Crossfit, according to the research participants, substantially nourishes the basic psychological needs, which in turn, in itself, is enough to justify the indices of autonomous motivation that we verify with our CrossFit Motivation Scale. As with our scale, here too, the means of the "male" and "female" strata do not exhibit significant differences. That is, men and women consider that the practice of Crossfit is efficient in meeting their basic psychological needs.

Table 7 shows the means and standard deviations stratified by practice time. It is noticed that the means in all strata are essentially similar, as are the standard deviations. It is interesting to note that, although Crossfit is a very complex activity, considering that it brings together elements of three other practices (Endurance, OW and Gymnastics), the feeling of competence of the participants remains practically unchanged throughout its evolution in practice.

**Table 7: Mean and Standard Deviation of self-reported satisfaction of basic psychological needs of Autonomy, Relatedness and Competence by time of Crossfit practice.**

Basic Psychological Need	<6 months		6 months-1 year		1-2 years	
	Mean	SD	Mean	SD	Mean	SD
Autonomy	4,7	0,4	4,7	0,4	4,7	0,4
Relatedness	4,4	0,7	4,4	0,7	4,3	0,8
Competence	3,9	0,7	3,7	0,8	3,8	0,8
Necessidade Psicológica Básica	2-3 years		3-4 years		>4 years	
	Mean	SD	Mean	SD	Mean	SD
Autonomy	4,7	0,6	4,7	0,4	4,7	0,3
Relatedness	4,5	0,6	4,4	0,6	4,4	0,6
Competence	3,8	0,9	4,0	0,7	4,1	0,7

This, most likely, is due to the fact that Crossfit offers beginners the possibility of adaptations of all the most complex movements, which, in turn, generates the feeling of successfully performing what is proposed. That is, to feel competent in the proposed task. The feeling of Relatedness and autonomy, combined with this feeling of competence, favor the development of skills that, in turn, will help to maintain a high sense of competence. The three needs feed back and feed each other's motivation.

Table 8 presents the p-values for the correlations between each of the basic psychological needs, the types of motivation and demotivation. It is easy to observe that there is always a very strong correlation (p-value < 0.001) between competence, Relatedness and autonomy with autonomous motivation. On the other hand, the three basic psychological needs have a very low correlation (p-value = 1,000) with demotivation.

**Table 8: p-value calculated for correlations between basic psychological needs and types of motivation and demotivation.**

	Controlled	Autonomous	Demotivation
Competence	0,003	<0,001	1,000
Autonomy	0,211	<0,001	1,000
Relatedness	0,723	<0,001	1,000

The data in Table 8 serve as another source of corroboration of the statement that the satisfaction of basic psychological needs always acts in the sense of internalizing the perceived locus of causality, transforming demotivation into controlled motivation and, this, in turn, in autonomous motivation.

## 6 FINAL CONSIDERATIONS

In our study, we were able to construct and evaluate the psychometric properties of a scale to measure the motivational quality of Crossfit practitioners. Parallel to this, we analyzed the self-report of the satisfaction of the basic psychological needs of these same participants. The scale provided us with the information that Crossfit practitioners are, in general, regardless of gender, age group and time of practice, autonomously motivated for this activity.

The self-report of satisfaction of basic psychological needs (evaluated through the Brazilian version of the BNSSS) revealed a high degree of satisfaction of the basic psychological needs of Crossfit practitioners (also independent of stratification by sex, age group and time of practice), and the correlation analysis between the results obtained with this self-report and those of our scale revealed a strong correlation between the satisfaction of autonomy, competence and Relatedness, and the autonomous motivation of the participants.

We consider the statistical data obtained and presented here robust enough to affirm that Crossfit is a physical activity that autonomously motivates its practitioners. However, aware of the limitations of self-report studies, we considered the possibility of developing a translational research with some of the participants of the study reported here as future work. Our goal is to compare the observation data with the self-reports that produced the results we present here in order to obtain a more faithful account of how the practice of Crossfit satisfies basic psychological needs.

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