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Are environmental and sociodemographic factors associated with physical activity of pediatric oncologic patients and their parents? A cross-sectional study

Fatores sociodemográficos e ambientais estão associados à prática de atividade física de pacientes pediátricos oncológicos e seus pais? Um estudo transversal

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ABSTRACT

Introduction: Physical activity (PA) during pediatric oncologic treatment provides health benefits to patients. However, different factors can facilitate or hinder this practice. Objective: Verify the asso-ciation between environmental and sociodemographic factors and leisure-time and commuting-re-lated physical activity (LTPA-CPA) of pediatric oncologic patients and their parents. Methods: Cross-sectional study in partnership between the University and the Reference Children's Oncologic Center. Young patients (10-19 years old) diagnosed with cancer and at any stage of treatment partic-ipated, as well as their father or mother. Participants answered socioeconomic and sociodemographic questions, a questionnaire of PA for adolescents, and the environmental scale for youth, through telephone or face-to-face contact. Descriptive statistics, Student's t-test, Pearson's chi-square test, Poisson regression, Fisher's exact test, and the Kappa index were used. A p-value of < 0.05 was con-sidered statistically significant. Fisher's exact test and Kappa Index (k) were performed to verify pos-sible associations and concordance between adolescents and parents, with a p value <0.05. Results: 40 patients participated in this study (62.5% male), most diagnosed with leukemia (40%) and 40 parents (43.08 ± 7.67 years old; 73% female), 63% white ethnicity and 50% socioeconomic level C1/C2/D-E. The mean LTPA-CPA by patients was 286.7 ± 238.6 min/week, and by parents it was 50.8 ± 99.7 min/week. There was no association between sociodemographic factors, PA of parents, and LTPA-CPA of patients (p > 0.05). There was a negative association between LTPA-CPA and recreational facilities (p = 0.04), and a positive association for greater neighborhood safety (p = 0.02). Conclusion: There was no association between sociodemographic factors and LTPA-CPA in pediatric patients and their parents. Greater neighborhood safety was associated with this practice.

Keywords: Cancer; Adolescents; Healthy lifestyle.

RESUMO

Introdução: A atividade física (AF) durante o tratamento oncológico pediátrico proporciona benefícios à saúde de pacientes. No entanto, diferentes fatores podem facilitar ou dificultar essa prática. Objetivo: Verificar a associação entre os fatores sociodemográficos e ambientais e a prática de atividade física de lazer e deslocamento (AFL-AFD) de pacientes pediátricos oncológicos e de seus pais. Métodos: Estudo transversal em parceria entre Universidade e Centro Oncológico Infantil de Referência. Participaram pacientes jovens (10-19 anos), diagnosticados com câncer e em qualquer fase do tratamento, além do pai ou da mãe. Os participantes responderam a questões sociodemográficas e socioeconômicas, um questionário de AF habitual e a escala ambiental para jovens, por meio de contato telefônico ou presencial. Foram utilizados estatística descritiva, teste t de Student e o teste qui-quadrado de Pearson, regressão de Poisson, Teste exato de Fisher e índice Kappa e o valor de p adotado foi < 0,05. Teste exato de Fisher e índice Kappa (k) foram utilizados para verificar possíveis associações e concordâncias entre adolescentes e pais, com valor de p < 0,05. Resultados: Participaram 40 pacientes (14,7 ± 2,7 anos de idade; 62,5% meninos), sendo a maioria diagnosticados com Leucemia (40%), e 40 pais (43,08 ± 7,67 anos de idade; 73% mulheres), 63% de etnia branca e 50% com nível socioeconômico C1/C2/D-E. A média de AFL-AFD dos pacientes foi de 286,7 ± 238,6 min/sem e dos pais foi de 50,8 ± 99,7 min/sem. Não houve associação entre fatores sociodemográficos, AF dos pais e AFL-AFD dos pacientes (p > 0,05). Houve associação negativa entre AFL-AFD e instalações recreativas (p = 0,04), e associação positiva para maior segurança na vizinhança (p = 0,02). Conclusão: Não houve associação entre fatores sociodemográficos e AFL-AFD em pacientes pediátricos e dos seus pais. Maior segurança na vizinhança foi associada a essa prática.

Palavras-chave: *Câncer; Adolescentes; Comportamentos saudáveis.*

Introduction

The global incidence of pediatric cancer is 387,845 new cases, with specific cancers standing out in incidence and mortality: leukemias (22.9%; 27%), central nervous

system (9.6%; 13.4%), and Non-Hodgkin lymphomas (7.8%; 8.4%)[1]. Although the survival of oncologic patients is approximately 80%, given the therapeutic advances[2], pediatric cancer is still considered a public health problem. This occurs because cancer leads to the mortality rates due to diseases in the pediatric population[3], affecting the physical and mental health and quality of life of these patients and survivors[4].

Oncological development and relapses may involve non-modifiable risk factors, such as genetic factors[5], and modifiable and/or mitigating factors, such as behavioral, environmental, and sociodemographic factors, some viruses, and chemotherapy and radiotherapy itself[6]. However, protective factors should be encouraged, such as the reduction of pesticides, pollution and inequities, vaccination campaigns, and educational actions and incentive for healthy habits, such as physical activity (PA)[7].

Leisure-time and commuting-related PA (LTPA -CPA) practice is considered a promising therapy in the prevention[8] and in reducing adverse effects and sequelae arising from cancer and its treatments (e.g., reduction of bone mass, physical and cognitive functions, pain and depression)[9]. Although the literature still does not present robust evidence on commitment to LTPA-CPA of pediatric oncologic patients and survivors, the findings indicate that this practice is safe and with positive effects on health, such as improvement in aerobic capacity, fatigue, muscle strength, psychosocial health, physical function, cardiovascular/cardiorespiratory fitness, bone mineral density and activity and participation levels[10,11].

However, international literature on these patients indicates that the time allocated to the LTPA-CPA practice is insufficient, varying between four minutes[12] and forty-seven minutes[13] per day. According to international and Brazilian recommendations, it is recommended moderate-to-vigorous PA at least sixty minutes per day for adolescents[14,15]. Some studies indicate that the low amount of time spent on PA in this population may be related to factors such as older age[16], female gender and low income[17], in addition to the lack of accessible, safe, and stimulating environments for these activities[18].

Even though the benefits of LTPA-CPA for health are evident, there is a need to understand the environmental and sociodemographic factors associated with the PA practice of pediatric oncologic patients, especially in low-income countries, such as Brazil. Thus, this study aimed to verify the association between environmental and sociodemographic factors and LTPA-CPA of pediatric oncologic patients and their parents.

Method

Location characterization and ethical aspects

Cross-sectional study, carried out in partnership between the Public University and the Children's Oncologic Center, a reference in pediatric oncology, in the São Paulo state. The location chosen for convenience, has a multidisciplinary team, ample structure, and high therapeutic technologies.

Study approved by the Ethics Committee for Research with Human Beings of the Institute of Biosciences of the São Paulo State University Júlio de Mesquita Filho (nº 2.812701) and by the Ethics Committee of the Dr. Domingos Ademar Boldrini Children's Center for Hematological Research (nº 2.965.559).

Participant recruitment procedures

The inclusion criteria for patients and parents were: a) patient being in any phase of oncologic treatment; b) From 10 to 19 years old (adolescence period according to World Health Organization); c) reside in the São Paulo state; d) accepted to participate in the study; e) one of the parents agrees with the child's participation; and f) one of the parents accepts to participate in the study. Exclusion criteria were: a) patients or parents who did not answer the entire questionnaire; b) patients or parents who discontinued data collection; and c) patients or parents requesting that the data not be used. However, there were no exclusions.

To avoid losses in the identification of pediatric oncologic patients treated at the co-participating Childrens' Oncologic Center, we chose to contact all adolescents aged 10 to 19 years old (n = 753) considered as active patients in the hospital's database, in order to identify potential adolescents who were still undergoing treatment. In addition, they need to reside in São Paulo state, with an active registration between January 2008 and December 2018. Figure 1 shows the complete target audience recruitment process (Figure 1).

Instruments for data collection

The patients answered a survey organized for this study that included validated questionnaires and additional questions, namely: sociodemographic questions, such as gender (1: male; 2: female), age (years), ethnicity/

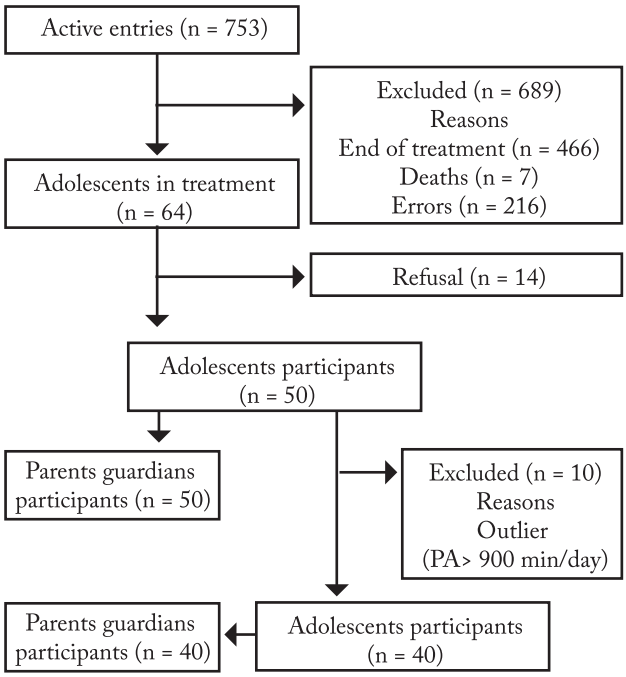

Figure 1 – Flowchart of the recruitment process for data collection and analysis.
PA = physical activity

race (1: White; 2: Black/Brown; 3: Asian/Indigenous), educational level (1: elementary school; 2: high school), weight, height, body mass index (1: underweight/eutrophic; 2: overweight/obesity), and a question about the type of cancer diagnosed.

Questions about LTPA-CPA were answered via the Habitual PA Questionnaire for Adolescents - QAFA, which generates a weekly and annually score (multiplication of days by time of this practice), with reproducibility (r = 0.61) and acceptable validity (rho = 0.15 - shuttle run test) for Brazilian adolescents[19]. The instrument includes 17 questions, divided into two blocks: 1- Sports and physical exercises (considered LTPA) and 2- PA related to commuting to school (considered CPA). Information was collected through open questions, considering the daily minutes reported by patients for each question. At the end, the LTPA-CPA was categorized into 0: Insufficient PA (< 300 min/week) and 1: Sufficient PA (≥ 300 min/week), and this cutoff point was adopted according to international recommendations for adolescents[14].

To assess adolescents' environmental perception and mobility, the Neighborhood Environment Scale for Youth - NEWS-Y[20] was used, consisting of 73 items, divided into nine subscales, being translated, adapted, and validated for Brazil[21]. The NEWS-Y has moderate validity and reliability, with an intraclass correlation coefficient from 0.24 to 0.64 and Cronbach's alpha from 0.18 to 0.87[22]. The nine subscales refer to: A- Mixed land use; B- Recreational facilities; C- Types of residences; D- Access to services; E- Neighborhood surroundings; F- Neighborhood streets; G- Places to walk; H- Security in the neighborhood; I- Criminality. The domain score is defined by the average responses to each item. For this study, the cutoff point was made based on the median of each domain, in order to dichotomize them into 0: low environmental perception/low walkability (≤ median) and 1: high environmental perception/high walkability (> median).

Parents answered, in the format of a survey, the sociodemographic information questionnaire and the socioeconomic questionnaire called Brazil Economic Classification Criteria[23], which identifies the consumption of Brazilian families. This questionnaire contains 35 questions about education, housing, access to public services, durable goods, and the size of municipalities. A score distributed in classes is generated at the end: A = 100-45, B1 = 44-38, B2 = 37-29, C1 = 28-23, C2 = 22-17, and D-E = 16-0. Socioeconomic information was categorized into medium-low/low economic status: C1/C2/D-E and medium/high economic status: A/B1/B2.

Parents answered seven questions about PA practice, aiming to confront the perception of patients and parents about PA. Equally, LTPA-CPA was categorized into 0: Insufficient PA (< 150 min/week) and 1: Sufficient PA (≥ 150 min/week), whose cutoff point is based on international recommendations for adults[21]. Furthermore, they answered the NEWS-Y environmental scale (parents' version)[20,22].

Data collection procedures

The main researcher performed all collections, initially calling all contacts on the list of patients considered active by the hospital. Five telephone contact attempts were made for each registered number on different days and times. During the contact, they were asked to talk to one of the parents, presenting the purpose and relevance of the research, the data collection methods, and the consent form. The phone call lasted approximately five minutes.

When the parents agreed to participate in the research, the data collection was scheduled according to the preference of day, place, and time. Information was collected by telephone (n = 44) or in person at the hospital (n = 6), facilitating access to participants.

The collection was carried out first with the adolescents and, later, with the parents. The interviewer interrupted data collection if the participant wanted to because of tiredness or discomfort. The first questionnaire was related to sociodemographic information, followed by the NEWS-Y and QAFA questionnaires. For parents, some PA-related questions and the socioeconomic questionnaire were added at the end of that order. Regardless of the collection method, face-to-face or via telephone from the public university, which was chosen by the participants in order to facilitate participation in the research, the average duration was 30 to 40 minutes with each participant. All participants were invited to read and sign the Informed Consent Form and the Informed Assent Term with the lead researcher or at the hospital reception.

The Open Data Kit application was used to record the collected information, as it features easy data entry, online database, financial savings, and interviewer time[24]. The application was stored on two electronic devices, a Tablet and a Smartphone.

Statistical analysis

Descriptive statistics were performed for absolute and relative frequency (mean, minimum and maximum), Shapiro-Wilk test to verify data normality, followed by Student's T for independent samples when comparing male and female participants, the Pearson's chi-square test to verify the possible difference between the proportion, identifying non-collinearity for all variables. Regarding the reported PA time, it should be noted that values greater than 900 minutes per week, equivalent to more than two hours daily in LTPA-CPA, were considered outliers. Subsequently, Poisson regression with robust variance was performed to verify possible associations between independent and dependent variables, considering the value of $p < 0.05$ and a confidence interval (CI) of 95%.

Fisher's exact test was performed to verify the association between the time of practice of the LTPA-CPA of the adolescents and the parents. In the concordance analysis between the responses of adolescents and parents, the Kappa Index (k) was performed for the environmental variables, considering the value $p < 0.05$. All analyses were performed using the SPSS 21 program (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.).

Results

Fifty pediatric oncologic patients were identified between November 2018 and May 2019, residing in 30 cities in São Paulo state, predominantly in the city of Campinas (Figure 2). Ten patients were classified as outliers due to the high time devoted to LTPA-CPA practice (> 900 min/week), which was excluded, as these data contrasted with the scientific literature.

For analysis, 40 patients were included (Table 1). The diagnosis of acute lymphoblastic leukemia was more frequent (n = 12; 30%), followed by chronic myeloid leukemia (n = 4; 10%), and more than half were diagnosed with 18 other types of cancer (n = 24; 60%).

Male patients were prevalent (n = 25; 62.5%), with a mean age of 14.68 ± 2.68 years and a body mass index of 22.80 ± 6.99 Kg/m². No difference was identified between genders regarding age (U = 182.50; p = 0.88), weight (U = 150.00; p = 0.29), height (t[38] = -1.43; p = 0.16) and body mass index (t[38] = -1.08; p = 0.28).

Also, 60% (n = 24) of patients reported white ethnicity, 50% (n = 20) with socioeconomic status C1/C2/D-E (reported by parents), 70% (n = 28) classified as underweight/eutrophic and 55% (n = 22) attended elementary school, with no difference between male and female gender ($p > 0.05$).

Regarding parents (n = 40), 73% (n = 29) women participated in this study, with a mean age of 43.08 ± 7.67 years, BMI 28.14 ± 4.48 Kg/m², 70% (n = 28) classified as overweight/obesity, 63% (n = 25) reported white ethnicity, 50% (n = 20) with socioeconomic status C1/C2/D-E and 78% (n = 31) completed high school. Regarding the LTPA-CPA, 92% (n = 37) were classified as having insufficient practice, reporting a time of 50.80 ± 99.67 minutes per week.

Patients reported practicing approximately 286.75 ± 238.59 min/week of LTPA-CPA, with no significant difference (t[38] = 1.09; p = 0.28) between male (318.60 ± 234.76 min/week) and female (233.66 ± 243.45 min/week) patients. However, 57.5% (n = 23) of patients reported exceeding the global PA recommendations (≥ 300 min/week), with no association for those who reported performing insufficient or sufficient practice, in both genders ($x^2[1] = 1.15$; p = 0.28). In addition, of the 17 patients who reported having insufficient practice, 47% (n = 8) did not practice any LTPA-CPA (Table 2).

As for the environmental variables perceived by the patients, the medians and minimum and maximum values of NEWS-Y were: mixed land use 2.80 (1.95 - 4.35); recreational facilities 2.60 (1.21 - 4.57); types

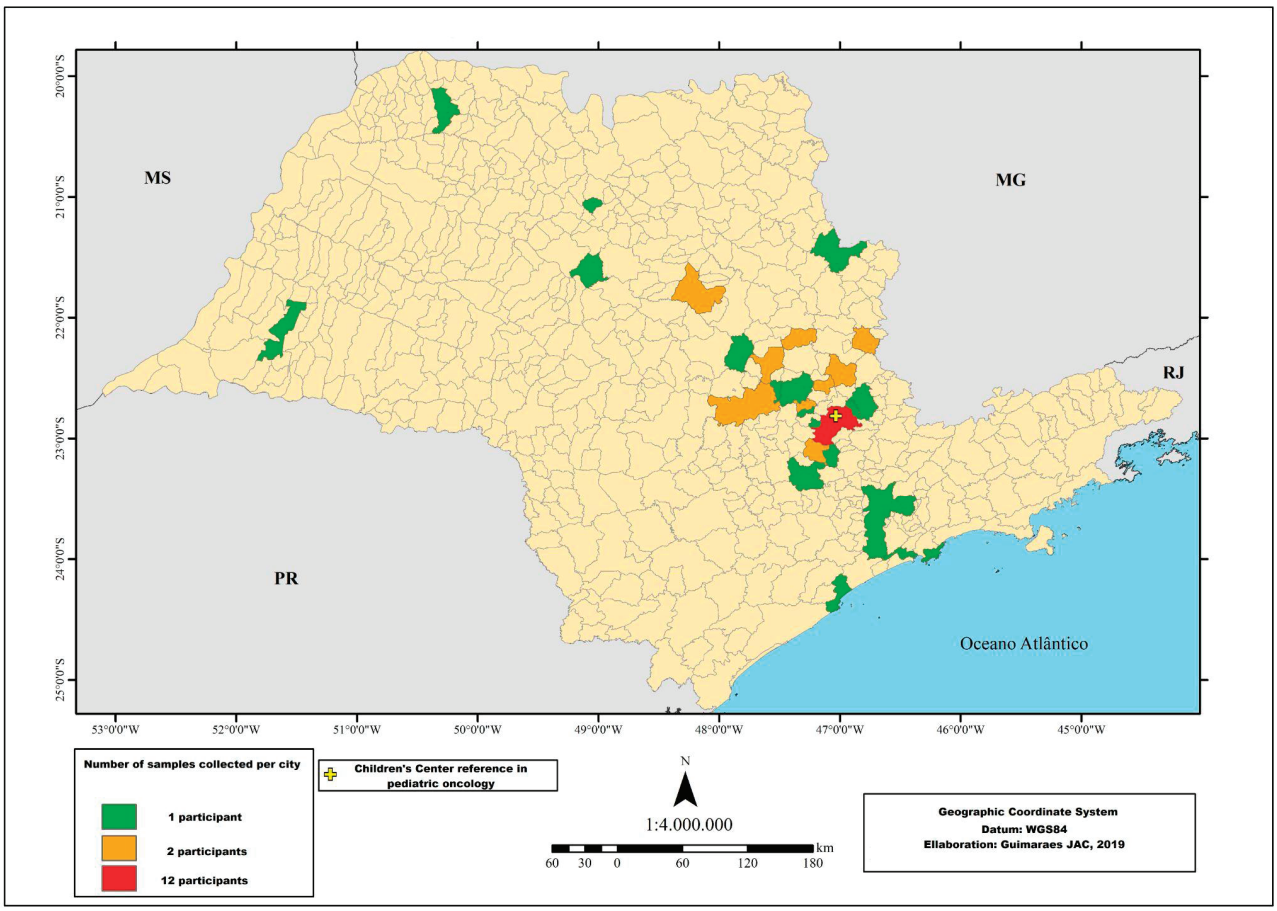

Figure 2 – Cities of the São Paulo state in which the oncologic pediatric patients lived and the location of the Children's Center reference in pediatric oncology.
Source: Authors.

of residence 70.50 (43.00 - 193.00); access to services 2.67 (2.00 - 3.33); neighborhood surroundings 2.67 (2.00 - 3.67); neighborhood streets 2.67 (2.00 - 3.00); places to walk 2.75 (1.75 - 4.00); neighborhood safety 2.63 (2.13 - 3.25) and criminality 2.43 (1.29 - 3.57).

Regarding the responses of parents and patients, for the subscales of the NEWS-Y questionnaire, there was significative and regular agreement regarding mixed land use (k = 0.64; p < 0.01), types of residence (k = 0.50; p = 0.00), neighborhood safety (k = 0.55; p < 0.01) and criminality (k = 0.35; p = 0.02). The other subscales showed weak/sufferable agreement (k = 0.02 - 0.26), as expressed in Table 3:

In the raw analysis of Poisson regression, no association was identified between the environmental variables and LTPA-CPA (p > 0.05). In the adjusted analysis, recreational facilities, access to services, places to walk, neighborhood safety, and criminality expressed a significant association. Scores above the median for the recreational facilities subscales (adjusted PR = 0.53; 95% CI = 0.28 - 0.99; p = 0.04) and neighborhood safety (adjusted PR = 1.66; 95% CI = 1.05 - 2.61; p = 0.02) were associated with sufficient LTPA-CPA practice (Table 4). An environment with a greater perception of safety was positively associated with sufficient LTPA-CPA practice. In comparison, an environment with a greater perception of recreational facilities was negatively associated with this practice.

Discussion

This study verified the association between environmental and sociodemographic factors and the LTPA -CPA practice of pediatric oncologic patients and their parents. Most of the sample was male patients, with white ethnicity, approaching 15 years old, underweight or eutrophic, and diagnosed with acute lymphoblastic leukemia. This type of cancer leads to incidence and mortality in the pediatric population. It is related to environmental factors, such as pesticides, toxic gases, and artificial light, and genetic factors, such as genetic mu-

Table 1 – Characteristics of oncologic pediatric patients (n = 40) and parents (n = 40, São Paulo, 2019).

Variables	n or X (SD)	%
Patients reported		
Gender		
Male	25	62.5
Female	15	37.5
Age (years)	14.68 (2.68)	
Ethnicity/Race		
White	24	60.0
Black/brown	16	40.0
Asian/indigenous	0	0
Body characteristics		
Weight (Kg)	57.47 (22.07)	
Height (m)	1.59 (0.12)	
Body mass index (Kg/m²)	22.80 (6.99)	
Body type		
Underweight/eutrophic	28	70.0
Overweight/obesity	12	30.0
Educational level		
Elementary school	22	55.0
High school	18	45.0
Oncological diagnosis		
Acute lymphoblastic leukemia	12	30.0
Chronic myeloid leukemia	4	10.0
Other types*	18	60.0
Parents reported		
Gender		
Male	11	27.0
Female	29	73.0
Age (years)	43.08 (7.67)	
Ethnicity/Race		
White	25	63.0
Black/brown	15	37.0
Asian/indigenous	0	0
Body characteristics		
Weight (Kg)	78.85 (14.22)	
Height (m)	1.67 (0.09)	
Body mass index (Kg/m²)	28.14 (4.48)	
Body type		
Underweight/eutrophic	12	30.0
Overweight/obesity	28	70.0
Educational level		
Elementary school	9	22.0
High school	31	78.0
Economic status		
Low/middle-low	20	50.0
Middle/high	20	50.0

x = average; SD = standard deviation; * Other types = astrocytoma, Hodgkin's disease - nodular sclerosis, lymphocyte-predominant Hodgkin lymphoma, malignant glioma, acute promyelocytic leukemia, peripheral T-Cell lymphoma, malignant lymphoblastic lymphoma, medulloblastoma, desmoplastic medulloblastoma, nephroblastoma - Wilms tumor, neuroblastoma, osteosarcoma, malignant paraganglioma, choroid plexus malignant papilloma, rhabdomyosarcoma, alveolar rhabdomyosarcoma, embryonal rhabdomyosarcoma, Ewing's sarcoma.

tations, maternal infections, and immune responses[25].

Regarding parents, most were women, white ethnicity, approaching 50 years old, overweight or obese, with a medium or higher education level. Half of the sample had medium-low and low economic status. It is common for family members of children and adolescents to also participate in research like this, as it is of interest to investigate whether their active and healthy behaviors are similar, influence, or stimulate, in some way, this pediatric population[26].

Table 2 – Classification of leisure-time physical activity and commuting reported by pediatric oncologic patients (n = 40, São Paulo, 2019).

Physical activity	Sufficient practice (≥ 300 min/week)		Insufficient practice (< 300 min/week)		x^2 (p)
	n	%	n	%	
Total	23	57.5	17	42.5	1.15 (0.28)
Male	16	64.0	9	36.0	
Female	7	47.6	8	53.3	

x^2 = chi-square

Diverging from the literature[12,13], a large proportion of the patients in this study were classified as sufficiently active. However, the results also showed that almost 50% of the patients did not reach the global/national LTPA-CPA recommendations; of these, half did not perform any PA. Likewise, half of the parents spent insufficient weekly time on LTPA-CPA. It is known that this practice decreases after the age of seven years[27] and is inversely associated with age[28]. Therefore, it is imperative that, from the beginning of oncologic treatment, actions that promote healthy habits occur, encouraging patients and their families inside and outside the hospital environment, and beyond the therapeutic period.

Regarding environmental factors, safety in the neighborhood was positively associated with greater walkability, helping these patients to reach LTPA-CPA for a longer time, corroborating with other studies that reinforce the positive association among adolescents[29]. Other environmental factors also favor the achievement of PA recommendations by adolescents, such as traffic influences[30], paved streets, better public lighting, and cycle lanes for bicycles[31].

However, contrary to what the literature presents, the perception of recreational facilities was negatively associated with the walkability of the investigated adolescents. The poor quality of the structures, the difficulty of access, and the territorial differences in the cities of the patients may have influenced these findings. The literature indicates that environments with open public

Table 3 – Agreement between environmental/walkability perceptions reported by parents (n = 40) and adolescents (n = 40) on the subscales of the Neighborhood Environment Walkability Scale for Youth (Rio Claro-São Paulo, 2019).

Subscales	Parents and adolescents				
	Low perception		High perception		Kappa (p)
	n	%	n	%	
Mixed land use	18	45.0	22	55.0	0.64 (0.00)*
Recreational facilities	20	50.0	20	50.0	0.15 (0.33)
Types of residences	20	50.0	20	50.0	0.50 (0.00)*
Access to services	24	60.0	16	40.0	0.02 (0.88)
Neighborhood surroundings	24	60.0	16	40.0	0.14 (0.36)
Neighborhood streets	29	72.5	11	27.5	0.09 (0.50)
Places to walk	24	60.0	16	40.0	0.55 (0.00)*
Security in the neighborhood	27	67.5	13	32.5	0.26 (0.09)
Criminality	24	60.0	16	40.0	0.35 (0.02)*

*p < 0.05.

Table 4 – Crude and adjusted Prevalence Ratio (95% Confidence Interval), and significance level between environmental variables, gender and leisure-time and commuting-related physical activity of pediatric oncologic patients (n = 40) (Rio Claro-São Paulo, 2019).

Variables	High perception						Low perception					
	Crude			Adjusted[a]			Crude			Adjusted[a]		
	PR	95% CI	p	PR	95% CI	p	PR	95% CI	p	PR	95% CI	p
Mixed land use	0.76	0.21 - 2.70	0.67				1.00					
Recreational facilities	0.81	0.23 - 2.86	0.74	0.53	0.28 - 0.99	0.04*	1.00			1.00		
Types of residences	0.81	0.23 - 2.86	0.74				1.00					
Access to services	2.20	0.58 - 8.28	0.24	1.55	0.98 - 2.46	0.05	1.00			1.00		
Neighborhood surroundings	0.60	0.16 - 2.16	0.43				1.00					
Neighborhood streets	0.50	0.12 - 2.07	0.34				1.00					
Places to walk	2.20	0.58 - 8.28	0.24	1.44	0.86 - 2.40	0.16	1.00			1.00		
Security in the Neighborhood	2.08	0.51 - 8.46	0.30	1.66	1.05 - 2.61	0.02*	1.00			1.00		
Criminality	0.60	0.16 - 2.16	0.43	0.54	0.28 - 1.03	0.06	1.00			1.00		

PR = Prevalence ratio; CI = Confidence Interval; *p < 0.05; aAdjusted analysis = recreational facilities, access to services, places to walk, security in the neighborhood, and criminality.

spaces[29], access to gyms[32], community programs, free practices[33], and better school infrastructures[34] encourage LTPA-CPA in different age groups.

Extrapolating these findings, it is necessary to think about built environments and the school environment that are easily accessible beyond the vicinity of the patients' homes, since many of them live long distances from the places of treatment. This can be a limiting factor for a greater scope of PA recommendations, considering the long periods that patients are treated in hospitals[35].

Therefore, it is important to minimize the factors that hinder the PA practice in this population, enabling these patients to be more active and healthy during and after cancer treatment. During this period, PA significantly improves self-esteem[36], quality of life, physical fitness, and reduces adverse effects of treatment, such as fatigue[37]. A summary of this literature indicates promising results that PA generates positive effects on the physical, psychosocial, and cognitive health of pediatric patients[38].

On the one hand, some limitations are important to highlight. Despite the Hospital being a reference center for pediatric oncology treatment, limitations were identified in reaching participants. Among the registered active patients (n = 753), who were potentially eligible, 28.7% (n = 216) could not be contacted by phone due to incorrect phone information or failure to answer the calls, despite five attempts made at different times and on other days. Ultimately, patients undergoing treatment (n = 64) were considered eligible, and 40 participants were included in the sample after applying exclusion criteria.

Another limitation to be considered was the collection of data on participants' PA through a questionnaire. This is justified by the lack of knowledge of the sample size of this population and by the fact that in observational studies, involving a considerable number of participants, the use of a questionnaire can enhance the feasibility of preliminary investigations. Additionally, although the Hospital is a reference center for the target population's treatment, patients were in different treatment phases. They had various types of cancer, which limited the categorization of the sample. Consequently, data analysis should be interpreted cautiously, considering the characteristics of the study population.

On the other hand, the study's strengths should be acknowledged. Although there are still no validated instruments in the literature to assess the PA levels of pediatric oncology patients, this study contributed by providing a methodological model for collecting information from these patients, highlighting important variables to be considered in analyzing this population. In this regard, understanding the sociodemographic characteristics of patients and their families, as well as their perception of the environmental characteristics of their residential area, allows for a better understanding of limiting factors or contributors to greater engagement in LTPA-CPA.

Increasingly, studies have shown positive correlations between active behaviors and environmental characteristics[29-31]. However, there is still a lack of research exploring these relationships among populations undergoing oncology treatment. Furthermore, the results can assist the Hospital's multidisciplinary teams in recommending LTPA-CPA based on the environmental characteristics perceived by adolescents and their families, encouraging them to adopt more active behaviors whenever possible.

Conclusion

There was no association between sociodemographic factors and LTPA-CPA of pediatric oncology patients and parents/guardians. Greater safety in the neighborhood was associated with this practice. Most of these adolescents reported meeting the global PA recommendations. However, a considerable portion still do not meet them, and parents reported little time in LTPA -CPA.

Conflict of interest

The authors declare no conflict of interest.

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Author's contributions

Guimarães JAC: Conceptualization; Methodology; Validation; Formal analysis; Investigation; Data curation; Project administration; Visualization; Funding acquisition; Writing – original draft; Writing – review & editing; Approval of the final version. Manta SW and Christofoletti AEM: Validation; Investigation, Data curation; Visualization; Writing – original draft; Writing – review & editing; Approval of the final version. Sannomiya VFC: Conceptualization; Methodology; Validation; Formal analysis; Investigation; Data curation; Supervision; Project administration; Writing – original draft; Writing – review & editing; Approval of the final version. Nakamura PM: Conceptualization; Methodology; Validation; Formal analysis; Investigation; Resources; Supervision; Project administration; Visualization; Funding acquisition; Writing – original draft; Writing – review & editing; Approval of the final version.

Declaration regarding the use of artificial intelligence tools in the article writing process

The authors did not use artificial intelligence tools for preparation of the manuscript.

Availability of research data and other materials

The contents underlying the research text are contained in the manuscript.

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Reviewers' assessment

The reviews of this article were originally conducted in Portuguese. This version has been translated using ChatGPT and subsequently reviewed by the Chief Editors.

Reviewer A

Lisa Fernanda Mazzonetto
University of São Paulo, Ribeirão Preto Campus, São Paulo, Brazil.

Formatting

- Does the manuscript comply with the submission guidelines of the Revista Brasileira de Atividade Física e Saúde?
  Yes
- From a formal perspective, is the manuscript well-structured, including the sections: introduction, methods, results, and discussion (with conclusion as part of the discussion)?
  Yes
- Is the language appropriate, and is the text clear, precise, and objective?
  Partially
- Was any evidence of plagiarism observed in the manuscript?
  No

Suggestions/comments:

- The language is generally clear and appropriate; however, breaking up some sentences and avoiding redundancies would make the text more concise and fluent.

Abstract

- Is the abstract appropriate (including objective, participant information, variables studied, main results, and a conclusion) and does it reflect the content of the manuscript?
  Yes

Suggestions/comments:

- The abstract is clear and objective. However, the introduction could be more specific regarding research gaps; a brief reference to previous studies on environmental and sociodemographic factors could add value.
- Consider including how the data were analyzed.

Introduction

- Is the research problem clearly stated and defined?
  Yes
- Is the research problem appropriately contextualized based on existing knowledge, moving from general to specific?
  Yes
- Are the reasons for conducting the study (including authors' assumptions) clearly stated?
  Partially
- Are the references used to support the research problem current and relevant?
  Partially
- Is the objective clearly presented?
  Yes

Suggestions/comments:

- Lines 23–24: The information about insufficient LTPA-CPA time is confusing: "varying between four minutes and forty seventeen minutes."

Methods

- Are the methodological procedures generally appropriate for the research problem?
  Yes
- Are the methods sufficiently detailed?
  Yes
- Is the recruitment/selection process for participants appropriate and clearly described?
  Partially
- Are the data collection instruments described, including psychometric properties (e.g., reliability, internal consistency, and validity) and, where relevant, operational definitions of variables?
  Partially
- Is the data analysis plan appropriate and adequately described?
  Yes
- Are the inclusion/exclusion criteria for participants clearly described and appropriate?
  Yes
- Did the authors provide information about the ethical procedures followed in the study?
  Yes

Suggestions/comments:

- Check the symbol used for time in line 20: "Insufficient PA (> 150 min/week)."

Results

- Is the use of tables and figures appropriate and helpful for presenting the study's results?
  Yes
- Is the number of illustrations in accordance with the journal's submission guidelines?
  Yes
- Is the number of participants at each stage of the study, as well as the reasons for dropouts or refusals, reported?
  Yes
- Are the participant characteristics adequately presented?
  Yes
- Are the results appropriately presented, highlighting the main findings and avoiding unnecessary repetition?
  Partially
  Suggestions/comments:
- Although it is mentioned that participants are undergoing treatment, a more detailed breakdown (e.g., type of treatment—chemotherapy, radiotherapy, etc.) could clarify how this might influence physical activity.
- Highlight the most relevant results. Rather than listing all results from the tables, emphasize statistically significant findings and those with an impact on participants' behavior.

Discussion

- Are the main findings of the study presented?
  Yes
- Are the study's strengths and limitations presented and discussed?
  Yes
- Are the results discussed in light of the study's limitations and existing knowledge?
  Yes
- Do the authors discuss the potential contributions of the findings to scientific development, innovation, or real-world interventions?
  Yes
  Suggestions/comments:
- The discussion effectively integrates the study's results with its limitations and pre-existing knowledge, comparing them to findings from other studies and theoretical frameworks. The limitations are used to explain possible inconsistencies or constraints in the results, while existing knowledge provides context for the findings and helps suggest implications for clinical practice and public health—especially regarding the promotion of healthy habits and physical activity among pediatric oncology patients and their families.

Conclusion

- Is the conclusion appropriately presented and aligned with the study objective?
  Yes
- Is the conclusion original?
  Yes
  Suggestions/comments:
- The conclusion is original, as it not only summarizes the findings but also proposes new perspectives and practical actions that may contribute to future research and interventions aimed at promoting physical activity among pediatric oncology patients. It brings to light issues that are still rarely discussed or widely explored, especially in the Brazilian context and in relation to cancer patients.

References

- Are the references current and sufficient?
  Yes
- Are most of them original research articles?
  Yes
- Do the references comply with the journal's formatting and quantity guidelines?
  Partially
- Are the in-text citations appropriate and do they support the corresponding claims?
  Yes
  Suggestions/comments:
- Most references are up-to-date, but some, like Belson et al. (2007) on risk factors for leukemia, are outdated. Updating this topic could improve the relevance of the discussion about current environmental and social factors.
- Check that all references follow the journal's formatting rules (based on ABNT).
- In terms of quantity, they comply with the journal's standards.

Comments to the Author

- The manuscript is interesting and highly relevant, offering important contributions to the fields of public health and pediatric oncology, particularly in emphasizing the need to promote healthy habits and physical activity during and after cancer treat-

ment.
- The research is well-structured, with clear objectives and appropriate methodological rigor.
- Explore possible explanations for the associations found, especially regarding neighborhood safety perception. How might contextual and cultural factors influence safety perception and physical activity?
- For the lack of association between sociodemographic factors and LTPA-CPA, cite examples from previous studies showing similar or divergent results to better contextualize your findings.
- Considering the limitations, could the sample heterogeneity (age range, cancer types and stages) have influenced the results?
- Include practical recommendations for healthcare professionals and policymakers, such as improving public health infrastructure and neighborhood safety to promote physical activity among pediatric cancer patients.

Final Recommendation (Decision)
- Minor revisions required.

Reviewer B

Jessica Fernanda Correa Cordeiro
Universidade do Porto, Faculdade de Desporto, Centro de Investigação em Atividade Física, Saúde e Lazer, Porto, Portugal.

- The study, titled "Are environmental and sociodemographic factors associated with physical activity of pediatric oncologic patients and parents?", aims to investigate the association between environmental and sociodemographic factors and leisure-time and commuting-related physical activity (LTPA-CPA) among pediatric oncologic patients and their parents. The article is well-written and organized, addressing a highly relevant topic. However, it primarily presents a descriptive analysis of the data. Below are some suggestions to enhance the manuscript.

Title
- I suggest including the study design in the title.

Abstract
- The abstract is structured clearly and concisely. I suggest adding more details about the analyses conducted in the methods section and clarifying the participants' age range from the outset. Additionally, in the conclusion, ensure that the response aligns precisely with the stated objective.

Introduction
- The introduction is well-written and organized. As a suggestion to strengthen the work, it would be interesting to include additional references, especially if there are any meta-analyses on physical activity practices in this population. I know there are not many studies available, but I believe exploring this point will enrich both the introduction and the manuscript overall.

Objective
- Align it identically with the abstract.

Method
- The method is well-detailed and informative. However, I suggest some clarifications to enhance the transparency and justification of the methodological choices:
- Justify the definition of the age range from 10 to 19 years. What criterion was adopted for this delimitation?
- Indicate whether the questionnaire used was validated and include the corresponding reference.
- Specify who made the calls to the participants. Was it a single researcher or a team?
- Explain the choice between in-person and telephone data collection. What was the criterion for determining the method used for each participant?
- Indicate whether a sample size calculation was performed to determine the number of participants. If not, justify the absence of this procedure.

Results
- The results are interesting and well-written. However, I believe they could be further enriched with some clarifications:
- Standardize the numerical formatting in the tables, ensuring consistency in the use of commas or decimal points.
- Include the source for Figure 2.
- Provide the meaning of all abbreviations used, including those related to statistical analyses.
- Explain whether a specific diagnosis was predominant in the hospital and, if so, justify the possible reasons for this occurrence.

Discussion
- The discussion is well-organized, following a logical and standardized sequence. However, to further

enrich the study, I suggest expanding the discussion on the importance of physical activity for this population, incorporating evidence from national and international literature, preferably including meta-analyses on the topic.

- Additionally, I recommend providing a more detailed presentation of the study's limitations, such as data collection by phone, sample size, the questionnaire used, recall bias, and the justification for the prevalence of a specific diagnosis. If the hospital specializes in this condition, it is important to clarify this information.
- Finally, highlight the study's strengths, such as the relevance of the topic and its impact on the field, reinforcing the research's contribution to a better understanding of the subject.

Conclusion

- The conclusion is disconnected from the discussion. I recommend reviewing the journal's guidelines and aligning the conclusion directly with the response to the study's objective, ensuring a clear and objective summary of the main findings.

References

- Among the 30 references, only 5 are from the past 5 years. It is recommended to update the references and format them according to the journal's guidelines.