

Impact of COVID-19 on physical and mental functioning in adolescents with disabilities in a sports nongovernmental organization

Impacto da COVID-19 no funcionamento físico e mental de adolescentes com deficiência em organização não governamental esportiva

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ABSTRACT

Objective: This study aimed to assess physical and mental health, and health-related quality of life (HRQL) parameters in adolescents with physical disabilities enrolled in a sports nongovernmental organization (NGO) versus adolescents without disabilities during coronavirus disease 2019 (COVID-19) pandemic.

Methods: This cross-sectional study included 30 adolescents with disabilities and 86 adolescents without disabilities who responded to an online questionnaire with sociodemographic data and self-rated healthcare routine information during the COVID-19 quarantine. Validated self-report versions of the Strengths and Difficulties Questionnaire (SDQ), Pediatric Quality of Life Inventory 4.0 (PedsQL 4.0), Pittsburgh Sleep Quality Index (PSQI), and Pediatric Outcome Data Collection Instrument (PODCI) were also applied.

Results: The median of emotional [4 (0–10) vs. 5 (0–10), $p=0.018$] and prosocial [7 (0–10) vs. 9 (3–10), $p=0.006$] problems was lower in adolescents with disabilities versus adolescents without disabilities. Adolescents with disabilities had significantly lower global function [68 (21–99) vs. 94 (67–100), $p<0.001$] and higher happiness scores in the PODCI scale [90 (65–100) vs. 80 (0–100), $p=0.016$] compared to controls. Logistic regression analysis demonstrated that physical activity/week (OR=1.03; 95%CI 1.01–1.05, $p=0.002$) was higher in adolescents with

RESUMO

Objetivo: Avaliar os parâmetros de saúde física e mental, de qualidade de vida relacionada à saúde (QVRS), em adolescentes com deficiência física matriculados em organização não governamental (ONG) esportiva vs. em adolescentes sem deficiência, durante a pandemia da doença do coronavírus 2019 (COVID-19).

Métodos: Este estudo transversal incluiu 30 adolescentes com deficiência e 86 adolescentes sem deficiência que responderam a questionário *online* com dados sociodemográficos e informações de rotina de saúde autoavaliadas durante a quarentena da COVID-19. Versões validadas de autorrelato do *Strengths and Difficulties Questionnaire* (SDQ), *Pediatric Quality of Life Inventory 4.0* (PedsQL 4.0), *Pittsburgh Sleep Quality Index* (PSQI) e *Pediatric Outcome Data Collection Instrument* (PODCI) também foram aplicadas.

Resultados: A mediana de problemas emocionais [4(0–10) vs. 5(0–10), $p=0,018$] e pró-social [7(0–10) vs. 9(3–10), $p=0,006$] foi menor em adolescentes com deficiência vs. adolescentes sem deficiência. Adolescentes com deficiência tiveram função global significativamente inferior [68(21–99) vs. 94(67–100), $p<0,001$] e pontuações de felicidade mais altas do PODCI [90(65–100) vs. 80(0–100), $p=0,016$] em comparação com o grupo sem deficiências. A análise de regressão logística demonstrou que a atividade física/semana (*odds ratio* — OR=1,03; intervalo de confiança

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disabilities compared to adolescents without disabilities. However, housework activities (OR=0.14; 95%CI 0.04–0.43, $p=0.001$) and screen time ≥ 3 h/day (OR=0.09; 95%CI 0.02–0.38, $p=0.001$) were lower in adolescents with disabilities compared to adolescents without disabilities.

Conclusion: Adolescents with disabilities attending a sports NGO were not at higher risk of adverse health-related indicators; despite showing reduced physical function, they reported more physical activity, higher happiness, and less screen time compared to adolescents without disabilities during the COVID-19 pandemic.

Keywords: COVID-19 pandemic; Adolescents; Disabled persons; Mental health; Nongovernmental organization; Sports for persons with disabilities.

— IC95%=1,01–1,05, $p=0,002$) foi maior nos adolescentes com deficiência. No entanto, atividades domésticas (OR=0,14; IC95%=0,04–0,43, $p=0,001$) e tempo de tela ≥ 3 horas/dia (OR=0,09; IC95%=0,02–0,38, $p=0,001$) foram menores nos adolescentes com deficiência.

Conclusões: Os adolescentes com deficiência que frequentam uma organização não governamental (ONG) esportiva não tiveram maior risco de apresentar indicadores adversos à saúde; apesar de apresentarem função física reduzida, relataram mais atividade física, maior felicidade e menos tempo de tela em comparação com adolescentes sem deficiência durante a pandemia da COVID-19.

Palavras-chave: Pandemia por COVID-19; Adolescentes; Deficiência física; Saúde mental; Organização não governamental; Esportes para pessoas com deficiência.

INTRODUCTION

A global sanitary crisis due to the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection developed at the end of 2019, and since March 2020, the World Health Organization has been reinforcing quarantine and social isolation to prevent the spread of the coronavirus disease 2019 (COVID-19).¹ This has greatly affected the routines and lives of people worldwide and some groups have been particularly vulnerable to falling into physical decline and emotional distress.² Adolescence is one of the most challenging stages of life due to hormonal changes that represent entrance into maturity of mental and physical development.³ This makes adolescents an at-risk group for suffering drastic consequences due to isolation.^{4,5}

Potential impacts of COVID-19 pandemic on adolescents with disabilities go beyond their developmental stage or the deleterious effects of the virus on their vulnerable organism. The necessary emergency measures of social distancing have broadened the gap they confront in terms of access to health and rehabilitation services.³ Moreover, they are at risk of engaging in more sedentary behaviors as they are already generally less active compared to their healthy peers.⁶ This may be due to scarce facilities and infrastructure adapted to their needs, as well as lack of specialized and integrated health teams that can provide personalized care for this population.

Previous studies reported that sports nongovernmental organizations (NGOs) have attempted to create inclusive environments and extend the outcomes of participation for people with disabilities.^{7,8} The aim of the present study was to assess sociodemographic data, physical and psychosocial functioning, and health-related quality of life (HRQL) parameters in adolescents with physically disabling conditions compared

to adolescents without disabilities quarantined during the COVID-19 pandemic.

METHOD

The NGO of this study is dedicated to providing rowing and canoeing on a regular basis to young patients with physical conditions that result in disabilities. At this NGO, sports activities ground personal development in an inclusive environment along with the assistance of an interdisciplinary health team (e.g., physical educator, physical therapist, psychologist, and social worker). During the pandemic, due to a state mandate, all in-person activities were suspended. Then, weekly video activities were sent via WhatsApp containing exercises prescribed by physical education professionals and physiotherapists, which were performed regularly under virtual supervision. In addition, following an interdisciplinary method, virtual sessions mediated by a psychologist and a social worker aimed to develop social and emotional skills, awareness of citizenship, and effective participation in society.

The inclusion criteria of this study were as follows: participants regularly attending the NGO's online activities during the pandemic, aged between 10 and 18 years, and with at least one physical disability without a known diagnosis of intellectual disability. From July to October 2020, 63 adolescents were invited to complete an online survey as a cross-sectional assessment related to the pandemic period. At least six invitations were sent by email or WhatsApp. Participation was voluntary and required approval of parent/legal guardians. Of the 63 adolescents, 33 patients were excluded due to cognitive dysfunction that would impair capability to complete

the survey (n=8), restricted Internet access (n=9), no approval from the parents/legal guardians or no desire to participate by the adolescents (n=13), and failure to complete the questionnaire (n=3). Thus, a total of 30 adolescents were included in the disability group for this study. Adolescents diagnosed with physical disabilities were classified according to diagnostic criteria. A control group of 86 age-matched adolescents with no disabilities were recruited by advertising on various social media platforms and completed the same survey as the former group, after parent/legal guardian approval.

Study data were collected and managed using Research Electronic Data Capture (REDCap).⁹ This study was approved by the Brazilian National Committee for Research Ethics (CONEP number 4.081.961). All parents/legal guardians and adolescents signed the informed consent and assent terms, respectively.

Participants responded to the online questionnaires considering the previous month. It had five parts, and the median time necessary for each group to complete the online questionnaires was 45 min. The first part of the survey contained 37 questions about sociodemographic data, school data, adherence to COVID-19 public health guidelines, and impact of quarantine on daily routine during the COVID-19 pandemic. In addition, the following situations were assessed using a visual analog scale (VAS)¹⁰ (ranging from 0 to 10): fear of COVID-19 (0=no fear to 10=with extreme fear), physical activity per week (0=without any physical activity to 10=physical activity daily), and sleep quality scale (0=insomnia to 10=no abnormality).

The subsequent four parts used the following instruments validated in Brazilian Portuguese: Strengths and Difficulties Questionnaire (SDQ),¹¹ Pittsburgh Sleep Quality Index (PSQI),¹² Pediatric Outcome Data Collection Instrument (PODCI)¹³, and Pediatric Quality of Life Inventory 4.0 (PedsQL 4.0).¹⁴

Questions of a sociodemographic nature included age, sex, ethnicity, number of rooms in the home, and number of household members. Level of education was assessed by asking if individuals attended elementary school, middle school, high school, or were not studying; respondents also informed if they were attending school before the COVID-19 pandemic (yes/no answer); if they were attending public school (yes/no answer); and the amount of time spent with school homework during the COVID-19 pandemic (no homework, ≤ 3 h/day, and > 3 h/day). Questions were also asked to determine individuals' COVID-19 information source (family and friends, health professional, social media/television/radio); if they considered COVID-19 information they were receiving reliable (yes/no answer); and about their compliance to the "Stay-Home" policy (yes/no answer).

Several questions evaluated the respondents routine during the COVID-19 quarantine to determine if there were household members with COVID-19 (yes/no answer); if daily routine

changed after the "physical distancing" policy (yes/no answer); time dedicated to housework (no housework, ≤ 1 h/day, and > 1 h/day); time taking care of elderly (not taking care, ≤ 1 h/day, and > 1 h/day); sleep duration (≤ 8 h/day and > 8 h/day); sleep after midnight (yes/no answer); sleep difficulty (yes/no answer); amount of screen time (≤ 3 h/day, 4–6 h/day, and ≥ 7 h/day); if screen time increased during the pandemic (yes/no answer); alcohol use during the pandemic (increased, did not change, decreased, and do not drink alcohol); financial status during the pandemic (worsened, did not change, and improved), and household members working outside the home (yes/no answer).

The second part of the survey was the self-report portion of SDQ for adolescents from 11 to 17 years. SDQ contains 25 items, grouped under 5 subscales (i.e., emotional problems, conduct problems, hyperactivity/inattention, peer problems, and prosocial behavior). Each item could be answered as "not true," "somewhat true," and "certainly true" and scores ranged from 0 to 2 for each answer. The subscales scores ranged from 0 to 10. The scores of emotional, conduct, hyperactivity/inattention, and peer problems subscales generate the total difficulties score, which ranges from 0 to 40.

The third part was the PSQI, a questionnaire that consists of 19 questions considering sleep quality and sleep disorders in the previous month. This instrument assesses seven sleep categories: subjective quality of sleep, sleep latency, sleep duration, sleep efficiency, sleep disorders, use of medication, and daytime dysfunction. Scores for each category varies from 0 to 3, with a total score ranging from 0 to 21. A total score above 5 points suggests poor quality of sleep.

The fourth part was the PODCI, a generic HRQL scale developed to evaluate musculoskeletal conditions in the adolescent. This questionnaire contains 83 questions that generate five-subscale scores ranging from 0 to 100 (upper extremity and physical functioning, transfer and basic mobility, sports and physical functioning, pain/comfort, and happiness) and a PODCI global function score. Lower scores are indicative of lower HRQL.

The fifth part of the survey was the self-report version of the PedsQL 4.0. This is a generic version of global assessment in four multidimensional scales (i.e., physical, emotional, social, and school functioning) over the previous month. The questionnaire consists of 23 items, which are scored using a five-point scale (0 never=100 points; 1 almost never=75 points; 2 sometimes=50 points; 3 often=25 points; and 4 almost always=0 points). The total scale score is a sum of two main scales, the physical health summary score, which represents physical functioning, and the psychosocial health summary score, which represents the sum of emotional, social, and school functioning. All score ranges from 0 to 100, and higher score reflects higher HRQL.

All statistical analyses were performed using Statistical Package for Social Sciences (SPSS) for Windows 24.0 (IBM Corp., Armonk, NY, USA). Results were described as a number (frequency) for categorical variables and median (minimum–maximum) or mean±standard deviation (SD) for continuous variables according to non-normal or normal distribution, respectively. Scores that had non-normal and normal distributions were compared using a Mann-Whitney U test and t-test, respectively. Differences between categorical variables were evaluated according to Fisher's exact test or Pearson's chi-square test, as indicated. Spearman rank correlation coefficient was used for testing correlations between continuous variables. Logistic regression analyses model (Backward Stepwise) was performed using adolescents with disabilities as a dependent variable and variables that presented a statistical significance level of $p < 0.2$ in the univariate analyses as independent variables, including analyses of both populations of adolescents with disabilities and adolescents without disabilities. Statistical significance was accepted at $p < 0.05$.

RESULTS

Adolescents with physical disabilities diagnosis participated in the present study and had the following diagnosis: cerebral

palsy¹⁵ [n=16 (54%)], myelomeningocele¹⁶ [n=2 (7%)], Down's syndrome¹⁷ [n=2 (7%)], spinal cord injury¹⁸ [n=1 (3%)], autism spectrum disorder¹⁹ [n=3 (10%)], Legg-Calvé-Perthes disease²⁰ [n=3 (10%)], juvenile systemic lupus erythematosus²¹ [n=1 (3%)], bilateral hip dysplasia²² [n=1 (3%)], and ataxia²³ [n=1 (3%)].

Demographic data revealed no differences between the two groups for age [14 (10–18) years vs. 14 (10–18) years, $p=0.854$], female sex (43% vs. 61%, $p=0.104$), and Caucasian race (57% vs. 52, $p=0.681$) (Table 1). Answers regarding the impact of COVID-19 quarantine showed no differences in relation to public school attendance (87% vs. 84%, $p=0.701$), reliable COVID-19 information (50% vs. 61%, $p=0.430$), and school homework ($p=0.377$) (Table 2). Conversely, adolescents with disabilities reported lower frequencies of housework activities ($p < 0.001$) and had less screen exposure ($p < 0.001$) compared to adolescents without disabilities (Table 2).

The median of hyperactivity/inattention [6 (2–9) vs. 4 (0–8), $p=0.002$] and conduct problems [3 (0–7) vs. 2 (0–6), $p=0.015$] was significantly higher in adolescents with disabilities compared to adolescents without disabilities, whereas the median of emotional [4 (0–10) vs. 5 (0–10), $p=0.018$] and prosocial [7 (0–10) vs. 9 (3–10), $p=0.006$] problems was lower in adolescents with disabilities (Table 3). No differences were shown for peer problems, impact score, and total difficulties

Table 1. Sociodemographic data of the adolescents with physical disabilities versus adolescents without physical disabilities.

	Adolescents with physical disabilities (n=30)	Adolescents without physical disabilities (n=86)	p-value
Current age	14 (10–18)	14 (10–18)	0.854
Female sex	13 (43)	52 (61)	0.104
Caucasian	17 (57)	45 (52)	0.681
Number of rooms in the residence			
≤5	20 (67)	53 (62)	0.623
>5	10 (33)	33 (38)	
Number of household members			
≤3	14 (47)	27 (31)	0.132
>3	16 (53)	59 (69)	
School data			
Level of education			
Elementary school	21 (70)	49 (57)	0.399
Middle school	9 (30)	31 (36)	
High school	0 (0)	3 (3.5)	
Not studying	0 (0)	3 (3.5)	

Results are presented in n (%), median (minimum–maximum values), mean (standard deviation).

Table 2. Impact of COVID-19 quarantine reported by adolescents with physical disabilities versus adolescents without physical disabilities.

	Adolescents with physical disabilities (n=30)	Adolescents without physical disabilities (n=86)	p-value
Attending school before COVID-19	24 (80)	78 (91)	0.121
Online learning during COVID-19	26 (87)	78 (91)	0.505
Enrolled in public school	26 (87)	72 (84)	0.701
School homework during COVID-19, h/day			
No homework	4 (13)	8 (9)	0.377
≤3	8 (27)	35 (41)	
>3	18 (60)	43 (50)	
COVID-19 information source			
Family and friends	3 (10)	6 (7)	0.734
Health professional	0 (0)	1 (1)	
Social media, television or radio	27 (90)	79 (92)	
Considered information on COVID-19 as reliable	15 (50)	52 (61)	0.430
Compliance to “stay-home” policy	30 (100)	80 (93)	0.137
Household member with COVID-19	6 (20)	13 (15)	0.534
Life routine changed after “physical distancing” policy	29 (97)	79 (92)	0.371
Housework, h/day			
No housework activities	13 (43)	11 (13)	<0.001
≤1	15 (50)	32 (37)	
>1	2 (7)	43 (50)	
Taking care of elderly people, h/day			
Not taking care	23 (77)	59 (69)	0.704
≤1	4 (13)	15 (17)	
>1	3 (10)	12 (14)	
Sleep duration, h/day			
≤8	9 (30)	32 (37)	0.477
>8	21 (70)	54 (63)	
Sleep after midnight	15 (50)	58 (67)	0.089
Sleep difficulty	9 (30)	27 (31)	0.887
Screen time, h/day			
<3	8 (27)	5 (6)	0.001
3–6	16 (53)	45 (52)	
≥7	6 (20)	36 (42)	
Screen time increased during COVID-19 quarantine	24 (80)	79 (92)	0.076
Financial status during pandemic			
Worsened	14 (47)	36 (42)	0.816
Did not change	15 (50)	5 (6)	
Improved	1 (3)	45 (52)	
Household member worked outside the home	22 (73)	70 (81)	0.348
Intrafamilial violence during pandemic	10 (33)	23 (27)	0.491
VAS (0–10)			
Fear of COVID-19	6.9 (0–10)	5.4 (0–10)	0.437
Physical activity/week	4.9 (0–10)	2.9 (0–9.2)	0.004
Sleep quality	8.5 (1.2–10)	8.3 (0.3–10)	0.854
Previous psychiatric diseases	8 (27)	0 (0)	<0.001

NA: not applicable to assess Pearson's chi-square test; VAS: visual analog scale in the last month (scale 0–10). Results are presented in n (%), median (minimum–maximum values), mean (standard deviation). Bold indicates statistically significant values.

Table 3. Strengths and Difficulties Questionnaire score, Pittsburgh Sleep Quality Index, Pediatric Outcome Data Collection Instrument, and Pediatric Quality of Life Inventory 4.0 reported by adolescents with physical disabilities versus adolescents without physical disabilities during quarantine of COVID-19 pandemic.

	Adolescents with physical disabilities	Adolescents without physical disabilities	p-value
SDQ	(n=30)	(n=83)	
Total difficulties score (0–40)	13 (0–23)	13 (2–36)	0.616
Abnormal total difficulties score	6 (20)	22 (27)	0.479
Peer problems (0–10)	3 (0–10)	2 (0–7)	0.212
Emotional problems (0–10)	4 (0–10)	5 (0–10)	0.018
Emotional disorders	3 (10)	30 (36)	0.007
Internalization scale (0–20)	6 (0–14)	7 (0–20)	0.505
Conduct problems (0–10)	3 (0–7)	2 (0–6)	0.015
Conduct disorders	7 (23)	7 (8)	0.034
Hyperactivity/inattention (0–10)	6 (2–9)	4 (0–8)	0.002
Hyperactivity/inattention disorder	12 (40)	16 (19)	0.024
Externalization scale (0–20)	6 (0–11)	7 (0–17)	0.613
Prosocial (0–10)	7 (0–10)	9 (3–10)	0.006
Impact score (0–10)	1 (0–6)	0 (0–7)	0.337
PSQI	(n=23)	(n=71)	
PSQI total score (0–21)	6 (1–9)	6 (0–18)	0.409
Overall sleep quality (0–3)	1 (0–2)	1 (0–3)	0.686
Sleep latency (0–3)	1 (0–3)	1 (0–3)	0.277
Sleep duration (0–3)	0 (0–3)	0 (0–3)	0.860
Sleep efficiency (0–3)	0 (0–3)	0 (0–3)	0.569
Sleep disturbances (0–3)	1 (0–2)	1 (0–3)	0.439
Sleep medication use (0–3)	0 (0–3)	0 (0–3)	0.530
Daytime dysfunction (0–3)	1 (0–3)	1 (0–3)	0.566
PODCI (0–100)	(n=29)	(n=62)	
PODCI global function score	68 (21–99)	94 (67–100)	<0.001
Upper extremity and physical functioning	96 (4–100)	100 (42–100)	0.001
Transfer and basic mobility	77 (6–100)	100 (73–100)	<0.001
Sports and physical functioning	42 (0–95)	87.5 (42–100)	<0.001
Pain/comfort	82 (26–100)	90 (33–100)	0.145
Happiness	90 (65–100)	80 (0–100)	0.016
PedsQL (0–100)	(n=29)	(n=82)	
PedsQL 4.0 total scale score	71 (53–90)	74.5 (40–93)	0.987
Physical health summary score	72 (41–100)	78 (25–100)	0.443
Psychosocial health summary	70 (43–93)	69 (33–92)	0.545
Emotional functioning	55 (15–90)	60 (0–95)	0.644
Social functioning	85 (60–100)	80 (25–100)	0.507
School functioning	65 (30–100)	65 (20–100)	0.284

SDQ: Strengths and Difficulties Questionnaire; PSQI: Pittsburgh Sleep Quality Index; PODCI: Pediatric Outcome Data Collection Instrument; PedsQL 4.0: Pediatric Quality of Life Inventory 4.0. Results are presented in median (minimum–maximum values). Bold indicates statistically significant values.

score between groups, or for overall sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, sleep medication use, daytime dysfunction, and PSQI total score in both groups (Table 3).

Adolescents with disabilities had significantly lower scores for global function of the PODCI [68 (21–99) vs. 94 (67–100), $p < 0.001$], upper extremity and physical functioning [96 (4–100) vs. 100 (42–100), $p = 0.001$], transfer and basic mobility [77 (6–100) vs. 100 (73–100), $p < 0.001$], and sports and physical functioning [42 (0–95) vs. 87.5 (42–100), $p < 0.001$] compared to adolescents without disabilities (Table 3). During the pandemic, the median score on the happiness PODCI scale [90 (65–100) vs. 80 (0–100), $p = 0.016$] was significantly higher in adolescents with disabilities attended by the NGO compared with adolescents without disabilities in the control group (Table 3). No differences between groups were evident for total PedsQL or its subscales (Table 3).

There was a significant negative Spearman rank correlation coefficient between online exercise/physiotherapy activities in min/week and age ($r = -0.395$, $p = 0.037$) in adolescents with disabilities during the COVID-19 pandemic. A significant positive Spearman rank correlation coefficient was shown between online exercise/physiotherapy activities in min/week and school functioning score ($r = +0.630$, $p < 0.001$) and between online exercise/physiotherapy activities in min/week and PedsQL 4.0 total scale score ($r = +0.386$, $p = 0.043$) in adolescents with disabilities during the COVID-19 pandemic.

Logistic regression analysis including both adolescents with and without physical disabilities ($n = 116$) demonstrated that adolescents with disabilities had an increase OR of physical activity/week assessed by VAS (OR = 1.03 95%CI 1.01–1.05 $p = 0.002$), however, with lower housework activities (OR = 0.14; 95%CI 0.04–0.43, $p = 0.001$) and screen time ≥ 3 h/day (OR = 0.09; 95% CI 0.02–0.38, $p = 0.001$). The R^2 of the Nagelkerke test was 0.359 (Table 4).

Table 4. Logistic regression analysis including both adolescents with and without physical disabilities ($n = 116$) in which adolescents with disabilities had increased or decreased odds ratio in the following independent variables. The R^2 of the Nagelkerke test was 0.359.

Independent variables	Odds ratio	95%CI	p-value
Physical activity/week by VAS	1.03	1.01–1.05	0.002
Housework activities	0.14	0.04–0.43	0.001
Screen time ≥ 3 h/day	0.09	0.02–0.38	0.001

CI: confidence interval; VAS: visual analog scale. Bold indicates statistically significant values.

DISCUSSION

To the best of our knowledge, this is the first study to report on the impact of social isolation during the COVID-19 pandemic on physical and mental health, and HRQL in adolescents with physical disability who are attended by a sports NGO. Overall, the adolescents with disabling conditions enrolled in this NGO during the pandemic were not at higher risk of adverse health-related indicators. We also demonstrated that with their engagement in the proposed online activities, these adolescents reported increased physical activity per week, less housework, and less screen time than adolescents without disabilities.

The strengths of this study were the evaluation of a unique subgroup of adolescents with disabling conditions enrolled in a sports NGO. The fundamental premise lies in the value of a community-based initiative with solid and long-term work to promote physical and mental health for children and adolescents with disabling conditions even before the pandemic, and its ongoing efforts throughout of quarantine using virtual assistance⁸. Another strength was the use of a global semi-structured self-reported questionnaire, including adolescent habits and problems, and healthcare routines during the COVID-19 pandemic. We also used validated international self-report instruments with high reliability to measure psychosocial functioning in adolescents¹¹ as well as two generic tools of HRQL,^{13,14} namely, sleep quality and sleep disorder tools.¹² The simultaneous inclusion of these parameters allowed a broad characterization of the interaction of physical, mental, and HRQL variables for these adolescents.

The collaborative work of a multidisciplinary team contributes to the development of socioemotional skills and citizenship awareness aiming for psychosocial growth and more participation in society.²⁴ The NGO of this study has been designed in a way that sports activities (e.g., rowing and canoeing) create the milieu for an integrated and supportive approach from a multidisciplinary health team (i.e., physical educator, physical therapist, psychologist, and social worker) toward a more positive self-concept for adolescence development.

During the pandemic, as in-person sports activities were not possible, this NGO rapidly developed intervention programs aiming to maintain physical activity in their adolescent attendees with disabilities, including an Internet-based intervention orienting therapeutic exercises and home-based physical activity, as well as virtual counseling sessions to improve social and emotional skills.⁸

Recent evidence suggests that, during quarantine, adolescents with physical deficiency were less involved in physical activity and had greater screen exposure time.^{25,26} Interestingly, using

multivariate analysis, our study showed that, despite having less participation in domestic tasks, adolescents with disabilities attended by the NGO spent less time in front of computer screens, cell phones, and tablets and performed more physical activities compared to adolescents without disabilities. Corroborating with what is observed in daily practice for patients with these conditions, Spearman rank correlations emphasized the relevance of online physical activities, particularly in older ages, reflecting in higher school functioning and HRQL scores. Indeed, the most important goal for the NGO of this study since the beginning of quarantine was the promotion of activities with no disabilities for these patients to avoid sedentary behaviors.

The impact on mental health, as well as emotional well-being, has also been reported during isolation, with adolescents appearing to be more vulnerable to psychological disorders in other cohorts.²⁷ Our study showed that adolescents attended by a sports NGO did not appear to be an at-risk group for poor mental functioning outcomes related to COVID-19, since they showed less emotional problems compared to adolescents with no disabilities. The high scores of conduct problems and hyperactivity/inattention and reduced prosocial scores reported by adolescents with disabling conditions compared to controls with no disabilities may be intrinsically related to developmental disabilities observed in our patients. Our data support the idea that the practice of physical activity does not only promote good musculoskeletal conditioning but also reduce the incidence of negative feelings, especially during setbacks such as those faced during the pandemic.²⁸ In fact, we observed that higher engagement in the online exercise program was associated with better overall school functioning and HRQL, which suggests the importance of this intervention. Also, we observed an association between lower exercise with increasing age, which confirms that older adolescents are more refractory to physical activity, and may need more focused strategies to improve their adherence.

Although the global function score was lower (as was expected) in adolescents with disabilities compared to adolescents in the control group, perception of happiness in the former was significantly higher, similar to other studies.²⁹ This may be due to the fact that this feeling of well-being and joy is more latent in people who practice physical activities on a regular basis.³⁰

The multidisciplinary and multiprofessional approach with simultaneous online appointments may have safeguarded the effect of stressors during this catastrophic period in these subgroups of disabling conditions.

We are aware that our research has some limitations. The first is the limited number of adolescents in the

study, which is a natural limitation of a real-life non-profit organization that seeks to challenge barriers to maintain youngsters with heterogeneous sets of diagnoses active. The second limitation is the study's cross-sectional design, precluding any direct causative relationships between the COVID-19 pandemic and changes in lifestyle, overall health, and HRQL. Third, our sample was heterogeneous in terms of chronic conditions, levels of functionality, and socioemotional backgrounds. Another limitation refers to the sample losses observed herein, which is partially due to the intrinsic challenges associated with surveying adolescents, including variability in motivation, cognitive abilities, and maturity level of the respondent. Finally, socioeconomic class was not evaluated herein; however, we assessed other relevant sociodemographic data that were similar in both groups, such as number of rooms in the residence, number of household members, and public-school attendance.

In conclusion, adolescents with physical disabilities attended by a sports NGO during COVID-19 pandemic were not at higher risk of adverse indicators or poorer HRQL. Despite showing reduced physical function, the adolescents with disabilities reported more physical activity, higher happiness, and less screen time than those without disabilities during the current pandemic. This study highlights the importance of NGOs to unload the demands on the health system via an inclusive and caring environment. Further longitudinal studies will be necessary to assess the cumulative impact and long-term effects of this unprecedented crisis on these adolescents with disabling conditions.

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Conflict of interests

The authors declare there is no conflict of interests.

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Declaration

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