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Can home-based training influence mood states and quality of life in Paralympic boccia athletes? ¿Puede el entrenamiento domiciliario influir en el estado de ánimo y la calidad de vida de los deportistas paralímpicos de bocha?

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Abstract. To verify the influence of home-based exercise and the type of physical limitation on the mood and quality of life were analyzed 34 Brazilian paralympic boccia athletes (with functional classes BC1 = 8, BC2 = 8, BC3 = 9, and BC4 = 9) of both genders, with different disabilities (e.g., cerebral palsy, quadriplegia, polio, congenital malformation, and muscular dystrophy). Profile of the Mood States and Quality of Life questionnaires were sent via apps through social media in electronic forms, and distributed throughout the country, in the shape of a snowball. To compare the typical characteristics of exercise at home in social isolation in the domains of mood state and quality of life, the independent t-test and Mann-Whitney were used. Then, to verify the influence of home training characteristics in isolation in specific groups of athletes (with and without cerebral palsy/with and without assistance) on the domains of mood state and quality of life, an analysis of covariance. No relevant differences exist between mood states and quality of life among the different demographic information analyzed. However, when controlling for comparisons through training covariates and the frequency used, it was found that the perception of quality of life under the "physical" domain presents significant differences among the analysis groups. The frequency of training in question may be enhanced by support covariates and the type of disability, significantly influencing their perceptions of quality of life.
Keywords: Paralympic Sport; People with Disabilities; Cerebral Palsy; Sports Psychology; COVID-19.

Resumen. Para verificar la influencia del ejercicio domiciliario y el tipo de limitación física sobre el estado de ánimo y la calidad de vida, se analizaron 34 atletas de bocha paralímpicos brasileños (con clases funcionales BC1 = 8, BC2 = 8, BC3 = 9 y BC4 = 9) de ambos sexos, con diferentes discapacidades (e.g., parálisis cerebral, cuadriplejia, poliomielitis, malformación congénita y distrofia muscular). Los cuestionarios Perfil de Estados de Ánimo y Calidad de Vida fueron enviados a través de aplicaciones en redes sociales en formato electrónico, y distribuidos en todo el país, en forma de bola de nieve. Para comparar las características típicas del ejercicio en el hogar en aislamiento social en los dominios de estado de ánimo y calidad de vida, se utilizaron la test-t independiente y la análisis Mann-Whitney. Luego, para verificar la influencia de las características del entrenamiento en casa solo en grupos específicos de atletas (con y sin parálisis cerebral/con y sin asistencia) en los dominios de estado de ánimo y calidad de vida, se realizó un análisis de covarianza. No existen diferencias relevantes entre los estados de ánimo y la calidad de vida entre las distintas demografías analizadas. Sin embargo, al controlar las comparaciones a través de las covariables de entrenamiento y la frecuencia utilizada, se verificó que la percepción de la calidad de vida en el dominio "físico" presenta diferencias significativas entre los grupos de análisis. La frecuencia de entrenamiento en cuestión puede verse potenciada por las covariables de apoyo y el tipo de discapacidad, influyendo significativamente en sus percepciones de calidad de vida.
Palabras clave: Deporte Paralímpico; Persona Discapacitada; Parálisis Cerebral; Psicología del Deporte; COVID-19.

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Introduction

Identified in China, the disease caused by the "new coronavirus" (Sars-Cov-2), called COVID-19, has spread across several continents and confirmed its first infection in Brazil in February 2020 (The Lancet, 2020). As of March, of the same year, the World Health Organization (WHO) declared a pandemic disease, presenting itself as a new challenge for society and considering the high rate of transmissibility and high spread of the virus (Li et al. 2020). In Brazil, until the last week of June 2021, more than eighteen million cases were reported, with more than five hundred thousand deaths—the highest number currently (https://covid.saude.gov.br)..

Thus, the government adopted social distancing and isolation methods to control transmission and consequently avoid a more significant number of deaths (Bezerra et al. 2020). However, social isolation impacted changes in factors of the quality of life of the general population were observed during the pandemic (da Costa Matos et al. 2021). In general, there was a negative influence on sports practice (Crochemore-Silva et al. 2020) and emotional factors (Goularte et al. 2021) of people who adhered to these methods of restricting social contact.

Thus, reflections were raised on whether, in this period, people with severe motor disabilities were the most affected in these aspects (Gonçalves et al. 2020; Kamalakannan et al. 2021). Regarding emotional factors, mood, and quality of life, observations made by (García-Rudolph et al. 2021; Mikolajczyk et al. 2021) in people with spinal cord injury showed worse perceptions in all or some of the domains of these aspects during the pandemic. It is important to note that before the period, different perceptions about the quality of life in people with severe motor disabilities were found in the literature, depending on their etiology and/or sequelae (Alves-Nogueira et al. 2020). Therefore, it is seen both before and during the pandemic that practicing physical activity and sports in the population with disabilities can improve psychological aspects (Noce et al. 2009; Thomson et al. 2021).

One of the sports that most add to the inclusion of different impairments is the Paralympic boccia. In this sport, athletes with several disabilities perform in stratified functional classes to equalize the competition (WorldBoccia, 2021). Thus, BC1 and BC2 classes are limited only to individuals diagnosed with cerebral palsy (CP); the BC1 athlete has more severe motor limitation than the BC2 athlete. The BC3 class is the most comprehensive and is intended for athletes with CP and/or degenerative disabilities since they affect severe locomotor dysfunction in all four limbs. The BC4 class, on the other hand, is exclusive to athletes diagnosed with a degenerative impairment who have an active range of small movements (e.g., muscular dystrophy and multiple sclerosis). Because of this, the sport rule implemented using auxiliaries (staff) and/or equipment in certain functional classes (WorldBoccia, 2021).

Before the pandemic, only the study by Barak et al. (2016) investigated the effect of playing boules independently or dependent on the use of aids on psychological aspects, including mood and quality of life. More recently, Arruda et al. (2022) explored the possible influence of social isolation in these aspects in players of this sport, with greater influence on functional classes BC4 and BC2, with athletes from the Northeast region of Brazil presenting lower indicators of quality of life oriented towards the environment.

However, neither study considers whether aspects of mood and quality of life were modulated by the individual training performed by athletes, which is usually composed of frequency, intensity, and volume. Despite the aspects related to mood and quality of life, there is strong evidence of the effects of systematic sports practice on Paralympic athletes of different modalities (Ahmadi et al. 2020; Biagini et al. 2022). Therefore, this information remains unknown in the scenario of paralympic boccia athletes. In addition, it is unknown how these training characteristics added to factors of athletes being helped or not, and different deficiencies included by the modality can significantly alter psychological aspects. To this end, this study aimed to verify the influence of home-based exercise and the type of physical limitation on the mood and quality of life of Paralympic boccia athletes.

Materials and methods

Research and sample

This research was characterized as exploratory observational with a cross-sectional design developed in a Survey model (Thomas et al. 2009). Participated in this study were 34 Boccia athletes of both genders (11 female and 23 male), with different disabilities, from different regions of Brazil, with an average age of 29,6±11,1, time of experience in the modality of at least 6 months, and attest to perform an exercise at home during social isolation (table 1). All participants were recruited through contact with coaches and clubs that have Paralympic boccia as a sport. Athletes who showed interest in participating in the research, aged at least 16 years, with an already defined functional classification, and with a history of competitions in the modality, were included in the study. Athletes who did not complete the form were excluded from the study (a total of 8 athletes were excluded). This research was approved by the Ethics Committee in Research on Human Beings of the Federal University of Pernambuco under protocol CAAE: 31940220.0.0000.9430 and received authorization from the National Association of Sports for People with Disabilities (http://ande.org.br/).

Home workout routine

Data related to the athletes' training routine were collected through questions formulated by the research team, according to the electronic questionnaire developed to transmit on social networks (Whatsapp®, Facebook®, and Instagram®), for the athlete's personal use. The questions referred to the practice of training at home during social isolation with a prescription from the coaches. Thus, data were collected about the existence or not of supervision in the performance of the training, the weekly frequency, and hours per day of exercises practiced by the athletes. In addition, based on these last two elements (weekly frequency and hours per day) the weekly volume of exercises was stipulated as "low", "medium", and "high". Therefore, the athlete who responded in the form would be called low volume if they practice their training in isolation less than 3 days a week and less than 3 hours a day. The average volume, on the other hand, was through the athletes who indicated having inversely proportional measures in weekly frequency and hours per day, respectively (e.g., 3 to 5 days a week and less than 3 hours a day/ less than 3 days a week and 3 days a week) to 8 hours a day. Therefore, it was considered a high volume of training practiced in isolation for the athletes who were found to perform 3 to 5 days a week and 3 to 8 hours a day.

Mood state assessment

The Profile of Mood States (POMS) questionnaire was initially developed to observe mood states in psychiatric patients. However, it has been used in several studies in sports and is duly validated in Brazil (Peluso, 2003). Furthermore, they have usually been widely used in studies with athletes from different sports (Howe et al. 2019; Vancini et al. 2019). This questionnaire, composed of 65 items with closed questions, allows the quantitative assessment of six transient mood states: tension, depression, anger-hostility, vigor, fatigue, and mental confusion. First, each item is analyzed according to a Likert scale (4 scores). Then, Total Mood Disorder (TMD) is calculated by adding the negative factors and subtracting the score from the positive factor. The final TMD result is added to 100 so that there are no negative results.

Quality of life assessment

To assess the quality of life, the WHOQOL-BREF questionnaire translated and validated in Portuguese was used

(Fleck et al. 2000). It is a generic instrument composed of 26 items, with 2 questions about the general quality of life and another 24 questions covering 4 domains: physical, psychological, social relationships, and environment. The answers follow a Likert-type scale (from 1 to 5, the higher the score, the better the quality of life). This questionnaire is used in various contexts related to people with disabilities, in addition to playing an important role in checking the sensitivity of exercise interventions in this population (Barak et al. 2016; Vancini et al. 2019).

Procedures and data collection

The instruments were disclosed in a Google Forms Platform through the link: https://forms.gle/8cuQjHHvP6qKTNYo9. The results were accepted in the period between 06/04/2020 to 07/31/2020 when a sustained curve of COVID-19 cases was registered in Brazil (https://covid.saude.gov.br). Informed consent from participants was obtained. All questions in the original instruments were respected and the respective forms of response were. Along with the form link, an explanatory video was sent about the research procedures, its objectives, and ways to answer the questions. Each athlete was instructed so that the answers were given correctly, reflecting the actual perception and according to what each instrument relates. Athletes with several impairments regarding the coordination and control of gestures were instructed to receive help to clarify doubts, whether for reading or even for using their electronic equipment (computers, cell phones, and tablets), family members, or any staff. In addition to these indications, the athletes were instructed to respond to the form calmly and in a peaceful environment at home, seeking the best conditions for reading, concentration, and effective response. If there was any difficulty in understanding that needed to be clarified, the possibility of consultation with the research team was given, in addition to scheduling with coaches and team leaders, using the most common video call platforms (Google Meet® or Zoom®). Given this, if there was a response duplication in the form sent, only the most contemplated markings would be computed.

Consequently, the other response was excluded. Each athlete responded only once to the entire form containing all questions about all questionnaires. Finally, the form was sent to the athletes through personal social networks (Whatsapp®, Facebook®, and Instagram®), using the "snowball" method. This method is most effective when members of the population are not easily accessible, as in the case of athletes with severe disabilities(Naderifar et al. 2017).

Data analysis

The socio-demographic data obtained through the athletes' responses were presented in quantity (N) and percentage (%) for descriptive analysis. The Shapiro-Wilk test verified data normality. The reliability of the POMS and WHOQOL-BREF instruments was measured via Cronbach's Alpha to confirm whether the individual scores were consistent in different items. When finding agreement between normality and non-normality in the data, it was preferable to describe them after inferential analyses in mean and standard deviation, due to the more significant amount presenting normality. Training characteristics (weekly frequency, hours per day, weekly volume, and the use of supervision) were determined as dependent variables and mood and quality of life indicators as independent variables. To compare the typical characteristics of exercise at home in social isolation in the domains of mood state and quality of life, the independent t-test and Mann-Whitney were used. Then, to verify the influence of home training characteristics in isolation in specific groups of athletes (with and without CP / with and without assistance) on the domains of mood state and quality of life, an analysis of covariance (ANCOVA). This analysis was necessary to identify whether the level of assistance (need for support) of the athletes could influence the comparisons between the characteristics of the exercise performed at home. Given the analysis, the effect measurement that occurred through partial ETA squared (ηp2) was determined as "small - 0.01", "medium -0.06", and "large -0.14" (Maher et al. 2013). Data were analyzed using SPSS, version 20.0 (IBM, USA). All analyses adopted a significance value of 5% ($p<0.05$).

Results

Forty-two complete responses were sent through the form sent, however, 8 were excluded because they had two duplications, and 6 passed on the information about not practicing training at home during social isolation. Given this, 34 responses sent by Paralympic boccia athletes (BC1=8, BC2=8, BC3=9, and BC4=9) met the study's eligibility criteria. Regarding the questionnaires, almost perfect reliability was found through Cronbach's Alpha in the POMS (0.924) and substantial reliability in the WHOQOL-BREF (0.789). Table 1 presents the socio-demographic descriptive data (general and specific) of these athletes who exercised at home during social isolation with and without gender division.

Table 2 shows the comparisons (mean and standard deviation) between the domains of mood state with typical characteristics of training performed at home during isolation in the studied sample.

Table 3 shows comparisons (mean and standard deviation) of quality of life domains between home training characteristics assessed during isolation.

Table 4 shows the results of the analyzes of covariance in the group of athletes who receive or do not receive deliberate assistance by the functional classification of characteristics of the training performed during confinement. The influence of the group, with or without support, can be seen on fatigue and weekly frequency *($F=5.386$; $p=0.027$; $\eta 2p=0.148$)*, physical health and weekly frequency *($F=7.270$; $p=0.011$; $\eta 2p=0.190$)*, psychological health and weekly frequency *($F=4.808$; $p=0.036$; $\eta 2p=0.134$)*, and weekly volume *($F=4.742$; $p=0.037$; $\eta 2p=0.133$)*.

Table 1.
Descriptive characterization of athletes who practice physical exercises at home and fully complete the form.

GENERAL AND SPECIFIC DEMOGRAPHIC DATA		BOTH GENDER	FEMALE	MALE
		N (%)	N (%)	N (%)
TOTAL		34(100%)	11(32.4%)	23(67.6%)
Country region	North East	8(23.5%)	4(50%)	4(50%)
	North	0 (0%)	0 (0%)	0 (0%)
	Midwest	3(8.8%)	1(33.3%)	2(66.7%)
	Southeast	11(32.4%)	3(27.3%)	8(72.7%)
	South	12(35.3%)	3(25%)	9(75%)
Type of disability	Cerebral Palsy	21(61.8%)	8(35%)	13(65%)
	Quadriplegia	3(8.8%)	0 (0%)	3(100%)
	Polio	1(2.9%)	0 (0%)	1(100%)
	Congenital malformation and unspecified	5(14.7%)	3(66.7%)	2(33.3%)
	Muscular dystrophy	4(11.8%)	0 (0%)	4(100%)
Functional classification	BC1	8(23.5%)	3(37.5%)	5(62.5%)
	BC2	8(23.5%)	3(37.5%)	5(62.5%)
	BC3	9(26.5%)	3(33.3%)	6(66.7%)
	BC4	9(26.5%)	2(22.2%)	7(77.8%)
Functional classification with and without assistance	BC1 and BC3	17(50%)	6(35%)	11(64.7%)
	BC2 and BC4	17(50%)	5(29.4%)	12(70.6%)
Time of experience in the modality	Less or up to 5 years	14(41.2%)	4(28.6%)	10(71.4%)
	More than 5 years	20(58.8%)	7(35%)	13(65%)
Participation at national competitive level	No	15(44.1%)	6(40%)	9(60%)
	Yes	19(55.9%)	5(26.3%)	14(73.7%)

Table 2.
Comparisons between mood state domains with typical exercise characteristics during isolation were obtained by athletes.

Comparison groups about the exercise	Mood State Domains (mean± standard deviation)						
	Tension	Depression	Anger-hostility	Vigor	Fatigue	Mental confusion	TMD
Weekly frequency							
Less than 3 days (N=13)	19.46±4.55	18.77±9.77	11.46±6.46	26.23±5.21	10.92±5.20	16.08±4.55	149.69±25.31
From 3 to 5 days (N=21)	21.14±6.06	18.52±7.97	12.95±5.50	24.48±4.35	13.57±6.66	15.81±4.75	157.62±28.04
Hours per day							
Less than 3 hours (N=13)	20.62±4.31	18.08±6.25	10.92±3.54	25.92±5.28	11.31±5.02	15.54±3.30	149.92±17.43
From 3 to 8 hours (N=21)	20.43±6.26	18.95±9.85	13.29±6.82	24.67±4.37	13.33±6.82	16.14±5.32	157.48±31.47
Weekly volume							
Low and/or Medium (N=16)	20.50±4.83	19.08±9.09	12.06±6.01	26.25±5.20	11.50±5.15	16.06±4.18	152.44±23.69
High (N=18)	20.50±6.22	18.22±8.30	12.67±5.84	24.17±4.10	13.50±7.01	15.78±5.07	156.50±30.06
With supervision							
No (N=11)	22.09±5.62	21.73±8.79	12.27±5.25	24.45±4.92	13.45±6.80	16.09±4.08	160.45±28.64
Yes (N=23)	19.74±5.43	17.13±8.22	12.43±6.21	25.48±4.67	12.13±6.00	15.83±4.92	151.78±26.25

Note: TMD = Total Mood Disorder.

Table 3.
Comparisons of quality of life domains between exercise characteristics assessed during isolation.

Comparison groups about the exercise	Mood State Domains (mean± standard deviation)			
	Physical	Psychological	Social relationships	Environmental
Weekly frequency	29.08±1.84	25.08±2.66	11.31±2.17	29.31±2.56
Less than 3 days (N=13)	26.86±3.24	23.33±2.72	11.00±2.79	27.81±4.86
From 3 to 5 days (N=21)				
Hours per day				
Less than 3 hours (N=13)	28.46±2.33	24.85±2.96	11.08±2.13	29.08±4.07
From 3 to 8 hours (N=21)	27.24±3.27	23.48±2.62	11.14±2.81	27.95±4.24
Weekly volume				
Low and/or Medium (N=16)	28.63±2.24	24.94±2.67	11.06±2.14	28.63±3.86
High (N=18)	26.89±3.34	23.17±2.70	11.17±2.91	28.17±4.50
With supervision				
No (N=11)	26.91±4.11	22.91±3.39	10.36±2.73	27.91±5.14
Yes (N=23)	28.09±2.25	24.52±2.37	11.48±2.42	28.61±3.70

Table 4.
Results of the analysis of covariance in the group of athletes who received or did not receive assistance (BC1/BC3 and BC2/BC4 groups) on training characteristics during isolation. Expressed as statistical test values (F), significance (p), and effect size (η^2p) respectively for each domain of mood state and quality of life.

Mood State Domains	F	p	η^2p
Tension			
Weekly frequency	1.659	0.440	0.051
Weekly volume	0.076	0.785	0.002
Hours per day	0.013	0.910	0.000
With supervision	1.209	0.280	0.038
Depression			
Weekly frequency	0.319	0.576	0.010
Weekly volume	0.037	0.848	0.001
Hours per day	0.473	0.497	0.015
With supervision	2.050	0.162	0.062
Anger-hostility			
Weekly frequency	1.234	0.275	0.038
Weekly volume	0.323	0.574	0.010
Hours per day	1.931	0.175	0.059
With supervision	0.020	0.888	0.001
Vigor			
Weekly frequency	1.576	0.219	0.048
Weekly volume	2.098	0.158	0.063
Hours per day	0.711	0.406	0.022
With supervision	0.305	0.585	0.010
Fatigue			
Weekly frequency	5.386	0.027	0.148[a]
Weekly volume	2.914	0.098	0.086[d]
Hours per day	2.293	0.140	0.069[f]
With supervision	0.216	0.646	0.007[h]
Mental confusion			
Weekly frequency	0.115	0.737	0.004
Weekly volume	0.049	0.839	0.001
Hours per day	0.469	0.499	0.015
With supervision	0.003	0.955	0.000
TMD			
Weekly frequency	2.729	0.109	0.081[b]
Weekly volume	1.002	0.325	0.031[e]
Hours per day	1.595	0.216	0.049[g]
With supervision	0.620	0.437	0.020[i]

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Table 5 shows the results of the analysis of covariance in

the group of athletes with and without cerebral palsy on typical characteristics of training performed at home during social isolation. It was observed that only the weekly frequency in physical health *(F=4.433; p=0.043; ηp2=0.125)* was influenced in the group of these athletes.

Table 5.
Results of analysis of covariance in the group of athletes with and without cerebral palsy (BC1/BC2 and BC3/BC4 groups) on training characteristics during isolation (except follow-up, which did not meet the statistical prerequisites). Expressed as statistical test values (F), significance (p), and effect size (η^2p) respectively for each domain of mood state and quality of life.

Mood State Domains	F	P	η^2p
Tension			
Weekly frequency	0.611	0.440	0.019
Weekly volume	0.000	0.993	0.000
Hours per day	0.000	0.986	0.000
With supervision	-	-	-
Depression			
Weekly frequency	0.040	0.844	0.001
Weekly volume	0.087	0.770	0.003
Hours per day	0.172	0.681	0.006
With supervision	-	-	-
Anger-hostility			
Weekly frequency	0.476	0.495	0.015
Weekly volume	0.084	0.774	0.003
Hours per day	1.365	0.252	0.042
With supervision	-	-	-
Vigor			
Weekly frequency	0.964	0.334	0.030
Weekly volume	1.640	0.210	0.050
Hours per day	0.685	0.414	0.022
With supervision	-	-	-
Fatigue			
Weekly frequency	1.035	0.317	0.032[a]
Weekly volume	0.928	0.343	0.029[b]
Hours per day	1.689	0.203	0.052[c]
With supervision	-	-	-
Mental confusion			
Weekly frequency	0.086	0.771	0.003
Weekly volume	0.037	0.848	0.001
Hours per day	0.260	0.614	0.008
With supervision	-	-	-
TMD			
Weekly frequency	0.464	0.501	0.015
Weekly volume	0.176	0.678	0.006
Hours per day	0.969	0.332	0.030
With supervision	-	-	-

Note: TMD: Total Mood Disorder; η^2p: Partial ETA squared representing effect size; [a]The weekly frequency was not influenced. but it potentiated and influenced the perception of fatigue among the groups (F=4.589; p=0.040; η^2p=0.129); [b]The weekly volume was not influenced. but it potentiated and influenced the perception of fatigue among the groups (F=5.126; p=0.031; η^2p=0.142); [c]The number of hours of exercise per day was not influenced. but it potentiated and influenced the perception of fatigue among the groups (F=6.016; p=0.020; η^2p=0.163).

Discussion

This study sought to analyze and compare the short-term implications of training in confinement during the pandemic on the quality of life and mood of Brazilian boccia Para athletes. As the main findings for coaches and committees, it was noticed that those who had a lower weekly frequency of training at home during social isolation had better overall results than those who practiced more frequently, especially in the perception of physical health and quality of life. In addition, when increased as a covariate in the division of specific groups (type of disability and need for help), it demonstrated to potentiate both this and made it possible to influence other domains in quality of life. Another important finding was that all domains in mood state did not show significant differences in typical training characteristics during social isolation. However, the perception of fatigue and TMD was distinguished from the influence of training variables on the group of athletes who received assistance or not during practice. It was also found that these variables also influenced different perceptions of fatigue in athletes with and without CP.

When comparing the characteristics of training performed at home by athletes in isolation with aspects of mood state, no significant differences were found. Even without robust evidence, this reinforces that physical exercise or sports activity can preserve against negative feelings in people with CP (Barak et al. 2016) and motor deficit (Vancini et al. 2019). It is also speculated that resilience as an individual psychological factor must have motivated this result through the easy ability to adapt to adverse situations, this was found in people with spinal cord injury (Mikolajczyk et al. 2021; Patatas & Winckler, 2022).

Athletes showed a significant difference in the perception of physical health in quality of life through the weekly frequency of training practiced during social isolation. Considering that we use a statistical method based on comparisons of means and their respective significance, some subjects in the sample are positioned with values above or below the mean of their respective groups. This means that the interpretation of the results is logically restricted to analyzing central trends and dispersion. Even so, this limiting factor does not diminish the importance of our findings, given that it is a characteristic of the selected statistical analysis method of physical activity (Noce et al. 2009). However, there is no mention in the literature about training frequency. In contrast, the study by Vancini et al. (2019) in groups with and without Para athletes did not find significant differences in quality of life.

Even so, our study also pointed out that the weekly training frequency modulates the perception of physical health as increased among specific groups of athletes in the sport. We could not find studies corroborating this specific finding in both the parasports and rehabilitation literature, especially during isolation. On the other hand, pre-pandemic research on Paralympic boccia players showed that groups with and without assistance in the sport did not show significant differences in all domains of quality of life (Barak et al. 2016). Therefore, both the sample size and the substantial reduction in social interaction caused by social isolation must have attributed different effects of this study to the investigation mentioned above.

Still, on the weekly frequency, among specific groups of athletes, it has been shown to influence and potentiate the perception of fatigue in the mood state. In observation of athletes with CP, the perception of fatigue differs from athletes without CP due to the severe impairment of the motor area. Therefore, it can be seen that the literature corroborates this that individuals with less motor limitation had a greater sensitivity to fatigue when performing exercises (El-Aloul et al. 2020). In addition, our study pointed out as a new factor that the weekly frequency of exercise with the use of aids in this Paralympic sport reduced the perception of fatigue, preserving deleterious effects on the psychological health of athletes during social isolation. In terms of

quality of life, there was also a difference in psychological health, following the same considerations as above. Thus, we see the need for studies to be carried out to know if BC2 and BC4 athletes are likely to experience symptoms of overtraining during pre and/or competitive periods since their functional classification is not allowed to have assistance during sports practice.

The most relevant information in the present investigation lies in the influence of training frequency on mood and quality of life variables, especially in athletes who demand more help and in those with cerebral palsy (Tables 4 and 5). In this sense, we can highlight important questions about the analyzed athletes. People with cerebral palsy generally benefit from systematic and long-term physical exercise programs, a fact that is closely related to the frequency and volume of stimuli distributed in a specific period (Sakzewski et al. 2023). On the other hand, athletes with severe disabilities who need more support in their rehabilitation routines also tend to respond with greater magnitude to long-term training programs (Kim et al. 2023). Thus, we strongly recommend that home programs aimed at maintaining health for athletes with severe disabilities be carried out in a continuous and systematic manner, following the guidelines oriented to each specific condition and sport modality.

Despite bringing essential results at a tough time, this investigation has limitations that must be highlighted. First, a factor that may have influenced the results is that the population is very heterogeneous (both groups were composed of men and women) in terms of causes and type and duration of disability (which could not be controlled). Following this logic, the confinement itself may have been a confounder of the athletes' response. Given this, we also emphasize that there was no control over which moments the form should be answered by the athletes, with the possibility of situations that modulate mood occurring. Another variable to be observed is the type of disability and its functional dependence (or independence), referring to the idea of bias in the responses. Finally, the intensity of the training routine may not have been measured reliably through the athletes' feedback, taking into account each athlete's subjective intensity.

Therefore, we point out as a future perspective in the parasports area the need to have experiments after a pandemic with athletes from different modalities to compare the effects of volume and intensity stipulated in a specific training of the modality carried out at home and/or court under aspects of the state mood and quality of life. Furthermore, it refutes or corroborates the theory that sports practice can reduce/minimize negative perceptions of psychosocial aspects, regardless of the different levels of limitation caused by the deficiency, whether in motor, sensory, and/or cognitive capacity.

Conclusion

It is concluded that Paralympic boccia athletes who had a lower weekly frequency of training at home during social isolation had better overall results than those who practiced more frequently, mainly in the perception of physical health and quality of life. Additionally, when the type of disability and the need for help were included as covariates (classes BC1 and BC3), potentiation of the effects of the exercise was verified, both this and a more significant influence in other domains on quality of life, especially related to socialization. In this way, these results can be supported and help associations, clubs, and coaches to develop better strategies to supervise athletes when training at home, regardless of the severity and dependence that the disability manifests. In this way, we believe that supervision programs carried out at home for all functional classes can positively influence or preserve the condition of each athlete regarding psychological aspects.

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