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Experiences in Physical Education and Sport: analysis of inequalities according to sociodemographic conditions

Experiências na Educação Física e Esporte: análise de desigualdades segundo as condições sociodemográficas

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ABSTRACT

Introduction: High-quality Physical Education and Sport classes provide experiences that foster personal and social skills, self-esteem, as well as physical and cognitive competencies. Objective: To describe positive and negative experiences in Physical Education and Sport classes and their relationship with inequalities based on students' demographic characteristics (gender, age, race/ethnicity, educational level of the family's financial provider, and region of residence). Method: A cross-sectional, school-based epidemiological study with statewide coverage, conducted in 2021, involving 1,303 adolescents (51% female). A validated instrument was used to analyze experiences in Physical Education and Sport classes (Youth Experience Survey for Sport – Portuguese Version). The absolute inequality index and the concentration index were calculated to assess disparities. Results: Groups with more positive experiences compared to their peers included: girls, with 4.49 points (95% CI: 1.73; 7.25) in personal and social skills; students aged ≥18 years, with 9.93 (95% CI: 5.49; 14.37) in personal skills and 5.65 (95% CI: 1.21; 10.09) in initiative; Indigenous students, with 16.52 (95% CI: -12.32; 45.36) in personal and social skills; and students from rural areas, with 7.79 (95% CI: 4.99; 10.59) in personal and social skills, 4.86 (95% CI: 1.95; 7.77) in cognitive skills, and 4.16 (95% CI: 1.36; 6.97) in initiative. Indigenous students showed lower scores in cognitive skills -9.04 (95% CI: -38.72; 20.65) and greater exposure to negative experiences -16.38 (95% CI: -29.82; -2.95) compared to white students. Conclusion: Despite sociodemographic variations, most experiences were consistent, with few inequalities observed.

Keywords: School physical education; Sports; Inequalities; Students.

RESUMO

Introdução: Aulas de Educação Física e Esporte de qualidade oferecem experiências que estimulam habilidades pessoais, sociais, autoestima, além de competências físicas e cognitivas. Objetivo: descrever as experiências positivas e negativas nas aulas de Educação Física e Esporte e suas relações com desigualdades a partir das características demográficas (gênero, idade, raça/cor, escolaridade do responsável financeiro familiar e região de moradia) de estudantes. Método: estudo epidemiológico transversal, de base escolar e abrangência estadual, realizado em 2021, com 1.303 adolescentes (51% do gênero feminino). Utilizou-se instrumento validado para analisar as experiências nas aulas de Educação Física e Esporte (Youth Experience Survey for Sport Portuguese Version). O índice absoluto de desigualdade e o índice de concentração foram calculados para avaliar as desigualdades. Resultados: Os grupos que se destacaram com maiores experiências positivas, quando comparados com seus pares, foram: as meninas, com 4,49 pontos (IC 95%: 1,73;7,25) em habilidades pessoais e sociais, os estudantes ≥18 anos com 9,93 (IC 95%: 5,49;14,37) em habilidades pessoais e 5,65 em iniciativa (IC 95%: 1,21;10,09), os indígenas com 16,52 (IC 95%: -12,32; 45,36) em habilidades pessoais e sociais e os alunos do interior com pontuações em habilidades pessoais e sociais de 7,79 (IC 95%: 4,99; 10,59), habilidades cognitivas de 4,86 (IC 95%: 1,95; 7,77), e experiências de iniciativa de 4,16 (IC 95%: 1,36; 6,97). Alunos indígenas apresentaram menores pontuações em habilidades cognitivas -9,04 (IC 95%: -38,72; 20,65) e maior exposição a experiências negativas -16,38 pontos (IC 95%: -29,82; -2,95), quando comparados aos alunos brancos. Conclusão: Apesar de variações sociodemográficas, a maioria das experiências foi uniforme, com poucas desigualdades.

Palavras-chave: *Educação física escolar; Esportes; Desigualdades; Estudantes.*

Introduction

Investigations into the benefits of Physical Education and Sport (PES) classes in the lives of children and adolescents point to opportunities for experiences that promote self-esteem and personal and social skills, in addition to developing physical and cognitive compe-

tencies, such as engagement in the proposed activities, concentration, and creativity[1–3]. Using the concept presented by Fletcher and Chróinín[4], which defines a meaningful experience in PES as an attribution of value, symbol, or emotion that is interpreted and/or internalized by participants during classes, this study sought to explore the potential of experiences in PES classes from the perspective of Positive Youth Development (PYD).

The PYD theory, developed by Lerner in the early 2000s, addresses human developmental systems in adolescent education, proposing that young people should be viewed as potential agents of social transformation rather than as problems to be managed[5]. PYD is a comprehensive concept, grounded in multiple theories and models[5–7], which can be applied across various contexts such as camps, outdoor activities, art, music, mentoring, and school-based programs[8].

Moreover, this theory represents a holistic approach, as it considers multiple domains of development (physical, cognitive, social, and emotional), and an inclusive one, insofar as it is based on the assumption that every young person possesses talents and strengths that can be nurtured across different contexts[9]. Initially investigated through young people's experiences in sport[10] and the development of life skills through sport[11], studies on PYD in PES classes are still at an early stage[1,12].

In this sense, experiences in PES classes are similar to the perspective of the PYD in that they provide both positive experiences, such as the development of personal, social, and cognitive skills and experiences of initiative, and negative experiences, such as inappropriate behavior by adults and peers, social exclusion, and stress[10].

Based on global initiatives, the right to quality PES is advocated through recommendations that emphasize integrated, collaborative, and inclusive actions to ensure equal opportunities for all[13,14]. Moreover, the debate surrounding policies and pedagogical practices in PES has increasingly focused on inequalities, particularly on inequities, that is, those inequalities that are unjust and avoidable and are related to the provision of physical activity and sport practices across different sociodemographic contexts[15,16].

Studies that investigate students' experiences while considering factors such as race/ethnicity, gender, age, economic condition, and place of residence can help to understand differences in interactions among diverse social groups. Therefore, broadening the analytical lens from an equity perspective to examine this phenomenon[17] may contribute to understanding the possible causes of inequalities in PES classes among school-aged children and adolescents. In light of the above, the aim of the present study was to describe positive and negative experiences in PES classes and their relationships with inequalities based on demographic characteristics (gender, age, race/ethnicity, educational level of the family's primary financial provider, and region of residence) in a sample of high school students from the state of Ceará.

Methods

Study Design and Context

This is a field-based, descriptive study with a cross-sectional epidemiological approach and a probabilistic design, covering the federal school network at the state level and conducted in a school-based setting. The study was carried out in the state of Ceará, in Northeastern Brazil, which has a Human Development Index of 0.734[18]. In 2021, Ceará had a population of 9.24 million inhabitants[19], including an average of approximately 594.5 thousand students enrolled in basic education in public schools[20]. Of these, 5,942 students were enrolled across the 21 campuses (municipalities) of the Federal Education Network[21]. Therefore, the study population comprised students aged 15 to 19 years who were enrolled in upper secondary education at the Federal Institute of Education, Science and Technology of Ceará (FIESC).

Admission of students to FIESC occurs through selective processes (entrance examinations or analysis of lower secondary school academic records) that follow the provisions of Law No. 12,711 of 2012[22], which establishes the reservation of places in upper secondary technical education programs for diverse student profiles[23]. The choice of the selection method is determined by the management of each campus, in partnership with the FIESC Office of the Vice-Rector for Education [24]. As a federal institution, this admission process differs from that of municipal and state schools, which usually employ other admission and/or enrollment criteria.

The study was approved by the FIESC Human Research Ethics Committee under approval number 43484921.5.0000.5589 and followed the National Health Council's Research Ethics guidelines[25] as well as the guidelines for conducting research during the covid-19 pandemic[26].

Population and Sample

The study population comprised all 5,942 upper secondary school students enrolled at FIESC. Sample size calculation considered compliance with physical activity recommendations as the primary outcome. Based on the sample size calculation parameters, with a 95% confidence level and a margin of error of three percentage points[27], a sample of 905 students was required for the study.

Sample selection was conducted randomly using a cluster sampling approach and occurred in two stages. Initially, participating campuses were selected by random draw, considering the four regions of the state of Ceará. Subsequently, the campuses were contacted to obtain information on integrated upper secondary education classes (no random selection of classes was performed).

After these sampling procedures, out of a total of 1,561 students invited to participate, 142 refused participation and 178 questionnaires were incomplete. Thus, the analytical sample consisted of 1,303 adolescents who completed the questionnaire, resulting in a response rate of 83.5%

Data Collection Procedures

The teachers responsible for the classes were contacted via their institutional email addresses in order to initiate the data collection phase. In the message sent, they were asked to share information related to the class, including class schedules. The inclusion of the researcher in the respective class Google Classroom was also suggested, with the aim of optimizing communication with the participating students.

Data collection was carried out from August to October 2021. During this period, all FIESC classes were still being conducted remotely (due to the second wave of covid-19, in accordance with current public health recommendations). That is, synchronous classes (those in which teachers and students are present at a predetermined time) were held via Google Meet, and asynchronous classes (those in which students did not need to be present at the same time to participate) took place through Google Classroom.

Prior to completing the questionnaire (one week before data collection), students received the necessary instructions for participation in the study, including the requirement to sign the Free and Informed Assent Form, in which they indicated their agreement or refusal to participate in the research. Students under 18 years of age completed the Free and Informed Assent Form, and their legal guardians signed the Free and Informed Consent Form. Students aged 18 years or older completed the Free and Informed Consent Form directly. Clarifications regarding the procedures for completing the questionnaire were provided by researchers who had received prior training in data collection. These instructions and the data collection itself were conducted during synchronous classes held via Google Meet, due to the pandemic period and prevailing public health recommendations.

Monitoring of data collection with participants was carried out during the initial sections of the questionnaire in order to guide completion and address questions. Subsequently, participants completed the questionnaire independently, and the researchers remained available to address any potential questions. The questionnaire sections were introduced with a brief explanation of their content, and each question included guidance for completion. In addition, the questionnaire was configured to require responses to mandatory questions and did not allow progression unless a response had been recorded.

Variables and Instruments

Experiences in PES classes were assessed using the Youth Experience Survey for Sport, Portuguese Version (PYES-S), which has been validated for Portuguese-speaking youth athletes[10]. The questions referred to both a week of conventional in-person classes (prior to the pandemic) and a week of synchronous remote classes, during which students had the opportunity to actively participate in the activities. This instrument comprises 22 items, covering the following dimensions: personal and social skills (3 items), cognitive skills (4

Table 1 – Dimensions, items, and meanings of the dimensions of Youth Experience Survey for Sport Portuguese Version

	Dimensions	Items	Meanings
Positive experiences	Personal and social skills	1 a 3	Giving and receiving feedback; leadership; emotional awareness; making friends; helping others; and sharing responsibilities.
	Cognitive skills	4 a 7	Academic skills; information seeking; creativity; and desire to remain in school.
	Initiative experiences	8 a 13	Effort; attention; energy; and improvement of physical/athletic skills.
Negative experiences		14 a 22	Inappropriate behavior by adults and peers; social exclusion; and stress.

items), initiative experiences (6 items), and negative experiences (9 items). To adapt the instrument to the federal education network context, the beginning of the questions included the following header: "In my experience in sport and Physical Education classes at FIESC:". Responses were provided using a scale ranging from 1 to 4 points, with the following options: not at all (1); a little (2); somewhat (3); and definitely yes (4). The meanings of the analyzed dimensions are presented in the Table 1.

Students' responses to the items within each dimension were summed. The directionality of the questionnaire items was preserved, meaning that higher scores reflected more positive perceptions of experiences in PES classes. The exception was the negative experiences dimension, in which scores were reverse-coded: higher scores indicated a lower perception of negative experiences in PES classes. Subsequently, for the purpose of standardizing the interpretation of scales with different scoring ranges, values were converted to percentages ranging from 0 to 100%.

Sociodemographic variables were assessed using the standardized instrument from the National School Health Survey[28] and were categorized as follows: age group (≤15 years, 16 years, 17 years, and ≥18 years), race/ethnicity (White, Black, Brown, Yellow, and Indigenous), educational level of the family's primary financial provider (incomplete elementary education, complete elementary education, and complete secondary/higher education), and region of residence (non-metropolitan/inland areas and Metropolitan Region). The use of these sociodemographic variables in studies addressing inequalities is important for understanding and mapping the factors that contribute to disparities in access to and participation in physical activity, as well as in population health conditions.

Data analysis

Absolute and relative frequencies were calculated for categorical variables, and means and standard deviations (SD) were estimated for continuous variables. To describe positive and negative experiences in PES classes, simple measures of difference and ratio were calculated using simple linear and Poisson regression, respectively, considering 95% confidence intervals (CI) based on each adolescent's relative scores and according to demographic characteristics (gender, age, race/ethnicity, educational level of the family's primary financial provider, and region of residence). Difference values and the Slope Index of Inequality (SII) are presented in percentage points, along with their respective CIs. The comparison between groups for difference and ratio values was performed using CIs obtained from simple linear regressions (for difference estimates) and Poisson regressions (for ratio estimates). Statistically significant differences were considered when confidence intervals did not overlap.

O SII or absolute index of inequality, and the Concentration Index (CIX), or concentration index, were calculated to assess inequalities across age groups and educational levels of the family's primary financial provider in experiences in PES[29].

The SII is an absolute measure of inequality applied to ordinal variables, such as those related to socioeconomic aspects, for example income categories, wealth levels, or educational indicators[29]. The CIX represents a relative measure of inequality that incorporates all categories of the variable used for stratification. Its functioning is comparable to that of the Gini Coefficient, yielding values ranging from -1 to +1, where zero indicates perfect equality. The further the value is from zero, the greater the degree of inequality between the analyzed groups. Thus, both indices are complementary, with higher values (in absolute terms) indicating greater inequality or inequity, whether measured in terms of absolute differences (SII) or relative concentration (CIX)[29]. Data analyses were performed using Stata statistical software, version 14.

Results

In Table 2, the characteristics of the evaluated sample are presented. Among the 1,303 study participants, 51.0% were female. Regarding age, 32.7% of the students were 16 years old. Most participants identified as Brown (*Pardo*) (56.6%) and had a family's primary financial provider with complete secondary and/or higher education (58.0%). PES class was reported by 80.5% of the students as the main context for engaging in physical activity.

Figure 1 shows the mean scores of experiences in PES classes, with an overall mean of 69% (SD = 25.5). Among positive experiences, the highest mean scores, in descending order, were for personal and social skills at 72% (SD = 25.5), initiative experiences at 70% (SD = 25.3), and cognitive skills at 57.0% (SD = 26.3). After reverse-coding the negative experiences dimension, higher scores indicated a lower perception of these experiences. From this perspective, the mean score of

Table 2 – Descriptive characteristics of the study participants.

Variable	n = 1.303	
	n	%
Gender		
Male	639	49.0
Female	664	51.0
Age group		
≤ 15 years	337	25.9
16 years	426	32.7
17 years	343	26.3
> 18 years	197	15.1
Race/ethnicity		
White	433	33.2
Black	105	8.1
Brown	737	56.6
Asian	25	1.9
Indigenous	3	0.2
Educational level of the family's primary financial provider		
Incomplete elementary school	291	22.3
Complete elementary school	256	19.7
Complete high school/higher education	756	58.0
Context(s) of involvement in Physical Education and Sport		
Physical Education classes	1049	80.5
Extracurricular classes	45	3.5
Sports teams	18	1.4
Physical Education classes and extracurricular classes	78	6.0
Physical Education classes and sports teams	84	6.4
Extracurricular classes and sports teams	4	0.3
All contexts	25	1.9
Region		
Metropolitan Region	785	60.2
Inland	518	39.8

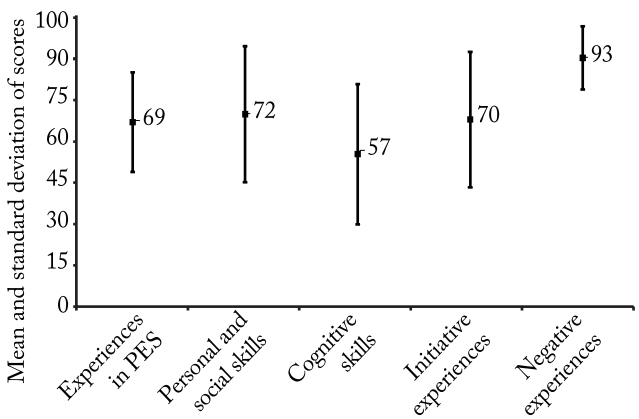

Figure 1 – Mean and standard deviation of experience scores in physical Education and Sport classes of high school students. For the negative experiences dimension, scores were reversed for standardization purposes in line with the other scales.

93% (SD = 11.8) suggests that most students reported a low frequency of negative experiences in PES classes. The distributions of high school students' responses regarding their experiences in PES are detailed in the supplementary table 1.

Table 3 presents the mean scores of experiences in PES classes across different sociodemographic groups. It also highlights the results of the SII and the CIX, used to analyze inequalities among groups based on factors such as race/ethnicity, age group, and educational level of the family's primary financial provider.

In the gender analysis, the overall PES experience scale showed an absolute difference of 2.39 percentage points (95% CI: 0.37; 4.41) in favor of female students. For the personal and social skills and cognitive skills scales, absolute differences of 4.49 (95% CI: 1.73; 7.25) and 2.96 (0.11; 5.81) percentage points were observed, respectively, also favoring girls.

Older students (18 years or older) demonstrated higher scores across all experiences compared with younger students (up to 15 years). Absolute differences observed were 9.93 (95% CI: 5.49; 14.37) percentage points for personal and social skills and 5.65 (95% CI: 1.21; 10.09) percentage points for initiative experiences. The CIX (0.0290) and SII (9.85) for personal and social skills indicated a higher concentration in favor of older students, revealing a certain degree of inequality: younger students generally had fewer opportunities to develop these skills. However, the CIX was significant for initiative experiences, indicating that older students had greater access to opportunities promoting these practices, reflecting lower inequalities compared to other groups. Additionally, both indices (CIX and SII) were significant for negative experiences, showing that older students were more exposed to adverse experiences in PES classes.

Analyses by race/ethnicity showed that, compared with White students, Black students reported higher mean scores in personal and social skills (8.7 pp; 95% CI: 2.1; 15.3), cognitive skills (10.5 pp; 95% CI: 4.3; 16.8), initiative experiences (6.4 pp; 0.5; 12.3), and overall experiences (5.1 pp; 95% CI: 0.9; 9.3). Brown (Pardo) students also showed significantly higher scores in personal and social skills (4.0 pp; 95% CI: 0.4; 7.7) and cognitive skills (4.7 pp; 95% CI: 0.9; 8.5). Among Yellow students, a positive difference was observed in initiative experiences (12.3 pp; 95% CI: 2.0; 22.5). For Indigenous students, a negative difference was noted in cognitive skills (- 7.7 pp; 95% CI: - 15.2; - 0.2). No statistically significant differences were found between groups in the negative experience's domain.

Table 3 – Inequalities in Physical Education and Sport Experiences of Students at the Federal Institute of Education, Science, and Technology of Ceará, Based on Demographic Characteristics.

	Experiences in Physical Education and Sport classes	Personal and social skills	Cognitive skills	Initiative experiences	Negative experiences
	% (CI 95%)	% (CI 95%)	% (CI 95%)	% (CI 95%)	% (CI 95%)
Gender					
Male	68.2 (66.8; 69.6)	69.6 (67.6; 71.7)	55.7 (53.6; 57.8)	69.4 (67.4; 71.4)	92.5 (91.5; 93.5)
Female	70.6 (69.1; 72.0)	74.1 (72.3; 76.0)	58.7 (56.7; 60.6)	71.4 (69.5; 73.3)	92.7 (91.9; 93.5)
Difference	2.39 (0.37; 4.41)	4.49 (1.73; 7.25)	2.96 (0.11; 5.81)	1.99 (-0.76; 4.74)	0.20 (-1.09; 1.49)
Ratio	1.04 (1.02; 1.05)	1.06 (1.05; 1.08)	1.05 (1.04; 1.07)	1.03 (1.02; 1.04)	1.00 (0.99; 1.01)
Age group					
≤ 15 years	70.5 (68.4; 72.5)	70.3 (67.5; 73.2)	60.0 (57.2; 62.8)	70.5 (67.8; 73.2)	93.7 (92.4; 95.1)
16 years	69.0 (67.2; 70.7)	69.3 (66.8; 71.8)	54.9 (52.4; 57.4)	68.7 (66.2; 71.1)	94.9 (94.1; 95.6)
17 years	67.4 (65.3; 69.4)	72.0 (69.4; 74.7)	54.9 (52.2; 57.6)	69.2 (66.5; 72.0)	90.6 (89.4; 91.9)
> 18 years	72.2 (69.7; 74.7)	80.3 (77.3; 83.3)	61.4 (57.6; 65.2)	76.1 (73.0; 79.3)	89.2 (86.9; 91.5)
Difference	1.74 (-1.54; 5.01)	9.93 (5.49; 14.37)	1.36 (-3.24; 5.96)	5.65 (1.21; 10.09)	-4.53 (-6.58; -2.49)
Ratio	1.02 (1.00; 1.05)	1.14 (1.12; 1.16)	1.02 (1.00; 1.05)	1.08 (1.06; 1.10)	0.95 (0.93; 0.97)
Concentration Index	0.0025 (-0.0058; 0.0109)	0.0290 (0.0181; 0.0398)	0.0018 (-0.0128; 0.0164)	0.0136 (0.0027; 0.0245)	-0.0115 (-0.0159; -0.0071)
Slope Index of Inequality	-0.37 (-4.01; 3.27)	9.85 (5.03; 14.68)	-0.94 (-6.15; 4.26)	4.35 (-0.45; 9.16)	-6.45 (-9.13; -3.76)
Race/ethnicity					
White	67.1 (65.2; 68.9)	68.7 (66.3; 71.1)	53.5 (50.9; 56.1)	67.7 (65.1; 70.2)	92.9 (91.9; 94.0)
Black	72.5 (69.5; 75.5)	77.4 (72.4; 82.3)	64.0 (59.4; 68.6)	74.4 (70.3; 78.6)	90.7 (87.8; 93.6)
Brown	70.3 (68.9; 71.6)	73.0 (71.2; 74.9)	58.3 (56.5; 60.2)	71.2 (69.4; 73.0)	92.8 (91.9; 93.6)
Asian	73.9 (67.2; 80.6)	72.0 (60.5; 83.6)	62.3 (51.6; 73.0)	79.8 (71.7; 87.9)	92.2 (88.0; 96.3)
Indigenous	55.8 (17.1; 94.5)	85.2 (43.0; 127.3)	44.4 (32.5; 56.4)	59.3 (-4.5; 123.0)	76.5 (39.4; 113.7)
Difference (Black vs White)	5.12 (0.90; 9.34)	8.72 (2.12; 15.33)	10.53 (4.26; 16.81)	6.41 (0.53; 12.28)	-2.57 (–6.31; 1.17)
Difference (Brown vs White)	2.69 (–0.08; 5.45)	4.04 (0.40; 7.68)	4.66 (0.85; 8.46)	2.86 (–0.88; 6.59)	-0.45 (–2.15; 1.26)
Difference (Asian vs White)	7.00 (–1.47; 15.47)	3.85 (–10.47; 18.17)	8.83 (–4.52; 22.18)	12.26 (2.00; 22.52)	-0.68 (–5.94; 4.58)
Difference (Indigenous vs White)	–9.22 (–28.16; 9.72)	12.40 (–11.40; 36.21)	–7.67 (–15.15; –0.19)	–10.57 (–41.14; 20.00)	–10.42 (–34.47; 13.64)
Educational level of the family's primary financial provider					
Incomplete elementary school	72.3 (70.2; 74.4)	76.1 (73.2; 78.9)	60.4 (57.4; 63.4)	73.9 (70.9; 76.8)	92.7 (91.4; 94.0)
Complete elementary school	70.2 (67.9; 72.4)	71.1 (67.9; 74.3)	59.9 (56.7; 63.1)	70.7 (67.8; 73.7)	92.8 (91.4; 94.2)
Complete high school/higher education	68.1 (66.7; 69.4)	70.6 (68.8; 72.4)	55.1 (53.2; 57.0)	69.0 (67.2; 70.8)	92.5 (91.6; 93.4)
Difference	-4.19 (-6.70; -1.68)	-5.44 (-8.88; -2.00)	-5.27 (-8.82; -1.73)	-4.89 (-8.31; -1.47)	-0.19 (-1.79; 1.42)
Ratio	0.94 (0.93; 0.96)	0.93 (0.91; 0.94)	0.91 (0.90; 0.93)	0.93 (0.92; 0.95)	1.00 (0.98; 1.01)
Concentration Index	-0.0075 (-0.0159; 0.0009)	-0.0013 (-0.0121; 0.0094)	-0.0147 (-0.0292; -0.0002)	-0.0075 (-0.0190; 0.0039)	-0.0020 (-0.0058; 0.0019)
Slope Index of Inequality	-6.66 (-10.57; -2.75)	-7.46 (-12.80; -2.11)	-9.54 (-15.09; -3.98)	-7.41 (-12.80; -2.03)	-0.42 (-2.88; 2.04)
Region					
Metropolitan Region	68.3 (66.9; 69.6)	68.8 (67.0; 70.7)	55.3 (53.4; 57.1)	68.8 (67.0; 70.6)	93.5 (92.7; 94.2)
Inland	71.2 (69.6; 72.8)	76.6 (74.6; 78.6)	60.1 (57.9; 62.3)	72.9 (70.8; 75.0)	91.3 (90.1; 92.4)
Difference	2.95 (0.88; 5.01)	7.79 (4.99; 10.59)	4.86 (1.95; 7.77)	4.16 (1.36; 6.97)	-2.19 (-3.50; -0.88)
Ratio	1.04 (1.03; 1.06)	1.11 (1.10; 1.13)	1.09 (1.07; 1.10)	1.06 (1.05; 1.07)	0.98 (0.97; 0.99)

Note: * For the Difference and Slope Index of Inequality lines, percentage points and their respective confidence intervals are reported. Legend: CI = Confidence interval.

Regarding educational level, students whose family financial providers had completed secondary or higher education had, on average, - 4.19 (95% CI: - 6.70; - 1.68) percentage points in overall PES experiences, - 5.44 (95% CI: - 8.88; - 2.00) in personal and social skills, - 5.27 (95% CI: - 8.82; - 1.73) in cognitive skills, and - 4.89 (95% CI: - 8.31; - 1.47) in initiative experiences, compared with students whose family providers had only incomplete elementary education. These data indicate a form of inequality for students with more highly educated parents, i.e., this group experienced fewer opportunities compared with students whose parents had lower educational attainment.

For negative experiences, the observed difference was - 0.19 (-95% CI: 1.79; 1.42) percentage points, suggesting a negligible difference. The CIX for overall experiences was - 0.0075, while the SII was - 6.66, both statistically significant, indicating a slight negative concentration and inequality disadvantaging students with parents who completed secondary or higher education. For personal and social skills, the CIX and SII were - 0.0013 and - 7.46, respectively; for cognitive skills, - 0.0147 (CIX) and - 9.54 (SII); and for initiative experiences, - 0.0075 (CIX) and - 7.41 (SII), all statistically significant, evidencing inequalities that disadvantage students with more highly educated parents.

Data on region of residence showed that students living in non-metropolitan/inland areas, on average, had more positive experiences in PES classes compared with students in the capital/Metropolitan Region. Specifically, students in inland areas had 2.95 (95% CI: 0.88; 5.01) percentage points higher overall experiences, 7.79 (95% CI: 4.99; 10.59) points higher in personal and social skills, 4.86 (95% CI: 1.95; 7.77) points higher in cognitive skills, and 4.16 (95% CI: 1.36; 6.97) points higher in initiative experiences. In summary, students residing in inland areas reported more positive experiences compared with those living in the capital or metropolitan regions, reflecting an avoidable inequality, i.e., a situation of inequity.

In contrast, for negative experiences, the difference was - 2.19 percentage points (95% CI: - 3.50; - 0.88), suggesting that students in the capital/Metropolitan Region reported fewer negative experiences. Overall, these results indicate that, except for negative experiences, students in inland areas generally perceive PES classes more favorably than those in the capital/Metropolitan Region.

Discussion

The present study described positive and negative experiences in PE and sport classes among adolescents enrolled in integrated upper secondary education at IFCE, taking into account inequalities according to sociodemographic factors such as gender, age, race/ethnicity, educational level of the family's primary financial provider, and region of residence.

Our results can be interpreted in light of PYD, which provides a theoretical framework for understanding the coexistence of positive and negative experiences in PES classes. Higher perceptions of personal and social skills among certain groups (such as female students and those living in inland areas), for example, illustrate the potential of PYD to foster socioemotional competencies in school contexts. On the other hand, the negative experiences reported by Indigenous students indicate that not all groups have equitable access to development opportunities, highlighting structural inequalities within the school environment. Thus, PYD not only helps to interpret the findings but also reinforces the importance of policies and pedagogical practices that value diversity and promote inclusion.

Participants reported more positive experiences in dimensions related to interpersonal and leadership competencies (personal and social skills, initiative experiences), whereas cognitive skills were less prominent. Additionally, they reported lower perceptions of inappropriate behaviors, social exclusion, and stress (negative experiences).

The mean percentages of positive experiences found in our study (above 70% in personal and social skills and in initiative experiences) are consistent with international investigations that have used the Youth Experience Survey for Sport or derived instruments. Holt et al.[1] identified similar levels of positive experiences in urban schools in Canada, highlighting interpersonal and leadership gains. Systematic reviews, such as that by Eime et al.[2], have also documented that participation in sport and school contexts tends to generate high percentages of favorable experiences, particularly in social and emotional competencies. More recently, Bruner et al.[3] highlighted in a meta-analysis that sport-based interventions achieve comparable percentages, reinforcing that structured school environments foster positive perceptions among adolescents.

The analyses revealed differences among sociodemographic groups, particularly girls, older students, indigenous students, and those residing in rural areas,

who reported more positive experiences in PES classes. These results indicate that these groups experience this context more favorably compared to their peers, revealing inequalities that disadvantage others.

The data showing that girls experience more positive outcomes than boys may appear surprising, considering that studies in the field of physical activity and health have demonstrated a tendency toward lower levels of physical activity and a higher prevalence of sedentary behavior among girls compared to boys[30]. This lower participation may be related to lack of interest or absence from PES classes[31]. Furthermore, this gender disparity in engagement was evidenced in a study demonstrating that girls remain, on average, 20 minutes less in PES classes compared to boys[32].

Although the groups presented variations in some of the experiences analyzed, most showed a certain degree of uniformity, indicating that these differences were not recurrent to the extent of constituting a scenario of inequity. A likely justification for this finding may be related to the multicultural environment of the institution in which the study was conducted, which adopts PES policies focused on the development of students' life skills[33].

It is noteworthy that the research was conducted at a federal institute, an environment that generally provides more favorable conditions in terms of physical infrastructure and material resources for PES classes and sports activities. In addition, teachers at this institution typically receive higher remuneration than that offered to basic education professionals in general, which may positively influence the quality of the classes delivered. This combination of elements contributes to students experiencing more enriching and meaningful experiences during school practices.

The differences and similarities observed may also be attributed to the plural nature of PES classes, which vary according to the methodologies applied and the diversity of participants' characteristics, elements inherent to pedagogical practice in the field[34]. In this context, the emphasis of pedagogical intervention in PES should go beyond students' physical development, also promoting critical reflection on the body, health, and well-being[35]. Therefore, it is important to consider the relevance of students' psychosocial aspects, especially their strengths, interests, individual characteristics, and the context in which they are embedded[36].

It was observed that Black and Brown students reported more positive experiences than White students, suggesting a compensatory role of PES classes at FIESC for historically vulnerable groups. In contrast, Indigenous students presented lower scores in cognitive skills, highlighting the need for specific pedagogical inclusion actions. The absence of differences in negative experiences indicates a certain homogeneity in this domain but reinforces that opportunities for positive experiences are still distributed unequally among groups.

Considering that the social function of the school transcends academic learning, offering comprehensive education to students by encompassing physical, socioemotional, and psychological aspects[37], it is important to recognize this space as a reference point for the community that articulates educational actions aimed at health promotion[38].

In light of the above, PES plays a strategic and inclusive role in reducing inequality in Brazilian education, particularly by fostering awareness of regular physical activity, stimulating the development of socioemotional skills, promoting social interaction, and strengthening community bonds[39]. Furthermore, high-quality PES classes provide meaningful experiences through collaboration between the school community and other intersectoral agents, resulting in improvements in the living conditions of both students and the school community itself[40]. Thus, the importance and centrality of PES classes in human development and in reducing inequalities within the school environment are reinforced.

Among the strengths of this study is the investigation of topics that have been scarcely addressed in the field of PE, being the first to examine inequalities in adolescents' experiences in PES classes. In addition, the statewide scope of the study, although limited to the federal education network, involved municipalities with diverse contexts and sizes, which represents a strength of the study by indicating the representativeness of different contexts within an important region of Brazil.

Regarding limitations, the cross-sectional design prevents causal inferences, and data collection through self-report may be subject to recall and accuracy biases, despite the use of validated instruments. The group of indigenous students analyzed was too small to be representative and to allow for generalization of the results. Participants who reported pre-pandemic experiences had an interval of 17 months since the onset of the crisis, with data collection occurring between August and October 2021, after the second wave of covid-19 in Brazil. The fact that data collection did not direct participants to a specific type of experience,

whether in classes before or during the pandemic, resulted in responses being attributed to PES classes in general, including both synchronous and asynchronous classes. In summary, the challenging context experienced during the pandemic period influenced access to remote education and led many adolescents to assume financial responsibilities within their families. Such factors may have interfered with how these young people perceived the experiences analyzed, impacting the results obtained. Future studies are recommended to consider these variables in a post-pandemic scenario in order to deepen the understanding of the findings.

In conclusion, the findings indicate that PES classes in integrated high school at FIESC play a crucial role in students' holistic development, contributing to both interpersonal competencies and leadership skills. Despite variations observed according to sociodemographic factors such as gender, age, race/ethnicity, parental education, and region of residence, most experiences were uniform, with few inequalities identified. These differences may be explained by the diversity of methodologies applied and by participants' characteristics, which are intrinsic features of pedagogical practice in the field. Therefore, the strategic role of PES classes goes beyond physical development, contributing to the provision of more equitable, high-quality pedagogical practices that value students' psychosocial aspects, which are indispensable for building a more just and meaningful school environment

Conflicts of interest

The authors declare no conflict of interest.

Author Contributions

Lopes IE: Conceptualization; Methodology; Software development, implementation, and testing; Data and experiment validation; Data analysis; Investigation; Resource provision; Data curation; Supervision; Data presentation design; Writing, original draft; Writing, review and editing; Approval of the final manuscript. Maciel GP: Methodology; Software development, implementation, and testing; Data and experiment validation; Data analysis; Investigation; Data curation; Data presentation design; Writing, original draft; Writing, review and editing; Approval of the final manuscript. Oliveira ARC and Pontes Júnior JAF: Data presentation design; Writing, original draft; Writing, review and editing; Approval of the final manuscript. Castro VHS: Conceptualization; Methodology; Investigation; Writing, review and editing; Approval of the final manuscript. Barbosa Filho VC: Conceptualization; Methodology; Software development, implementation, and testing; Data and experiment validation; Data analysis; Investigation; Resource provision; Data curation; Project administration; Writing, review and editing; Approval of the final manuscript.

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Statement on the Use of Artificial Intelligence Tools in the Writing Process

The authors used the Google Gemini artificial intelligence tool to perform the following activities: translation of the abstract into American English, aiming to eliminate grammatical and spelling errors, as well as improve the fluency and objectivity of the sentences.

The authors used ChatGPT and DeepL for the following activities: translation into American English. The AI tools were not used to write, generate content, or develop reasoning and the authors assume full responsibility for all the content of the manuscript. Additionally, translations from both AI tools were compared to enhance the overall quality and accuracy of the final translation

Availability of Research Data and Other Materials

Following publication, the data will be available upon request from the authors.

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Supplementary table

Supplementary table 1 – Distribution of responses on High School Students' Experiences in Physical Education and Sport

		Not at all	A little	More or less	Definitely yes	Total
		n (%)	n (%)	n (%)	n (%)	n (%)
Personal and social skills	I learned about helping others	54 (4.1)	205 (15.7)	330 (25.3)	714 (54.8)	1303 (100)
	I made a new friend	172 (13.2)	183 (14.0)	288 (22.1)	660 (50.7)	1303 (100)
	I learned that I had a lot in common with people from different backgrounds	101 (7.8)	2,72 (20.9)	373 (28.6)	557 (42.8)	1303 (100)
Cognitive skills	I improved academic skills (reading, writing, math, etc.)	214 (16.4)	373 (28.6)	390 (29.9)	326 (25.0)	1303 (100)
	I improved computer/internet skills	417 (32.0)	331 (25.4)	295 (22.6)	260 (20.0)	1303 (100)
	I improved creative skills	144 (11.1)	341 (26.2)	414 (31.8)	404 (31.0)	1303 (100)
Initiative experiences	This activity increased my desire to stay in school	135 (10.4)	219 (16.8)	334 (25.6)	615 (47.2)	1303 (100)
	I learned to find ways to achieve my goals	138 (10.6)	274 (21.0)	378 (29.0)	513 (39.4)	1303 (100)
	I set goals for myself in this activity	149 (11.4)	250 (19.2)	348 (26.7)	556 (42.7)	1303 (100)
	I learned to consider challenges when making plans for the future	119 (9.1)	207 (15.9)	355 (27.2)	622 (47.7)	1303 (100)
	I learned to put in effort	56 (4.3)	168 (12.9)	282 (21.6)	797 (61.2)	1303 (100)
	I learned to focus my attention	97 (7.4)	258 (19.8)	330 (25.3)	618 (47.4)	1303 (100)
	I put all my energy into this activity	115 (8.8)	233 (17.9)	445 (34.1)	510 (39.1)	1303 (100)
Negative experiences	I was treated differently because of my gender, race, ethnicity, lack of ability, or sexual orientation	1174 (90.1)	46 (3.5)	43 (3.3)	40 (3.1)	1303 (100)
	Adult leaders in this activity were controlling and manipulative	1201 (92.2)	54 (4.1)	30 (2.3)	18 (1.4)	1303 (100)
	Adult leaders scared me	1204 (92.4)	65 (5.0)	19 (1.5)	15 (1.2)	1303 (100)
	Adult leaders made personal comments that made me angry	1213 (93.1)	57 (4.4)	21 (1.6)	12 (0.9)	1303 (100)
	Adult leaders encouraged me to do something I believed was morally wrong	1161 (89.1)	50 (3.8)	49 (3.8)	43 (3.3)	1303 (100)
	Other youth in this activity made inappropriate sexual comments, jokes, or gestures	1148 (88.1)	90 (6.9)	40 (3.1)	25 (1.9)	1303 (100)
	Youth in this activity led me to drink alcohol or use drugs	1277 (98.0)	5 (0.4)	10 (0.8)	11 (0.8)	1303 (100)
	I was stuck in activities that were not part of my responsibilities	1146 (88.0)	101 (7.8)	36 (2.8)	20 (1.5)	1303 (100)
	There were "cliques" in this activity	710 (54.5)	274 (21.0)	144 (11.1)	175 (13.4)	1303 (100)

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

Anonymous

- Was any indication of plagiarism observed in the manuscript?
- No
- Did the authors provide clarification on the ethical procedures adopted for conducting the research?
- Yes

Comments to the author

- The manuscript entitled "Experiences in Physical Education and Sport: a descriptive analysis according to sociodemographic conditions" aimed to describe positive and negative experiences in Physical Education classes and in Sport, and their relationships with inequities based on sociodemographic characteristics. This study is extremely important, as it presents the students' perspectives on the experiences lived in Physical Education classes and sports practices, in addition to presenting data related to inequities during Physical Education classes—a relevant and underexplored topic. In this sense, this work has great relevance for the field of Physical Education, especially for studies related to school Physical Education. Therefore, some necessary corrections are suggested to make the manuscript more comprehensible.

Title

- I suggest inserting the word inequities in order to align the title with the study objective.
- Suggested title: Experiences in Physical Education and Sport: a descriptive analysis of inequities according to sociodemographic conditions.

Abstract

- Align the objective presented in the abstract with that of the introduction.
- Add the main results related to inequities that were found in the study.
- On line 18, replace the phrase "greater more positive experiences in Physical Education classes" with: greater positive experiences in Physical Education classes or reported more positive experiences in Physical Education classes.
- Adjust these changes in the Abstract as well.

Keywords

- I suggest replacing Physical Education and Training with School Physical Education.

Introduction

- On page 2 (lines 22–24), the authors state that "the potential of experiences in Physical Education classes and in Sport (PES) was explored from the perspective of Positive Youth Development (PYD)"; however, there is no further discussion of how this approach relates to Physical Education classes. As a suggestion, the authors could further elaborate on this relationship and discuss this approach in light of the results found in the discussion section. This approach is mentioned only in the introduction and is neither further commented on nor related throughout the text. In addition, on page 3 (line 1), the approach is presented as "holistic and inclusive," but there is no further information about where, when, and by whom this approach was developed.

Method

- In the data collection procedure, on page 6 (lines 5–8), the monitoring of data collection with participants is mentioned; however, it is not clear how this monitoring occurred. Was it carried out during synchronous classes? Asynchronous classes? Please clarify how this procedure was conducted.
- On page 8 (lines 4–5), the indices used to assess inequities are presented. Therefore, it is necessary to add a brief explanation of how these indices are assessed and interpreted: do higher values indicate greater inequities and inequalities? Or do lower values indicate fewer inequities and inequalities between groups? As currently described in the Methods and presented in the Results, it is not possible to understand these indices without consulting Crochemore-Silva et al., 2018. This brief explanation will help readers better interpret and understand the results found.
- In addition, the authors cite Crochemore-Silva et

al., 2018, and should follow the same citation format used for other articles according to the journal's guidelines, and add this article to the reference list.

Results

- On page 12 (lines 34–35), it is stated that: "These results indicate that, although girls report greater negative experiences, the values are not statistically significant." However, in the same paragraph, the authors show that girls presented better values for personal experiences, which are related to positive experiences (is that correct?), and better values for overall experiences in PES. Therefore, why does the paragraph conclude by emphasizing that girls had more negative experiences, even though these experiences were not significant?
- The results regarding inequities and inequalities are not tangible to readers; it is important to make clearer what these findings actually mean. A new reading of these data is needed, and the writing should aim to translate them into something understandable for readers who are becoming familiar with studies on inequities and inequalities.
- An example to clarify the issue mentioned above: on page 12, lines 39–41, it is reported that "the CIX (0.0290) and SII (9.85) indices in personal and social skills pointed to a greater concentration in favor of older students." It is not clear what this information represents. Is it a greater concentration of inequities and inequalities? Do older students present more inequalities than younger students in Physical Education classes? Or do older students present fewer inequalities than younger students? During the reading of the results, this information is not accessible to readers.
- Another example, still on page 12 (lines 42–43), when it is reported that "CIX was significant for initiative experiences, as well as both indices (CIX and SII) were significant for negative experiences"—what does this represent? Does it mean that students who have better initiative experiences in Physical Education classes present fewer inequities? These are very important data to be presented to the field as a whole, but they need to be more understandable during reading.
- This needs to be reviewed throughout the entire Results section.

Discussion

- In the introduction, on page 2 (lines 22–24), the authors state that "the potential of experiences in Physical Education classes and in Sport (PES) was explored from the perspective of Positive Youth Development (PYD)," but this is not revisited at any point in the discussion. In a way, this approach mentioned in the introduction gets lost in the text. After the results found, what is the importance of this approach? If it is to be maintained in the manuscript, it is important to bring it into the discussion.
- An important finding in the results is that girls reported more positive experiences compared to boys, but this is not discussed in depth in this section. The authors do not sufficiently explore this important topic, considering that studies on physical activity levels consistently show girls to be less active and more sedentary than boys (as presented in the article Temporal Trends of Physical Activity and Sedentary Behavior Simultaneity in Brazilian Students, by Martins et al., 2018), and that this greater physical inactivity is often associated with not liking or not participating in Physical Education classes (as published in Prevalence of physical inactivity and associated factors among adolescents from public schools in Uruguaiana, Rio Grande do Sul State, Brazil, by Bergmann et al., 2013). Moreover, when participation in Physical Education classes is observed, girls participate at least 20 minutes less than boys (as presented by Soares et al., 2023, in the article "Temporal trend of physical activity in Brazilian adolescents: analysis of the National School Health Survey from 2009 to 2019"). Therefore, the authors could further explore and discuss this finding regarding girls' positive experiences in Physical Education classes.
- Another important result, presented on page 13 (lines 1–4 of the Results section), shows that Indigenous students reported greater negative experiences and that inequity indices favor inequality among non-white students; these data are extremely important and are not discussed.
- The authors highlight in the discussion that few inequities were found in the study. One factor that may be related to a better perception of experiences in Physical Education classes is that the study was conducted at a federal institute, a setting presumed to have better physical infrastructure and materials

for Physical Education classes and sports practices. In addition, teachers are better paid compared to teachers in basic education in general, which may be directly related to the development of better classes and, consequently, to better experiences for students, thus reducing inequities in this context. This aspect is not discussed in greater depth.
- Pay attention to citations and ensure they follow the journal's guidelines.
- References: Add the reference Crochemore-Silva et al., 2018.

Final decision (recommendation)
- Minor revisions

Reviewer B
Anonymous

- Congratulations on the work and for addressing a relevant topic with an important approach to inequalities. I believe the comments below can help improve the manuscript for future publication.
- Regarding the objectives, I suggest revising the wording to make it clear that the study will describe the perception of experiences in PE and that inequality in this indicator will be assessed. The phrase "relationship with inequities" seems to be adding noise.
- In the methods, it is necessary to clearly state that the study covers the federal school network at the state level (both in the abstract and at the beginning of the methods section).
- It is necessary to specify for which outcome the sample size calculation was performed. In its current generic form, this is inadequate.
- Regarding the analyses of race/color inequalities, it is not appropriate to use SII and CIX, as these are summary measures of inequality for ordinal stratifiers. For the categories being used, a simple or complex measure suitable for nominal variables is required.
- In the results, I suggest better explaining the interpretation where the percentage related to the inverted scale is presented: "As previously mentioned, the inversion of the scale of the negative experiences dimension, where higher scores indicate a lower perception of these experiences, revealed scores of 93.0% (SD = 11.8) in PE classes."
- Figure 1 was not identified.
- When presenting the results of sex differences in Table 2, the authors need to be more direct in stating that there is no difference in the perception of PE experiences across any domain between boys and girls. As written, it suggests a direction (difference) that the authors themselves state does not exist (last sentence of the paragraph). The same should be applied to the other interpretations in the table.
- Correctly report the unit of measurement for SII and for the differences (percentage points).
- In the discussion, I suggest summarizing the first three paragraphs, presenting only the highlights and avoiding excessive repetition of the results section.
- Regarding the percentage of experience scores, is there a possibility of comparison with the literature?
- Concerning strengths, I suggest mentioning that representativeness is limited to the federal school network of the state of Ceará. This could also be presented as a limitation or discussed earlier. The direction of some inequalities and the absence of others may be related to the student profile, standardized structures, and teaching staff—i.e., a reality quite different from other schools.
- In the limitations, issues related to the pandemic are mentioned. However, I think it is necessary to discuss how the data collection period may have more directly affected the results regarding the perception of experiences.
- Finally, I highlight the need for caution in the use of the term "inequity." For example, when stating that there is an inequity in PE experience between students whose parents have lower education compared to those whose parents have higher education, the authors are making a value judgment that this difference is unfair. I believe this is a mistaken way to frame the debate, as we may actually be observing actions focused on equity—providing more attention to those who need it most—and resulting in more positive experiences among less privileged groups.
- Therefore, I consider it extremely important to present the results as differences or inequalities, and to include in the discussion a paragraph explaining the distinction between inequality and inequity and reflecting on the findings.

Final decision
- Minor revisions