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TRAINING ROUTINE AND MOTIVATION AMONG CROSSFIT® PARTICIPANTS IN BRAZIL AND PORTUGAL DURING THE COVID-19 PANDEMIC: AN OBSERVATIONAL STUDY

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ABSTRACT

In late 2019, a new coronavirus was identified in Wuhan, Hubei province, China. Considering the transmission characteristics, public health actions have been indicated such as social distance, guidance on staying at home, quarantine and traffic restriction. There are some strategies to enhance immune system that can fight virus, decreasing its efficacy. Moderate intensity physical exercise demonstrated before to prevent many infectious diseases. In this paper, is detailed the characteristics of motivation and training status of CrossFit® practitioners during corona virus quarantine, in Brazil and Portugal. Its hypothesized that CrossFit® participants are doing high-intensity training (HIT) and they are highly motivated during quarantine, independent of the country. 263 CrossFit® participants volunteered to participate in this study (231 from Brazil and 32 from Portugal). Questions about motivation level was related with other questions (how many partners training, together, intensity, training frequency per week, etc). The aspects of “how many participants are training together”, “sessions per week”, “spreadsheet training utilization”, “intensity of the workouts” and “motivation” demonstrated significance. There are a significant number of CrossFit® participants in Brazil and Portugal who are training HIT in their workouts, and it can suppress the immune system. Motivation and training routine demonstrated impairment. Coaches and trainers in general must control training intensity and keep the participants highly motivated, through strategies that avoid long period of HIT and high-volume training in quarantine.

Key words: Immunology. Exercise. Motivation. Training. COVID-19.

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RESUMO

Rotina de treinamento e motivação entre participantes de crossfit® no brasil e em portugal durante a pandêmica covid-19: um estudo observacional

No final de 2019, um novo coronavírus foi identificado em Wuhan, província de Hubei, China. As características da transmissão, ações de saúde pública têm sido indicadas como distanciamento social, orientações sobre como ficar em casa, quarentena e restrição de trânsito. Estratégias para melhorar o sistema imunológico que podem combater os vírus, diminuindo sua eficácia. Exercício físico de intensidade moderada demonstrou anteriormente prevenir diversas doenças infecciosas. São detalhadas as características de motivação e status de treinamento de praticantes de CrossFit® durante a quarentena do coronavírus, no Brasil e em Portugal. A hipótese é que os participantes do CrossFit® estão treinando alta intensidade e estão altamente motivados durante a quarentena, independentemente do país. 263 participantes do CrossFit® ofereceram-se como voluntários para participar deste estudo (231 do Brasil e 32 de Portugal). As questões sobre o nível de motivação estavam relacionadas com outras questões (quantos parceiros treinam, juntos, intensidade, frequência de treinamento por semana). Os aspectos “quantos participantes estão treinando juntos”, “sessões por semana”, “utilização da planilha de treinamento”, “intensidade dos treinos” e “motivação” demonstraram significância. Há um número significativo de participantes do CrossFit® no Brasil e em Portugal que estão treinando HIT, e isto pode suprimir o sistema imunológico. A motivação e a rotina de treinamento demonstraram comprometimento. Os treinadores em geral devem controlar a intensidade do treinamento e manter os participantes altamente motivados, por meio de estratégias que evitem longos períodos de HIT e treinamentos de alto volume em quarentena.

Palavras-chave: Imunologia. Exercício. Motivação. Treinamento. COVID-19.

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INTRODUCTION

In late 2019, a new coronavirus was identified as the cause of numerous cases of pneumonia in Wuhan, Hubei province, China.

It spread rapidly, resulting in an epidemic across China, followed by an increasing number of cases in other countries around the world.

In March 2020, the World Organization declared a coronavirus pandemic (COVID-19) (World Health Organization. Director-General's Remarks at the Media Briefing On 2019-Ncov on 11 February 2020, 2020).

Considering the transmission characteristics, public health actions have been indicated such as social distance, guidance on staying at home, quarantine, and traffic restriction.

There are some strategies to enhance immune system that can fight virus, decreasing its efficacy (Nieman, e colaboradores, 1997).

Physical exercise is a strategy well used in this pandemic coronavirus, it has a positive enhancing effects on immune system to fight a disease (virus, like COVID-19) also, exercise is correlated to keep participants highly motivated, this fact, important verifying people changing their life style and limiting their common life habits (Sales, e colaboradores, 2014). Recently, new training programs were popularized in the world, and programs that use high-intensity training (HIT) were included due its benefits (Feito, e colaboradores, 2018).

CrossFit is a training type that spreads in the world due its efficacy, including throwing, gymnastics and metabolic exercises, done at high intensity (Glassman, 2007).

Usually the CrossFit workout lasts about 60 minutes, and the practitioners training about four days per week (Bellovary, e colaboradores, 2016).

Recently, studies involving CrossFit demonstrated that this training is able to keep participants highly motivated for the purpose of enjoyment, challenge and affiliation, leading their practitioners to great satisfaction (Dominski, e colaboradores, 2020).

In the present literature, there are no studies evaluating motivation and multiple correlation CrossFit training parameters through domestic quarantine (due COVID-19).

The training intensity and training volume factor must have attention due the negative effects it can lead to immune system (Nieman, Nehlsen-Cannarella, 1994).

People who are physically active had a better immune system control to the disease and it can be a prevention form to contract some virus (Zhu, 2020).

Due the recently positive approaches about motivational factors in CrossFit practitioners its hypothesized that during this pandemic season (COVID-19 quarantine) could not significantly change the CrossFit practitioner's motivation and they are training high-intensity even in quarantine.

In this paper is detailed characteristics of motivation and training status of CrossFit practitioners during the COVID-19 quarantine in a sample of Brazilian and Portuguese subjects.

MATERIALS AND METHODS

This cross-sectional study was carried out contacting by email the CrossFit® gymnasiums in São Paulo region (Brazil) and Lisbon region (Portugal). 263 CrossFit® participants from 13 gymnasiums (10 from Brazil and 3 from Portugal) volunteered to participate in this study, which was approved by institution ethics committee, CAEE: 13353719.4.0000.5659. Data were collected between 02/02/2020 and 20/04/2020.

Procedure

231 participants from Brazil (São Paulo region) and 32 participants from Portugal (Lisbon region) were selected.

Data are showed in table 1.

The inclusion criteria was: any individual practitioner of CrossFit and only healthy subjects, without any pain complaint in the last six months. The exclusion criteria was: individuals who practiced other forms of physical exercise, such as CrossTraining, running or weight training.

Two Portuguese participants were withdrawn due they weren't training on the quarantine.

All subjects agreed to complete the electronic questionnaire and accept to participate in the study (electronic consent term was applied).

The questionnaire was made in electronic data base (Google Forms®) containing 16 questions about their personal life, training motivation, habits, and training routine in quarantine. Subjects were instructed to report about their motivation using a basis

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parameter of the motivation training routine before quarantine.

The questionnaire was applied in Portuguese language. The questionnaire is available at: https://docs.google.com/forms/d/1FxcrEgrmy8qR57vR_hHef2ohMDv1_iT9f11e1LeakrE/edit

Table 1 - Subjects characteristic.

Overall		
Age (years)	n São Paulo region (231)	n Lisbon region (32)
0-19	7	0
20-29	92	7
30-39	85	13
40-49	38	8
50-59	6	4
> 60	3	0
BMI	25,14 (3,64)	23,96 (2,62)
Training level		
Beginner	23	0
Non competitor scale	55	5
Competitor scale	34	9
Non competitor amateur	83	10
Competitor amateur	34	8
Professional	2	0
Sessions per Week		
Once	6	0
Twice	12	5
Three	29	10
Four	43	2
Five	63	8
Six	65	6
Seven	13	1

Legend: BMI, body mass index (average; standard deviation).

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Statistical Analyzes

The p-value threshold was pre-fixed at 5% (p≤0,05). The power of the test used was 80%. For correlations Person's chi-squared test was used to compare "age", "genre", "training level", "hours of training per week", "use of training spreadsheet", "sessions per week", "how many partner trainings together" and "training intensity" with "motivation", individually.

When Person's chi-squared test was significant, correlation classification was used following a model proposed by Hinkle e colaboradores, (2003).

Size of correlation from 0.00 to 0.30 was considerable "negligible"; 0.30-0.50 was considered "low correlation"; 0.50-0.70 was considered "moderate correlation"; 0.70-0.90 was considered "high correlation" and, 0.90-1.00 was considered "very high correlation". Trend was used to find possible changes in the non-parametric data, using linear by linear association.

RESULTS

244 (93,5%) of the participants (from both countries) were training at home, 10 (3,8%) of them were training at a CrossFit® gymnasium and seven (2,7%) of them were training in the street.

The most used equipment for training in Brazil was speed rope (for jumping), and weight in Portugal, such as books, dumbbells and bands. Correlation between "motivation" and training routine is exposed in table 2.

Table 2 - Significance and correlation values between "motivation" and multiple questions.

	São Paulo Region			Lisbon Region		
	Prevalent Data	p	r	Prevalent Data	p	r
Age (years)	20-39	0.470	0.01	30-49	0.470	-0.22
Genre (%Man/%Woman)	M =35,1% W =64,9%	0.400	-0.02	M =45,2% W = 54,8%	0.290	0.25
Training level	Intermediary non competitor (23,8%) and amateur non competitor (35,9%)	0.500	0.11	Intermediary Competitor (29%) and amateur non competitor (32,3%)	0.280	0.21
Training partner	Alone (63,6%)	0.750	0.07	Alone (67,7%)	0.002*	0.31
Intensity	Moderate (65,4%)	0.003*	0.24	Moderate (48,4%) and high- intensity (38,7%)	0.748	0.19
Use of training spreadsheet	CrossFit gymnasium (67,5%)	0.233	-0.01	CrossFit gymnasium (51,6%) and no spreadsheet (25%)	0.013*	0.18
Number session per week	Six (28,1%) and five (27,3%)	0.000*	0.44	three (29%) and five (25,8%)	0.308	0.28
Number hours per week	Five to six (30%) and four to five (28%)	0.242	0.12	Two to three (30,5%) and four to five (26%)	0.247	0.44

Legend: Motivation used was classified by low, normal, or high. The most answered response about motivation was normal for both, Brazilian and Portuguese subjects. Training level, beginner was considered the subjects who training up to six months; intermediary, from 6 months to one year; amateur, above one year and professional, those who compete internationally. Training partner was considered the subjects who training alone, with a partner, with two partners or those who trained with. more than two partners. Intensity was considered low-intensity, moderate-intensity, and high-intensity.

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Use of training spreadsheet, was considered those who training without any help (no spreadsheet), CrossFit gymnasium spreadsheet, physical educator professional help or another professional. Number of sessions per week, was considered since 1 session per week to 2, 3, 4, 5, 6, 7, 8 or more than 8 sessions. Number hours per week, was considered from 1 hour to 2, 3, 4, 5, 6, 7, 8 or more than 8 hours per week. Considered significance was p≤0,05.

Detailed data about "motivation" in Brazil and Portugal, only, are exposed in figure 1a.

Detailed data about "training intensity" in Brazil and Portugal, only, are exposed in figure 1b.

Detailed data about "Motivation" and "how many subjects are training together" are exposed in figure 2a and 2b.

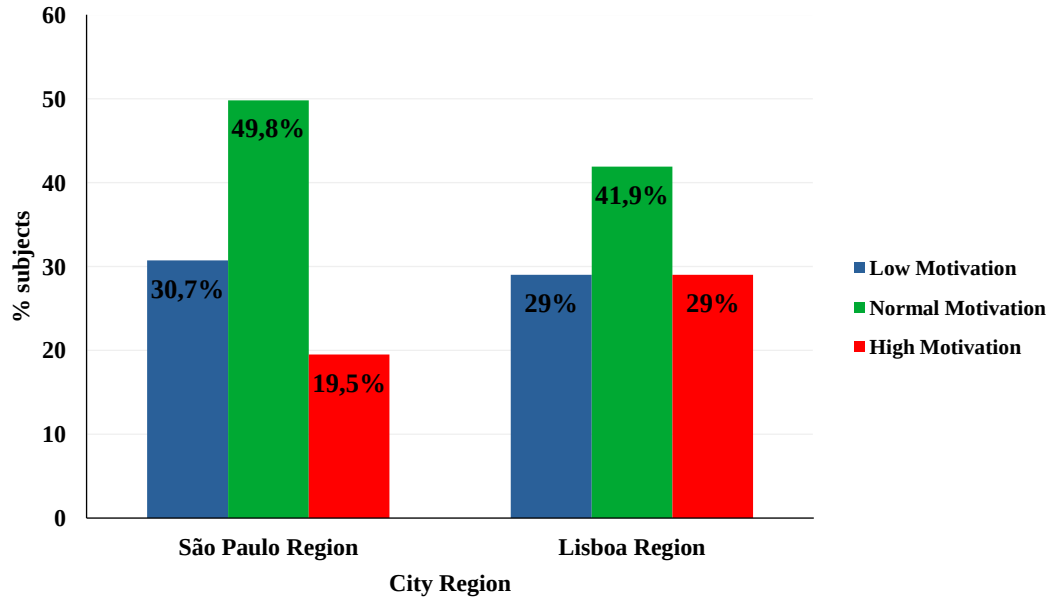

Figure 1a - Percentage of motivation subjects by region.

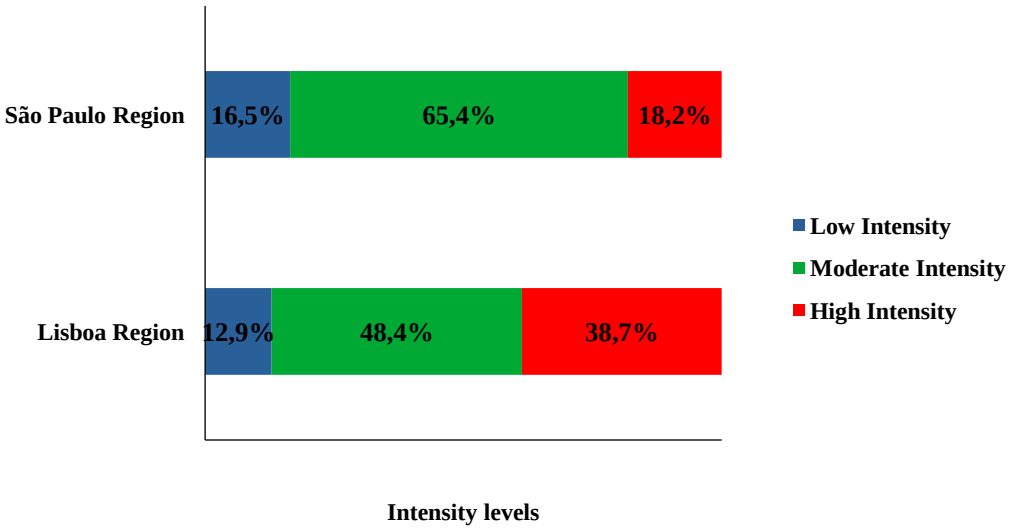

Figure 1b - Percentage of training intensity level in each city region.

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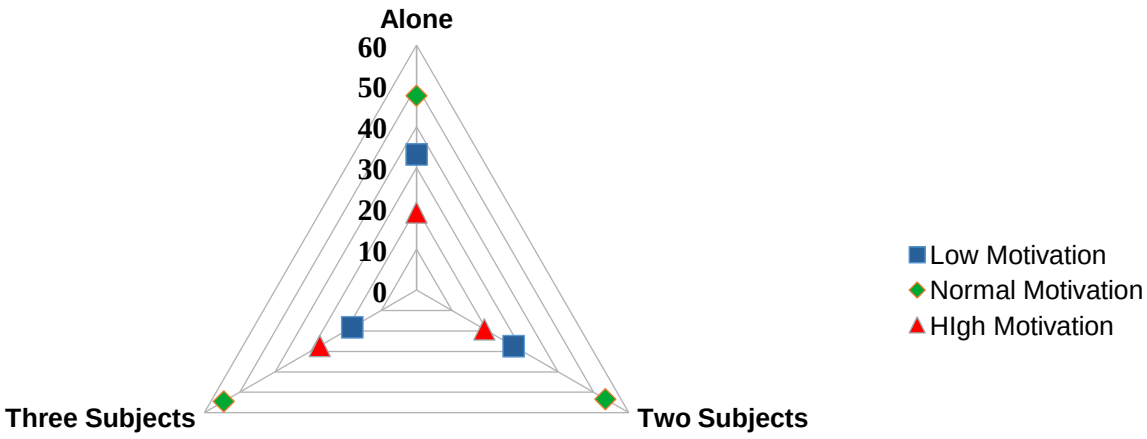

Figure 2a - Relationship between number of subjects training together (%) and motivation level in São Paulo region.

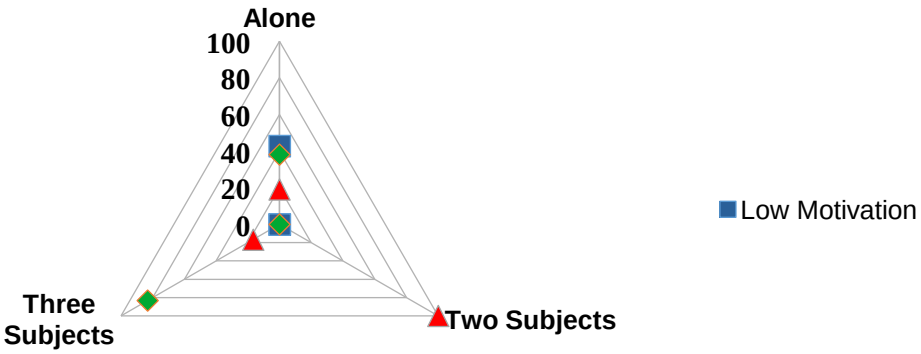

Figure 2b - Relationship between number of subjects training together (%) and motivation level in Lisbon region

DISCUSSION

This study described how CrossFit® practitioners are training in quarantine, and the most important, we discussed data to studies which strengthen the practice of physical exercise in a healthier and safer way.

For the best of our knowledge this is the first study evaluating a cluster of psychological and multiple correlations of CrossFit® profile in quarantine by COVID-19.

The present study evaluated many aspects of the quarantine training and correlated data, such as motivational state, training level, intensity of workouts, sessions made per week, spreadsheet use, partners to training together, training time per week, age, and genre.

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We did not confirm the hypothesis that CrossFit® participants are highly motivated and training HIT.

Most of them showed normal to low motivation status and most of them are taking moderate intensity. The hypothesis that CrossFit subjects are training HIT was not in part, confirmed. The subjects are training moderate do high training intensity.

Moreover, Lisbon region are training more intense than São Paulo region.

This study can be summarized with three key findings. The first key observation was the intensity of the workout.

There were more subjects working HIT in Portugal than in Brazil, and these results must be discussed.

HIT is a training method useful to reach anaerobic performance and it can lead to innumerable positive effects (Kilpatrick, Jung, Little, 2014).

However, severe inflammation process due HIT can be contracted, including respiratory superior tract inflammation (URTI) if the volume and intensity are not well paired (Foster, 1998).

It's not so uncommon to find URTI even in athletes who are in tapering periodization phase, normally it is related with HIT, analyzing that tapering usually decreases the training volume, and it maintains or increase the intensity (Freitas, e colaboradores, 2014).

Despite these findings, A recently study investigated 1509 Swedish subjects, and the authors found that high level of exercise (~1-hour exercise per day) could reduce the incidence of upper respiratory tract infection (URTI) (Fondell, e colaboradores, 2011).

CrossFit® classes normally during about 50-60 minutes. People who are training in online CrossFit classes (using video communication software's) are less exposed to contract URTI. This pathology has been correlated with one of the main and severe causes of death in COVID-19 (Li e colaboradores, 2020).

Training that exceed a threshold of 40-60% VO2max seems to increase lymphocyte apoptosis, which corresponds to cell necrosis, lowering the immune system (Navalta, Sedlock, Park, 2007). The physiology of HIT can be explained by the constant use of non-aerobic system (>90%VO2max), that leads to increase the lactate producing, leading to decrease of blood Ph, slowing the muscle contraction due the lack of calcium on sarcoplasmic reticulum or sarcolemma (Ojuka, 2004). This basic fatigue explanation is the beginning of the inflammation process.

Between six to 12 hours after the intense exercise, monocytes concentrate in the local, with its peak is about 48 hours after training, then monocytes change to macrophages, synthesizing more prostaglandins concentration, which is responsible for inflammation control, leading to suppression of immune system (Nascimento, Bacurau, Navaro, 2007).

Kinase creatine (CK), which is the one of the best markers to observe muscle cell rupture, reaches the peak about 24 hours after exercise (Ide, Lazarim, Macedo, 2011).

Due the inflammation that begins right after the exercise, cytokines pro-inflammatory such as IL-1α, IL-6, and inflammation markers such as NF-Kß and TNF-α (released by natural killer cell), are active leading to severe inflammation if the exercise is non well-regulated through volume and intensity (Walsh, Oliver, 2016).

A recently study found that IL-6 is activated right after a CrossFit® session and it remains active for 24 hours after the exercise, then IL-10 (anti-inflammatory interleukin) reaches the peak after 48 hours, but if the intensity still high and the exercise is non well programed, NFKB, which is a transcription factor well known for its role in the innate immune response, can be active with the peak also in 48 hours, leading increases in pro-inflammatory interleukins (Tibana e colaboradores, 2016).

This inflammation cluster leads to "open window", that describes suppression of the immune system which may last between 3 to 72 hours, depending of the training intensity (Nieman, Pedersen, 1999).

Studies evaluating exercise intensity over 70%VO2max demonstrated that low volume over this intensity can decrease immunity, supporting the recommendation that CrossFit® practitioners should consider replacing higher intensity training with some spikes of moderate intensity (about 60% VO2max) training and low volume training (could be multiple short sessions with great nutrition between sessions, in special carbohydrate, which is considered the best energetic substrate to regularize immune system) (Zhu, 2020; Hellard e colaboraodres, 2015).

The second key observed was "sessions made per week". This study found

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correlation between “sessions per week” and “motivation”. Here, we discuss the training volume, exposing studies and comparing training time as well (training time was a limitation of the study, cited below). 28,1% of Brazilians are training six days a week and 29% of Portuguese are training three times a week.

World Health Organization (WHO) recommend for adults and elderly physical exercise for 75 min/week with vigorous aerobic exercise intensity or 150 min/week of moderate aerobic intensity, with muscle strengthening twice weekly(World Health Organization. Global Recommendations on Physical Activity for Health, 2010).

Prolonged chronic exercise (>1,5hour for several days, using continuous or HIT method) are related with many impairment, such as neutrophilia and lymphopenia, induced by high plasma cortisol, decrease in nasal mucociliary clearance, decrease in natural killer cell cytotoxic activity (NKCA), Decrease in T-cell function, increase in anti-inflammatory cytokines (as cited above), leading to immune system suppression (Bagby, Crouch, Shepherd, 1996).

To limit the risk of training induced impairments in immune system, some changes should be done, such as:

1- Increase the frequency of shorter training sessions;

2- Reduce the overall weekly training volume and training sessions;

3- Increase the frequency and volume training slowly;

4- Don’t do linear volume training sessions or just high-volume training sessions. Some days of lower volume training sessions, some days of higher volume training sessions (do not exceed 1,5 hours per sessions);

5- Implement recovery activities after two or three days of workout(exercise intensity and duration effects on in vivo immunity, 2015).

Finally, the third key observed was motivation to do exercise. This study aimed to correlate many aspects to motivation status. Most of subjects are staying at home and training home due the quarantine, and it seems they are not highly motivated.

CrossFit® subjects of Lisbon region showed to be more motivated to do workouts in the quarantine, while CrossFit® subjects of São Paulo region exposed lower level of motivation.

Both countries significantly showed level of normal to low motivation in quarantine. These data can be explained through our findings analyzing the isolation subjects.

When subjects are training alone in quarantine, the low motivation status increase, when subjects are training with one or two more partners motivation increases (figure 2a and 2b).

CrossFit® subjects are more likely to report higher levels of motivation when they are training in class group (Claudino, e colaboradores, 2018).

CrossFit® classes normally are made in group, challenging participants to reach better performance, this is an intrinsic motivational factor.

In this and other pandemic seasons governments all over the world asked people to isolate completely, avoiding people interaction due the fast virus transmission (Robinson, 2009).

It is important to participants do not interact each other (including exercising together, if the people are not living your home, e. g. friends, cousin, uncle, aunt).

Wilson e colaboradores, (2009) demonstrated that in general, 50% of adults will discontinue an exercise program within the first six months. It suggests that beginner CrossFit® participants are more susceptible to loss of motivation in the quarantine.

In conclusion, some of CrossFit® participants in Brazil and Portugal are training HIT in their workouts and it’s not indicated at this time.

It can be dangerous for health if made many days a week, without correct rest between the sessions. Most of CrossFit® participants are training more than five days a week (specially in Brazil), this must have attention due the training accumulation, suppressing the immune system (if the volume or intensity remains high).

Finally, CrossFit® participants are in part being low motivated, and it can be possible due the fact that they are training alone (low correlation was found).

These findings can describe how CrossFit® participants are training in the quarantine due COVID-19. It is important to help people to training in a certain intensity and frequency (volume), decreasing the risks of suppressing the immune system which can worsen the virus infection if contracted.

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Furthermore, these results can help doctors and coaches to advise and prescribe exercises in this pandemic.

This study is not without limitation. There was a low number of participants in Portugal. It happened due the difficulty to receive answer of the CrossFit gymnasiums and due the population number comparing Brazil to Portugal.

We encourage researchers to study more about “motivation” and “exercise” in the quarantine, to help coaches and doctors understand better strategies of keeping active in quarantine.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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