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Validation of The Canadian Assessment of Physical Literacy – CAPL-2 Questionnaire for German and Polish School Children

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A) conception and design of the study
B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
E) obtaining funding

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Abstract

Physical literacy (PL) is a lifelong process of developing the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engaging in physical activity throughout life. It is also an important concept for understanding and promoting physical activity in children and adolescents and is becoming a theoretical basis for analysing physical education in schools. One of the best known, well-operationalised assessments of PL is the Canadian Assessment of Physical Literacy – CAPL-2. The aim of the study was to translate and culturally adapt the CAPL-2 questionnaires in two EU languages, German and Polish. Data from Poland and Germany were combined for this study, with a total sample size of N=802, consisting of 58.6% Polish and 41.4% German students. We used the TRAPD (the Translation, Review, Adjudication, Pre-test and Documentation) approach to translate the CAPL-2 questionnaires. The main results of this study show that the proposed Polish and German versions of the CAPL-2 questionnaires are satisfactory for use in research or for teachers to assess PL in physical education. Our results also indicate better predictive characteristics of the CAPL-2 questionnaires for children who are very close to or who meet the moderate-to-vigorous physical activity (MVPA) recommendations for health as defined by the WHO. We recommend that adaptations be made that are consistent with the original Canadian version, but which are deeply embedded in the language and culture of the country in question, especially in their wording and terminology.

Keywords: primary school children, physical activity, test-retest, motivation, knowledge.

Introduction

All across Europe, many children and adolescents do not meet the World Health Organization (WHO) guidelines of at least 60 minutes of moderate to vigorous physical activity (MVPA) per day (Bull et al., 2020; Guthold, Stevens, Riley & Bull, 2020). A recent study shows that only 16.2% of German children and adolescents met these guidelines in 2021 (Schmidt et al., 2021). Similar negative trends were reported in the Health Behaviour of School-Aged Children (HBSC) study in Germany (Bucksch et al., 2020). Kantanista et al. (2021) also found relatively low levels of physical activity and the implementation of the WHO recommendation in Poland. A decrease in physical activity was found among Polish children and adolescents (Bronikowska et al., 2021; Fijałkowska et al., 2022). Consequently, there is a need for approaches that improve children's physical activity.

In recent years, physical literacy (PL) as a prerequisite of participation in physical activity has attracted research-

ers' attention worldwide (Carl et al., 2023). According to Whitehead (2019), a child with physical literacy knows about and understands what it means to be physically active, is motivated to be physically active, is confident when engaged in physical activity, and has physical skills. This concept of physical literacy is interpreted as a holistic approach that enables researchers to design and evaluate physical activity programmes. Consequently, standardized tools are needed to measure physical literacy internationally to collect and compare the data.

Canadian researchers play a leading role in concept-building and tracking physical literacy among children. The Canadian Assessment of Physical Literacy, second edition (CAPL-2), as a revised version of CAPL with the four domains of Motivation and Confidence, Physical Competence, Knowledge and Understanding, and Daily Behaviour, is a valid and reliable instrument for assessing physical literacy in children 8–12 years old (Shearer et al., 2021). CAPL-2 consists of two questionnaires to assess the Knowledge and Understanding and Motivation and Confidence domains. The Daily Behaviour domain is assessed subjectively from one self-report item of weekly physical activity included in the questionnaire, and objectively from step counts for one week. To measure the Physical Competence domain, three physical tests are applied (Longmuir et al., 2018b).

Recently, the complete CAPL-2 has been validated worldwide for the target group, in Greece (Dania et al., 2020), China (Li et al., 2020), Denmark (Elsborg et al., 2021), Iran (Valadi & Cairney, 2023), and Pakistan (Liu et al. (2023). Also, CAPL-2 questionnaires have been validated among Spanish children (Pastor-Cisneros et al., 2022). In China a total of 371 primary students (174 girls; 153 boys; mean age = 10.0 ± 1.0) participated in a cross-sectional validation study (Li et al., 2020). According to Beaton et al. (2000), the Chinese translation process includes five steps: (1) initial translation, (2) synthesis of these translations, (3) back translation, (4) expert committee review, and (5) test of the pre-final version. 891 school children (484 girls; 407 boys; mean age = 9.86, SD=1.47) were tested in Denmark (Elsborg et al., 2021). The CAPL-2 questionnaires were translated into Danish and adapted to the Danish context according to the World Health Organization (2009) protocol, which includes four phases: (1) forward translation, (2) expert panel back translation, (3) pretesting and cognitive interviewing, and (4) final decision making (Elsborg et al., 2021).

In the Greek validation study (Dania et al., 2020) were 576 children participated (308 girls; 268 boys; mean age=10.22, SD=1.27). The original CAPL-2 questionnaires were translated by two Greek translators, added by experts to one Greek version and back-translated by English native speakers. The pre-final version was tested by physical education (PE) teachers and primary school children to produce the final version. No reliability was reported.

In a Spanish validation study by Pastor-Cisneros et al. (2022), with 57 schoolchildren aged from 8–12 years, the authors used the process of translation-back-translation of questionnaires in accordance with WHO guidelines (2009). After the translation of the questionnaires by two Spanish translators and a consensus meeting, a first version was created. After back-translation of this version and the comparison with the original CAPL-2 questionnaires, the Spanish version was pilot tested with 10 students in a face-to-face interview, including comprehension and paraphrase statements of the items, and the final version produced.

In Pakistan, Liu et al. (2023) examined the level of physical literacy stratified by 1360 children aged 8–12 years of normal weight and overweight. In this context, the authors translated the CAPL-2 questionnaires. The differentiation between Body Mass Index revealed higher levels of physical literacy in the normal-weight children in all domains except for the Knowledge and Understanding domain, where overweight children had higher scores. The Motivation and Understanding domain correlated significantly with Daily Behaviour and Physical Competence in normal weight and overweight children. The Knowledge and Understanding domain had a weak correlation with the other domains in both groups.

Valadi and Cairney (2023) studied the levels of PL in 504 Iranian elementary school children (boys, n=327, girls, n=177) aged 8–12 years. Using forward-backward translation, the questionnaires were translated by three fluent English-speaking sport scientists. The content validity and the face validity of the Persian version was examined by eight experts in motor behaviour and sports psychology. One week after the first testing, 30 children were randomly selected to assess the test-retest reliability.

The overview presented above clearly shows that CAPL-2 is now one of the best-recognised PL assessment tools in the world. Also, considering the results of recent literature reviews in this area (Jean de Dieu & Zhou, 2021; Shearer et al., 2021), the choice of the CAPL-2 seems justified from the perspective of the need to assess all the presumed dimensions of physical literacy: cognitive, affective, physical, behavioural. In the last five years, there have been many validations of this tool in European countries and internationally. To be able to compare the PL levels of school-aged children, universal, well-validated tools for its assessment are needed. These can then form the basis for further studies and discussions on the choice of the best form and method of PL assessment in individual countries, should the need arise. This may be due, for example, to cultural differences or those related to the organisation of education (including physical education) in different countries.

To the best of our knowledge, there are no German and Polish versions of the questionnaires of CAPL-2 (Longmuir et al., 2018a). Therefore, the aim of our study is translating and culturally adapting the questionnaires of CAPL-2 in two EU languages, German and Polish, exploring the reliability for use with children 8–12 years of age, and comparing the results in Germany and Poland. All questions were translated into Polish and German in parallel and adapted separately to the Polish and German country context following the TRAPD translation model (Harkness, 2003), one of the most widely used methods to translate questionnaires (Behr & Zabal, 2020). In comparison with the translation process suggested by the World Health Organisation (2009), the TRAPD approach does not include back-translation into the native language.

The overall objective of our study is ensuring that the translated CAPL-2 questionnaires are psychometrically sound and effective for use in research and educational settings (Tsang et.al., 2017). We expect that we have questionnaires to obtain information about physical literacy in the Polish and German target group in the most reliable and valid manner (Taherdoost, 2016).

Materials and Methods

We established the sample size for our analysis based on Cohran's formula (Kotrlik & Higgins, 2001). According to statistical governmental data in the school year 2020/2,1 there were around 2 million (1.96) students aged 8–12 in Poland and 2.85 million in Germany. Based on this data, we calculated the minimum representative sample as 384 for each analysed country. We also calculated minimum sample size according to the respondent–to–item ratio of at least 8:1, which gives a sample size of at least 136 for each country. For test-retest intra-class correlation coefficient (ICC), a sample size of at least 79 is recommended, regarding an ICC of 0.50 (the minimum acceptable ICC obtained), expected ICC 0.7 and a 95% confidence interval (CI) for a two-tailed test, a probability error of 0.05 and power of 80% (Arifin, 2018; Borg et al., 2022).

Participants

A database containing data from Poland and Germany was combined for this study, with the total samples size OF N=802, n=470 (58.6%) Polish students and n=332 (41.4%) German students. The sample size for the test-retest analysis was n=138 for Polish data and n=131 for German data. Demographic characteristics of the sample containing age (8–12 years; mean age=11) and gender (53% girls) were described in Table 1.

Table 1. Sample size and demographic characteristics

Category	Poland (n = 470)	Germany (n = 332)	Total (N = 802)
Gender			
Boys n (%)	216 (46%)	160 (48.2%)	376 (46.9%)
Girls n (%)	254 (54%)	172 (51.8%)	426 (53.1%)
Age			
M (SD)	11.10 (0.84)	11.05 (0.98)	11.08 (0.90)
8 years n (%)	3 (0.6%)	5 (1.5%)	8 (1.0%)
9 years n (%)	4 (0.9%)	26 (7.8%)	30 (3.7%)
10 years n (%)	114 (24.3%)	43 (13.0%)	157 (19.6%)
11 years n (%)	169 (36.0%)	132 (39.8%)	301 (37.5%)
12 years n (%)	180 (38.3%)	126 (38.0%)	306 (38.2%)

CAPL-2 Measures

The CAPL-2 questionnaires contain two domains with four subscales, and self-reported moderate-to-vigorous physical activity (MVPA). The first domain – Motivation and Confidence – assesses participants' confidence in being physically active and motivation to participate in physical activity. The total score of this domain consists of the result of four subscales of Predilection and Adequacy items ("What's most like me?"), Intrinsic Motivation ("Why are you active?"), and Physical Activity Competence ("How do you feel about being active?"), with three items each. According to the manual, the subscale scores vary from 1.5 resp. 1.8 to 7.5, with a maximum domain score of 30 points. The second domain – Knowledge and Understanding – measures participants' knowledge regarding physical activity. The scale consists of four multiple-choice questions, with one correct and three incorrect answers for each question. The second part is

a text with a gap-fill task to complete a story. For each correctly placed word, one point is assigned, with a maximum of six points available. The total sum of the domain ranges from 0 to10 with 10 as the best score. To assess children's perceptions of their own daily physical activity, a Prochaska-screening-test-based question with the number of days the child was physically active for at least 60 minutes during the last seven days (Prochaska et al., 2001) was performed. Recoded categories ranged from 0–5, where 5 corresponds to the recommended children's engagement in moderate-to-vigorous intensity physical activity (MVPA) of at least 60 minutes daily.

Translation and Cultural Adaptation

We used the TRAPD approach (Harkness, 2003; Walde & Völlm, 2023) to translate the CAPL-2 questionnaires into Polish and German language and to adapt them to the Polish and German context. TRAPD comprises the five steps of translation, review, adjudication, pre-test and documentation. Accordingly, the CAPL-2 questionnaires were translated into German and Polish language by two Polish and two German translators each independently, with Polish and German as their first language. The two versions were reviewed by a Polish and a German expert, respectively, in the area of physical literacy. During the review stage the reviewer met with the translators to adapt the translations. In the adjudication step final decisions were made and a pre-final Polish and German version of CAPL-2 questionnaires were produced. The two versions of the questionnaires were pilot tested in Germany with 12 boys and 9 girls (mean age=9.8) and in Poland with 10 boys and 12 girls (mean age=10.2). The German and Polish research groups chose a paper-pencil version performed in Magdeburg primary schools and in PE class in Poznan and Warsaw. In the pilot testing the questionnaires were administered and the children were asked to comment on whether the questions were understandable, etc. The whole process of translation and review and the results of the feasibility studies from the pilot were documented.

Procedure

The data collection was administered by the Polish and German research group and carried out differently in Poland and Germany. In Germany, the children participated in all the tests of the four domains of CAPL-2, including the physical tests and the daily step count. All measurements were made during scheduled PE classes by trained student research assistants on site in primary schools in different German states. The students were asked to complete the questionnaires on paper independently. If necessary, the student research assistants assisted the children. Polish children of primary schools in Wielkopolskie and Mazowieckie voivodships completed only the CAPL-2 questionnaires online. Regarding COVID-19 pandemic restrictions, schools in Poland were closed during the research period and all classes were conducted remotely. Therefore, an electronic version of the questionnaires was set up in the LimeSurvey survey program. PE teachers from the participating schools were instructed on how to conduct the survey and to help students in case of any doubts. The participants filled in the questionnaires on a computer or a tablet at home during PE classes. The instructions for the questionnaires emphasized that students were to give their own opinion for each question. The questionnaires were anonymized using a code consisting of selected letters of the student's first name, surname and date of birth. This allows for data to be paired post testing.

Ethics

All research procedures were conducted with strict adherence to ethical principles as set out by the universities involved, and ethical approval was obtained from the Ethics Committees. Approval was sought and obtained from the Ministries of Education in the different German states, and in Poland the research protocol was approved by Bioethics Committee at Poznan University of Medical Sciences. Written information about the study was given in advance to the school headteachers and teachers participating in the study. Prior to the study, all parents/legal guardians provided written informed assent. All children took part in the study voluntarily and were able to withdraw from the tests at any time.

Statistical analysis

The analysis of the data was performed using Pearson's r coefficient and Spearman's rho, by calculating interclass correlation coefficient (ICC) and standard error of measurement (SEM), %SEM and minimum detectable change (MDC). In addition, an ROC curve with area under the curve (AUC) was made. Normality and homogeneity of the analysed variables and scales were checked through the Kolmogorov–Smirnov test. Based on the 95% confidence interval of the ICC estimate, values less than 0.5 show poor, between 0.5 and 0.75 moderate, between 0.76 and 0.9 good, and greater than 0.90 excellent reliability (Koo & Li, 2016). Additionally, Cronbach's alpha coefficient was calculated for reliability evaluation. Cronbach's alpha of at least 0.60 has been suggested to indicate adequate internal consistency (Connelly, 2011). The correlation coefficient results were interpreted according to the recommendation by Schober et al. (2018) as less than 0.1 – negligible; 0.1 to 0.39 – weak; 0.4 to 0.69 – moderate; 0.7 to 0.89 – strong; 0.9 to 1 – very strong. The classical threshold of $\alpha = 0.05$ was adopted as the level of statistical significance. All calculations were performed using IBM SPSS Statistics version 25.0.

Results

The intercorrelations of the CAPL-2 questionnaires subscales and the overall score on the Polish and German samples were checked to determine whether there are any relationships between the subscales of the tool and the overall score. Initially, the distributions of the variables in both samples were checked. The distribution of variables in the Polish sample are shown in Table 2 and the German sample in Table 3.

Table 2. Descriptive statistics and tests of normality of distributions for CAPL-2 questionnaire in Polish sample

	M	*Me*	*SD*	*Sk.*	*Kurt.*	*Min.*	*Max.*	*D*	*p*
TEST (N = 470)									
Predilection	5.77	6.10	1.64	-0.75	-0.36	1.80	7.50	0.15	<0.001
Adequacy	6.06	6.10	1.32	-0.69	-0.16	1.80	7.50	0.17	<0.001
Intrinsic motivation	6.13	6.50	1.41	-1.16	0.01	1.50	7.50	0.16	<0.001
PA Competence	5.82	6.00	1.31	-0.85	0.39	1.50	7.50	0.16	<0.001
Motivation and Confidence	23.77	24.30	4.37	-0.70	-0.04	9.60	30.00	0.09	<0.001
PA Comprehension*	3.79	4.00	1.61	-0.42	-0.67	0.00	6.00	0.17	<0.001
Knowledge and Understanding*	5.70	6.00	2.10	-0.41	-0.19	0.00	10.00	0.13	<0.001
Total score CAPL-2Q*	29.48	30.40	5.12	-0.64	0.01	10.60	40.00	0.08	<0.001
MVPA	3.63	4.00	1.47	-0.90	-0.62	0.00	5.00	0.22	<0.001
RE-TEST (n = 139)									
Predilection	5.80	6.10	1.47	-0.65	-0.29	1.80	7.50	0.14	<0.001
Adequacy	5.90	6.10	1.39	-0.75	-0.11	1.80	7.50	0.15	<0.001
Intrinsic motivation	6.05	6.50	1.37	-1.01	0.79	1.50	7.50	0.14	<0.001
PA Competence	5.64	6.00	1.46	-0.64	-0.07	1.50	7.50	0.14	<0.001
Motivation and Confidence	23.43	23.90	4.66	-0.71	0.16	9.90	30.00	0.08	0.056
PA Comprehension**	4.07	4.00	1.65	-0.78	-0.08	0.00	6.00	0.20	<0.001
Knowledge and Understanding**	6.14	6.00	2.03	-0.88	0.51	0.00	10.00	0.18	<0.001
Total score CAPL-2Q**	29.56	30.70	5.61	-0.92	0.71	11.40	38.80	0.10	0.003
MVPA	3.61	4.00	1.55	-0.86	-0.34	0.00	5.00	0.25	<0.001

NOTE: *missing values (n = 60), ** missing values (n = 17)

In the Polish sample, the results of the Kolmogorov-Smirnov test indicate distributions away from the Gaussian curve (non-normal), but most of the skewness does not exceed the absolute value of 1. This indicates a slight asymmetry of the distribution. In addition, outliers exceeding the third standard deviation were removed from the analyses. For this reason, analyses of the Polish sample were based on parametric tests.

In the German sample, not only the results of the normality of distribution test are statistically significant, but also skewness values outside the range of -1 to 1 were noted. Numerous outliers were also found for almost every variable. Therefore, analyses were performed using non-parametric tests.

Correlation analysis of Pearson's r (Polish sample) and Spearman's rho (German sample) were performed for the first measurement of the tool (test). The results of these analyses are presented in Tables 4 and 5.

In the Polish and German samples, the analysis of the Motivation and Confidence subscales shows that

Table 3. Descriptive statistics and tests of normality of distributions for CAPL-2 questionnaire in German sample

	M	*Me*	*SD*	*Sk.*	*Kurt.*	*Min.*	*Max.*	*D*	*p*
TEST (N = 332)									
Predilection	6.28	6.80	1.45	-1.11	0.53	1.80	7.50	0.25	<0.001
Adequacy	6.08	6.10	1.38	-0.89	0.61	1.80	7.50	0.17	<0.001
Intrinsic motivation	5.89	6.00	1.52	-0.96	0.45	1.50	7.50	0.14	<0.001
PA Competence	5.57	5.50	1.57	-0.62	-0.28	1.50	7.50	0.13	<0.001
Motivation and Confidence	23.82	24.40	4.52	-0.70	0.04	7.80	30.00	0.09	<0.001
PA Comprehension*	4.88	5.00	1.51	-1.59	1.98	0.00	6.00	0.26	<0.001
Knowledge and Understanding*	6.54	7.00	1.96	-1.07	0.92	0.00	10.00	0.20	<0.001
Total score CAPL-2Q*	30.36	31.00	5.17	-0.68	0.63	13.90	40.00	0.07	0.001
MVPA	3.54	4.00	1.52	-0.76	-0.51	0.00	5.00	0.22	<0.001
RE-TEST (n = 133)									
Predilection	6.54	7.50	1.26	-1.38	1.68	1.80	7.50	0.29	<0.001
Adequacy	6.09	6.10	1.29	-0.93	0.72	1.80	7.50	0.15	<0.001
Intrinsic motivation	5.31	5.00	1.44	-0.56	0.43	1.50	7.50	0.17	<0.001
PA Competence	5.20	5.00	1.39	-0.47	0.42	1.50	7.50	0.17	<0.001
Motivation and Confidence	23.15	24.00	3.94	-0.92	1.37	10.20	30.00	0.12	0.001
PA Comprehension**	5.48	6.00	1.03	-2.68	9.02	0.00	6.00	0.41	<0.001
Knowledge and Understanding**	7.34	8.00	1.63	-1.40	3.46	0.00	10.00	0.19	<0.001
Total score CAPL-2Q**	30.49	31.00	4.28	-0.93	1.28	17.20	39.00	0.11	0.002
MVPA	3.77	4.00	1.41	-0.93	-0.14	0.00	5.00	0.25	<0.001

NOTE: *missing values (n = 70), ** missing values (n = 19)

they are positively and moderately correlated. In addition, strong associations were observed regarding the overall score of the Motivation and Confidence domain (see table 4).

In the Polish and German samples, significant relationships were also observed for the correlation of the two domains Motivation and Confidence, Knowledge and Understanding, and MVPA. However, it turned out that the Knowledge and Understanding domain in the Polish sample is weakly related to the Motivation and Confidence domain, and yet it correlates moderately with the overall score, and it is only weekly correlated with MVPA. The Motivation and Confidence domain is also weekly to moderately correlated with the subjective measured

Table 4. Correlations within the Motivation and Confidence domain

	Poland				**Germany**			
	1	2	3	4	1	2	3	4
1. Predilection	-				-			
2. Adequacy	0.39**	-			0.42**	-		
3. Intrinsic Motivation	0.42**	0.29**	-		0.43**	0.32**	-	
4. PA Competence	0.38**	0.43**	0.66**	-	0.41**	0.46**	0.66**	-
Motivation and Confidence	0.75**	0.68**	0.78**	0.81**	0.76**	0.67**	0.77**	0.81**

NOTE: *** - $p < 0.001$; ** - $p < 0.01$; * - $p < 0.05$

Table 5. Correlations between CAPL-2Q domains, MVPA and CAPL-2Q total score

	Poland			Germany		
	1	2	3	1	2	3
1. MVPA	-			-		
2. Motivation and Confidence	0.44**	-		0.31**	-	
3. Knowledge and Understanding	0.16**	0.16**	-	0.07	0.14**	-
Total score CAPL-2Q	**0.43****	**0.90****	**0.55****	**0.30****	**0.90****	**0.52****

NOTE: **-p < 0.01; *-p < 0.05

MVPA in the German and Polish samples, respectively (see Table 5).

The data above indicate a good tool characteristic in the Polish and the German sample.

Reliability

Next, reliability was calculated based on Cronbach's α and ICC. In addition, SEM, %SEM and MDC for 95% CI were calculated. The obtained results for the Polish sample based on test-retest analysis indicate an ICC value exceeding 0.50 (moderate reliability) and even 0.75 (good reliability) for the Motivation and Confidence domain. The SEM values range from 0.56 to 1.65 and the MDC 95%, IC from 1.31 to 3.83 (see Table 6). In the case of the Knowledge and Understanding domain, a moderate reliability result was observed (see Table 7).

Table 6. CAPL-2 reliability scores for Motivation and Confidence domain and subdomains in Polish and German samples.

Motivation and Confidence	**Test-re-test reliability**			
	ICC (95% CI)	SEM	%SEM	MDC
Poland (*n* = 139)				
Predilection	0.769 (0.677-0.835)	0.78	13.74	1.82
Adequacy	0.747 (0.646-0.819)	0.69	11.52	1.60
Intrinsic motivation	0.722 (0.611-0.801)	0.74	12.19	1.71
PA Competence	0.831 (0.762-0.880)	0.56	9.80	1.31
Total domain score	**0.870 (0.816-0.907)**	**1.65**	**7.03**	**3.83**
Germany (*n* = 131)				
Predilection	0.656 (0.514-0.756)	0.73	11.10	1.69
Adequacy	0.716 (0.599-0.798)	0.69	11.19	1.59
Intrinsic motivation	0.229 (-0.047-0.438)	1.20	20.82	2.78
PA Competence	0.299 (0.031-0.495)	1.16	21.00	2.70
Total domain score	**0.646 (0.456-0.763)**	**2.38**	**9.92**	**5.52**

Table 7. CAPL-2 reliability results for Knowledge and Understanding domain in Polish and German samples.

Knowledge and Understanding	**Test-re-test reliability** (*n* = 139)			
	ICC (95% CI)	SEM	%SEM	MDC
Poland (*n* = 139) **Total domain score**	**0.690 (0.566-0.778)**	**1.26**	**22.13**	**2.92**
Germany (*n* = 131) **Total domain score**	**0.596 (0.429-0.713)**	**1.09**	**15.54**	**2.54**

In the German sample, two out of five of the ICC values are below the conventional threshold (0.50) (see Table 6). ICC values for Predilection, Adequacy and Motivation and Confidence total domain show moderate reliability. SEM values range from 0.69 to 2.38, and for MDC 95% IC from 1.59 to 5.52. In the case of the Knowledge and Understanding domain, moderate reliability was observed for the general domain (see Table 7).

To supplement, Cronbach's Alpha was calculated for individual subscales and the total CAPL-2 questionnaire score (see Table 8).

The reliability based on Cronbach's α for individual subscales of the Motivation and Confidence domain and its total score is mostly at a strong level (α > 0.70). In this case, α values in the range of 0.6 to 0.9 were recorded, but this is still an acceptable level of reliability. For Adequacy and for the Knowledge and Understanding domain in the Polish sample, the value of Cronbach's α in the first measurement is lower than 0.60 (0.578 and 0.567, respectively), which indicates a slightly reduced reliability of these subscales.

Table 8. Cronbach's Alpha results for CAPL-2 questionnaire domains and subscales for Poland and Germany.

	Number of items	Cronbach's α			
		Test		Re-test	
		Poland	Germany	Poland	Germany
Motivation and Confidence	**12**	**0.851**	**0.866**	**0.889**	**0.845**
Predilection	3	0.714	0.745	0.659	0.698
Adequacy	3	0.578	0.691	0.673	0.648
Intrinsic motivation	3	0.868	0.819	0.893	0.885
PA Competence	3	0.827	0.848	0.894	0.879
Knowledge and Understanding	**10**	**0.567**	**0.612**	**0.571**	**0.593**
Total score CAPL-2Q	**22**	**0.796**	**0.815**	**0.851**	**0.772**

The Knowledge and Understanding domain total scores mostly do not show adequate reliability in both Polish and German data. Cronbach's α values in this case are below the threshold of 0.6. However, the total CAPL-2 questionnaire score in the test and re-test is reliable for both the Polish and German samples.

Predictiveness of the CAPL-2 Questionnaire Based on Physical Activity

Due to the fact that the study was expanded with a question initially diagnosing the level of physical activity of participating children, the test-retest reliability analysis was completed for MVPA (see table 9), and an additional analysis was proposed, to check the overall diagnostic performance of the Polish and German CAPL-2 questionnaire. For this purpose, the ROC curve analysis was performed, and the AUC was estimated. The analysis was made separately for the Polish and German samples, and for the test and re-test study.

The results for the test-retest reliability of MVPA measurement showed a moderate level of reliability in both Polish and German samples. Following the CAPL-2 Questionnaire Manual, two cut-points, closest to the World Health Organization recommendations (2020) of

Table 9. Reliability results for MVPA in the Polish and German sample.

MVPA	Test-re-test reliability			
	ICC (95% CI)	SEM	%SEM	MDC
Poland	0.712 (0.597-0.794)	0.84	29.11	1.96
Germany	0.703 (0.581-0.790)	0.74	23.62	1.71

the health-enhancing physical activity for children, were checked in ROC analysis. The first cut-point for physical activity for at least 60 minutes for 5 days a week, and the second for 6 or 7 days a week. In addition, the classification was verified in both test and retest measurements (see table 10).

Both models made using data from the test sample and re-test measurement in Poland and in Germany were

Table 10. Results of ROC curve analysis for CAPL-2Q total score based on children's physical activity.

Measure	MVPA Cut point	Poland		Germany	
		AUC (95% CI)	*P*	AUC (95% CI)	*p*
Test	6-7-days-60-min.	0.69 (0.65-0.73)	<0.001	0.64 (0.58-0.70)	<0.001
	5-days-60-min.	0.52 (0.47-0.57)	0.395	0.51 (0.43-0.58)	0.843
Re-test	6-7-days-60-min.	0.69 (0.62-0.76)	<0.001	0.66 (0.56-0.75)	0.002
	5-days-60-min.	0.57(0.47-0.67)	0.190	0.41 (0.30-0.53)	0.161

statistically significant. The AUC values of the models were sufficient, indicating a quite good fit of the classification. The best data fit to the model appeared in the test sample for both countries. Figure 1 for Poland and Figure 2 for Germany show the ROC curves for the physical activity cut-off point for 6-7-days-60-minutes in the first measurement. This result indicates better predictive characteristics of the questionnaire for children who are very close to (6 days per week) or who meet (7 days per week) the recommendations for the minimum level of physical activity for health, as defined by the WHO (Bull et al., 2020).

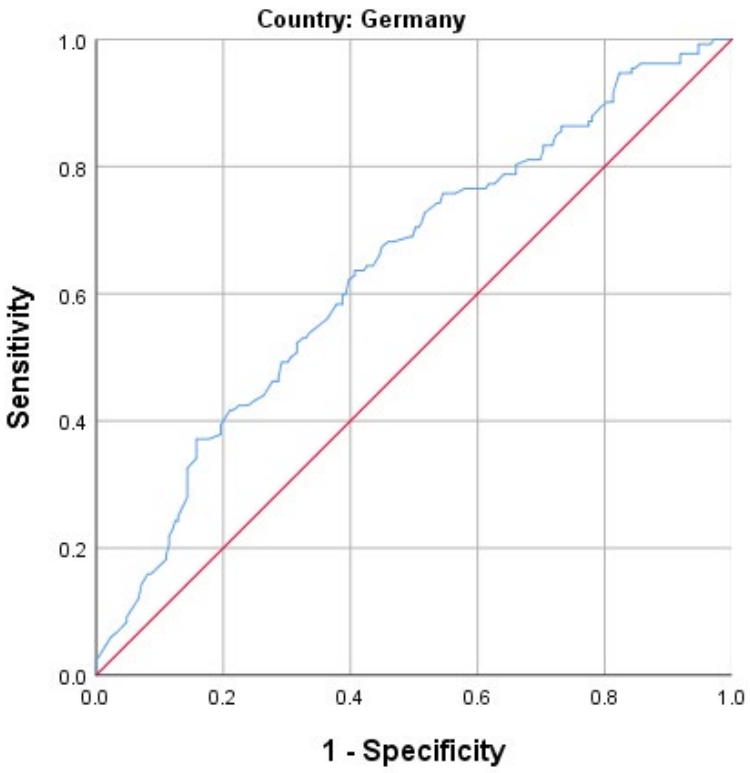

Figure 1. ROC curve for CAPL-2 questionnaire total score based on MVPA in the Polish sample

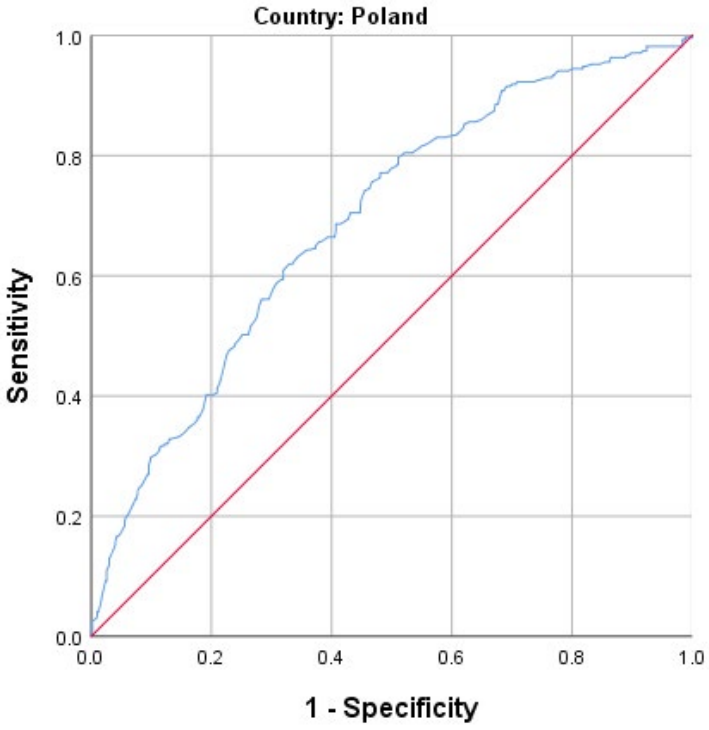

Figure 2. ROC curve for CAPL-2 questionnaire total score based on MVPA in the German sample.

Discussion

The aim of our study was to translate and culturally adapt the questionnaire of CAPL-2 to German and Polish contexts and to explore its reliability when used with children aged 8 to 12. The main results of this study show that the proposed Polish version and German version of CAPL-2 questionnaires are satisfactory for use in research or for teachers to evaluate PL in physical education.

The CAPL-2 was based on the Holistic Assessment of Learning Outcomes approach (Akubuilo, 2012; Wortman & Mamo, 2018). This approach assumes that it will be very difficult for an inactive child to achieve a high level of physical literacy. A child who possesses adequate knowledge, understanding, motivation, confidence, and physical competence would be more likely to lead an active, healthy lifestyle (Longmuir et al., 2018b).

It appears that in the Polish and German samples all subscales of the Motivation and Confidence domain are positively and moderately correlated. Strong correlation was observed regarding the Motivation and Confidence total domain with its subscales. The domain proves the good psychometric properties of the German and Polish instruments. Analysing the correlation between the Knowledge and Understanding domain and Motivation and Confidence domain, we found that they were positively correlated. However, this correlation is low for both Polish and German samples. Validation studies in Denmark (Elsborg et al., 2021), Greece (Dania et al., 2020) and Pakistan (Liu et al., 2023) did not report any correlation between those two domains. These different results could be affected by the physical education curriculum or culture differences in these countries.

Our correlation results demonstrated that students with a higher level of Motivation and Confidence are more physically active (self-evaluation of MVPA), but we could not find such direct relationships with Knowledge and Understanding domain. The same results were observed in Pakistan (Liu et al., 2023), Denmark (Elsborg et al, 2021) and China (Li et al., 2020). However, these authors analysed the Daily Behaviours domain in a subjective and objective way and found weak to moderate correlations with the Motivation and Confidence domain but none with the Knowledge and Understanding domain. As we know, there is insufficient knowledge about the importance of physical activity to promote motivation for behaviour change. Studies (Caldwell et al., 2020) show that the impact of knowledge alone is insufficient to alter the level of physical activity. Future research in the area of physical literacy should examine the extent to which the relationship between the domains of Knowledge and Understanding and Motivation and Confidence influence

daily physical activity in the long term. Furthermore, we need more empirical evidence that the concept of physical literacy with the factors of Knowledge and Motivation, on the one hand, and the level of daily physical activity and motor skills, on the other hand, is increasing physical activity as a determinant of a healthy lifestyle (Cairney et al., 2019).

Regarding test-retest ICC reliability we have obtained moderate to good results for Motivation and Confidence subscales and a good result for the total domain in the Polish sample. The same results were obtained in two (Predilection and Adequacy) of the four subscales and in the total domain of Motivation and Confidence in the German sample. This indicates the need for a more detailed analysis of the two subscales (Intrinsic motivation and PA Competence) from the German version of the questionnaire. In the Knowledge and Understanding domain the total score shows moderate ICC results for the Polish and German samples. Reliability ICC results for MVPA are moderate for the Polish and German samples. The Iranian study (Valadi & Cairney, 2023) found better inter-examiner reliability using ICC method but with 30 students within one week. In the Spanish study by Pastor-Cisneros et al. (2022), the authors report substantial results for test-retest ICC reliability with fewer than 60 students and without information about the mean age of the students.

Regarding Cronbach's α coefficient, our results for Motivation and Confidence domain demonstrate good reliability. Similar results were found in the Chinese (Li et al., 2020), Danish (Elsborg et al., 2021) and Spanish (Pastor-Cisneros et al., 2022) validation studies of CAPL-2 questionnaires. For the domain of Knowledge and Understanding, we obtained slightly lower results. The same situation was mentioned by Li et al. (2020), and the authors suggested revising the Chinese version of the Knowledge and Understanding questions to confirm correct wording. Much better results of Cronbach's α were reported by Pastor-Cisneros et al. (2022). Other validation studies of CAPL-2 questionnaires did not report Cronbach's α coefficient of reliability for this domain. For the subscales of Motivation and Confidence domain, we found acceptable to good Cronbach's α as it was in the Danish validation study by Elsborg et al. (2021). For MVPA, the Spanish study (Pastor-Cisneros et al., 2022) shows a reasonably strong α coefficient compared with the German and Polish results. However, the time in their study between pre- and post-test was three weeks compared with our study (4–5 weeks).

Our result indicates better predictive characteristics of the CAPL-2 questionnaires for children who are very close to or meet the MVPA recommendations for health, as defined by the WHO (Bull et al., 2020). This finding is in line with well-established results confirming that self-concept (including self-efficacy, perceived health, participation motives, perceived competence, and enjoyment) has been one of the strongest predictors of physical activity participation in children and adolescents (Hu et al., 2021). This result is also in line with some results which indicate that better knowledge and understanding of behaviour leads to better performance (Cornish et al., 2020). Knowledge and understanding of movement and health seems to be necessary to efficiently engage in physical activity from an early age (Cale & Harris, 2018). Own movement experiences are also of great significance, as underlined by Cornish et al. (2020). However, in the body of literature, we can find inconclusive results of the relationship of the knowledge on physical activity or other health behaviours and actual behaviours. A positive relationship was found in different studies (Chung et al., 2019; Nagy-Pénzes et al., 2020; Raghupathi & Raghupathi, 2020). The results of Nagy-Pénzes et al. (2020) show an interesting relationship of better knowledge and better performance of MVPA only for adolescent girls.

Physical literacy is fundamental to understanding the role of and lifelong participation in physical activity. In the work of Cornish et al. (2020), cited above, a very apt summary of the relationship between physical activity and physical literacy can be found. The authors emphasize that physical literacy is "a concept that creates a condition to engage in physical activity, but it is likely a bidirectional relationship exists in that increasing physical activity will increase physical literacy and vice versa" (Cornish et al., 2020, p.16). It is also suggested that physical literacy may be an important determinant of health, and an evidence-based conceptual framework for this has been established (Cairney et al., 2019).

Although the present validation of the CAPL-2 questionnaires is an important contribution to the PL literature, we could also point out some limitations of our study. The first is the dual protocol, as Poland is so far only validating CAPL-2 questionnaires and Germany is developing all CAPL-2 measurement procedures. Furthermore, we suggest comparing the German version of CAPL-2 with other instruments in the target population, such as Krenz et al. (2022) used in Germany to measure physical literacy in children aged 8–12 years. It is also necessary to consider the socio-economic differentiation of the sample analysed in order to understand its impact on PL. Due to cultural, social and geographical differences between countries, as well as differences in the organisation and curriculum of physical education in different countries, it is advisable to include research of a qualitative nature, especially in areas related to children's and young people's knowledge and understanding of physical activity. Physical education teachers, in particular, should be valuable collaborators. In general, longitudinal research is also advocated to understand variability and to capture the impact of different fac-

tors on the process of building physical literacy in children and adolescents. With longitudinal studies investigating the psychometric properties of the CAPL-2 questionnaires, we will be able to identify and understand how children's levels of physical literacy grow at different ages and grades. For future research, we recommend that the gender differences in the different age groups should also be studied.

Conclusions and implications

Our results indicate that the Polish and German versions of the CAPL-2 questionnaires are a valid and reliable measure of physical literacy in primary school children. We expected that the German and Polish versions of CAPL-2 would be an applicable instrument to measure PL in children 8–12 years old. However, due to the fact that the school age in Germany and Poland starts at 6 years and 7 years, respectively, our experience is that children aged 8–9 years do not have the reading and writing skills to fill out the questionnaires. We therefore recommend using the CAPL-2 questionnaires in these countries from the age 10–12 years.

The cooperation of researchers from Poland and Germany made it possible to validate a tool adapted to the conditions of more than one country, usable in Polish and German, and available on request in pen paper or electronic version. These questionnaires can be used extensively in research into children's self-perceived physical literacy as a screening tool and to raise the profile of physical inactivity in this population. As a screening tool, it allows professionals to identify individuals and groups to implement behaviour change programmes tailored to the educational setting. Future studies are needed to validate the full CAPL-2 in Poland.

The work of multicultural and international teams is advisable when adapting the questionnaires in other European countries. For further studies a European initiative to compare the levels of physical literacy in different EU countries in different age groups could be a fruitful approach. We recommend creating adaptations that are consistent with the original Canadian version, but deeply embedded in the language and culture of the country in question, especially in wording and terminology. We have also found that the online version of the questionnaires helps children to understand the process of completing the questionnaires, especially the first one on the Predilection and Adequacy subscales, which were often the cause of a problem. It also prevents them from accidentally missing out some questions.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Executive Functions and Competitive Attitudes in Near-Elite Ice Hockey Players

Authors' contribution:

A) conception and design of the study
B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
E) obtaining funding

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Abstract

Ice hockey is considered one of the most competitive sports, and it requires physical and mental preparation to perform appropriately under the pressure of a competitive environment. The present study aims to investigate the impact of competitive sports on executive functions such as emotion regulation, inhibitory control, working memory, and competitive attitudes among near-elite ice hockey players. Near-elite athletes have been gathered (N = 67) from the four Hungarian Ice-Hockey Academies. Our results indicated a small positive association between Canadian points and maladaptive emotion regulation and a slight positive correlation between maladaptive cognitive emotion regulation and false alarms of the N-back task. The result revealed a significant difference between National and Non-National Team members in maladaptive cognitive emotion regulation regarding hypercompetitive attitude. The result of linear regression revealed that maladaptive cognitive emotion regulation significantly predicts false alarms, indicating that the maladaptive cognitive emotion regulation explains 10% of the variance. In conclusion, we highlight the role of the environment, which affects executive functions and competitive attitudes alongside sports performance. Although the findings were mainly correlational, we can conclude that the nature of competitive ice hockey expects certain behavior for the players indifferent of the situation that could lead to emotion suppression, rumination and other maladaptive emotion regulation strategies. We can also conclude that inadequate emotion regulation might be related to the overstimulation of players, characterized by a hypersensitive state to stimuli. We suggest that practitioners ensure the development of adequate competitive attitudes of players to enable long-term physical and psychological benefits.

Keywords: inhibitory control, competitive attitudes, cognitive emotional regulation, near-elite ice hockey players

Introduction

The link between complex motor activation and cognitive performance enhancement has been explored on several occasions (Pesce et al., 2009; Formenti et al., 2021), although both processes can function as a starting point of the response circle. Enhanced performance is executed through higher-order cognitive processes such as executive functions. The term executive functions (EF) refers to the ability that elicits and maintains cognitive energy for appropriate problem-solving (Ropovik, 2014). Besides many other cognitive functions, EF is also responsible for delaying gratification (Rybanska et al., 2018), predicting consequences, and regulating emotions (Barkley, 2012). Although there is a lack of consensus in the literature regarding the categorization and definition

of EF, the most commonly used categorization is when cognitive processes are grouped into three major categories: inhibitory control, which refers to the ability to control or suppress impulses, distractions, or automatic responses, enabling focused and intentional actions; working memory, which refers to the capacity to temporarily hold and manipulate information, facilitating tasks like problem-solving, decision-making, and comprehension; cognitive flexibility, which refers to the mental agility to be able to adapt and switch between different tasks, ideas, or perspectives in response to changing circumstances. Self-regulation has been associated with enhanced sports performance through inhibitory control processes (Albuquerque et al., 2019). According to this definition, EF is the ability to sustain focused attention and energize mental approaches for solving problems effectively. It involves holding back for later rewards, foreseeing outcomes, and managing emotions. A recent meta-analysis revealed that athletes' reaction time for stop-signal tasks was shorter compared to non-athletes, and this result was mediated by age (Albaladejo-García et al., 2023), suggesting the beneficial impact of frequent engagement in a demanding environment on response suppression. Although some study results indicate inhibitory control enhancement in a sports context, a systematic review indicates that aerobic exercise intervention and resistance training show the least evidence of gain in working memory (Diamond & Ling, 2019).

Mental preparedness in sports involves essential cognitive processes, such as inhibitory control, working memory and emotion regulation (Koch & Krenn, 2021). By the nature of sports contexts, the level of competition as a trait of the athletes or the teams can decide the outcome of the competition (Brustad, 1988). However, the competition of comparable performances is best when the goal is improving through competition (Breitbach et al., 2014). Ice hockey is considered to be an open-skills sport, which means the competitive environment is continuously changing, requiring the players to adapt their skills to this environment. In many open-skills sports, besides the level of competition, executive functions gain significance as athletes compete mentally. This phenomenon affects the well-being of the athletes, possibly through resilience (Galli & Gonzalez, 2014). Considering sports teams as complex systems, the sum of the individual competition levels does not equal a team-level competitive trait, as in these systems non-linear processes emerge (Ramos-Villagrasa et al., 2018). Athletes are assumed to develop more context-relevant competitive skills compared to non-athletes, and competitive skills can predict how the athlete fits into the competitive sports environment (Beckmann & Elbe, 2015). A good fit in the sports environment results in effective and successful performance (Janelle & Hillman, 2003). An athlete's attitude is one of the most influential determinants in sports (Lorimer et al., 2011). Attitude is one's evaluation or feeling about a particular situation, group, person, or object, which is measured on a continuum from negative to positive, depending on various factors such as social norms, personal experiences, and cultural values. On the other hand, behavior is a person's actions, influenced by many factors such as environment, situations, personal experiences, beliefs, social norms, and, most valuable for us, attitudes. Behavior and attitude are closely related, but they are only sometimes consistent. The competitive attitude style is a psychological phenomenon that refers to an individual's beliefs and attitudes towards competitions or competitive situations. Individuals with a strong competitive attitude style are highly motivated by competitive challenges. They are more likely to view them as an opportunity to succeed rather than as improving self-esteem (Martinent & Ferrand, 2015). Research has found that athletes with a competitive attitude tend to have better sports performance outcomes, including greater enjoyment, higher self-esteem, and less anxiety (Martinent & Ferrand, 2015; Tamminen & Gaudreau, 2014).

In addition to these constructs, dual process theory and self-perception theory have been applied to the study of sports psychology. Dual process theory proposes that the following two cognitive systems function in human behavior: the intuitive system is automatic, fast, and unconscious, while the analytical system is deliberative, slow, and conscious (Evans, 2010). Athlete preparation is a complex process that aims at automatizing mental and physical methods, i.e., competitive developmental styles (Ryckman et al., 1996) and emotion regulation processes (Wagstaff, 2014) that require the knowledge of multiple experts, which explains why teamwork is frequently employed even in individual sports. (Reid et al., 2004). Although competitive attitudes fit well in competitive environments, being overly competitive in sports hinders performance, prohibiting teams from functioning correctly. By contrast, being insufficiently competitive in such an environment will likely result in underperformance.

Ice hockey is among the world's most highly competitive team sports. Various factors, including coaching, team dynamics, and individual player characteristics, influence the success of ice hockey national teams. Research has found that team cohesion, communication, and goal-setting contribute to the success of ice hockey teams (Carron et al., 2002). On the individual level, players perform at their best if the three factors of self-determination theory are present: autonomy, competence, and relatedness (Ryan & Deci, 2000). The level of autonomy in ice hockey depends on the relationship between the coach and the players. Some coaches prefer highly autonomous players, while others prefer players that rely on the team's tactics (Jakobsen, 2021). In this case, competence is related to the

players' fit in the competitive environment. Players who fit well achieve more in these environments, which is the basis of feeling competent. Relatedness is experienced as being a valued member of the ice hockey team (Amiot, Sansfaçon, and Louis, 2014).

Having a competitive attitude has also been identified as a factor affecting team sports performance. Athletes with a highly competitive attitude may be more motivated to perform well, but this can also lead to negative emotional experiences such as frustration and anger when performance is not optimal. In ice hockey, the highly competitive attitude is associated with increased aggression (Kavussanu & Roberts, 2001), which can negatively affect team dynamics and performance. It is a phenomenon to be avoided, as it means over-competition (Schields & Bredemeier, 2009). Therefore, competitive attitudes describe individuals having a compelling desire to compete and succeed (while avoiding losses) as a way to uphold or boost their self-esteem and self-worth. Competitive attitudes may help players master their chosen game positions. Regardless of the position played, all players are required to be competitive.

In ice hockey, forwards compete primarily to find and exploit opportunities to score, while defenders compete to extinguish their opponents' opportunities. Goalies are primarily competing against the opposing goalie. The competition is best if the skill discrepancy between the teams is minimal, though the difference can be huge in motor and technical skills or tactics between the teams. Besides attacker-defender interactions, ice hockey games offer situations for players with no attacker-defender roles, only neutral competing parties, in which pure competition emerges. One such example is when two opposing players compete for a loose puck, a situation in which both players want to gain possession of the puck. The outcome of the games is highly correlated with the competitive performance in these loose puck battles (Parnican et al., 2020). Although performance measures are frequently used in ice hockey, offering individual performance indicators (goals, assists, and plus-minus measures), a great performance indicator remains if the player is invited to play for the national team. In ice hockey, the national teams of countries compete in World Championships in U18, U20, and senior age groups. On the individual level, self-perception theory suggests that the athletes of an ice hockey team are likely to develop their attitudes and beliefs about their abilities based on their performance and feedback from coaches and teammates (Bem, 1972; Tamminen & Gaudreau, 2014). A player that fits well in the competitive environment is likely to be invited to join the national team. Therefore, the national team is likely to consist of the best-fitting players of a country. In order to become a member of the national team, competitive skills alone are insufficient to explain sports performance. Therefore, the executive functions of players are analyzed in the present study.

Ice hockey is a dynamic game that requires players to regulate their emotions, otherwise the opposing team can exploit them. Adaptive emotion regulation refers to the ability to effectively manage and respond to emotions in a healthy and constructive manner. It involves strategies that contribute positively to well-being, relationships, and overall psychological adjustment. Such strategies include expressing emotions appropriately, seeking support, and using positive coping mechanisms. Maladaptive emotion regulation refers to ineffective or harmful ways of managing and responding to emotions. These strategies can have negative consequences for mental health, relationships, and overall well-being. Athletes in high-pressure situations often employ cognitive emotion regulation strategies to manage their emotions. Maladaptive cognitive emotion regulation strategies are cognitive processes used to regulate ineffective or counterproductive emotions, leading to adverse outcomes. Maladaptive cognitive emotion regulation strategies include rumination, catastrophizing, and self-blame. These strategies are associated with higher levels of psychological distress and more inadequate mental health outcomes. Research has found that maladaptive cognitive emotion regulation strategies are associated with more unsatisfactory performance in sports, including ice hockey (Robazza et al., 2016). Players who channel their emotions to increase performance will likely fit better than those who are unable to do so (Feltz et al., 2008). Although regulating emotions is mostly beneficial for sports performance in the long term, unregulated emotions might energize the athlete, resulting in increased efficiency (Grandey, 2000).

Complex games like ice hockey require players to make fast and accurate decisions. Under the effect of strong emotional states, these decisions are likely to be far from optimal. Inappropriate emotional responses for different situations may result in being penalized by the game rules, causing penalty-kill situations for the team, in which the team is playing shorthanded, in a four-versus-five structure for two minutes. If the opponent scores during the two-minute penalty, the game returns to a five-versus-five structure.

A well-functioning competitive sports team is cooperative on the inside while competitive on the outside. Team sports are related to unique emotional experiences, affecting athletes' performance and well-being. Several studies have examined the role of dynamic regulation strategies in team sports and have identified the importance of adaptive regulation strategies for athletes' success (Gross & John, 2003). In ice hockey, studies have explored the relationship between emotional regulation and performance. For example, Robazza et al. (2016) found that maladaptive cognitive emotion regulation strategies

were negatively associated with sports performance in Italian ice hockey players. It was also found that learning emotion regulation is fostered by a caring climate in the team (Fry et al., 2012). A caring climate, therefore, supports the performance of the team in the long term through better emotion regulation and protecting talented players from being burnt out before their performance peak is reached, which is seen as a positive characteristic of well-performing teams.

In a caring climate, teaching interactions happen frequently and adaptive cognitive regulation strategies spread in the team; through this mechanism, the team functions at the highest possible level. Supported by a caring climate, multiple emotional regulation strategies might emerge in the same team, offering a more comprehensive coverage of adaptive strategies for the team. Cognitive and emotional regulation strategies are predominantly used by athletes just before and during competitions (Martinent et al., 2015). Researchers claim that these strategies can be automatized, and this automatization may create competitive edges for the athletes in a highly competitive environment. They identify two subcategories for cognitive and emotional regulation strategies: attention deployment strategies (e.g., increased concentration, avoiding overthinking, planning future actions) and cognitive change strategies (e.g., rational self-talk, positive self-talk, humor). It was found that athletes essentially use these strategies to manage their negative emotions, while many athletes manage positive emotions with no regulation or automated regulation strategies. As cognitive and emotional regulation is considered the dominant method of dealing with emotions during competition, and ice hockey is found to be among the top sports regarding competition levels, it is reasonable to analyze the emotional regulation skills of its players. Near-elite U21 players are still at an age when many practical emotion regulation strategies can be learned. Therefore, this paper offers practitioners suggestions on preparing athletes for elite-level competition.

Cognitive-emotional regulation strategies are subject to modification based on the positive or negative feedback the athlete experiences when using a particular strategy (Beattie et al., 2016). Individual performance measures (i.e., Canadian points, which consists of the goals and assists achieved in competitive games) are inherent objective feedback for performance, and coaches often use verbal feedback to enhance the performance of their teams. These studies suggest that emotional regulation strategies are essential to ice hockey performance and well-being. Furthermore, the relationship between competitive attitude and emotional regulation has been explored in team sports and ice hockey. For example, a study by Hanin & Stambulova (2002) found that athletes with a highly competitive attitude were more likely to use cognitive emotion regulation strategies such as self-talk to manage their emotions during competition. However, these strategies may be maladaptive if they lead to rumination or self-blame. Emotional regulation and a competitive attitude are essential in team sports and ice hockey. Maladaptive cognitive emotion regulation strategies have been discovered to have negative consequences for performance and well-being, and competitive attitudes can lead to adverse emotional situations. Therefore, it is vital that coaches and trainers educate athletes on adaptive emotional regulation strategies and monitor their emotional experiences to optimize performance and well-being in team sports and ice hockey.

The current research investigates the effect of expertise on athletes' psychological well-being through participating in competitive environments. Secondly, it focuses on the possible relationships between measurable competitive attitudes, cognitive emotional regulation, and the most frequently used individual performance indicators for players, i.e., Canadian points. Thirdly, the predictive value of cognitive emotion regulation on working memory and inhibitory control was examined. Identifying the competitive characteristics of near-elite ice hockey players can help practitioners to develop players who fit better in the increasingly competitive environment.

Method

The present research design is quasi-experimental, ex post facto. The quasi-independent variables are participation in the national team and maladaptive cognitive emotion regulation strategy, and the dependent variable is the competitive attitude style.

A statistical power analysis – G*Power (Faul et al., 2007; Faul et al., 2009) – was used to compute sample size. To detect an effect of η 2 p = 0.4 with 80% power in the two-way analysis of variance ANOVA (four groups, alpha = .05), G*Power suggests we would need 20 participants in each group (N = 80).

The present study sample consisted of 67 male ice-hockey players aged between 17 and 21 (M = 19.03, SD = 1.06). Participants were enlisted from four Hungarian Ice-Hockey Academies, and their experience ranged from 7 years to 17 years (M = 13.43, SD = 1.90). Players from the following academies participated: 19 players from "Budapest Jégkorong Akadémia" (28.4 %), 17 players from "DVTK Jegesmedvék" (25.4 %), 13 players from "Fehérvár Hockey Academy" (19.4 %), and 18 players from "Újpesti Jégkorong Akadémia" (26.9 %); 38 were forwards (56.7 %), 22 defencemen (32.8 %), and 7 goalies (10.4 %). Of the 67 players, 21 are members of the national team (31.3 %). The majority were Hungarian players (91 %), one player was Slovenian (1.5 %), two of them were Hungarian-Romanian (3 %), and 3 players were Hungarian-Serbian (4.5 %).

The form of the study consisted of three main parts: a sociodemographic section; The Competitive Attitude Scale (CAS) developed by Menesini et al. (2018); and The Cognitive Emotion Regulation Questionnaire (CERQ), initially developed by Garnefski et al. (2001), the Hungarian version translated and validated by Miklósi et al. (2011). The Cognitive Emotion Regulation Questionnaire (Garnefski et al., 2001) was administered to evaluate emotion regulation strategies. Participants gave their answers on a Likert scale ranging from 1 (almost never) to 5 (most of the time). The questionnaire comprises 36 items divided into two emotion regulation categories, adaptive and maladaptive strategies. Adaptive strategies ($\alpha = .65$) are compiled by the average scores of the following dimensions: acceptance (e.g., "I think I have to accept that this happened"), positive refocusing (e.g., "I think of nicer things than what I have experienced"), refocus on planning (e.g., "I think of what I can do best"), positive reappraisal (e. g. "I think I can learn something from the situation"), and putting into perspective (e.g., "I think that it all could have been much worse"). Maladaptive strategies ($\alpha = .64$) are compiled by the average scores of the following dimensions: self-blame (e.g., "I feel that I am the one to blame for it"), rumination (e.g., "I often think about how I feel about what I have experienced"), catastrophizing (e.g., "I continually think how horrible the situation has been"), and other-blame (e. g. "I feel that others are to blame for it").

The Competitive Attitude Scale (CAS) (Menesini et al., 2018) was used to measure two dimensions of player attitude. The first dimension is the Hyper-competitive attitude ($\alpha = .63$), constructed by the first 26 items (e.g., "Winning in competition makes me feel more powerful as a person"). The second dimension is the Developmental-Competitive Attitude ($\alpha = .70$), constructed by the second block (from item 27 to item 41). The following items were reversed: 3, 5,6,10,13,15,16,18,19,20,25,28,32,36. On a 5-point Likert scale, participants gave each statement a rating ranging from "Never true for me" to "Always true for me."

The N-back task is complex, measuring working memory-related processes such as inhibition and interference control. The task consists of a series of stimuli, and for each stimulus, participants have to decide if it is the same stimuli as N stimuli ago. In this experiment, a modified N-back task was used. Each stimulus is presented for 500 ms with a 2500 ms no stimuli period. Stimuli consisted of letters from A to T. Participants needed to respond to the letters two letters ago in this implementation. We measured the correctness of the response and the response time (Jaeggi et al., 2010).

The institution's ethical committee granted ethical permission for this study. The study was carried out under license number TE-KEB/20/2022. The four state-accredited Hungarian ice-hockey academies were contacted and informed about the objective of the study before consenting to participate. The aim of the study, the confidentiality of the findings, and the voluntary nature of participation were all explained.

Before the study started, participants signed an informed consent form and generated a unique code to maintain anonymity. Data was collected through Google Forms, under the surveillance of our team and the coaches of the respective teams. The individual performance statistics of athletes used in the analysis were Canadian points of the 2022/23 Hungarian U21 championship regular season obtained from the official website of the Hungarian Ice Hockey Federation. The data were gathered on March 15, 2023. The measurement included questionnaires on Google Forms and N-Back tasks running on computers. As multiple tests were used and the time allowed for measurement was limited, we conducted the measurement in a circular design, in which six players started with the computer tests. In comparison, another six players started with the CAS and CERQ scales and switched between them. The randomization allowed the measurement to take place in an acceptable time frame. Three researchers supervised the computer tests to ensure the players focused on the tasks, while the two other researchers supervised the CAS and CERQ tests. Although groups of six athletes were given the same task, the CAS, the CERQ, and the N-Back tasks were completed individually.

Results

A Pearson correlation coefficient was computed to assess the linear relationship between Canadian points, adaptive- and maladaptive cognitive emotion regulation strategy points, Hypercompetitive attitudes (HCA), and Personal Development Competitive attitudes.

There was a positive correlation between the Maladaptive Cognitive Emotion Regulation score and the Canadian points $r(62) = .3$, $p = .015$. Our results also indicate a statistically significant positive correlation between Hypercompetitive Attitude scores and Adaptive Cognitive Emotion regulation scores $r(65) = .25$, $p = .04$. Our results (Table 1) also revealed a significant correlation between Personal Development Competitive attitude scores and Canadian points $r(62) = .41$, $p = .001$. We also found a significant negative correlation between False alarm reaction time and Maladaptive emotion regulation strategies $r(67) = -.31$, $p = 0.1$. Pearson correlation revealed a significant association between subdimensions of Competitive Attitudes scale scores and Cognitive Emotion Regulation strategy scores; as a next step, we conducted variance analysis to explore the dynamics of National Team membership status regarding cognitive emotion regulation and competitive attitudes. Significant correlations

Table 1. Descriptive Statistics and Correlation for Study Variables

Variable	*n*	*M*	*SD*	1	2	3	4	5	6.
1. Canadian points	64	7.59	6.68	-					
2. Adaptive cognitive emotion regulation score	67	65.77	9.11	.03	-				
3. Maladaptive cognitive emotion regulation score	67	41.97	7.34	.3*	.09	-			
4. Hypercompetitive Attitude score	67	3.18	0.36	.15	.25*	.11	-		
5. Personal Development Competitive attitude score	67	3.52	0.41	.3*	.23	-.02	.41**	-	
6. N- back task False Alarm Reaction time	67	556.72	443.08	-.13.2	.2	-.31**	-.13	.6	-

* p< .05 **p< .01.

were found between regular season Canadian points and maladaptive cognitive emotion regulation and personal development competitive attitude scores. A 2x2 Factorial ANOVA was conducted to compare the main effects of participation in the national team and the interaction effect of the maladaptive cognitive emotion regulation strategy on competitive attitude style. The significance level of Levenes's Test of Equality of Error Variance was higher than .05, so we can conclude that we have not violated the homogeneity of variances assumption. A two-way analysis of variance was conducted on the influence of two independent variables (participation in the national team and maladaptive cognitive emotion regulation strategy) on the competitive attitude style.

The effect of participation in the national team was statistically significant on the .05 significance level (Table 2). N = 67. ANOVA = analysis of variance; G = group, National Team member, Non-National Team member; MCERS = Maladaptive cognitive emotion regulation strategy. The main effect for National Team members, Non-National Team members yielded an F ratio of F (1,67) = 4.58, p < .001, with a medium effect size, indicating a significant difference between Players in the National Team (M = 4.2, SD = .38) and Non-National Team members (M = 4.02, SD = .56). The main effect for Maladaptive cognitive emotion regulation strategy did not reach statistical significance. There was no significant interaction effect between the Maladaptive cognitive emotion regulation strategy and the National team membership. Our results indicate a difference between players on the National team and Non-National Team members regarding maladaptive cognitive emotion regulation strategies. National Team players' maladaptive Cognitive Emotion Regulation strategy score is higher than that of Non-National Team members, influencing Hypercompetitive Attitude. Considering our results, we conclude that Players in the National Team who score higher in the Hypercompetitive dimension are also most likely to use more maladaptive cognitive regulation strategies. A single linear regression was calculated to predict False alarm reaction time based on Maladaptive emotion regulation strategies. The regression result indicated that the variable explained 10% of the variance. A significant regression equation was found F(1, 65) = 7.12, p < .01., with R2 = .10. Our results indicate

Table 2. Means, Standard Deviations, and Two-way ANOVA for Groups as a Function of National Team Membership and Competitive Attitude Style

Variable		NTM		NNTM		ANOVA			
		M	*SD*	*M*	*SD*	Effect	*F* ratio	*df*	η^2
MCERS	Above average	3.15	.36	3.05	.407	G	4.58*	1	.68
	Below average	3.39	.35	2.87	.38	MCERS	.35	1	.001
						G x MCERS	2.11	1	.032

Note. N = 67. ANOVA = analysis of variance; NTM = National Team member; NNTM = Non- National Team member; G = group; MCERS = Maladaptive cognitive emotion regulation strategies. * p< .05

that Maladaptive emotion regulation strategies significantly predicted False alarm reaction time (β = -.31, p = .01).

Altogether, a small positive correlation was found between Canadian points and maladaptive emotion regulation. Our results also revealed a slight positive correlation between maladaptive cognitive emotion regulation and False alarms of the N-back task, and maladaptive cognitive emotion regulation scores significantly predicted False alarm reaction time. Higher hypercompetitive attitude style was associated with higher maladaptive cognitive emotion regulation.

Discussion

In the present study, we investigated the difference between Non-National and National Team athletes, considering the athletes' Canadian points and the following factors: maladaptive cognitive emotion regulation, competitive attitude style, inhibitory control, and working memory. Our results indicate a significant difference between players who are officially National Team members and Non-National Team members. Statistical test results revealed that National Team players scored higher in the maladaptive emotion regulation dimension.

Considering our results regarding the maladaptive emotion regulation strategies, the explanation of the difference between the two groups might be in the developmental aspect of emotion regulation. Emotion regulation is a skill that changes over time; this change appears in the intensity, behavioral aspect, and temporal context of the evoked emotions; older adults use maladaptive emotion regulation strategies less frequently compared to young adults (Schirda et al., 2016, Robazza et al., 2016). Nevertheless, emotion regulation strategies are also influenced by environmental context (Charles & Piazza, 2009).

Participation in the National Team might represent a highly demanding environment, where young players could feel the need to prove their suitability for team membership, which leads to frequently used maladaptive emotion regulation strategies. The impact of contextual influence and developmental aspects of emotion regulation might also explain the differences between the two groups regarding the hypercompetitive attitude style.

Regarding the results of National Team membership, athletes engage in the competitive environment in more maladaptive emotion regulation strategies, which enables higher performance but is disadvantageous for well-being. National Team athletes also had higher scores on the Hypercompetitive Attitude Subscale. The hypercompetitive scores might be higher in non-elite athletes due to a lack of self-regulation strategies, self-confidence, and many other factors (Robazza et al., 2016).

On the other hand, the research leads us to another result, in which athletes with higher hypercompetitive attitudes perform better in their hockey careers. Better performance has many influential factors that can explain this phenomenon. Jones et al. (2010) found that athletes with higher trait anxiety perform better in high-pressure situations than low-anxiety athletes. Further research should consider the relationship between the athlete's expertise and their state of anxiety. The correlation between maladaptive CER and HCA has been found to be significant. It can be explained by rumination, self-blame, blaming others, and catastrophizing (Hannin & Stambulova, 2002). Maladaptive CER strategies, most of the time, indicate poorer performance. On the other hand, these factors can also be seen as motivating factors. It is reasonable to inform practitioners that Hungarian near-elite ice hockey players require learning to adaptively regulate their emotions, as improving international ice hockey competition requires every possible method that enables increased performance. Maladaptive strategies might pay off in the short term (Wolgast & Lundh, 2017), while adaptive strategies also pay off in the short- and long-term. Research shows that sports performance can be influenced by both automatic and controlled cognitive processes (Hardy et al., 2010). Therefore, it is suggested that practitioners should emphasize players' adaptive cognitive and emotional regulation skills more thoroughly and automatize these strategies to enable a more active focus on the game.

The linear regression results revealed that Maladaptive emotion regulation predicts False alarm reaction time, suggesting a difficulty in differentiating between match and no-match stimuli. In the N-back task, False alarm refers to stimuli that are not matching for the target stimuli. These results indicate that maladaptive emotion regulation impacts False alarm reaction time, implying a hypersensitive response to any stimuli that appear and a weakness in inhibitory control and working memory. Our results are scaffolded by previous study results, underlining the developmental aspect of EF, also highlighting the influence of the contextual aspect of the environment on EF (Carlson, 2009).

Functional changes emerge during adolescence due to the maturation of particular brain regions. Brain developmental changes also differ due to different environmental impacts; a supportive environment promotes neurocognitive development and adaptive EF processing, which impacts working memory capacity and inhibitory control function (Huffman & Oshri, 2022). Sustained attention over an extended period is also considered a demanding aspect of the cognitive system that can decrease cognitive processing efficacy (Al-Shargie et al., 2019).

Considering the evidence from the literature and our results, we can conclude that maladaptive emotion regulation influences response sensitivity to any contextual changes, resulting in decreased cognitive processing, such as inhibitory control and limitation in working memory capacity. During developmental changes, adolescents

acquire strategies to respond to stimuli. External factors such as social support systems can influence the adequacy of coping strategies by considering developmental changes and offering a safe atmosphere.

Adolescent athletes are also considered at higher risk regarding psychological well-being because the environment is competitively demanding. Sports practitioners are suggested to emphasize the mental development of athletes, since, based on the results, athletes require learning adaptive emotion regulation strategies to be competitive at an international level and to ensure the psychological well-being that enables high performance.

There are a few limitations associated with the current research. First, the quasi-experimental design lacks a concluding causal association and hinders the generalization of the results. Another limitation comes from the materials that were used to measure the variables. The Competitive Attitude Scale (CAS) and Cognitive Emotion Regulation Questionnaire were self-reported. We should also consider the limitation of the N-back task; previously, an inaccuracy was reported in differentiating the results of several aspects of working memory (Miller, 2009). Therefore, further investigation of working memory tasks is needed, along with exploring possibilities of athletes learning adaptive emotion regulation strategies.

Although the current research did not focus on other highly competitive team sports such as handball or soccer, we presuppose that the dynamics of these variables are similar to the results of the current study, based on their similarity as invasion team sports (Lemmink and Frencken, 2013). Further investigations are needed to validate and explore the phenomena in more detail.

Conclusion

Ice hockey is considered one of the most competitive sports, in which emotional regulation and competitive attitude are essential. Fitting into this environment requires highly developed executive functions, such as cognitive emotional regulation, inhibitory control and working memory, along with an outstanding competitive attitude style. Maladaptive cognitive emotion regulation strategies have been discovered to have negative consequences for performance and well-being (Robazza et al., 2016), and competitive attitudes can lead to adverse emotional situations (Hanin & Stambulova, 2002). The small positive correlation between Canadian points and maladaptive emotion regulation suggests that the nature of the sport expects certain behavior for the players regardless of the situation or the context that could lead to emotion suppression, rumination, etc. A slight positive correlation between maladaptive cognitive emotion regulation and False alarms of the N-back task was found, suggesting that inadequate emotion regulation might be related to the overstimulation of the players, characterized by hypersensitive state to stimuli. Hypercompetitive attitude style is linked to higher maladaptive cognitive emotion regulation, which suggests that the environment of ice hockey promotes players who are highly competitive, and this level of competitive attitude is inherently maladaptive. These conclusions are based on correlations, and we do not know the cause-and-effect relationship.

It is vital for coaches and practitioners to equip athletes with adaptive emotional regulation strategies and to monitor their emotional experiences in order to optimize performance and well-being in team sports and ice hockey. It is suggested that sports practitioners emphasize the mental development of athletes, since, based on the results, athletes require learning adaptive emotion regulation strategies to be competitive at an international level and to ensure their psychological well-being, which enables high performance. Although competitive team sports such as ice hockey are traditionally characterized by high competition, it is inevitable that adjustments toward players being highly competitive are made and also that they are fair and respectful toward their opponents. It is the responsibility of sports practitioners to enable players to be not only competitive but also to become great sportsmen with an appropriate attitude towards competition.

Ethics approval and informed consent

Permission for this study was granted by the ethical committee of the funding institution. The study was carried out under license number TE-KEB/20/2022. The participants of the study gave informed consent for the current research.

Competing interests

The authors declare no conflicts of interest to disclose.

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Anti-doping and National Politics: An Ethnography in Brazilian Anti-doping Around the Era of the Rio de Janeiro Games

Authors' contribution:

A) conception and design of the study
B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
E) obtaining funding

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Abstract

This study is based on an investigation into the Brazilian anti-doping policy, with a specific focus on the establishment and operational mechanisms of the Brazilian Doping Control Authority (ABCD), under the auspices of the Ministry of Sport (ME). The objective was to describe how Brazilian national policy (general political decisions, interests of parties or particular politicians/agents) affects the fight against doping and, vice versa, how the harmonization process controlled by the World Anti-Doping Agency (WADA) affects national sports policy. A multi-sited ethnographic study was undertaken, involving field diary practices, interviews and document analysis. Adopting the perspective of pragmatic sociology, this study delves into the descriptions of three key periods in the recent history of anti-doping in Brazil: the creation of ABCD and the dissolution of ANAD (National Anti-Doping Agency), the realization of the first 100 anti-doping tests by the ABCD (critical period for its members who managed to keep away ex-officers from ANAD) and the impeachment of the Brazilian president in 2016 (ex-officers from ANAD took over the direction of the ABCD). Our analysis allowed us to conclude that 'diverting others from decision-making spheres' comprised a political strategy to occupy spaces of power or to stabilize itself in them, which, in this case, allowed the control of anti-doping actions in the country. Local protagonists tried to make use of international injunctions and pressure or local political events to achieve these goals.

Keywords: Anti-doping, policy analysis, sport, ethnography, ABCD

Introduction

This research presents part of an extensive ethnographic research work on the anti-doping struggle in Brazil (Vasques, 2018) carried out by the first author of the text. This research investigated the anti-doping policy in Brazilian sports governance, focusing on actions and associations of protagonist actors in the constitution and operation of the Brazilian Authority for Doping Control (ABCD) for the 2016 Olympic and Paralympic Games in the city of Rio de Janeiro.

Among the objects emerging in the research was the creation of ABCD as a National Secretariat in the structure of the Ministry of Sport (Government of Brazil, 2011), that is, an agency as a state apparatus. Obtaining the rights to host the 2016 Olympic and Paralympic Games in 2009 led Brazil to promise to set up an anti-doping agency, in the form of a National Anti-Doping Organization (NADO) and under the umbrella of the World Anti-Doping Agency (WADA) (Vasques *et al.*, 2021a, Vasques *et al.*, 2021b). Until the creation of the ABCD, there were two organi-

zations responsible for anti-doping policies and practices: the National Anti-Doping Agency (ANAD) and the Brazilian Anti-Doping Agency (ABA), which were linked to the Brazilian Olympic Committee (COB) and the Sports Confederations. According to WADA, the existence of such agencies was not enough to take action in anti-doping control, as they did not have the characteristics of a NADO under the umbrella of WADA, such as independence from sports federations and the application of the rules of the World Anti-Doping Code (WADA, 2021).

For WADA, the NADOs should have independence and autonomy, both from the national governments and from the sports institutions/federations. The aim is for NADOs to operate independently with the objective of avoiding the cover-up of positives or the leaking of information, but the financing continues to be public, so that NADOs continue to depend on the state. In NADOs that are inside government apparatus, although almost all agents are hired technicians (in theory, independent), the directors are normally chosen by ministers, so they occupy a political position that depends on national policy and decisions. This is the case of countries such as Colombia, Spain, France, Algeria, South Africa and Brazil (Zubizarreta, 2021).

Vasques *et al*. (2021a) addressed WADA's use of the compliance device, investigating how it can be a requirement of an actor (WADA), a threat (the consequences of non-compliance are increasingly important) and eventually a legal issue if disputes arise. In this sense, for the authors, conformity is work over time and space marked by social tensions, in dialogue with the processes of stability and adaptation of a national community in the fight against doping in sport. In the case of Brazil, this community was composed of heterogeneous actors shown as a more or less stable collective for the International Olympic Committee (IOC) and WADA to be able to act in the Olympic and Paralympic Games.

Bearing in mind the establishment of ABCD in Brazil, this work intends to describe how Brazilian national policy (general political decisions, interests of parties or politicians/private agents) affects the fight against doping and, vice versa, how the harmonization process led by WADA affects national sports policy. For that, we will pay special attention to the actions of approximation or distancing between the groups of protagonists in charge of the fight against doping in Brazil.

One of these groups is the anti-doping 'old association/old arrangement', an empirical expression that designates a group of actors and practices closer to the sports federations/institutions, which commanded the ABA and the ANAD, and in the case of the ABCD constitution and preparation for the 2016 Olympic and Paralympic Games whose members had close ties with the International Olympic Committee, the Brazilian Olympic Committee and the Local Organizing Committee of the Rio2016 Games (COL), abbreviated to the IOC/COB/COL system. The other group, formed in the early days of the agency, called the 'new association/new arrangement' anti-doping, was composed of heterogeneous actors who were part of ABCD's first management, some of whom had experience in the private sports world, while others held positions in the Ministry of Sport or, in other instances, in the government. These were similar because they had no previous experience with the anti-doping system.

Theoretical Framework

Although it is not a major aspect of this study, an increasing number of studies are interested in the work of nation states and their adaptation and application of the World Anti-Doping Code (WADA, 2021). Studies on the creation of WADA and the beginning of the harmonization process (Demeslay, 2013, Hanstad *et al*., 2008) has laid the foundations that allow analyses to be carried out of the national policies adopted by states to apply these regulations in their respective national territories. These studies are not numerous and differ in terms of the methodology and theoretical frameworks used, but they allow us to understand how the fight led by WADA affects the national anti-doping policy, how national political interests interfere with the fight against doping, or how they affect the particularities from the ground to the process of applying international regulations.

Tan *et al.* (2020) studied China's strategy for complying with WADA. Since mid-2010, the country, with a history marked by the doping scandals of the 1990s, the mismanagement of the 2008 Games and the cases of doping by national athletes, has proposed to host major sporting events. To this end, the Chinese government has decided to invest considerable resources in creating a more independent NADO (CHINADA), to obtain ISO 9001 quality accreditation, build a second anti-doping laboratory, create cooperation ties with countries considered to be benchmarks in anti-doping, and to maintain good relations with WADA and UNESCO. As a result, Tan and colleagues argued that China would have achieved 'costly compliance' (costly in economic terms). This type of compliance would be characterized by a political action that creates an anti-doping system that goes beyond the implementation of the minimum necessary to respect the World Anti-Doping Code (WADA, 2021) and that aims to become a benchmark. As a limitation to the study, it is important to mention that it is limited to analyzing the creation of the anti-doping system, which does not analyze the implementation of the programme.

The work of Lipicer and McArdle (2014) studied how international anti-doping regulation affected Slovenian

national legislation. Since 2009, there is a harmonized legislation in Slovenia and, since 2011, a NADO (SLOADO). According to the authors (Lipicer & McArdle, 2014), although everything was true on paper, Slovenian practices had changed little compared to those before 2009. Therefore, there would be certain discrepancies between what is written on paper and what happens in reality: the activity was focused above all on carrying out controls and very little on education. Furthermore, it focused almost exclusively on high performance. In this case, it shows how a country was able to meet its obligations at minimal cost and satisfy WADA. Of course, the in-depth study of real activity shows that some of these obligations would only be fulfilled on paper.

Zubizarreta (2021) studied the evolution of the anti-doping system in Algeria, Colombia and South Africa. In the Algerian case, it is surprising to note that the Algerian Football Federation does not submit to the direction of the NADO and carries out an independent anti-doping programme, so far unimpeded by FIFA and WADA. This national reality shows the power (economic, but also political) that said federation has, which allows it to finance the anti-doping programme (control agents, kits, laboratory analysis, sanction committee experts, etc.) and makes it possible for that system to continue to function. Furthermore, it appears that WADA has been unwilling or unable to force a change to this system that would force WADA to submit to NADO, but the exact reasons are unknown. On the other hand, as far as the Colombian case is concerned, it is worth noting the great influence of changes in national policy on the budgets of NADO and the anti-doping laboratory. The directors of the Ministry of Sports have replaced each other on numerous occasions and each of them, during his tenure, has directed the fight against doping his own way, without a continuation of previous policy. This changing situation has made the NADO's work difficult and seems to have also affected the loss of WADA accreditation by the Bogotá laboratory at the beginning of 2017. These two specific cases show how it can affect (in this case make difficult) the national political reality in the fight against doping.

The three papers presented here show the interest in studying the relationships between national policy and the fight against doping from a local perspective. However, as the case study of Slovenia shows, above all, an analysis based only on indicators or on self-filled[1] questionnaires does not account for the anti-doping reality on the ground, and therefore does not offer a true picture of the fight against doping in different territories, nor of the particular challenges that governments or NADOs may encounter when applying the regulations on the ground. Therefore, as Hanstad *et al.* (2008) showed, the interest in carrying out ethnographic studies at the national level is notable. Along the same lines, Trabal and Le Noé (2019) argue that there is a gap in terms of this type of ethnographic research that studies the application of regulations on the ground. Studies that are interested in the work on the ground of national agents in charge of adapting regulations, creating local institutions, or carrying out the tasks assigned to NADO are rare. This article aims to respond to this need by focusing the study on the generally unknown and little described work of these national anti-doping agents, since they are a key piece in the global anti-doping framework and also represent the point of articulation between international demands and the political, social, and sports reality at a national level.

In terms of the sociological analysis of anti-doping, it has been decided to frame the article within pragmatic sociology. This choice is due to the claim of this theory to sidestep the dichotomy between structuralism and phenomenology (Chateauraynaud, 2009). In other words, it avoids an understanding of social acts always structured according to social norms that limit the actions of the agents, or of a constant negotiation of the norms by agents in the course of their actions. For this, the pragmatic sociology of transformations (Chateauraynaud, 2016) is committed to granting a central position to the agents and studying the meaning that they give to their actions in order to identify the structures that govern their actions, as well as the adjustments/negotiations they perform in order to achieve their goals. In the case of national anti-doping agents, we must clarify that they are in charge of implementing the World Anti-Doping Code (WADA, 2021) in their national territory and that, for this, it is necessary to adapt the rules (adoption of laws and decrees, the creation of the agency, the attribution of a budget, the recruitment and training of agents, etc.) and their application (carrying out controls, carrying out prevention days, study and attribution of TUEs, etc.). Therefore, the observation of their work will allow us to identify how international norms and events influence their work, but also the importance of national political, administrative and sports structures (Trabal & Le Noé, 2019), the national political events or particular interests.

An author who has studied the actions of actors from the perspective of pragmatic sociology is Latour (e.g., 1987). For Latour (2005), sociology must focus on reconnecting the ties, the nodes, the moorings that form the social, thus forming a sociology concerned with the visualization of associations. From this perspective, Latour (1987) understands that actors transfer their interests as long as it helps them to achieve their goals, thus diverting

[1] There are numerous works that use this methodology in their analyzes of anti-doping policies (see, for example, Gatterer *et al.*, 2020). UNESCO and WADA also use these procedures as part of their strategy for monitoring compliance with anti-doping stakeholder commitments.

a little from their path can be a strategy adopted to achieve what in fact interests them. For Latour (1999), diverting is changing the origin of actions, associating with other actors, with the aim of achieving their goals. In other words, it is the action of the actors in transferring interests, changing the route, modifying the way, in order to have more possibilities to meet the purposes. Such diversions are more visible in potential moments of change, which are capable of revealing the complexity of diversions and adjustments that make up the fact. Based on this perspective, we understand that diverting is a strategic and hybrid action of conduct taken by actors with a view to achieving their objectives.

In the case at hand, the aim of this text is to describe the actors 'in action' in the anti-doping harmonization process and their approximations and distances from Brazilian 'political' and 'sports' institutions. To achieve this, we studied the actions of the groups of actors ('old association' and 'new association') in their objective of coordinating ABCD and, consequently, anti-doping actions in Brazil. In this direction, we described how the actors acted based on their 'interests' and made use of or took advantage of international injunctions (i.e., the pressure by WADA to create an independent agency with respect to national federations) or national events (e.g., a change of government president) to try to squeeze another group of power and strengthen themselves more in it. Or to the contrary, to 'resist' diversion. The uniqueness of the article stems from its innovative investigation into the political dynamics within Brazilian anti-doping initiatives and its use of a multi-site ethnographic approach, a methodology not commonly employed in the analysis of national anti-doping policies.

Materials and Methods

This qualitative study is the result of multi-site ethnographic research conducted by the first author from February 2016 to August 2017. This period was chosen in view of Brazil's organization for the Rio de Janeiro Olympic Games in 2016, the impeachment of the country's president and the change of government at the beginning of 2016, as well as the changes in the ABCD during this period. In line with Marcus (1995), the object of study was not limited to one site and was not bound by a priori asymmetries such as micro/macro, human/non-human, present/past. It relied on research using multi-site circulation and following associations and flows of actions, actors, stories and artifacts. Therefore, like the actors in action, the object of research was actualized in the multi-site ethnographic experience, regardless of the variety and quality of this research and its access to various spaces. Understanding the multiple spaces and temporalities as well as flows, trajectories and connections (Marcus, 1995) was more relevant.

In terms of pragmatic sociology's understanding of scientific practices, we consider that anti-doping policies coexist with several sports organizations, laboratories, government buildings, documents, laws, conferences, meetings, newspapers, etc. From the perspective of pragmatic sociology, the methodological design seeks to study that coexistence in the actions and their development, paying attention to controversial situations or trying moments, which render the grammars of justification and criticism operated by actors tangible.

In order to be able to describe these movements, the first author of this article developed multi-site ethnographic immersions in the anti-doping universe, mainly by undergoing training and working as an anti-doping agent, which included processes of negotiation of participation as well as formal presentation letters and free and informed consent forms. However, as demanded by ethnographic research, interaction with anti-doping actors was sustained and consolidated on a daily basis through explanations and renegotiations of the researcher's presence, permanence and participation.

With regard to the materiality of empirical production, the multi-site and circulation-based experience of the research was recorded in field diaries based on initial notes. In addition to the diaries and parallel to the ethnographic work, 16 semi-structured interviews were conducted with anti-doping actors who agreed to participate in the research, including staff from ABCD, from the anti-doping laboratory, and from sports federations and private companies considered important. During the immersion process, the researcher recognized different actors and institutions in the anti-doping world. In this process, actors from different institutions and groups who could contribute to understanding the disputes, tensions and criticisms produced in that field were selected for interview. The interviews varied greatly in length (from 12 minutes to 4:51 minutes), depending on the topics to be discussed with the subjects and were conducted in-person in different cities (Brasília, Florianópolis, Lisbon, Porto Alegre, Rio de Janeiro and São Paulo), according to interviewees' availability. The names of the interlocutors were anonymized.

The research also included surveys of public documents selected as the researchers followed the actors, such as national and international anti-doping laws, standards, codes and protocols published by ABCD and WADA from 2009 to 2017. Those documents included: the World Code (WADA, 2015); the Brazilian Code (Ministry of Sport/ABCD, 2016); a WADA report on the 2016 Olympics and Paralympics (2016); the Independent Observer Team Report; in addition to two Brazilian executive orders and a law that provided for the creation and modification of

the makeup of the ABCD (Government of Brazil, 2011; 2016a; 2016b). Data production is shown in Table 1. Data analysis was carried out based on a content analysis, which led us to an organization of the research that considered two groups ('old and new associations') and diversion as a strategy of actors in action.

Table 1. Data produced.

PARTICIPANT OBSERVATION	
Paralympic Games	14 days
Course of DCO formation	3 days
World Championship	3 days
ABCD	2 days
Laboratory	1 day
DOCUMENTAL ANALYSIS	
Brazilian laws	4
ABCD and WADA documents	3
Television documentaries	2
INTERVIEWS	
Doping control officers (DCOs)	6
Sport and anti-doping officers	8
Members of government	5
Anti-doping business owners	2
Laboratory workers	2
TOTAL	**16**

Source: Elaborated by the authors.

Results and Discussion

The results of the research are presented in chronological order. Given the long history of the anti-doping fight in Brazil, the decision was made to focus the analysis on three periods. Each is presented in a section below. The first and third are related to two periods of great change in the anti-doping system and could be categorized as periods of change in the state of affairs, according to Chateauraynaud (2009). In the second, a discussion period is described, which, however, ended without giving rise to changes. The choice of these three periods is due to the fact that all the periods mentioned can be qualified as periods of great argumentative activity (Chateauraynaud, 2009). In these periods, the argumentative activity of the protagonists is greater due to the crystallization of arguments during confrontations between different groups (due to latent or new conflicts). This can occur due to a change in the daily situation, or a revelation or a particular event, but it can also be the consequence of the particular strategy of a group of actors. The interest in focusing the analysis on these moments is due to the fact that in these periods of discussion, debate or negotiation, the interests and arguments of the protagonists can be observed more clearly given the greater argumentative and justifying activity (Chateauraynaud, 2009).

In these periods, two groups played a leading role in these confrontations: the 'new association' and the 'old association'. The **first period** deals with the constitution of the agency that, as said, was created in order to distance the actors and practices from those previously established in the country. In this way, WADA and the Brazilian government acted to divert ABCD from the anti-doping 'old arrangement'. In the second period, the conflict created in relation to the realization of the first 100 anti-doping controls by ABCD is analyzed. The direction of the ABCD (new association) is maintained in the old association and the first author of this article carries out the controls with the help of other members; for its part, the old association denounced failures in carrying out these controls. The **last period** deals with the changes that took place in ABCD after the coup-impeachment of President Dilma Rousseff in 2016.

The creation of ABCD to divert anti-doping from the 'old arrangement'

The anti-doping practices carried out in Brazil were coordinated, until 2013, by the ANAD and the ABA, which were linked to the COB and the sports federations. However, in 2009, with the forecast of the 2016 Olympic Games in Rio de Janeiro, the government signed a commitment with WADA for the establishment of a NADO in the country. This is because WADA had criticized the existing anti-doping system in Brazil, under the pretext that the ANAD and the ABA were not independent with respect to the Brazilian sports institutions.

The WADA injunction that NADOs remain 'compliant' with the World Anti-Doping Code (WADA, 2015) has serious weight with governments. It requires that they respect all the obligations established by WADA for a national anti-doping system. Without this certification granted by WADA, states may be unable to organize major sporting events (Olympic Games, world championships, etc.) or even be prohibited from participating in international events[2]. In Brazil, the World Agency used this argument to put pressure on the government to create a NADO.

To set up a NADO, it was necessary for the government to create an entire infrastructure. It was necessary to

[2] For the reasons described, compliance can become the main objective of governments and, therefore, of NADOs. The study by Vasques *et al.* (2021a) shows compliance as a key element in the relationship between the national agency and WADA in Brazil. This device can be used as a pressure tool to 'make them act' and, likewise, can be used to suspend or disqualify those agencies that do not achieve WADA's objectives.

build and publish a national anti-doping code and create positions within the Ministry of Sport. It was also necessary to provide NADO with a budget, create the necessary committees for its proper functioning and purchase the necessary material for control and prevention activities.

The pressure exerted by the world agency on Brazilian authority defined many of the actions taken by the government and, later, by ABCD members. Next, 'scenes' that emerged during fieldwork are presented to show that the power relations between the WADA and the ABCD were also based on the 'compliance' device. The following is a statement by the Secretary of ABCD of the time – who claimed to have met with WADA many times – about the relationship between the two agencies.

> Considering that the Games would take place in 2016 and there was the issue of the laboratory and the *creation of the agency [ABCD], time was very short to create it and actually make it operational. Even because those putting pressure on us were not responsible for it, so it was easy for them to put pressure [...] I mean WADA and the IOC always put lots of pressure to create ABCD, which was their job; they had to put pressure and I had to live with it... So, the pressure was intense, but they had no idea of the complexity involved in creating something from scratch in government. Policy, management, everything... starting from scratch [...] it's one thing for you to sit here one day and understand everything: you'll choose a model, you'll create a Brazilian agency and you'll put it on its feet. Another thing is to get the budget, get legal authorization to create the positions, the law.* (ABCD employee)

This excerpt from the interview with the ABCD official presents the pressure from WADA and the IOC for the government and, in this case ABCD, to act. Nevertheless, it shows the justifications for difficulties related to administrative bureaucracies in the structure of the public institution of the state. This argument helps the interlocutor to justify the delay – and to mitigate the criticisms related to this – for the ABCD to be created and put into operation, which in fact only occurred in 2014/2015[3].

In September 2011, two years after Rio de Janeiro was chosen to host the Olympics, the Brazilian agency had not yet been created. Brazil was on the verge of being considered 'non-compliant' for not having an anti-doping agency. While the world agency accepted that countries without NADOs included the anti-doping agency into their Olympic Committees – Brazil had had the ABA, shut down in December 2012 – it did not apply that to Brazil, which had committed itself to creating its own dedicated agency.

According to a member of the 'new arrangement', "WADA considered the ABA as equal to nothing," that is, they criticized the agency, which operated under the COB and was headed by an 'old' anti-doping group. Such view shows that WADA diverted from the interests of the IOC/COB by pushing for the creation and compliant operation of "another agency" – not the one previously existing under the IOC.

Finally, President Dilma Rousseff signed an executive order creating the ABCD (Government of Brazil, 2011) on November 30, 2011, after the Conference of Parties (CoP) met at UNESCO, which was a first step in compliance with the requirements imposed by WADA. The creation of ABCD staff positions had to be approved by Congress for the agency to function effectively. In addition, regulations of the Ministry of Sports had to be changed as well, including the secretariat and its staff, and the budget had to be approved by Congress.

As a result of the pressure received, the Brazilian government decided to nominate people only to the ABA and to the ANAD. Therefore, 'new' people were named in the anti-doping fight who were named after employees who already worked in other secretariats of the Ministry of Sport, but which included heterogeneous actors from companies that organize sporting events, university professors and other areas far from the anti-doping universe.

After the appointment of the members of the ABCD, it became necessary to train additional personnel for the proper functioning of NADO. An ABCD employee says there was pressure in 2012, which became very clear in "extremely difficult meetings with WADA and the IOC" to train Doping Control Officers and carry out anti-doping controls.

> *In late 2012 [...] 2012 was a very difficult year for the President in Congress, but we managed to pass [the creation of staff positions] together with an executive order. "With the help of the office of Chief of Staff, the best thing here is to go with a 'benign' executive order, which is not controversial." Thus, the 24 positions of the executive order were created and published in December 2012.* (ABCD employee)

Such elements show that maintaining 'compliance' was an important justification regime adopted by the 'new anti-doping association' regarding its actions. Thus, associating with WADA in order to meet their demands was a strategy employed by that group to keep the 'old association' away from ABCD.

Conflicts between the two groups were consolidated after the choice of Rio de Janeiro as the host city for the 2016 Games, when the country committed to having an

[3] As we explained, ABCD was created in 2011 and started operating from 2014–2015.

active NADO for the competitions. The group of actors that was appointed to manage the ABCD – the 'new association' –, from its place in the state apparatus as the National Secretariat, sought to stop the monopoly of the old group in anti-doping control in the country. In turn, the more established group with more experience – the 'old association' – occupied the spaces of anti-doping in the Olympic and Paralympic Games, since it was close to the actors and institutions of the Olympic system, especially the IOC and the COB.

All for compliance: taking on jobs unprepared

Once created, the new NADO (or rather, the group of protagonists who directed the new NADO) tried to take advantage of WADA's desire for Brazil to have a more independent NADO in relation to the COB. Thus, it launched diversion strategies in relation to the 'old arrangement': no employee from the 'old arrangement' was invited to join the ABCD, nor to collaborate in precise work, despite some of them being recognized in the international universe of anti-doping practices. For example, the construction of the anti-doping legislation in the country, the court and the Brazilian anti-doping code was carried out by the members of the 'new arrangement', without the participation of the members of the other group, the COB, the sports federations or the organizers of the Olympic and Paralympic Games. The same thing happened when WADA wanted to test the ability to control ABCD, after its creation.

When ABCD was created, WADA wanted ABCD to start carrying out doping controls to prove its capability. At the end of 2012, still lacking employees[4], materials and budget, 100 anti-doping controls were performed on athletes belonging to the Athlete-Grant Program in Brasília, São Paulo and Rio de Janeiro. However, instead of asking for assistance from members of the old association and associations such as COB – who have practical experience and the necessary materials to carry out different tests − ABCD asked other institutions for help. In this way, this action was carried out with materials borrowed by the Brazilian Football Confederation (CBF) and the Brazilian Paralympic Committee (CPB) and with the help of ADOP (Portuguese NADO). A DCO who worked for the Portuguese NADO came to Brazil, based on a previously constructed agreement, to coordinate these controls. These 100 tests served to normalize a series of procedures for anti-doping control (norms for sample collection), rendering them similar to those that took place in the anti-doping agency in Portugal, due to the ties that united ABCD and the Portuguese agency: agreement, language, approaches and visits.

These 100 tests performed in 2012 were criticised for being irregular. The Secretary stated that they had to be performed for WADA to see that the Brazilian government could create a NADO and get it up and running. The problem was that the ABCD only existed under an executive order, that is, it had no staff, materials or budget. Interviewees reported – and they said[5] they had reported it to supervisory agencies – that the Ministry commissioned the tests from a company selected in a bidding process for ceremonial events. These companies are usually hired through bidding processes to organize events with the presence of the Minister or a representative. They are in charge of planning, making purchases for and executing the ceremony, providing water, chairs, microphones, organizing cocktail parties, etc. Therefore, the companies list the expenses and the Ministry authorizes the spending.

Such reports of using a company that had been hired for other purposes would put the ABCD under pressure, on the one hand, as a result of WADA's pressure for the agency to start operating and, on the other, because of the procedural delay in purchasing materials. Procurement procedures by government departments, in most cases through bidding processes, are often criticized for the time they take when compared to the private sector, since they must include public notices, price surveys, and competition between providers, and deadlines may be extended due to legal proceedings or postponed for various reasons, such as rain, lack of available stocks, difficulty in authorizing expenses, etc. (Vasques, 2018). The ABCD certainly found itself entangled in Brazilian government's procurement web.

As we described above, WADA's pressure resulted in the creation of ABCD by the government and in the creation of a new anti-doping system. The government could have requested assistance for the members of the 'old association', but in order not to jeopardize the compliance, it was decided to set these aside and create one from scratch, fully respecting the WADA demand for an independent system close to the sports federations and the COB. For that, the government created an alliance with the Chief of Staff and its corresponding articulation in the Brazilian National Congress that made it possible to approve specific positions for hiring workers for the ABCD. The agreement between the Ministry of Sports/ABCD and ADOP (Portugal's NADO) added the knowledge and experience to perform the 100 tests and to prove ABCD's capacity and its 'compliance' in terms of procedures and protocols. Materials from the anti-doping kit lent by CBF and CPB helped to set the conditions for performing the tests 'in compliance.' The involvement of a company that had already undergone the bidding

[4] The people who formed the 'new association' had been invited to work at ABCD, but had not yet been formally hired.

[5] We did not have access to the complaints made as they were confidential.

procedure streamlined the use of government funds for the acquisition of materials according to the timeframes and spaces of the Olympic and Paralympic movement.

This group of allies brought together by ABCD/'new arrangement' indicates WADA's diversion from the interests of the IOC/COB/COL, showing its shift towards institutional independence (distancing) to impose restrictions as an important aspect in the work towards achieving 'compliance'. The 100-test event was criticized because a male DCO – a specialist from Portugal – performed controls on female athletes, a practice banned[6] by the Anti-Doping Code (WADA, 2015). Such exposure was based on statements by the 'old arrangement' (linked to the IOC and previous anti-doping agencies), who wanted his group to take over the ABCD and, therefore, criticized the practices of the administration.

In the criticisms of this member of the 'old association', the 'new arrangement' saw criticism as an opportunity to embarrass him publicly, which would help him in his interest in coordinating the ABCD. He then stated that the ABCD was starting its work in the country and therefore undergoing a learning process, and that 'old' actors, having so much experience, should help in the agency's creation process rather than criticizing it publicly. However, according to interviewees, the 'new association' had already rejected this 'old arrangement' help several times and used that criticism to drive them even further away from ABCD. According to interviewees, that is when 'old arrangement' actors began to be criticized within WADA, which would have strengthened 'new arrangement' position in the Brazilian authority.

The aforementioned discussion about the 100 tests ultimately highlighted interests and accusations that further stabilized the two groups in different places of anti-doping. The new arrangement, instead of approaching and asking for help from the former anti-doping agents, decided to stay away from them and associate with other institutions in order to carry out the task ordered by WADA. The old team ('old arrangement'), for its part, wanted to recover its position of power from the pre-ABCD era, so it resisted in this new moment and exerted pressure to be able to recover the leadership of the national anti-doping that it had lost[7].

The coup-impeachment agency for the 'old arrangement'

The enlistment of 'new arrangement' allies – as well as the possibility of diverting IOC/COB/COL interests through the ABCD – would not last long, falling apart a few months before the Olympics. On May 12, 2016, President Dilma Rousseff of the Workers' Party (PT) was removed from office following an impeachment[8] process marked by an alliance of political, legal and media interests. The post-impeachment period marks a rupture in ABCD's politics as well. With the change in government and President Michel Temer of the then Brazilian Democratic Movement Party (PMDB)[9] taking office, all ABCD staff were dismissed and replaced with a new political group, with other practices.

Rogério Sampaio – a former judo athlete and a member of PMDB at that time – took over. Along with him, two other important actors in Brazil's anti-doping scene, who belonged to the anti-doping 'old group', joined the ABCD. It is possible to understand that this group was, in general, closer to the 'new' government, just as the previous one was to Dilma's government. Thus, in the last month before the Olympics (beginning on August 5), people who belonged to the same group and who were opposed to the first administration of Brazil's national agency were put in charge of both the ABCD and the Rio 2016 Anti-Doping Commission (COL).

The arguments on the side of the 'new association' for his dismissal resided in the government's political change, in the criticism of the state's rigging by another political group, and in the discontinuity of public policies. The arguments of the 'old association' are close to allegations of corruption[10] and the loss of legitimacy of this group in power.

The collapse of 'new arrangement' alliances after the President's impeachment and the simultaneous emergence of other interests mobilized by that 'old anti-doping' group – including PMDB, the Comptroller General (CGU), the Federal Court of Accounts (TCU) – created conditions

6 The members of the 'new association' defended themselves by stating that the DCO was a doctor and that he would therefore be a legitimate person to carry out the control in women.

7 The motivations of individuals and groups for wanting to occupy positions of power are not always obvious; even so, it is not difficult to consider that political and economic reasons are among them.

8 The National Congress, in a "big national deal" with the Judiciary and large parts of the media and business sectors, managed to remove the president through accusations of administrative impropriety and, thus, ascend the vice president to power.

9 Since 2017, this party has assumed the name of the Brazilian Democratic Movement (MDB).

10 The dismissal of ABCD employees is marked by controversy. A different version of dismissal – by a public servant of the Ministry of Sports who worked for a certain time at the ABCD – said that the new Minister of Sports – Leonardo Picciani, a politician from PMDB in Rio de Janeiro, the host city of the Olympics – learned that complaints had been made to the Federal Comptroller General (CGU) and the Federal Court of Accounts (TCU) about 'irregular practices' at the ABCD, and that these agencies were looking into them. As reported by two interviewees who were ABCD staff members, the allegations included irregular payments to DCOs and, as previously mentioned, the use of companies that had been selected by the Ministry of Sports in bidding procedures for purposes other than those in question. There is no way to be certain whether or not the corruption allegations affected the government's decision on ABCD's direction, in any case, the change in government did in fact bring about a change in the employee who was the target of denouncements.

for the appropriation of the ABCD by the same group of actors that led the Rio 2016 Anti-Doping Commission, linked to the IOC/COB/COL system[11].

The coup that overthrew President Rousseff, the complaints about the management of ABCD, and 'new arrangement' dismissal took place within two months – from May to July 2016. These three facts are ultimately related, as they caused ABCD staff to be changed during that period. Therefore, the coup was not directly related to the ABCD but impacted its makeup. As soon as the Vice-President took office temporarily, he appointed people from the parties that supported him – which had supported President Rousseff's first impeachment vote and which, after these appointments, became allies in the final vote against the President in the Senate. Some interviewees stated that the 'distribution of government positions' that happened when the Vice-President took office was intended to gather votes for the President's definitive impeachment.

Inflexion moments are unstable and temporary junctures that are eventually accommodated and create stabilization for the actors involved. The idea here is to show how stabilizations generated by these processes took place. The change of Secretary of ABCD, combined with the change of all ABCD staff – which did not happen before October 2016 – was certainly a moment of rupture in the agency. According to interviewees, information could not be passed on from one administration to the other. Policies changed: people close to sports federations were appointed; controls were performed involving more strategy, knowledge and experience; training of new DCOs stopped. In addition, new anti-doping education programmes were created (Vasques *et al.*, 2023). However, it was also more difficult to meet WADA's demands, since the previous administration was close to the Chief of Staff and the Ministry of Planning, which was not the case with the second administration.

The change of all ABCD employees put the 'old association' back in power, which acted to distance the 'new association', now outside ABCD, from anti-doping actions. In the end, the transformations of the Brazilian government built rearrangements into anti-doping that instituted a form of diversion in the opposite direction: in the direction of distancing itself from the actors of the 'new association'.

Rearrangements and new associations to stabilize actions were carried out as of July with other actors, such as sports confederations and the COB. However, since the ABCD was declared 'non-compliant' by WADA in November 2016 and therefore could not operate, it is possible to say that the space for stabilization was restricted, as it only lasted a few months. With this sanction, there was some rearrangement with other alliances to achieve 'compliance,' and there was more space for stabilization after 'compliance' was re-established in April 2017.

With respect to this third period, two main, interrelated issues should be highlighted. The first is the great influence that national politics has on sports policy, which once again became visible. This time the objective was not to respond to political pressure, but to distribute sports-related political posts among colleagues from the political parties in power. It is not the only described case of this type that affects the anti-doping fight, since Zubizarreta (2021) describes a similar practice of 'clientelism' in Colombia, which has a considerable effect on the anti-doping fight. The second is the impossibility of WADA to control or limit these changes in order to maintain an independent anti-doping system with respect to federative sports organizations (IOC/COB/COL). The compliance mechanism is not sufficient to make it act as it wants and it can also limit the performance of controls in the country. Finally, it is important to point out that this time it was the old association, the one that had been diverted from the anti-doping system, which came to occupy a central role and diverted it to the new association, contrary to what happened in the other two periods described.

We specifically observed periods when the actions of groups of protagonists sought as a political strategy to distance opposing groups from decision-making spaces of power, which we call 'diversion'. The first diversion occurred in the creation, in 2011, of ABCD as a state apparatus, in relation to the existing ANAD and ABA, which were linked to sports entities. The second period shows how the 'new association', at the head of the anti-doping fight, kept the old association crippled and prioritized other alliances until such a critical moment as the realization of the first 100 tests to prove the capacity of the ABCD. The third, in turn, took place after the impeachment of President Dilma Rousseff in 2016, and enabled rearrangements that brought the sports system closer to ABCD. In this case, diversions from ABCD distanced the actors present in its constitution, then belonging to the 'new association' anti-doping. These descriptions showed how actors acted to employ diversion as a political strategy to reach political-institutional spaces or maintain themselves in them, in this case, in ABCD.

Therefore, diversion was a political strategy to occupy spaces of power that, in this case, enabled the control of anti-doping actions in the country, granted political space within the government, and provided access to government funds. In order to divert or avoid diversion, actors sought to associate themselves with spaces of power, especially WADA, which controls the compliance mechanism. Therefore, keeping – or losing – the status of compliant

[11] We were left to look for information on how WADA reacted to this appropriation that focused on its independence in terms of 'conformity', since it did not make any public comment.

or even acting on the pressure for compliance was an important mechanism for those in power to avoid diversion. Furthermore, the use of public criticism and slander towards the opposing group was a strategy employed by the actors in this political game to manage diversion.

In terms of sociological analysis, it is possible to consider that, as Latour (2005) argues, association movements are the object of study of sociology, and looking at the diversion movements also helps to understand the formats that make up the social. Therefore, the social is formed by associations and diversions between actors, and, from this point of view, diversion is an action that enables exposing the makeup of the social.

Conclusions

This research illustrates the evolution of the anti-doping fight in Brazil by focusing on national political dynamics. This theme has proven to be pertinent, since it has allowed us to explain the dynamics of change in this area in light of political events at a national level (for example, in relation to impeachment), but also at an international level (the pressure received to harmonize the anti-doping system).

The choice of pragmatic sociology has been useful to describe the interests of the protagonists and understand how they have made use, or tried to make use of, international demands and political relations at the national level. Given that the anti-doping dossier has dealt with two groups of protagonists (on the one hand, the Dilma government and the new association and, on the other hand, the federative sports institutions, the old association and, to a lesser extent, the Temer government), the description in terms of diversion (in the sense of diverting someone) has allowed us to show how the groups that directed the anti-doping fight have almost systematically tried to alienate the rest of the anti-doping system, and thus strengthen their position.

The limitation of this work is linked to the methodology foreseen for the research work (of which this article only presents a small part, as mentioned above). The data collected within the anti-doping institution through ethnographic research present results of great interest, partly due to the scarcity of this type of research in anti-doping. However, the study could have been enriched if it had been extended to WADA, for example, including some interviews with those responsible for ensuring the relationship with Brazilian institutions.

The instabilities, rearrangements, inconsistencies, and volubilities involved end up posing risks to the fight against doping in Brazil, as can be seen in the well-documented case of the ABCD's failure to test any athlete in the month prior to the Rio 2016 Olympics. Such a gap – quite long and located in a crucial period, given the proximity to the Olympics – would allow the use of several banned substances that could lead athletes to perform better in the Olympics without control agencies being aware of it. Such a possibility was a risk that WADA was able to foresee, given that the presidential impeachment process lasted months. However, it was unable to act.

The media, legal and parliamentary reaction that was arranged to remove President Dilma Rousseff from office in 2016, on the eve of the Olympics, established a new order at the ABCD, with the return of the 'old association' of anti-doping actors and the resulting approximation to the IOC/COB/COL sports system. Finally, the coup brought about changes in Brazil's anti-doping policy.

Finally, it should be noted that instability in national policies can impact the integrity of anti-doping efforts, especially in those nations where anti-doping organizations are linked to state structures, as is the case in Brazil and several other countries. In the case of Brazil, there are ways to make anti-doping a state policy, not a government policy. The creation of permanent public positions, a change in status to a federal autarchy, which would give the agency greater relative managerial autonomy, and the stability of an independent budget forecast would be possible ways to reduce instability in the country's anti-doping integrity, but they depend on broad political mobilization for change.

Ethics approval and informed consent

The study followed integrity parameters in scientific research, as well as ethical research procedures. Its protocols were approved by the Research Ethics Committee of the Federal University of Rio Grande do Sul under report 2081732.

Competing interests

The authors report that there are no competing interests to declare.

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Effects of Brand Awareness, Brand Association, Perceived Quality, and Brand Loyalty on Overall Brand Equity in Sport. A Case Study of an Amateur Football Sports Club

Authors' contribution:

A) conception and design of the study
B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
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Abstract

The primary objective of this research endeavor outlined in the thesis was to evaluate the impact of the individual dimensions of Customer-Based Brand Equity (CBBE) – brand awareness, brand association, perceived quality and brand loyalty – on the overall brand capital of the researched amateur football club Talent Warszawa. The author sought to discern which among the individual dimensions of CBBE exerted the most significant influence on fostering the overall brand capital of the club under examination. A questionnaire was distributed amongst the constituents of Talent Warszawa, including players, parents and guardians, players' families, and supporters of amateur football. The survey garnered responses from a total of 102 stakeholders affiliated with the club. The reliability of the measurement scale was validated through Cronbach's Alpha analysis.

The findings of the study evince a positive correlation among all variables under scrutiny, encompassing brand awareness, brand association, perceived quality, brand loyalty, and the overarching construct of CBBE. Notably, perceived quality emerged as the factor showing the highest positive correlation (0.88), thus indicating the most robust positive association with CBBE. However, despite the observed positive relationship, brand awareness manifested the lowest correlation with the overall consumer-based brand equity (0.70), relative to the other investigated factors.

Using the insights from this study, amateur sports clubs can strategically manage brand elements to foster brand equity, emphasizing the importance of brand awareness as an initial step in building a positive brand image and fostering fan engagement and loyalty. Overall, the findings provide valuable insights into effective brand management strategies for amateur sports clubs to enhance their brand equity and foster enduring relationships with fans.

Key words: Customer-Based Brand Equity, CBBE, sports clubs, brand awareness, brand association, perceived quality, brand loyalty

Introduction

The rapid development of the sports market has created strong competition, with the emergence of a sport's brand serving as a distinguishing factor among its counterparts. Various entities contribute to the construction of a sports brand, including sports organizations, events, equipment manufacturers, clubs, and individual athletes (Karg & Funk, 2020).

The cultivation of brand capital in sports constitutes a crucial aspect for both professional sports entities and individual athletes. The utilization of brand equity within

sports clubs is substantiated by numerous significant justifications and advantages, benefiting both the club itself and its stakeholders (Chadwick, 2022). Building brand equity in a sports club is construed as an investment in its continuing development. A robust brand serves as the bedrock for the stability and sustained advancement of the club, enabling its resilience in the ever-evolving sports environment (Smith et al., 2017). Moreover, a recognizable brand attracts talented players and coaches to the club (Parmentier & Fisher, 2012), while fostering an emotional connection with fans (Martín et al., 2020). Fan allegiance, thereby, translates into a reliable source of financial and emotional support for the club (Mansouri et al., 2024). Often serving as a cornerstone of the local community, sports clubs can use a strong brand to strengthen community ties by involving local residents in club activities and endorsing local initiatives (Misener et al., 2020).

Furthermore, a popular and respected sports club brand garners attention from sponsors (Cobbs & Groza, 2022), as companies are more inclined to invest in clubs with a robust brand to capitalize on their visibility and positive image (Tsordia, 2018). A strong brand also stimulates the sale of branded merchandise, which creates a significant revenue stream for sports clubs (Singh & Basu, 2022).

Utilizing brand equity within sports clubs yields numerous benefits that can bolster their achievements within both the athletic and commercial domains. Prioritizing investments in branding is a fundamental component of any sports club's strategic development plan (Karg & Funk, 2020). As posited by Blumrodt et al. (2012), a brand stands as a fundamental asset for every professional football club, prompting inquiry into its applicability across both professional and amateur fields. The question of whether amateur sports clubs can also cultivate a robust sports brand and its associated capital prompts investigation into the landscape of amateur football clubs. Consequently, this article endeavors to elucidate the intricacies of brand capital predicated on the consumer base of Talent Warszawa amateur football club. Research pertaining to this domain serves as the foundational step towards delineating the desirability, avenues, and efficacy of brand establishment, management, and image communication within non-professional football contexts.

Literature Review

The Concept of a Consumer-Based Brand Equity (CBBE) Model

Measuring brand equity is extremely important because it allows brands to compare their value with their competitors (Aaker, 1996). This assessment serves a dual purpose: for financial evaluation, and for enhancing marketing endeavors (Keller, 1993). For the latter objective, the construction of Customer-Based Brand Equity (CBBE) is undertaken, in order to gauge the brand's value to consumers. Research in this domain provides organizational managers with insights into the mechanisms for cultivating brand value for consumers (Swaminathan, 2016). Employing the CBBE model facilitates the development of more efficacious marketing strategies and a deeper comprehension of consumer behavior (Keller, 1993), thereby fostering enhanced brand management and competitive advantage within a specific operational sector (Lassar et al., 1995).

One of the initial attempts to delineate consumer-based brand equity was undertaken by Farquhar (1989, p. 24), who defined it as "the consumer's perceived value that the brand adds to the product." This concept drew upon the theory of Brand Concept Management (BCM) articulated by Park, Jaworski, and Maclnnis (1986), who suggested a normative framework for selecting, implementing, and controlling brand image over time. These authors outlined three distinct stages for managing brand equity; namely, introduction, development, and reinforcement. During the introductory stage, an emphasis is placed on showcasing the product's quality as a basis for fostering a positive consumer perception, thereby laying the groundwork for brand image construction. This phase involves strategizing how the brand can serve as a platform for new products and extensions. Subsequently, in the development stage, efforts are directed towards solidifying and establishing the brand's position in the consumer's psyche, necessitating easy brand recall. At this juncture, the objective is to cultivate a distinctive bond between the brand and the consumer, with efforts focused on engendering brand loyalty. The final stage entails reinforcement.

The strategic approach involves leveraging the inherent equity of a brand by extending it to additional products. To attain a suitable competitive advantage, a brand association strategy must be formulated. This approach gave rise to the inaugural CBBE model, as articulated by Aaker (1991, p. 15), defining it as "a set of brand assets and liabilities, its name and symbol, which can be added to or subtracted from the overall value of the product/service to the company and its customers".

Within this model, Aaker (1996) delineates five dimensions of brands:

1. brand awareness,
2. brand association,
3. perceived quality,
4. brand loyalty,
5. other assets such as patents, trademarks, and distribution channel relationships.

The initial premise of the CBBE model (Aaker, 1996) stipulates that customers must possess awareness of the brand (*brand awareness*) for it to be entrenched in their consciousness and recognizable. Brand awareness can be cultivated through the implementation of effective market-

ing strategies such as advertising, promotions, and public relations. Another dimension of the model pertains to the establishment of positive and distinct *brand association*. A brand ought to exhibit clearly defined values, attributes, and characteristics with which customers can readily identify, aiding in contextualizing the brand for consumers. The third dimension pertains to perceived quality, wherein the brand must be perceived as offering high quality and value. Customers should harbor the belief that the brand is credible and capable of meeting their expectations. *Perceived quality* is contingent upon customers' encounters with the brand and their assessments of the products or services offered. Subsequently, the emphasis is on fostering customer loyalty to the brand, as loyal customers are inclined to engage in repeat purchases and advocate for the brand. Establishing an emotional connection and engendering trust between the brand and customers are pivotal in nurturing *brand loyalty* (Aaker, 1996; Akoglu & Özbek, 2021; Li et al., 2020). The fifth dimension is oftentimes overlooked in research as it does not directly address the consumer's perspective, primarily pertaining to the company (Christodoulides & de Chernatony, 2010). The components of the CBBE model can also be viewed collectively as a singular CBBE variable, referred to as Overall Brand Equity (Aaker, 1996).

Keller (1993, p. 8) introduces a conceptual framework of brand value centered on the perspective of the individual consumer. He defines CBBE as "the differential impact of brand knowledge on consumer response to brand marketing." Keller elucidates that a brand possesses positive (negative) customer-based brand equity when consumers react more (less) favorably to a marketing mix element associated with the brand compared to the same element attributed to a fictitious or unnamed version of the product or service. Brand knowledge is conceptualized within the associative network model of memory, comprising two components: brand awareness and brand image, which constitute a collection of brand memories. CBBE emerges when consumers possess awareness of the brand and harbor positive, robust, and distinctive brand associations within their memory. In Keller's framework, CBBE encompasses brand knowledge, comprising brand awareness and brand image (Keller, 1993).

By scrutinizing the individual dimensions of CBBE concerning brand image, brand perception, the associations evoked in consumers, and brand loyalty, it becomes feasible to investigate which brand values and characteristics hold significance for customers and the emotions evoked by the brand with its target audience. According to Sharp's (1995) conceptualization, factors such as brand/company awareness, brand image, and consumer relationships can exert an influence on CBBE. The brand equity model has undergone refinement and reinterpretation by numerous scholars (Kotler & Keller, 2016; Swaminathan, 2016; Keller & Brexendorf, 2019). Recent studies have pointed toward novel avenues for future CBBE research, addressing methodologies for measuring and managing brand value utilizing contemporary technologies and social media platforms (Vazquez et al. 2002; Keller, 2016; Swaminathan, 2016; Machado et al. 2019; Algharabat, 2020). For instance, social media platforms should be harnessed for more effective customer relationship management and relationship marketing to aid brands in delivering enhanced value to their customers (Keller, 2016).

Brand Awareness

As posited by Aaker (1996, pp. 114–115), brand awareness is defined as "the ability of a potential buyer to recognize or recall that a brand belongs to a particular product category." In each instance, brand awareness pertains to the extent of recognition, acceptance, and recall of a brand by consumers (Perreault et al., 2013). Keller (2009) further elucidates that brand awareness encompasses the strength of attraction or affinity towards a brand, indicative of consumers' capacity to remember or recognize the brand. Kotler and Keller (2016) underscore the significance of brand awareness in fostering brand value, highlighting its role in the consumer's ability to identify a brand. This entails establishing meaningful distinctions between products or services. For branding strategies to yield efficacy and engender brand value, consumers must be persuaded of substantial disparities between brands within a given product or service category. Consequently, objects (e.g., Nike sports shoes), services (e.g., a ticket to a Champions League match or personal training at a gym), establishments (e.g., Nike or Adidas stores), individuals athletes (e.g., footballer Leo Messi), sports facilities (e.g., Wimbledon courts), organizations (e.g., Real Madrid football club), or even concepts (e.g., fair play) can be branded.

If consumers have encountered or heard of a brand at any point, they are capable of recognizing it (Brewera and Zhao, 2010). Therefore, brand awareness is intertwined with consumers' capacity to identify brands across diverse circumstances. Furthermore, as posited by Aaker (2015), brand awareness constitutes an asset that shapes consumers' perceptions, preferences, and behaviors. Hence, brand awareness assumes a pivotal role in consumer decision-making processes. Elevated brand awareness heightens the likelihood of selecting a specific brand and augments the level of brand loyalty (Mathewet et al., 2014). Brand awareness mitigates the time and risk consumers expend in seeking out a product for purchase. Consequently, consumers are inclined to opt for a brand they are acquainted with and knowledgeable about. Previous research has underscored the positive influence of brand awareness on brand loyalty (Bilgin, 2018; Kim & Petrick, 2018; Su & Chang, 2018; Tran et al., 2019).

Keller (1993) delineates brand awareness as the extent to which customers recognize and recall a brand across various purchasing contexts. In the context of sports clubs, brand awareness encompasses familiarity not only with the club name but also with its history, values, culture, and athletic accomplishments.

Currently, consumers acquire brand awareness through effective marketing communications (Rubio et al., 2014), with social media advertising serving as a prominent avenue. Well-crafted messages instill confidence in the product's quality and credibility, thereby mitigating the risk associated with judgment and product selection during purchase decisions. Brand awareness significantly influences consumer decision-making processes, thereby benefiting customer-based brand equity management (Chung et al., 2013; Sasmita et al., 2015). Consequently, brand awareness also exerts an impact on CBBE (Pina & Dias, 2021).

Brand Association

Brand association pertains to the consumer's perception of the brand, encompassing both positive and negative dimensions (Dada, 2021). It encompasses a spectrum of feelings, opinions, thoughts, experiences, images, or attitudes linked with the brand (Gawrysiak et al., 2020). The more favorable these association, the greater the likelihood of consumer recall and the establishment of brand loyalty (Parganas et al., 2017). Marketing initiatives can thus be construed as a means of cultivating pertinent brand association by engendering positive experiences that resonate with consumers (Kotler & Keller, 2016).

Perceived Quality

Perceived quality is construed as "the customer's perception of the overall quality or superiority of a product or service relative to its intended purpose vis-à-vis alternatives" (Aaker, 1996, p. 109). It furnishes consumers with compelling reasons to opt for a particular brand and enables it to distinguish itself amidst competition (Hu et al., 2024). Research underscores the affirmative influence of perceived quality on purchase intention (Tsiotsou, 2006; Jang et al., 2018).

Brand Loyalty

Consumers' purchase decisions regarding a product or service are predominantly influenced by brand loyalty (Khandai et al., 2023). Brand loyalty stems from a strong sense of brand affiliation (Naghibi & Sadeghi, 2011) and is positively correlated with users' consistent purchasing behavior over time (Sheth, 1974). This loyalty denotes a consumer's commitment to persistently procure an organization's products and services despite competitive actions (Anagnostou & Tzetzis, 2021), indicating a dedication to remain a customer of the organization in the future (Chung & Welty Peachey, 2022). Jang et al. (2008) contend that brand loyalty is linked to sustained usage or a commitment to acquire a favored product or service. Consumers exhibiting brand loyalty consistently repurchase their preferred product, thereby fostering repeat purchases of the same brand (Rincón et al., 2023).

Moreover, customers displaying brand loyalty have the potential to draw in new customers (Maderer & Holtbrügge, 2019) by recommending the brand to potential consumers, advocating for their purchase, and expressing favorable opinions about the brand (Jiang & Zhang, 2016). To enhance the overall brand equity, brand loyalty should be continuously reinforced (Keshtidar et al., 2018). Research underscores that a well-established level of brand loyalty positively impacts the CBBE and fosters brand preference over competing brands (Vogel et al., 2008; Severi & Ling, 2013; Zhang et al., 2014).

Conceptualization and Hypotheses

The researcher aims to investigate the impact of individual CBBE constructs on the overall brand capital of the chosen amateur football club, Talent Warszawa. The central inquiry revolves around whether a consumer-based brand capital model can be constructed within amateur sports clubs. The research seeks to evaluate the influence of specific dimensions of consumer-based brand capital, namely brand awareness, brand association, perceived quality, and brand loyalty, on the overall brand capital of the targeted amateur football club. The study endeavors to determine which of these dimensions exerts the most significant influence on shaping the overall brand capital of the club under examination. Additionally, the research aims to assess the overall brand capital of Talent Warszawa. The core objective is to ascertain whether amateur sports clubs can leverage consumer-based brand capital for marketing initiatives and relationship-building endeavors.

In line with the research objectives, the following hypotheses were formulated:

H1: Brand awareness positively impacts the overall brand capital of the Talent Warszawa club.

H2: Brand association exhibit a positive interaction with the overall brand capital of the Talent Warszawa club.

H3: Perceived brand quality demonstrates a positive interaction with the overall brand capital of the Talent Warszawa club.

H4: Brand loyalty positively influences the overall brand capital of the Talent Warszawa club.

Material and Methods

Research Context

A significant gap exists within the sports marketing literature concerning branding initiatives and brand anal-

ysis within the realm of non-professional sports. Amateur sports clubs serve as the cornerstone of professional sports. The pronounced commercialization of professional football postulates a surge in the growth of the amateur sports market, particularly in urban locales where competition is fierce, necessitating adept marketing endeavors. Consequently, the researcher opted to investigate the extent of customer-based brand capital within an amateur football club situated in a metropolitan area, given the heightened competition that mandates professional marketing strategies.

The study was conducted among stakeholders of the amateur football club Talent Warszawa. Established in 2013, the club was founded with the primary objective of nurturing young talent. However, since 2019, a senior team has been incorporated into the club structure. Consequently, two distinct entities can be discerned within the Talent Warszawa framework: the Talent Warszawa club and its Academy. The senior team of Talent Warszawa has consistently achieved promotion each season since its inception, ascending from the B class (the 9th level of competition) by securing top positions in the district league. The junior teams enjoy widespread popularity among their peers, competing in premier provincial leagues and taking part in international tournaments. Currently, the most senior team within the Academy training setup is the U16 team, while the youngest team is the U7 team, comprising individuals born in 2016. Additionally, teams corresponding to various age groups are present, each consisting of approximately 20 actively training players.

Research Instrument

Utilizing the conceptual framework of CBBE proposed by Aaker (1996), a survey questionnaire tailored to the amateur football club Talent Warszawa was devised. Each construct of the CBBE model was represented by three questions. Responses were recorded using a five-point Likert scale, where a score of 1 indicated 'definitely yes' and 5 corresponded to 'definitely no'. Additionally, demographic inquiries were included in the questionnaire, addressing respondent characteristics such as gender, age, education, income, and occupational status.

The reliability of the research instrument was assessed through scale reliability analysis employing Cronbach's Alpha index. This index serves as a measure of the internal consistency of the measurement scale, gauging the extent to which the questions within the instrument are interrelated. The analysis demonstrated satisfactory scale reliability, yielding an average Cronbach's Alpha coefficient of 0.83.

Data collection

Data were gathered through an online survey questionnaire targeting the community affiliated with the amateur football club under investigation, including players, parents and guardians, players' families, and supporters. The survey was administered during the months of March and April 2023.

Participants

A total of 102 stakeholders of the club participated in the study. The socio-demographic composition of the study population is detailed in Table 1.

Table 1. Participants' socioeconomic profile

Gender	**N=102**	**%**
Male	57	56.0
Female	45	44.0
Age		
0–18	18	18.0
19–26	15	15.0
27–36	17	17.0
37–54	50	49.0
55+	2	2.0
Education		
Primary	17	17.0
Vocational	3	2.0
Secondary	17	17.0
University	65	64.0
Employment		
Student	26	25.0
In full-time employment	76	75.0
Unemployed	0	0
Income		
Less than 1500 zł	21	21.0
1501–2500 zł	2	2.0
2501–3500 zł	11	11.0
3501–4500 zł	15	15.0
4500 zł +	49	50.0

The data analysis revealed that 56.0% of the study cohort were male participants, while 44.0% were female. The predominant age bracket among respondents was between 37 and 54 years, accounting for 49.0% of the sample. Comparable percentages were observed across other age groups: 18.0% fell within the 0–18 range, 15.0% within 19–26, and 17.0% within 27–35. A minor proportion of respondents (2.0%) were aged 55 or above.

In terms of educational attainment, 64.0% of respondents held a university degree, while 17.0% each possessed primary or secondary education qualifications. The majority of respondents (75.0%) were employed on a full-time basis, with the remaining 25.0% comprising students or pupils. Regarding income distribution, half of

the respondents reported earning more than PLN 4500 per month. Notably, 21.0% earned less than PLN 1500, 2.0% fell within the range of PLN 1501–2500, 11.0% between PLN 2501–3500, and 15.0% between PLN 3501–4500. Based on the socio-economic profile of the respondents, it can be inferred that the largest proportion consists of parents and guardians of children and young individuals affiliated with the Talent Warsaw club.

Statistical analysis

Statistical analysis of quantitative variables involved computing the mean, standard deviation (SD), and median, as well as determining the frequency and percentage distribution of each value. Spearman's rank correlation coefficient (rho) was employed to assess the magnitude of the relationship between individual constructs of the CBBE model. A significance level of $p<0.05$ was adopted for all statistical tests, whereby values below 0.05 were deemed indicative of statistically significant relationships. The analyses were conducted utilizing the Statistica 13 software package.

Results

An examination of the data pertaining to the constituents of the CBBE model, along with their indicators of internal consistency (Cronbach's alpha) and statistical parameters (Mean, SD, Median), is delineated in Table 2.

The findings reveal a Cronbach's alpha (α) value of 0.86 for brand awareness, indicative of a high level of consistency among respondents' responses to the inquiries regarding brand awareness. The mean score of 3.74 suggests that, on average, respondents exhibit a considerable degree of awareness regarding the Talent Warsaw brand. However, the standard deviation (SD) of 1.33 indicates a notable diversity in respondents' responses. The median value of 4.0 implies that a majority of respondents possess a relatively strong familiarity with the Talent Warsaw brand. For the brand association aspect, α=0.74 underscores the robust consistency in respondents' responses. The mean score of 3.78 and standard deviation of 0.93 signify relatively homogeneous responses among respondents. The median value of 4 further substantiates that a significant proportion of respondents harbor positive associations with the Talent Warsaw brand. Similarly, for perceived brand quality, α=0.74 reaffirms the commendable consistency in respondents' responses. The mean score of 3.76 indicates a general perception of high quality attributed to the Talent Warsaw brand. However, the standard deviation of 1.04 highlights the diversity in respondents' assessments. Nonetheless, the median value of 4.0 reiterates that a majority of respondents perceive the Talent Warsaw brand to be of high quality. Furthermore, brand loyalty exhibited α=0.78, affirming the consistency in respondents' responses regarding brand loyalty. Notably, the highest mean score of 3.94 was observed for brand loyalty, indicating a relatively strong sense of loyalty among respondents towards the Talent Warsaw brand. Moreover, with a standard deviation of 1.12, respondents' responses exhibit a noteworthy degree of variability. Consistently, the median value of 4.0 underscores the prevailing loyalty among respondents towards the Talent Warsaw brand across all factors.

Table 2. Psychometric data of the Customer-Based Brand Equity (CBBE) model

Items of CBBE model	Cronbach α	Mean	SD	Median
Brand awareness	0.86	3.74	1.33	4.0
I have heard of Talent Warszawa football club		3.64	1.35	4.0
I am quite familiar with Talent Warszawa football club		3.23	1.45	3.5
I can recognize Talent Warszawa football club among other clubs		4.34	0.87	5.0
Brand association	0.74	3.78	0.93	4.0
Talent Warszawa football club brand has strong association		3.89	0.89	4.0
Talent Warszawa football club has favourable association		3.92	0.85	4.0
It is clear what Talent Warszawa football club stands for		3.54	1.01	4.0
Perceived quality	0.74	3.76	1.04	4.0
Talent Warszawa football club is good quality		3.74	1.02	4.0
Talent Warszawa football club has excellent features		3.73	1.05	4.0
Compared to other brands in its category, Talent Warszawa football club is of very high quality		3.82	1.05	4.0
Brand loyalty	0.78	3.94	1.12	4.0
I feel loyal to Talent Warszawa football club		4.05	1.05	4.0
Talent Warszawa football club is my first choice		3.82	1.21	4.0
I am committed to Talent Warszawa football club		3.94	1.11	4.0

Table 3. The results of the Spearman rank between dimensions of the amateur sports club brand

Variable	Brand awareness	Brand association	Perceived quality	Brand loyalty	CBBE
Brand awareness	1.00				0.70
Brand association	0.49	1.00			0.86
Perceived quality	0.43	0.74	1.00		0.88
Brand loyalty	0.33	0.63	0.69	1.00	0.81

The elevated Cronbach's alpha coefficients for the distinct components of the CBBE model underscore the consistency and reliability of the measurements, affirming the stability of these constructs within the study. However, it is crucial to contextualize the interpretation of these findings, considering the particulars of the survey methodology and the respondent demographics.

The findings of the Spearman rank correlation analysis, detailed in Table 3, elucidate the interrelationships among various dimensions of the sports club brand, including brand awareness, association, quality, loyalty, and overall brand equity (CBBE). The results consistently demonstrate positive associations across all variables examined. Notably, brand awareness exhibits the lowest correlation (rho=0.70) with overall brand equity compared to other factors, albeit still indicating a robust relationship with CBBE. Brand awareness manifests a moderate additive correlation with brand association (rho=0.49) and perceived quality (rho=0.43), and a weaker additive correlation with brand loyalty (rho=0.33).

Conversely, perceived quality displays the highest positive correlation (rho=0.88), signifying a very strong positive linkage with CBBE. Perceived quality demonstrates the most pronounced positive association with brand association (rho=0.74) and a moderate positive association with brand loyalty (rho=0.69). Brand association similarly exhibits a very strong positive correlation (rho=0.86) with overall brand equity. The correlation between brand loyalty and overall brand equity is 0.80, indicating a highly robust positive relationship between these variables.

The research outcomes underscore significant connections between distinct facets of a sports club's brand. The robust correlations observed between association, quality, and loyalty, and overall brand equity suggest their pivotal roles in fortifying a sports club's brand and fostering fan engagement and allegiance. Moreover, the elevated correlation between brand awareness and overall brand equity underscores the foundational importance of cultivating brand awareness in sculpting a positive brand image and enhancing brand worth for a sports club.

Discussion

The research conducted revealed that the brand awareness of the Talent Warszawa club positively impacts its overall brand capital. This implies that higher brand awareness among the audience correlates with increased overall brand capital for the Talent Warszawa club. Thus, Hypothesis 1, stating that brand awareness has a positive effect on the overall brand capital of the Talent Warszawa club, was supported. Spearman's rank correlation analysis revealed significant relationships among various dimensions of the sports club brand, including brand awareness, association, quality, loyalty, and overall brand equity (CBBE). Despite a positive relationship observed between these variables (rho=0.70), brand awareness exhibited the lowest degree of correlation compared to the other factors. The study suggests that while brand awareness is important, it is not the sole determinant of a sports club's overall brand equity.

In studies conducted by Aaker (1996) and Keller (1993), it has been demonstrated that brand awareness holds significant importance in the establishment of customer-based brand equity. Brand awareness serves as the fundamental pillar upon which consumer perceptions and preferences towards a brand are constructed (Keller, 1993). Greater brand awareness correlates with a heightened likelihood for customers to harbor positive associations with the brand and exhibit a propensity to engage in purchase decisions related to it. Enhanced brand awareness has the potential to augment customer-based brand equity by fostering positive associations and brand loyalty. According to Aaker's (1996) findings, heightened brand awareness can engender favorable brand association, subsequently leading to heightened brand loyalty. Customers are inclined to place greater trust and commitment in brands with which they possess familiarity and identification. Research indicates that sports clubs endowed with robust brand awareness typically demonstrate superior financial and athletic performance (Kunkel et al., 2016). Elevated brand awareness translates into heightened fan engagement, thereby resulting in increased

revenues derived from ticket sales, merchandise sales, and sponsorships (Merkle et al., 2020). A study by Funk and James (2006) examined the influence of brand awareness on the purchasing behaviors of sports club enthusiasts. Their findings suggest that heightened levels of brand awareness are positively associated with a greater propensity to purchase match tickets, club merchandise, and subscriptions to club services. Additionally, research by Reghunathan and Joseph (2021) underscores the pivotal role of brand awareness in shaping the overall perception of a sports club. The authors elucidate how brand elements are strategically employed by brand managers to establish distinct associations in consumers' minds, culminating in brand recall and recognition. Notably, brand elements exert a positive influence on fan loyalty towards a sports club. By discerning the key factors shaping fans' perceptions of a club, such as its historical legacy, sporting achievements, match ambiance, and emblematic symbols like jerseys or logos, sports clubs can cultivate a favorable brand image and foster fan loyalty (Shuv-Ami, 2016).

The findings indicate that positive brand associations also contribute to the overall brand capital of the Talent Warszawa club. Hence, favorable brand association facilitates the enhancement of the overall brand capital for the Talent Warszawa club, confirming Hypothesis 2.

In a study by Guschwana (2018), it was demonstrated that positive brand association, such as emotional connections to the club, club reputation, and brand experiences, play a pivotal role in fostering greater fan loyalty. Brand association exerts a substantial influence on fan loyalty, club valuation, revenue generation, talent attraction, and community engagement, underscoring the significance of adept brand management in cultivating sustainable success for sports clubs (Anagnostou & Tzetzis, 2021; Suchao-in et al., 2021; Mazloomi Soveini, 2022). Prior research also indicates that positive brand associations are indispensable in crafting a robust brand image for a sports club (Mansouri et al., 2024). Favorable associations, such as sporting accomplishments, community involvement, or exemplary professionalism, bolster a club's reputation and contribute to the establishment of a formidable brand esteemed by fans and the broader community (Amu et al., 2024). Studies conducted by Azadi et al. (2015) and Mazloomi Soveini (2018) corroborate that positive brand association fosters fans' loyalty to a sports club.

Additionally, the research demonstrates that the perceived brand quality of the Talent Warszawa club significantly influences its overall brand capital positively. Consequently, the high standard of services or products offered contributes to the overall brand capital of the Talent Warszawa club, confirming Hypothesis 3. Lastly, the research results validate that brand loyalty has a substantial positive impact on the CBBE of the Talent Warszawa club. Perceived quality demonstrated the highest positive correlation (rho=0.88) with CBBE, indicating its pivotal role in influencing the sports club's overall brand equity. Furthermore, brand association displayed a robust positive correlation (rho=0.86) with CBBE, underscoring their significance in shaping the sports club's overall brand equity. Brand association exhibited a strong positive association with perceived quality (rho=0.74) and a moderate association with loyalty (rho=0.69), suggesting their substantial impact on perceived brand quality and fan loyalty. Additionally, the correlation between loyalty and overall brand equity was 0.81, indicating a strong positive relationship between these variables. Thus, the findings highlight the substantial influence of fan loyalty on the overall brand equity of a sports club. Increased fan loyalty correlates with higher CBBE, supporting Hypothesis 4, which posits that brand loyalty positively influences the overall brand capital of the Talent Warszawa club.

Akoglu and Özbek (2022) revealed a positive association between perceived quality and brand loyalty. Fans gravitate towards a club that embodies a high standard of quality, both on and off the field. Strong emotional bonds with the club engender heightened fan loyalty and dedication. The study conducted by Maderer et al. (2016) revealed a notable influence of brand associations on fan loyalty within the football industry. It was observed that fans exhibiting positive associations with a club's brand demonstrated a higher propensity towards displaying loyalty to said club. This loyalty was evidenced through their attendance at sporting events, purchase of club-related merchandise, and active engagement with the brand across various platforms. Similarly, Kaynak et al. (2008) identified a significant correlation between brand associations and fan loyalty within the realm of professional sports. The study underscored the importance of positive brand associations, encompassing elements such as the club's sporting achievements, historical background, organizational objectives, and the overall experiences of fans during sporting events, in fostering and enhancing fan loyalty towards the respective club.

Conclusion

The findings underscore the significance of various components of a sports club's brand, including quality, brand association, brand loyalty, and brand awareness, in shaping overall brand equity (CBBE). The influence of these factors is multifaceted, encompassing not only direct brand associations but also the indirect ramifications of engagement and identification with the team. Thus, the development of a robust sports club brand necessitates the effective management of these factors to foster fan engagement and brand loyalty. Moreover, the results suggest that establishing brand awareness is an essential initial

step in cultivating a positive brand image and enhancing brand equity for a sports club.

Nonetheless, based on the conducted research, it is evident that perceived brand quality exerts the most substantial impact on the club's overall brand capital. The provision of high-quality services or products contributes significantly to the increase in the Talent Warszawa club's overall brand capital, thereby enhancing its long-term success and sustainability.

Prior studies indicate the efficacy of the CBBE model in developing robust club brands. Elevated levels of brand awareness can elevate overall customer-based equity by fostering positive associations, loyalty, and fan engagement with the sports club. The management of brand awareness can directly impact the augmentation of a sports club's CBBE. Through strategic marketing initiatives, promotional activities, community involvement, and the cultivation of a positive brand image, sports clubs can bolster brand awareness, thereby cultivating enduring connections with fans and subsequently fostering heightened loyalty and engagement. Sports organizations and their sponsors can use these insights to devise and execute marketing strategies aimed at increasing the overall brand equity.

Study limitations

The limitations of this study stem primarily from the relatively small sample size of 102 individuals, and the focus on a single amateur club located in a large city. Consequently, the composition of the selected club's demographic profile may be predominantly homogeneous, potentially limiting the generalizability of the findings to broader populations. The outcomes derived from such a sample may lack applicability to the wider populace and may be constrained to the specific context of this particular football club. Given the intense competition prevalent in the sports market, further comprehensive investigations are warranted to delve deeper into the realm of consumer-based brand equity research within amateur sports clubs.

Ethics approval and informed consent

Ethical approval was not required for this study.

Competing interests

No potential conflict of interest was reported by the authors.

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Effectiveness of a Life-Skills Based Intervention during Physical Education on Body Image and Goal Setting Skills in Adolescent Girls

Authors' contribution:

A) conception and design of the study
B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
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Abstract

Background: Negative body image in female adolescents is a sign of the times, but it is also a current global issue due to its implications for the onset of health-compromising behaviours and the increasing power of appearance-based social media. The aim of this study is to investigate the protective role of a life-skills based intervention during PE classes in adolescent girls against increasing body dissatisfaction resulting from body composition changes and to assess the impact of intervention on the skill of setting goals.

Method: The study involved 81 female students aged 12–14 years and used a pre-test/post-test control group design. Students participating in a 15-lesson programme (experimental group) were compared to those who had regular PE lessons (control group). Students completed self-reported measures of the analysed life skills. Anthropometric and body composition measurements were also taken.

Results: Despite more rapid biological changes during the programme (significantly higher waist circumference, waist-to-height ratio, BMI at post-test compared to the control group, not observed at baseline) the experimental group stayed at the same level of body dissatisfaction as at baseline ("mild concern"). In goal setting, lack of participation in the programme produced a negative change in the performance-avoid goal orientation (PAGO) dimension ($p=0.005$) in the control group.

Conclusions: The study suggests that a preventive intervention targeting life skills can be successfully implemented in PE settings and have a probable mitigating effect on body image dissatisfaction, even in situations when subjects experience intensive biological changes.

Keywords: adolescence, physical activity, body concerns, life skills education

Introduction

Life Skills Education

The concept of developing students' psychosocial health through the use of formal life skills education and physical activity spread globally at the turn of the 21st century. Interventions of various length to shape life skills within physical education (PE) lessons or after-school activities were developed, with positive results (Goudas & Giannoudis, 2008; Goudas et al., 2006; Papacharisis et al., 2005; Pepitas et al., 2004). Despite the existence of formal premises, health education is usually carried out selectively within various school subjects and is often not systematized. The most common form of health education in schools is short-

term interventions in the form of talks, most often linked to a specific health problem (e.g. stimulants, unhealthy diet).

In Poland, the PE curriculum allows teachers to develop students' life skills within the obligatory thematic block – health education (MEN, 2017).

Approaches based on skills-based health education, including life skills, are considered effective in creating positive behaviours in children and adolescents and in helping them cope successfully with the demands and challenges of life (Kirchhoff & Keller, 2021; Moulier et al., 2019; Gould & Carson, 2008; Danish et al., 2005). Among essential life skills in the context of promoting the health of young people are: effective communication, empathy building, cooperation and teamwork, advocacy, decision-making, problem-solving, creative and critical thinking, building self-esteem, setting goals, coping with stress and emotions, and developing a healthy body image (World Health Organization, 2020; 2003).

Life Skills Programme

In the programme, choosing the skill of building a positive body image was based on the fact that a negative perception of one's own body resulting from a self-image that differs from the ideal is associated with the onset of health-compromising behaviours such as eating disorders (e.g. binge eating), unhealthy weight control practices (Neumark-Sztainer et al., 2006), lower levels of moderate and vigorous intensity physical activity (Miranda et al., 2021), low self-esteem (Paxton et al., 2006), higher risk of perceived negative health (Meland et al., 2007) or even later depressive episodes (Bornioli et al., 2021).

In addition, numerous studies perceive current widespread media use (especially social media) and its content as a trigger for unrealistic standards in female adolescents and, consequently, frustration with their own appearance (Pedalino & Camerini, 2022; Jiotsa et al., 2021; Vries et al., 2019; Marengo et al., 2018; Eisenberg et al., 2017; Ho et al., 2016). It is worth noting that the associations between body dissatisfaction and social influences are stronger for females than for male students.

The majority of body image interventions in this age group target only female adolescents. Girls in this age group report lower life satisfaction, more health complaints, and higher body concerns and body monitoring than their male peers (Toselli et al., 2021; Fernández-Bustos et al., 2019; Ren et al., 2018; Latiff et al., 2018; Aanesen et al., 2017; Currie et al., 2012; Petroski et al., 2012; Lawler & Nixon, 2010; Knaus et al., 2008). This disproportion is not typical of any one country but has the features of a larger-scale problem. According to a study conducted in 24 countries, female adolescents reported higher body weight dissatisfaction than boys, across different weight and age groups (Al Sabbah et al., 2009).

The skill of goal-setting was trained to strengthen the development of a positive body image and to improve students' agency and regularity in taking actions beneficial to their health (e.g. physical activity habits), which is in line with the assumptions of modern PE. Goal-setting is also perceived as one of the key life skills for dealing in the school setting with one of the current global issues – noncommunicable diseases (NCDs) (World Health Organization, 2020). Drawing on goal orientation theory, for this skill analysis a three-factor model of goal orientations was used with: learning goal orientation (LGO), performance-prove goal orientation (PPGO) and performance-avoid goal orientation (PAGO) (Vandewalle et al., 2019; Vandewalle, 1997).

Physical Activity Based Intervention for Body Image

The significant potential of physical activity in building a positive body image proves to be important in the context of implementing this health education area within PE. Referring to physical health outcomes, regular exercise for girls has a positive effect on body composition and size, including a protective influence on adiposity and central body fat (Moliner-Urdiales et al., 2009; Lohman et al., 2006), lean mass gain (Völgyi et al., 2011), physical well-being (Kirkcaldy et al., 2002), as well as body posture (Sidlauskiene et al., 2019; Wyszyńska et al., 2016). Engaging in regular physical exercise can also result in psychological benefits in adolescents, including positive outcomes in terms of self- and body-perception. These include: a more positive self-image and lower anxiety (Kirkcaldy et al., 2002), a protective effect on body image dissatisfaction (Gaspar et al., 2011) and, in overweight and obese individuals, higher physical self-perception and body satisfaction, regardless of BMI changes (Goldfield et al., 2007).

The forms of physical activity used in interventions for girls in this age group, particularly those that target body image, include various types of fitness activities with music, such as aerobic exercise, dance and aerobic dance. They are considered to help release feelings and reduce emotional distress (Duberg et al., 2020), reduce body image dissatisfaction (Burgess et al., 2006) and contribute to increasing: self-esteem (Connolly et al., 2011), self-trust (Duberg et al., 2016), self-efficacy (Romero, 2012), self-rated health (Duberg et al., 2013), and two domains of physical self-perception – body attractiveness and physical self-worth (Burgess et al., 2006). Also noteworthy are the benefits of movement improvisation, which was an element of the programme, including improved mood, increased body awareness, increased self-esteem, release of emotional and physical tension, release of one's potential and personality (Hetmańczyk-Bajer & Krzywoń, 2013). The above-mentioned advantages of exercises with music and their popularity among adolescents contributed to their special attention in the experimental programme.

During adolescence, the decline in body acceptance among girls begins to play a significant role in determin-

ing their negative self-image (Ho et al., 2016; Veldhuis et al., 2014; Helfert & Warschburger, 2013; Helfert & Warschburger, 2011; Matera et al., 2013; Gondoli et al., 2011), and physical appearance may well become the most important predictor of self-worth (Harter, 2006). Body dissatisfaction and its potential negative consequences have even been described as a critical public health concern (Bucchianeri & Sztainer, 2014). Therefore, we developed a proposal of primary prevention for PE classes targeting the specific needs of this age group.

Current Study

This programme focused entirely on selected life skills in young girls and was conducted in school settings, as a part of PE and as a series of classes, not as passive lectures or classroom workshops. In general, the programme was intended to fill the gap between the body concerns experienced by adolescent girls and valuable resources available to physical culture, providing a new intervention in the educational landscape. In particular, it aimed to address several gaps. 1) Lack of knowledge – there were no formal education or ready-to-use structured life skills programmes for PE teachers on developing the analysed skills in adolescent girls. 2) Physical activity and gender-specific approach – traditional health education programmes for young people focus rather on health compromising behaviours in both sexes (e.g. substance use) and are conducted mainly in the form of passive lessons or lectures. Moreover, as body dissatisfaction is still more prevalent in girls and is a sensitive topic for them, a girls-only programme was created. This took advantage of the fact that PE lessons for boys and girls are conducted separately. The programme aimed to fill this gap by providing physical activity-based and tailored intervention. 3) Response to current needs – recognizing the importance of addressing body image content at a young age, the programme goal was to equip girls with ready-to-use solutions that could serve them in adolescence and then throughout their lives. 4) School settings and life skills transfer – by conducting the programme in school and PE settings, the programme could reach a larger number of girls than, for example, after-school interventions and integrate these life skills into their daily routine at school e.g. some relaxation techniques can be practiced during a long break or stressful moments, and positive self-talk may help during daily interactions with peers.

The aim of the research was to evaluate the protective role of a life-skills based intervention during PE classes among adolescent girls regarding increasing body dissatisfaction in the light of body composition changes. Additionally, we assessed the effectiveness of developing goal setting skills in this context. The proposed experimental programme focused on developing two life skills in female students: building a positive image and setting goals. We hypothesized that the proposed 15-week intervention based on an active teaching and learning approach, would be effective in preventing body dissatisfaction and developing goal setting skills, even when intensive body composition changes occur.

Material and Methods

Study Design and Participants

The study involved 81 students from two schools located in a Polish voivodeship city of over 500,000 inhabitants. Among the criteria for school selection were: urban school status, consent of school representatives to participate in a multi-week study within PE lessons and use the facilities, separate PE lessons for girls and boys, similar level of education. This study presents a two-group design, using purposive sampling, with the experimental group in one school and the control group in other school. The target population in the study were female students from all classes at both schools aged 12–14 years, meeting the inclusion criteria (written consent from the legal representative, general health status enabling the examination and active participation in PE lessons). This gave four classes in one school (experimental group) and two classes in the second school (control group). The resulting difference in the size of the experimental and control groups was due to the peculiarities of school structures, including the size of schools and the number of classes at a given level. The groups were culturally homogenous, with all students speaking Polish. There were no subjects with mobility limitations in any of the groups. The experimental programme was conducted during the 2016–2017 school year.

Both parents and students were informed about the possibility of withdrawing consent at any time during the programme without giving a reason. The study was approved by the Bioethics Committee at the Poznan University of Medical Sciences (No. 540/16). Intervention was realised during PE classes. Both groups (experimental and control) had the same number of classes. The difference was related to their content, which is described in detail in the *Intervention* section of this paper. The programme was implemented by the programme leader. The experimental design included pre-test and post-test data collection from the participants: one week before the start of the programme (T1), and immediately after the programme (T2). The same organizational scheme was used in each test point. The tests took place during double PE lessons, in the morning, in school gyms. All stages of the research were carried out with respect for the anonymity and dignity of the students and with attention to their mental comfort.

As the intervention was conducted in school settings, there were some confounding factors that could have potentially impacted the results and conduct of the study.

In this study, such factors were mainly external circumstances and logistics – a busy school calendar with a lot of events and a limited access to the gym, especially during poor weather conditions. There was only one gym for the entire school complex consisting of schools of different levels and many PE lessons were carried out in parallel at the same time. The envisioned control strategy for these external factors was to monitor on a regular basis a dynamic school calendar and its updates (e.g. school exchanges and community events, trial exams which had to be in a gym). The other strategy was to plan with other teachers a lesson schedule in advance to accommodate programme lessons at the gym. The effect of the teacher was not considered as a confounding variable – the programme in all classes of the experimental group was conducted by the same person.

Measurement of Somatic Characteristics

The following anthropometric measurements were taken: body mass, body height, waist circumference (WC) and hip circumference (HC). Weight was measured to the nearest 0.01 kg using a certified scale. Adding to that body mass index (BMI), waist-hip ratio (WHR) and waist-to-height ratio (WHtR) were calculated as predictors of adiposity.

Body Composition Measurements

Body composition analysis was performed on all subjects using the non-invasive bioelectric impedance analysis (BIA 101 Anniversary Sport Edition, Akern, Florence, Italy). This is a highly acceptable, reliable, and commonly used method in studies in adolescents (de Castro et al., 2018; Vicente-Rodríguez et al., 2012; Nichols et al., 2006). It is a four-electrode device with surface electrodes in a closed hand-foot system (Campa, 2020; Milewska, 2016; Dżygadło, 2012). The results were entered into the Bodygram 1.31 programme, which was used to estimate the body composition. Further statistical analysis included the following elements: FFM – fat free mass (kg, %), FM – fat mass (kg, %).

Diagnostic Surveys

A self-report questionnaire was used to measure the level of analysed life skills. It consisted of the tools mentioned below, which were adapted followed WHO recommendation (World Health Organization, 2009). The linguistic adaptation included the following stages: 1. Forward translation of the questionnaire from English into Polish (first interpreter), 2. Expert panel back translation of the questionnaire from English into Polish (second interpreter), 3. Back translation of the two Polish versions of the questionnaire into English, comparison and verification with the original version of the questionnaire (third interpreter), 4. Pre-testing and cognitive interviewing.

Goal-setting skill was measured by adapting the Goal Orientation Scale (Vandewalle, 1997). It consists of 13 items rated on a 6-point Likert scale (from 1-strongly disagree to 6-strongly agree). The scale is divided into three domains: 1) learning goal orientation (LGO), understood as the individual's desire to acquire new skills, learning through experience and finding oneself in a new situation, 2) performance-prove goal orientation (PPGO), meaning the willingness to obtain favourable assessments of one's own competences from other people, and 3) performance-avoid goal orientation (PAGO), defined as the willingness to avoid unfavourable opinions about one's own skills and undermining them by others. The Cronbach's alpha for subscales in our research was > 0.7 (0.7; 0.8; 0.8).
Building a positive body image skill was measured with the following two tools:

a) Body Shape Questionnaire (BSQ-8C) which is a short version of the Body Shape Questionnaire (BSQ) (Evans & Dolan, 1993). The self-report scale consists of 8 items measuring body image dissatisfaction. The items refer to the respondents' feelings about their own appearance over the past four weeks and are measured on a 6-point Likert scale (1-never to 6-always). Total BSQ-8C scores are classified into the four categories, with higher score indicating greater body dissatisfaction: no concern (<19), mild concern (19-25), moderate concern (26-33), severe concern (>33). The Cronbach's alpha for this scale in our research was 0.9.
b) Figural Rating Scale – Child Female Scale (Collins, 1991) – a pictorial scale for female children consisting of seven female child figures in ascending order from very thin (1) to obese (7). Students were asked to mark the figure that most closely resembled their current body shape, and then the figure that represented their ideal body shape. The presence of a difference between the current and ideal figures indicates dissatisfaction with the body image (current-ideal-self discrepancy).

Intervention

The study used a quasi-experimental design, with the use of an experimental and control group. The experimental group received an intervention during PE classes. The control group participated in regular PE classes without any specific health education topics. The intervention consisted of 15 units delivered once a week during a 45-minute PE lesson (standard duration of a school lesson in Poland). The units were based on an original life skills PE programme. Each programme lesson was conducted in a gym.

The first of the elements that differentiated the activities within the experiment from a standard PE lesson was the delivery of lessons based on Kolb's cycle of experiential learning. The second differentiating factor was the use of interactive teaching and learning methods, also known as active participation methods (Laudańska-Krzemińska,

2012). These included: audio-visual forms of generativity (dance and improvisation), demonstration, group work and brainstorming. The use of these methods was in line with the view of the existing literature that a condition for causing lasting positive changes in the area of health, including life skills is to involve students in the teaching process and to allow them to experience different situations.

The lessons were delivered according to a strictly defined schedule (see Appendix 1), which predicted their order – they were organised in thematic blocks for each of the developing life skills. Predominant activity forms used in the programme were dance and aerobic exercises with music, circuit station (with the option of adding their own exercises at a later date). Forms of physical activity that were not present before in physical education at the school were elements of creative dance and related movement improvisation. Previous irregular contact with dance movement, the limited possibility of expressing emotions through movement, creating own forms of movement and leading classes were difficult for some students, especially when performing some exercises and presenting them in the group forum. In order to create a positive attitude towards physical activity and also to search for its favourite forms, 9 lessons included a 5-minute "freestyle" element during which the students could perform any exercises of at least medium intensity to the rhythm of the music.

Each lesson was conducted by the programme author, without involving PE teachers and other adult third parties. However, in line with the idea of active teaching and learning, the students were gradually included in conducting selected exercises. An example of this is the "Fitness trainer" exercise, where some of the students played the role of trainers and trained others according to their needs and mood. In addition, within each aerobics class, except for the part where a specific system was taught or exercises were demonstrated, there was a change of the leader and the possibility of leading the group by presenting the previously taught pattern or demonstrating one's own exercises.

Statistical Analysis

The Kolmogorov-Smirnov test was used to check the consistency of variables distribution with normal distribution. Analysis of variance (repeated measures ANOVA) was used to determine differences in life skills level, circumferences and indices changes between groups, and Bonferroni was used for post-hoc analysis. Mann-Whitney U tests were used for the two-group comparisons in both phases of the study and Wilcoxon signed-rank tests were used to determine changes over time within each group. Correlations between variables were measured using Spearman's coefficient. All statistical analyses were performed using the Statistica software (version 12.0, StatSoft Inc., USA) with two-sided p-values at 0.05.

Results

The study group consisted of 81 female adolescents (mean age: 12.9 years, *SD*=0.6) from 6 different classes, with 53 students in the intervention group and 28 in the control one. During the study period, nine students dropped out, making the final sample of 72. Figure 1 shows the flow of the participants and Table 1 their characteristics at baseline, cross-time characteristics, and their changes.

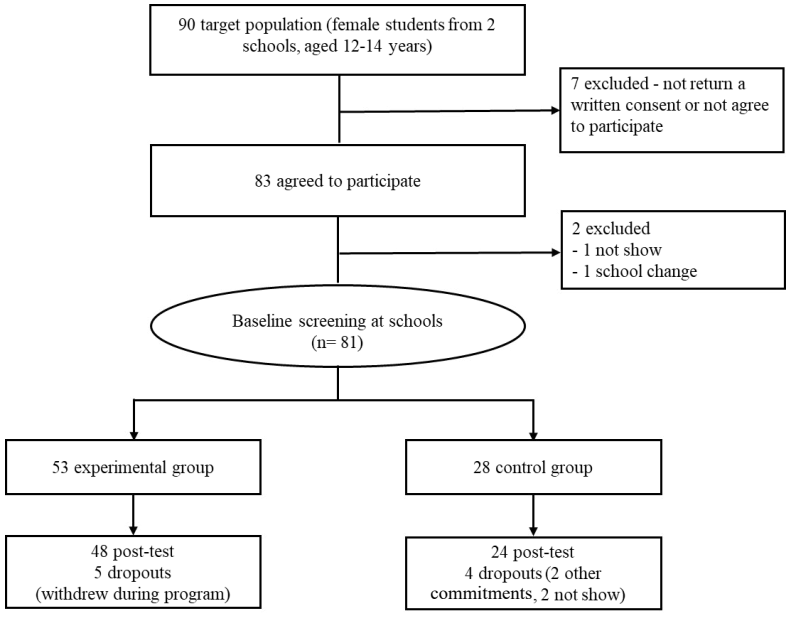


Figure 1. Study population flow

Baseline Characteristics

No significant difference was found for most of the descriptive characteristics analysed, including anthropometric ones. The variables related to the skill of goal-setting also did not differ between the groups. There was one significant difference between the groups – subjects in the intervention group rated their current figure as significantly larger than those in the control group (U=470.00, p=0.006), which directly affected a measure of body dissatisfaction understood as the current-ideal-self discrepancy (U=494.00, p=0.012) (Table 1). Regarding body dissatisfaction measured by BSQ-8C, its mean scores showed a mild body image concern in the experimental group (M=19.5, SD=10.6) and no concern in the control group (M=16.9, SD=5.5).

Table 1. Descriptive statistics for variables at baseline and post-test, values are mean (M), standard deviation (SD), median (Mdn) and p values for significant cross-time changes

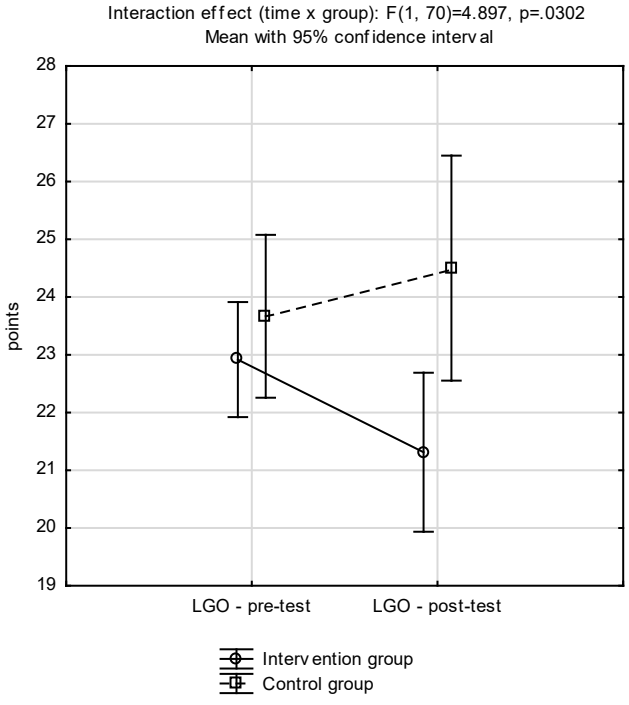
	Intervention (n=53)					**Control (n=28)**						
	Baseline		**Post-test**		**Wilcoxon test**	**Baseline**		**Post-test**		**Wilcoxon test**	**Pre-test differentiation M-W test**	**Post-test differentiation M-W test**
	M (SD)	Mdn	M (SD)	Mdn	p	M (SD)	Mdn	M (SD)	Mdn	p	p	p
BMI (m/kg2)	19.3 (2.6)	19.7	20.0 (2.1)	19.8	**.001**	18.2 (2.1)	18	18.8 (1.7)	18.4	**.002**	.068	**.008**
Waist circumference (cm)	64.3 (5.3)	64	73.3 (6.6)	72	**.000**	64.2 (4.0)	63.5	65 (3.0)	64.5	.149	.464	**.000**
Hip circumference (cm)	88.2 (7.3)	89	90.4 (5.9)	91	**.001**	85.8 (5.6)	84.5	87.8 (3.5)	88	**.000**	.205	**.033**
WHtR	0.4 (0.03)	0.4	0.4 (0.04)	0.4	**.000**	0.4 (0.03)	0.4	0.4 (0.03)	0.4	.465	.425	**.000**
WHR	0.7 (0.04)	0.7	0.8 (0.04)	0.8	**.000**	0.7 (0.04)	0.7	0.7 (0.04)	0.7	.072	.052	**.000**
FFM (kg)	37.4 (4.5)	38	39.5 (4.0)	39.9	**.000**	34.9 (3.9)	34.7	36.2 (3.3)	36.9	**.000**	**.012**	**.001**
FFM (%)	74 (5)	74	75 (5)	75	**.007**	74 (6)	76	74 (4)	75	.376	.781	.842
FM (kg)	13.5 (5.0)	13.6	13.9 (4.4)	13.6	.797	12.3 (4.0)	10.9	12.7 (2.5)	12.1	**.019**	.261	.437
FM (%)	26 (5)	26	26 (5)	25	**.007**	26 (6)	24	26 (4)	25	.376	.781	.842
LGO (points)	22.9 (3.3)	24	21.3 (5.4)	21.0	**.046**	23.2 (3.5)	23.5	24.5 (3.3)	24.5	**.014**	.693	**.013**
PPGO (points)	15.4 (4.1)	16	15.9 (6.3)	17.0	.245	16.2 (4.4)	16	15.8 (5.7)	17	.975	.723	.871
PAGO (points)	13.5 (4.1)	14	12.6 (5.4)	12.5	.090	12.1 (4.5)	12	13.3 (4.6)	12.5	**.005**	.147	.545
BSQ-8C (points)	19.5 (10.6)	16	24.2 (12.3)	22	**.001**	16.9 (5.5)	18.5	17.7 (8.2)	17	.372	.716	**.044**
Current self (points)	4.0 (0.9)	4.0	4.1 (1.0)	4	.802	3.4 (0.8)	3.5	3.4 (0.8)	3.5	.158	**.006**	**.004**
Ideal self (points)	3.4 (0.6)	3.5	3.3 (0.6)	3.5	.241	3.4 (0.6)	3.5	3.3 (0.5)	3.1	.779	.762	.868

	Intervention (n=53)				Wilcoxon test	Control (n=28)				Wilcoxon test	Pre-test differentiation M-W test	Post-test differentiation M-W test
	Baseline		Post-test			Baseline		Post-test				
Body image dissatisfaction (current-ideal self-discrepancy) (points)	0.6 (0.9)	0.5	0.8 (1.0)	0.6	.157	0.04 (0.7)	0.05	0.2 (0.6)	0.0	.510	**.012**	**.003**

Note: bold – p<0.05; M – mean; SD – standard deviation; Mdn – median; p – p value; M-W test – Mann-Whitney U test; BMI – body mass index; FFM – fat free mass (kg, %); FM – fat mass (kg, %); WHtR – waist-to-height ratio; WHR – waist-hip ratio; LGO – learning goal orientation; PPGO – performance-prove goal orientation; PAGO – performance-avoid goal orientation; BSQ-8C – body shape questionnaire.

Goal Setting Skills

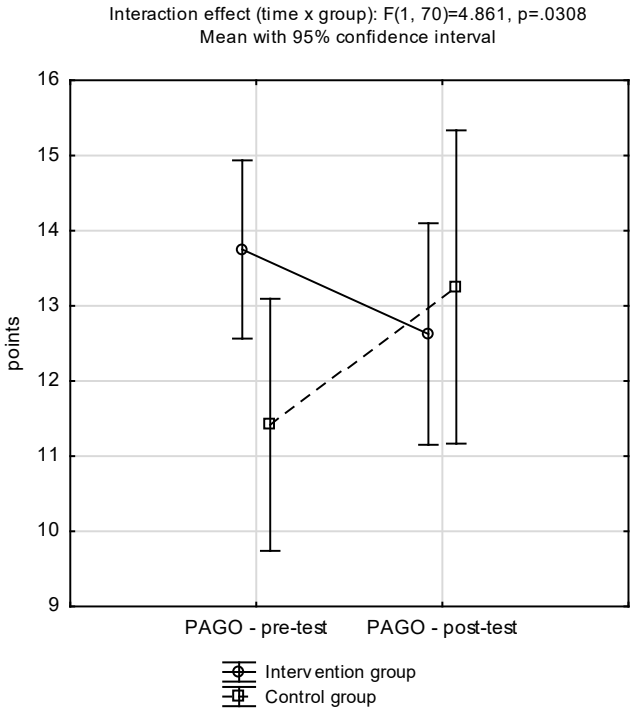
In the first step we analysed the interaction effect (time x group) for variables from the goal-setting skills questionnaire. A significant interaction was found between group (intervention, control) and time on LGO scores ($F_{(1,70)}$= 4.90, p=0.030, partial η^2=0.07) (Figure 2).



Note: LGO: learning goal orientation.

Figure 2. Repeated measures ANOVA results for interaction between group (intervention, control) and time in LGO

The Bonferroni post-hoc test showed that subjects in the experimental group reported lower LGO levels than those in the control group (p=0.017). The analysis of variance for the effect of the interaction between the group and time showed no significant interaction in PPGO levels (p>0.05). A significant interaction between group and time was observed for PAGO scores ($F_{(1,70)}$= 4.86, p=0.031, partial η^2=0.065) (Figure 3). The Bonferroni post-hoc analysis did not confirm any significant differences in PAGO levels between the groups.



Note: PAGO: performance-avoid goal orientation.

Figure 3. Repeated measures ANOVA results for interaction between group (intervention, control) and time in PAGO

In the next step, we analysed the changes in the goal-setting skill over time using Wilcoxon's tests. We found a significant decrease in LGO scores (Z=2.00,

p=0.046), but no significant changes in PPGO and PAGO for the intervention group. In the control group, a significant increase in LGO (Z=2.46, p=0.014) and in PAGO (Z=2.80, p=0.005) and no significant changes in PPGO were observed between baseline and post-test (Table 1).

Body Image Dissatisfaction (BSQ-8C And Current-Ideal-Self Discrepancy)

In the second step, we analysed the interaction effect (time x group) on the body dissatisfaction measured by BSQ-8C and no significant interaction was found (p>0.05). However, we found a significant increase in BSQ-8C scores (Z=3.32, p=0.001) during the programme only among participants in the intervention group (Table 1).

For the second measure of body dissatisfaction (current-ideal discrepancy), there was no significant interaction (time x group). The same was observed while using ANOVA separately for current-self and ideal-self variables. Wilcoxon's tests showed that at post-test both groups did not recall significant changes in the current-ideal-self discrepancy from baseline (p>0.05).

Somatic Characteristics (SC)

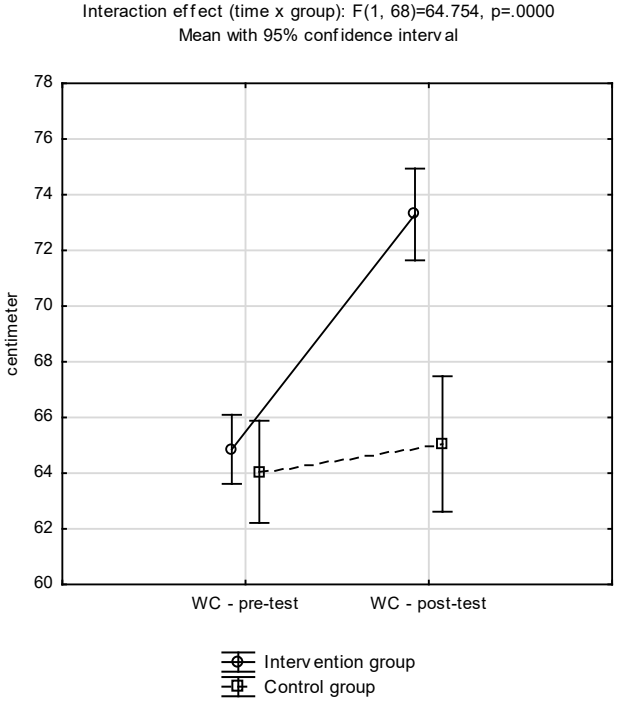
In our intervention, both groups had the same number of PE lessons. By measuring SC, we controlled for the developmental changes of participants in the research group.

Circumferences (WC and HC)

A significant interaction between group and time was found for WC ($F_{(1,68)}$= 64.75, p=0.000, partial η^2=0.49) (Figure 4).

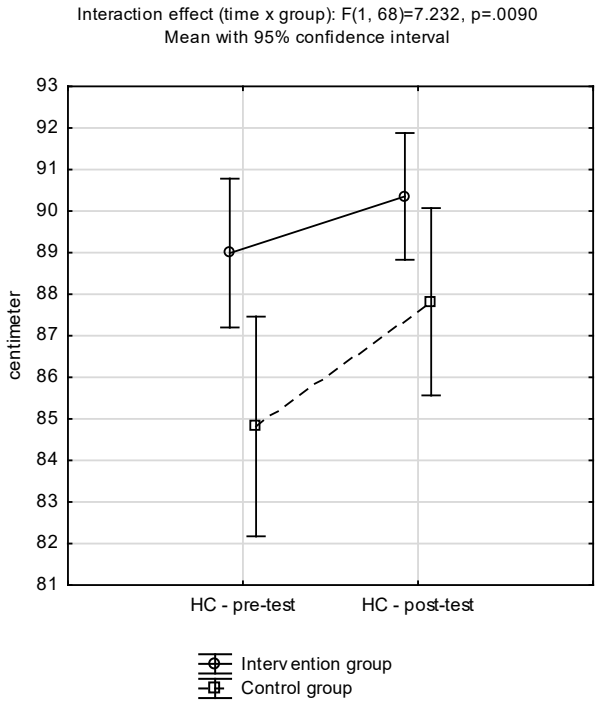
The Bonferroni post-hoc tests showed that the experimental group achieved a significantly higher level of WC (M=73.29) than it reported at baseline (p=0.000) and the values in the control group at post-test (p=0.000). According to the Wilcoxon's test, the mean WC value in the experimental group increased significantly from baseline (Z=5.96, p=0.000, Mdn difference=8 cm), while no significant difference was observed in the control group. Mann-Whitney U tests showed that the experimental group recalled significantly higher mean WC values at post-test (U=111.00, p=0.000, Mdn difference=7.5 cm) compared to the control group and with no significant difference in WC between the groups at baseline (Table 1).

ANOVA showed that there was significant interaction between group (experimental, control) and time for HC ($F_{(1,68)}$=7.23, p=0.009, partial η^2=0.096) (Figure 5). The post-hoc Bonferroni test indicated a significant increase in HC of experimental group subjects (p=0.001). According to Wilcoxon's tests, mean HC values increased significantly over time in both the experimental (Z=3.46, p=0.001) and the control groups (Z=3.73, p=0.000). Mann-Whitney U tests showed that the experimental group recalled a significantly higher mean in HC values at post-test (U=359.00, p=0.033, Mdn difference=3 cm)



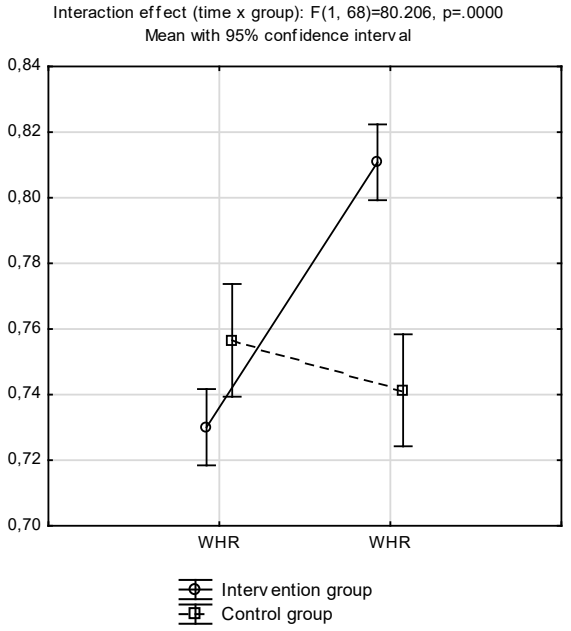
Note: WC: waist circumference.

Figure 4. Repeated measures ANOVA results for interaction between group (intervention, control) and time in WC



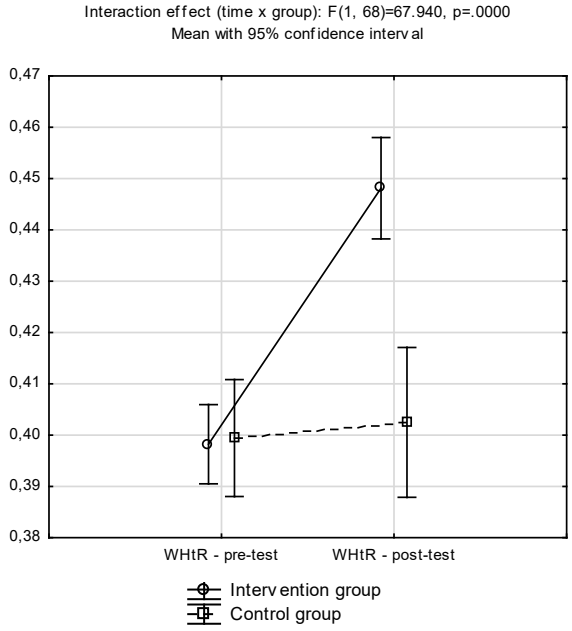
Note: HC: hip circumference.

Figure 5. Repeated measures ANOVA results for interaction between group (intervention, control) and time in HC



Note: WHR: waist-hip ratio.

Figure 6. Repeated measures ANOVA results for interaction between group (intervention, control) and time in WHR



Note: WHtR: waist-to-height ratio.

Figure 7. Repeated measures ANOVA results for interaction between group (intervention, control) and time in WHtR

than the control group, while at baseline there was no significant difference between the groups in this variable (Table 1).

WHR

A significant interaction between group and time was found for WHR ($F(1,68)= 80.21$, $p=0.000$, partial $\eta^2=0.54$) (Figure 6).

The Bonferroni post-hoc tests showed that the experimental group had significantly higher post-test WHR values compared to those achieved by the group at baseline ($p=0.000$) and higher than the post-test value achieved by the control group ($p=0.000$).

Wilcoxon's tests showed that the experimental group recalled a significantly higher level of mean WHR at post-test ($Z=5.95$, $p=0.000$) than at baseline, which was not observed in the control group. At post-test, subjects in the experimental group had a significantly higher mean value than those in the control group (Mann Whitney U, $U=114.00$, $p=0.000$), although there was no difference between the groups at baseline.

WHtR

ANOVA showed that there was a significant interaction between group (experimental, control) and time in WHtR ($F_{(1,68)}= 67.94$, $p=0.000$, partial $\eta^2=0.50$) (Figure 7).

The Bonferroni post-hoc analysis showed that subjects in the experimental group reported a post-test WHtR ($M=0.45$) that was higher than the group had at baseline ($p=0.000$) and higher than the WHtR in the control group at post-test ($p= 0.000$).

Wilcoxon's tests showed a significant increase in WHtR in the experimental group ($Z=5.99$, $p=0.000$), whereas no change was found in the control group. The post-test WHtR value was also higher in the first group (Mann Whitney U, $U=159.00$, $p=0.000$) and such a difference between the groups was not observed at baseline. This result may be due to a considerable increase in WC in the experimental group between the two time points.

BMI

The ANOVA results showed no significant interaction (time x group) on BMI ($p>0.05$). Wilcoxon's analysis indicated that both groups reported a significant increase in BMI levels at post-test (experimental: $Z=3.45$, $p=0.001$, control: $Z=3.09$, $p=0.002$). Moreover, according to the results of the Mann-Whitney U test, the post-test BMI levels in the experimental group were significantly higher than in the control group ($U=352.00$, $p=0.008$), and such a difference was not observed at baseline.

Body composition

Wilcoxon's tests showed that at post-test in the experimental group there was a significant increase in FFM ($Z=5.20$, $p=0.000$), FFM% ($Z=2.69$, $p=0.007$), FM% ($Z=2.70$, $p=0.007$) compared to baseline. At post-test in the control group a significant increase in FFM ($Z=3.89$, $p=0.000$), FM ($Z=2.34$, $p=0.019$) was observed compared to baseline. Taking into account a significant increase in WC in the experimental group, Mann-Whitney U tests were performed to check if this change might be a result of the increase in FM. However, at post-test no significant

differences were observed between the groups for both FM and FM%.

Correlations Between the BSQ-8C and the Indices

In the experimental group, the following significant correlations (Spearman) were found between: 1) baseline BSQ-8C with baseline current-ideal-self discrepancy (r=0.71, p=0.000), 2) baseline BSQ-8C and baseline HC (r=0.29, p=0.039), 3) baseline BSQ-8C and baseline WHtR (r=0.27, p=0.047), 4) baseline BSQ-8C and baseline BMI (r=0.34, p=0.012), 5) post-test BSQ-8C and post-test current-ideal-self discrepancy (r=0.60, p=0.000).

In the control group the following interactions were identified between: 1) baseline BSQ-8C and baseline BMI (r=0.42, p=0.027), 2) post-test BSQ-8C and post-test current-ideal-self discrepancy (r=0.41, p=0.049), 3) post-test BSQ-8C and post-test WHR (r=-0.42, p=0.049) (Table 2).

Table 2. Spearman correlations: BSQ-8C with indices (baseline and post-test)

	Baseline BSQ-8C		Post-test BSQ-8C	
	Experimental	**Control**	**Experimental**	**Control**
Current-ideal-self discrepancy	.71***	.37	.60***	.41*
WC	.25	.38	-.10	-.11
HC	.29*	.33	-.03	.39
WHR	-.05	-.06	.08	-.42*
WHtR	.27*	.34	-.07	-.06
BMI	.34*	.42*	.02	.34

Note: *<0.05; **<0.01; ***<0.001; WC: waist circumference; HC: hip circumference; WHR: waist-hip ratio; WHtR: waist-to-height ratio; BMI: body mass index; BSQ-8C: body shape questionnaire.

Discussion

To the best of our knowledge, this study was the first to be organised within physical education as a series of lessons dedicated solely to selected life skills and using active teaching and learning methods. The present study explored the effectiveness of an intervention on body dissatisfaction and goal-setting. Such a programme has not previously been implemented and evaluated in its entirety.

Our findings suggest that levels of body dissatisfaction may vary among students of the same age and similar BMI at a given point in adolescence, and that individual differences in the pace of puberty may dominate a body perception in subjects for whom this process is more dynamic. The programme was designed to serve as a protective factor and have a positive impact on adolescents' body image. The results suggest that the same level ("mild") of body concern was maintained among subjects from the experimental group, who experienced more intense changes in body composition over time compared to the control group.

In the goal orientation domains, the results indicate that the programme had the strongest impact on one of the goal orientation dimensions – PAGO. This outcome was accompanied by a significant increase in this variable in the control group (p=0.005). As suggested by studies on goal orientation, individuals high in PAGO may be at risk of being more worried about making mistakes, being more neurotic, avoiding challenges or more difficult goals, and preferring easy and routine tasks, which may result in fewer opportunities to learn something new, being more concerned with the social perception of one's own activities than with the work, and even hindering one's own development or procrastinating about non-routine tasks (Yeager et al., 2016; McCabe, 2013; Duchesne & Ratelle, 2010).

Goal orientation variables (LGO, PPGO, PAGO) did not differ significantly between groups at baseline. In the case of goal orientation and an increase in PAGO in the control group in the field of sport and PE, students with high PAGO may avoid taking specific movement activities in order not to show incompetence, which may limit or even block the potential of learning moments created during specific exercise (Ennis, 2017). In a study on 200 primary school students, there was a strong negative correlation between performance avoidance goals (measured by the AGQ questionnaire) and academic achievement (Rahmani, 2011). This may imply that for effective health education in this age group, this programme containing the issues of goal-setting and preparing plans for their implementation should be introduced in PE lessons, as

well as involving students and systematically motivating them to take systematic actions in achieving their own goals in the field of physical activity and a positive body image. At the end of the programme, an improvement in the PPGO mean scores was observed in the experimental group. However, it did not reach statistical significance. This means that the students' motivation to participate in situations where they could demonstrate their competence and, as a result, receive positive judgements from others (VandeWalle, 1997) remained the same throughout the intervention. A likely explanation for the observed lack of change in PPGO was offered in an analysis of achievement goal theory made in the context of schooling and the transition from elementary to middle-school level (Maehr & Zusho, 2009). As detailed, such a transition is accompanied by a change of the learning atmosphere towards a more achievement-oriented one. Thus, it is possible that the students in both groups had a high level of PPGO shortly after the start of middle school and then remained at the same level.

There was a significant decrease in LGO in the experimental group (p=0.046) and a significant increase in the control group (p=0.014), with significantly higher scores in the control group at post-test compared to the experimental group (post-hoc analysis, p=0.017). The results are in line with the suggestion of the study on LGO development in 5172 high and average ability students analysed during their transition from primary to secondary school. According to the results, high ability students reported lower LGO levels than average ability students at the beginning and throughout the transition. Furthermore, LGO decreased in both groups of students (Ramos et al., 2021). This could lead to two conclusions – that the decline in this goal orientation dimension is characteristic for this age group, and that the subjects from the experimental group were high-ability individuals. The second, in turn, is consistent with the profile and performance of the experimental school.

There is a lack of literature on the development of LGO through school-based programmes in this age group. Therefore, this negative shift of LGO levels in the experimental group over time might be explained by literature analysing LGO levels in older age groups and with higher levels of education. According to them, LGO is perceived as a facilitator of learning and transferring of acquired knowledge into skills, which positively affects one's performance and the proclivity to develop and master new skills. It is also a predictor of students' intrinsic interest and desire to develop their competence by, among other things, learning from experience (Beenen, 2014; Johnson et al., 2010; Fan et al., 2008). Another possible explanation for LGO decline may be that the motivation of the subjects from the experimental group to acquire new skills through the programme simply decreased. It would require further analysis if the duration of the programme was too long to maintain participants' motivation. It is worth noting that the experimental school has a very high level of education. The programme leader, through observation and discussion with the participants, found that the students already had many demands from other subjects and, in fact, the programme created additional demands (e.g. planning physical activity for the following week, preparing a group dance performance during a lesson) which could be overwhelming, even if these tasks were more conceptual than engaging. Considering that LGO was significantly positively related to academic help-seeking behaviours and self-efficacy beliefs in college students (Sakiz, 2011), its significant decrease in the current study might possibly be related to the fact that, after transitioning to a middle school with very high expectations, students became more prone to solve school problems on their own, but their belief in self-efficacy through comparison with other students decreased. Another possible reason is that the learning climate becomes more achievement-oriented in subsequent school years, and students are more prone to social comparison and place more emphasis on grades especially during the transition to middle school (Maehr & Zusho, 2009). The research on self-regulation and motivation in learning math among middle school students also largely supported the effect of the grade on the decline in LGO, indicating that seventh graders were less likely to use regulatory strategies compared to sixth graders, but were more likely to engage in maladaptive behaviours and were less motivated to learn (Cleary & Chen, 2009). Further research is needed to explore LGO, PPGO, PAGO in more depth in the context of health education, to explore what are the most favourable levels of these goal orientation dimensions for adolescents and their development, and how they correlate with each other. This could help to customize a programme to the current needs of participants and also predict its outcomes.

Baseline mean scores for body dissatisfaction on the BSQ-8C (M=19.5, SD=10.6) indicated mild body image concerns in the experimental group, while related scores in the control group showed no concern. This may be thought-provoking in view of the fact that the two groups did not differ significantly on any of the indices analysed (BMI, WC, HC, WHtR and WHR). Moreover, the classification of students based on BMI cut-off points shows that at baseline 90.57% of students in the intervention group met the criteria for normal weight. Hence, this observation might not be consistent with studies reporting that BMI is one of the main variables influencing body dissatisfaction in adolescents (Fernández-Bustos et al., 2019). However, correlation analysis in this study showed a weak relationship between baseline BSQ-8C and baseline BMI in both groups (EG – r=0.34, p=0.012; CG – r=0.42, p=0.027).

Choosing a desired body image significantly thinner than the current one by female adolescents, including those with normal BMI, which occurred here, has become a sign of the times (Fernández-Bustos et al., 2019; Lee et al., 2019; Schuck et al., 2018; Schneider et al., 2012). The occurrence of body concerns among subjects from the experimental group with correct BMI values may also be evidence of a negative phenomenon of weight overestimation (Jankauskiene & Baceviciene, 2019).

The baseline body dissatisfaction among those in the experimental group could also not be directly derived from the central obesity indicators WC and WHtR. Our results indicate that only three students had abdominal obesity according to WC categories and only one when WHtR was used. This may suggest that at baseline neither WC nor WHtR was a potential mediator of body dissatisfaction as assessed by the two measures. Such findings could also mean that students' self-perception was slightly disturbed. Nevertheless, a strong positive correlation WC-fat mass and a weak positive correlation WHtR-BSQ-8C were observed in the experimental group at baseline. Therefore, further research would be useful to investigate factors associated with body dissatisfaction in normal weight and normal WC subjects, especially the strength of standards idealized by the media and related social comparison.

On the first measure of body dissatisfaction, BSQ-8C, there was a significant increase in the experimental group (p=0.001). However, this increase was not alarming as the group fell into the same body dissatisfaction category as at baseline (mild concern). Two components of the second measure of body dissatisfaction (current-self and ideal-self) and the discrepancy itself did not change significantly over time in either group. However, there was a difference in discrepancy levels between the groups at post-test, with significantly higher values in the experimental group, as observed at baseline.

Taken together, these findings on body dissatisfaction raise the possibility that the negative body image formed in early adolescence was not subject to large fluctuations in the intervention group. Similar conclusions were drawn in the study examining individual trajectories of body dissatisfaction starting from mid-adolescence onwards, where body dissatisfaction showed stability over time in almost 95% of subjects (Wang et al., 2019). In the study on body image trajectories in adolescents (with a mean baseline age of 11.14 years) over the following four years, low body esteem showed considerable stability from pretest (Lacroix et al., 2020).

Various studies on social media use, particularly appearance-related activities, among female adolescents in developed countries have shown a significant positive correlation between appearance-related activities on social media and body image concerns (Scully et al., 2020; de Vries et al., 2019; Marengo et al., 2018; de Vries et al., 2016). Considering this, additional analysis of the extent and nature of visual-based social media exposure would enhance our current study and help to find a similar pattern of relationship in the two groups.

At baseline, there were only three people in the experimental group with abdominal obesity based on WC and one based on WHtR. The differences in the means of both indices between the groups were not significant. This changed at post-assessment, where there was a significant increase (M difference=9 cm) in mean WC in the experimental group, but no change in the control group. Moreover, at the second time point, subjects in the experimental group recalled significantly higher mean values of WC (M difference=8.3 cm) and also in HC (M difference=2.6 cm) than the control group, which was not observed at baseline. The significant increase in WHR and WHtR from baseline was also observed only in the experimental group. In addition, the between-group difference in WHR and WHtR also became significant at post-test, which was not the case at baseline. At post-test there was only one correlation between BSQ-8C and any of the indices, and it was in the control group (BSQ-8C-WHR relationship, negative and weak), which, taking into account post-test indices levels in the experimental group, raises questions about the lack of correlation between body dissatisfaction and higher indices values in its subjects at the second time point.

These results suggest that between baseline and post-test, participants in the intervention group may have experienced more rapid maturation compared to the control group, which was reflected in abdominal fat distribution. The findings support research showing an association between early pubertal maturation and a higher prevalence of central adiposity as measured by WC compared to peers experiencing normal pubertal stage (Adami et al., 2020). At baseline, there were strong, positive correlations between WC and FM in the experimental group, but at post-test, the WC and FM one deepened to become very strong (r=0.84).

A significant increase in HC was observed in both groups, which is also a sign of the development of secondary sexual characteristics (Rosenfield et al., 2009), but the mean HC value in the control group at post-test was still lower than its value in the experimental group at baseline. The results of the current study suggest that WHtR and WC may be biological indicators of the body image dissatisfaction risk, especially when their values increase noticeably, which was observed in the experimental group. It should be noted that the measurements in both research phases were taken by the same person, which minimized the probability of error.

At baseline, 67.92% girls in the experimental group and 50% in the control group had experienced menarche. However, Chi-square analysis did not show that this per-

centage was significantly higher, which could then lead to the conclusion that the group matured earlier.

BMI levels increased over time in both groups, with, however, higher mean post-test values in the experimental group. This, together with the significantly higher waist and hip circumferences, raises the possibility of a scenario in which all these changes were so important in shaping the body image of the subjects in the experimental group that external factors (such as this programme) were not sufficient to compensate for participants' body concerns. There is evidence that an increase of BMI over time has been shown to be a predictor of body dissatisfaction in a ten-year longitudinal study of 1,083 female subjects from adolescence to young adulthood (Bucchianeri et al., 2013), especially when WC and WHtR also changed significantly only in this group.

In the current study, an increase in BMI, a significant increase in WC and WHtR in the experimental group, suggest that a more intense developmental phase might take place among subjects during the study period. Moreover, at the post-test, they were at a higher stage of maturity than their peers in the control group. All of these visible changes, especially when they occurred together with pressure from peers or the media, could lead to higher body dissatisfaction. This suggests that, ideally, the programme should be implemented earlier in such a group.

Teachers need to act preventively and should be aware that dramatic changes in physical appearance may lead to lower self-acceptance in adolescent students. In the core curriculum of health education, we refer to positive health measures (e.g. BMI, WC, physical fitness, attitudes and behaviours related to health). Teachers can recognise the moment when it is worth introducing such interventions, especially when they are aware that the lack of self-acceptance resulting from the changes taking place in the body during adolescence will certainly occur even if the indicators are correct. The percentage of subjects with abdominal obesity was low. Therefore, the assessment of biological overweight and obesity at this age cannot be the only point of reference for the appearance of body image disorders. The results may suggest the need to carry out similar activities with adolescents, focusing the programme on supporting the development of the body through positive health habits (e.g. planning regular physical activity, conscious and systematic avoidance of unhealthy foods, positive thinking about oneself), while developing the students' self-empowerment and commitment.

The study has some limitations. First, the sample size was relatively small and the schools had a similar profile (schools with a strong focus on achievement, both located in a large city). Second, it did not analyse the influence of appearance-based social media (given their increasing popularity and contribution to young people's body dissatisfaction). Third, the study did not include an analysis of relationships between students and family members. It was not until the programme was underway and relationships were being built with the experimental group of students that the principal investigator realised what had not been considered in the design of the research – that the pursuit of perfection in academic achievement (own and parental expectations) was strongly translated into the pursuit of perfection in appearance. Conducting interviews with students might then have added more factors to help understand the nature of body image dissatisfaction in this group. Also, an analysis of free time after school could have added value to the study. Only open discussion with the students showed that the number of school and after-school tasks related to knowledge acquisition naturally pushed out after-school physical activity or leisure time in general. With such a busy schedule, doing additional tasks such as programme-related tasks, e.g. planning physical activity or relaxation breaks for the following week, may have seemed like just another duty, rather than a motivation or trigger that could develop into a lifelong habit over time.

Despite its limitations, the findings of this study are encouraging for several reasons. First, physical education provides meaningful opportunities for adolescents to acquire life skills and body image knowledge, and to take ownership of their learning and develop healthy habits. In addition, this can be achieved through physical activity, by accommodating most of the learning time in movement exercises rather than passive lectures where students just sit and listen to a teacher. The high level of student attendance and the relatively low dropout rate show that future life-skills programmes can be implemented in a regular, structured PE setting and be aligned with an existing curriculum. Further research is needed to examine whether it is possible to accurately predict when the maturation process accelerates sharply and then quickly adjust the programme, by creating alternative lessons to meet the needs of those classes where students suddenly and significantly gain weight and WC.

Conclusions

This study shows that a multi-week life-skills prevention programme can be integrated into the PE curriculum and still have a low drop-out rate. This makes a school a perfect setting for delivering health education programmes and reaching larger groups of students.

A preventive intervention targeting life skills can be successfully implemented in PE settings and have a probable mitigating effect on body image dissatisfaction, even for students experiencing intensive biological changes.

The goal-setting teaching strategy may help students achieve challenging goals and perform new skills.

The biological measures of overweight and obesity among young girls cannot always be a reference point for the development of body dissatisfaction. It is advisable to introduce preventive activities in the area of body image in advance, more frequently and with younger students, when the correlation between body dissatisfaction, body shape and weight is not so high and does not dominate other factors influencing body image.

Abbreviations

BIA: bioelectrical impedance analysis; BMI: body mass index; BSQ-8C: body shape questionnaire; FFM: fat free mass, FM: fat mass; HC: hip circumference; LGO: learning goal orientation; PAGO: performance-avoid goal orientation; PE: physical education; PPGO: performance-prove goal orientation; WC: waist circumference; WHO: World Health Organization; WHR: waist-hip ratio; WHtR: waist-to-height ratio.

Ethics Approval and Informed Consent

The study was approved by the Bioethics Committee at Poznan University of Medical Sciences (No. 540/16). Informed consent to participate in the study was obtained from parents/legal guardians of the participants. All children took part in the study voluntarily. Both parents and students were informed about the course of the research and possibility of withdrawing consent at any stage.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Uncovering Differences: A Study on Loyalty in Esports Mobile Apps by Gender

Authors' contribution:

A) conception and design of the study
B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
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Abstract

The aim of this research is to assess the existence or absence of differences in brand perceptions of users of an esports mobile app according to gender. In addition, it intends to discover the explanatory capacity of brand variables for the prediction of user loyalty, to understand how these variables influence perceptions according to gender, and to contribute to the creation of strategies more aligned with the interests and needs of each target audience.

The study involved 1,668 users of an esports tournament mobile app. An online questionnaire created for this purpose was used to discover users' perceptions of brand awareness, corporate image, perceived quality, and loyalty. The data were analyzed by creating structural equation models according to gender.

The study shows the absence of significant gender differences in the values of the brand variables, with higher means in the case of men. In addition, the important role of brand awareness, corporate image and perceived quality in understanding the loyalty of users of an esports app is confirmed for both genders, with differential aspects in the explanatory weight of some variables according to gender.

This study analyses brand perception in mobile sports apps and its relationship to user loyalty, a context that has been little analyzed so far at the brand level. In addition, it does so from a gender perspective, contributing to elimination of existing barriers and stereotypes in the context of esports events by discovering possible differences that allow managers to address each target audience more effectively.

Keywords: esports, gender equality, branding, consumer behaviour, sport management

Introduction

The phenomenon of esports has experienced rapid expansion and had a significant impact on the culture of generations Y and Z (Dìlek, 2019; Freeman & Wohn, 2017). Over the years, various definitions have been proposed for esports (Hamari & Sjöblom, 2017) and they have been classified into categories according to their genre (Llorens, 2017) and modality (Amor et al., 2022a). Recently, Formosa et al. (2022) have suggested a definition that includes nine different dimensions, which were drawn from the review of previous definitions of esports: competitive play, leisure, organisation, professionalism, spectators and fans, skills and training, esports as an extension of the game, esports as a sport, and the game itself. In this way, Formosa et al. (2022) have defined esports as

competitive and organised digital games that are played under a spectrum of professionalism. Its elements include spectators and fans; tournaments and leagues; training and skill development; and sponsorship and commercial partnerships and prize money.

Over the last decade, there has been a significant increase in esports viewership, driven in large part by the global pandemic and the popularity of online streaming platforms (Carter & Egliston, 2021; Orús, 2022). Esports currently has a global audience of over 500 million viewers and generates revenues of US$1.38 billion worldwide and is forecast to reach 680 million in 2025, of which 322 million will be occasional spectators and 318 million enthusiasts (Newzoo, 2022). This growth has also led to an increase in the number of research studies on esports in recent years (Chiu et al., 2021; Ke et al., 2022), including studies on gender (Fisher & Foust, 2022; Jang & Byon, 2021).

Esports have the context to mitigate gender inequalities present in traditional sports, which has been argued as a reason for their inclusion in the Olympic movement (Hayday & Collison, 2022). However, the most popular games often have a focus on male preferences (Kovács et al., 2022), generating a sexualisation of female players (Ruvalcaba et al., 2018), and leading women to play games other than those played by men (Schelfhout et al., 2021). To avoid this toxicity and harassment, many female gamers choose to maintain anonymity by playing male characters or adopting their identity (Gray & Huang, 2015). These inequalities can be addressed through inclusive education in schools by introducing esports as a complementary activity (Kovács et al., 2022).

Despite the general observation of equitable or similar distribution between men and women as players in video games (Jakob & Meehan, 2023), there exists a pronounced inequality in the realm of esports concerning gender representation in professional teams, sponsorship opportunities, and media visibility. This disparity may lead to lower participation and recognition of women in esports compared to men, a trend supported by previous research on esports (Jeong et al., 2024; Ke & Wagner, 2024; Kordyaka et al., 2023), where controls have been implemented to achieve identical values between men and women (Pizzo et al., 2023). Additionally, it is important to note that the esports audience represents only around 27% of the total video game audience, and, of this, only approximately half is considered truly enthusiastic (Jakob & Meehan, 2023). This distinction further underscores the need to differentiate between esports and conventional video games, as it demonstrates that interest and participation in esports are not necessarily representative of the entire gaming community.

Therefore, the objective of the study is to assess whether there are gender inequalities in the perception of the brand of a mobile app that organises online tournaments and esports events through an explanatory model of loyalty. The results of this study can be useful in marketing to assess whether there are gender differences in brand perception and to better understand their target audience to develop personalised strategies. In this way, it can contribute to the reduction of gender inequalities in the esports environment.

Theoretical Framework

In the field of esports, the study of brand perception is a crucial aspect in understanding the level of consumer loyalty (Lee & Kim, 2020). In this sense, understanding how a brand is perceived in this dynamic digital environment becomes more relevant as it significantly influences fan preference and continued engagement, especially considering the young age of many fans (Herreruela, 2022; Jang et al., 2024; Pizzo et al., 2023).

To make progress in this area, the construction of an explanatory model of loyalty has been contemplated. In this context, key brand variables such as brand awareness, corporate image, and quality have been taken into consideration. These elements constitute fundamental pillars, and their importance has been validated in the model proposed by Aaker (1992). This model, previously applied and analysed in conventional sports (Alonso-Dos Santos et al., 2023; Singh et al., 2023), is now expanded to include esports.

By considering these variables, we seek to map in detail the underlying dynamics that influence esports fans' loyalty to a specific brand. This multi-dimensional approach allows us not only to understand consumer loyalty, but also to identify areas of opportunity to strengthen the bond between the brand and its audience.

Brand Awareness

Brand awareness is a concept that addresses how a consumer associates a brand with the product they intend to own or use (Sasmita & Suki, 2015). This brand awareness affects consumer decision-making (Keller, 1993), as well as affecting consumer perceptions and attitudes (Aaker, 1996). Cultural differences must also be considered, as they can affect consumers' perception of the brand (Garza et al., 2024). Likewise, it has been demonstrated that brands in esports can be characterized by personality traits such as youthfulness and technological prowess (Hernández-Gil et al., 2018). The components of brand awareness are brand recall and brand awareness (Zhao et al., 2022). Previous studies find that there is a correlation between brand awareness and corporate image (Lee, 2014). Furthermore, a study by Romaniuk et al. (2017) explains that awareness also has a strong

relationship with quality. Therefore, within this context, it is proposed that brand awareness is positively related to corporate image (H1) and overall quality (H2).

Corporate Image

The corporate image of a brand is defined as the set of associations, both internal and external, that consumers retain about a brand (Chang et al., 2015; Chi et al., 2020; Keller, 1993). This image is related to consumers' use of a brand to reflect its symbolic meaning (Lau & Phau, 2007), which is commonly confused with brand image in the field of sports (Martínez-Cevallos et al., 2020). This corporate image allows for awareness of a brand's products or services from competitors (Lin et al., 2015). The literature has established that corporate image has an indirect effect on loyalty (Martínez & Nishiyama, 2019) and is also related to determining quality (Brucks et al., 2000). Therefore, within this context, the following research hypotheses are proposed: corporate image is positively related to overall quality (H3), and corporate image is positively related to brand loyalty (H4).

Perceived Quality

The perception of quality emerges as a fundamental factor when considering the effectiveness of a service (García-Fernández et al., 2018), highlighting the need to meticulously address user expectations, while avoiding the generation of unfounded promises that may lead to dissatisfaction (Alonso-Dos Santos et al., 2023). In this context, perceived quality is understood as consumers' perception of the quality of a given product or service (Shin, 2017). This quality always involves a comparison between two or more brands (Aaker, 1996) and has an impact on customer relational outcomes (Markovic et al., 2018). The literature establishes that quality affects consumers' purchase intention (Calvo-Porral & Lévy-Mangin, 2017) as it depends on the difference between expectations and perceptions held by customers (Parasuraman et al., 1988). Recent studies demonstrate the importance of quality on brand loyalty due to its direct positive impact (Akoglu & Özbek, 2022; Park & Kim, 2022). Therefore, the hypothesis is proposed that quality is positively related to brand loyalty (H5).

Brand Loyalty

Brand loyalty plays a crucial role as it is instrumental in retaining consumers. This is particularly significant in the realm of esports, given the youthful demographic profile of this sector and the promising prospects it holds for the future. Brand loyalty is defined as the connection between a customer and a brand (Coelho et al., 2018), demonstrating the consumer's intention to purchase or use the service (Atulkar, 2020; Ogunnaike et al., 2017). This loyalty is also defined as the total commitment that consumers have to a brand (Buil et al., 2013), causing them to recommend this product (Yulisetiarini & Mawarni, 2021). This connection can also be understood as a feeling of attachment (Kotler, 1989) that helps companies to grow (Keller & Swaminathan, 2020).

Method

Sample

The study sample consisted of 1,668 users participating in an esports tournament via a mobile application. In the gender distribution of the sample, 94% perceived themselves as male (n=1563) and 6% as female (n=105). No other genders were indicated. This distribution clearly reveals the low participation of women in this type of event. The age distribution showed that 51% (n=850) were 18 years old or younger, 38% (n=634) were between 19 and 25 years old, 7% (n=117) were between 26 and 32 years old and only 4% (n=67) were above 32 years old. Regarding the use of the application, 28.9% (n=482) used it every day, while 8.3% (n=138) used it only one day a week. In terms of employment status, 71.3% (n=1190) were students, 5.3% (n=87) were unemployed, 12.8% (n=215) were working part-time, and 10.6% (n=176) were working full-time. Seventy-one percent of the participants (n=1184) indicated that they do some kind of physical activity, while 29% (n=484) did not do so. Finally, the sample's geographical distribution consisted of 212 respondents from Europe, 1 from Asia, and 1,455 from America. It is important to note that all participants were Spanish speakers, as the questionnaire was presented in Spanish. The countries included in the sample with a significant number of participants where Mexico (n=324), Spain (n=205), Colombia (n=280), Peru (n=183), Ecuador (n=133), and Argentina (n=104).

Instrument

In this study, a questionnaire was used as the research instrument, with a total of four variables: brand awareness, corporate image, quality, and loyalty (see Table 1). This questionnaire was developed from instruments validated in the existing scientific literature. Each variable was assessed using a Likert scale from 1 to 5, where 1 represented strongly disagree and 5 represented strongly agree. The brand awareness variable was based on Tong and Hawley (2009), corporate image on Souiden et al. (2006), quality on Hightower et al. (2002), and loyalty on Yoo and Donthu (2001). These instruments belong to scientific literature that is widely referenced in the study of these variables, obtained from the Web of Science database. The scales were adapted specifically for their application in the esports sector and translated into Spanish, the language used for the data analysis. Notably, the decision to incorporate these scales was influenced by their widespread use and acceptance in the sports industry.

Table 1. Instrument

Dimension	Item
Awareness	Some characteristics of X come to mind quickly.
	I can recognise this brand quickly among other competing brands.
	I am familiar with brand X.
Corporate image	X is innovative and pioneering.
	This brand is successful and self-confident.
	This brand is persuasive and astute.
	X does business in an ethical manner.
	X is open and responsive to users.
Quality	Overall, I have received a high-quality service at X.
	Generally, the service offered at X is excellent.
	Generally speaking, the service offered at X is superior.
Loyalty	I consider myself loyal to X.
	Using this application would be my first choice.
	I will not use any other application as long as I can access X.

Procedure

The questionnaires were distributed anonymously online through a banner located at the center of the screen upon entering the application. The *LimeSurvey* platform was employed for questionnaire administration. The company collaborated by granting access to its user database solely for the purpose of this research, ensuring the confidentiality of the information. The estimated time to complete the questionnaire was approximately seven minutes. Data collection through the banner within the application remained available for one week. It is worth noting that, to guarantee participant anonymity and confidentiality, only a few socio-demographic details were collected.

Statistical Analysis

Collected data were analyzed using the IBM SPSS Statistics version 25 statistical package and the EQS 6.4 structural equation software. With SPSS, the descriptive values of the variables were obtained, as well as the correlations between them and the linear regressions. On the other hand, the structural model was constructed with EQS to evaluate the relationships between the variables and the hypotheses.

Results

First, the reliability of the variables used was tested. It is observed in Table 2 that all values in Cronbach's Alpha are greater than .70 (Hair et al., 2006). The values range from .80 for the awareness variable to .93 for the corporate image variable. Furthermore, high mean values were obtained for each variable, with the lowest value for awareness (4.08±1.02) and the highest value for corporate image (4.25±.95).

Table 2. Descriptive values and reliability of scales.

Variables	Mean	SD	Cronbach's Alpha
Awareness	4.08	1.02	.80
Corporate Image	4.25	.95	.93
Quality	4.20	1.01	.91
Loyalty	4.22	1.02	.88

Note: SD=Standard deviation

To determine the possible differences in brand perception between men and women, we first checked whether the data were parametric or nonparametric due to the difference in sample size between men (1,563) and women (105). To do this, a Kolmogorov-Smirnov test was performed, since the sample was larger than 50 and asymptotic significance was obtained ($p<.001$), meaning that the alternative hypothesis was accepted and it was, therefore, a non-parametric sample.

To identify possible differences in brand perception between men and women, the Mann-Whitney U test was performed. As can be seen in Table 3, there are no statistically significant differences between women and men in the brand variables used in the study.

Table 3. Comparison between women and men

Variable	Male Mean	Female Mean	U	P
Awareness	4.33	4.33	78341	.425
Corporate Image	4.6	4.4	74605	.107
Quality	4.67	4.33	78253	.405
Loyalty	4.67	4.33	75972	.181

Note: U=Man Mann-Whitney U; p= Significance value

Once the reliability of the scales of the different variables had been checked and the descriptive results had been analysed, a Pearson correlation analysis was performed, among both men and women (see Tables 4 and 5). As can be seen, all the variables used in the study are significantly correlated with each other. The highest value of these correlations corresponds to that between the image variable and quality in both cases. This value is below the limit established for considering two variables to be highly correlated, which is .85 (Kline, 1998).

Table 4. Pearson correlation (men)

Variable	1	2	3	4
1. Awareness	1			
2. Corporate Image	.76**	1		
3. Quality	.73**	.83**	1	
4. Loyalty	.72**	.79**	.76**	1

Note: **=p<.01

Table 5. Pearson correlation (women)

Variable	1	2	3	4
1. Awareness	1			
2. Corporate Image	.62**	1		
3. Quality	.62**	.80**	1	
4. Loyalty	.65**	.67**	.67**	1

Note: **=p<.01

Next, for the structural model of loyalty, an analysis of the reliability and convergent validity of the variables used for the model was conducted (see Table 6). For this analysis, we considered the composite reliability (CR), average variance extracted (AVE), the factor weights of each item (β), the t-statistic values and the explanatory values (R2). The results were as follows: awareness (Men: CR=.96; AVE=.55; Women: CR=.90; AVE=.51), corporate image (Men: CR=.98; AVE=.70; Women: CR=.98; AVE=.65), quality (Men: CR=.95; AVE=.70; Women: CR=.96; AVE=.71), loyalty (Men: CR=.95; AVE=.65; Women: CR=.94; AVE=.59). Based on these results, it is confirmed that the reliability values of the scales are adequate, since in all cases the composite reliability values were higher than .70 (Hair et al., 2006), and the AVE values were higher than .50 (Fornell & Larcker, 1981). As for convergent validity, the factor loadings of all items are higher than .60 (Hair et al., 2006) and the t-statistic values are also higher than 1.96 (Veasna et al., 2013), thus confirming convergent validity.

Table 6. Indicators of reliability and convergent validity

Dimension	Items	Men			Women		
		β	T value	R^2	β	T value	R^2
Awareness (F1)	1	.80	13.12	.65	.81	4.72	.66
Men: CR= .96; AVE= .55	2	.83	13.06	.69	.77	4.88	.59
Women: CR= .90; AVE= .51	3	.65	18.10	.43	.75	5.14	.58
	4	.83	13.26	.69	.85	5.18	.72
Corporate Image (F2)	5	.87	12.22	.75	.88	3.76	.77
Men: CR= .98; AVE= .70	6	.79	12.48	.62	.79	3.91	.63
Women: CR= .98; AVE= .65	7	.86	12.97	.74	.80	3.86	.63
	8	.87	14.10	.76	.85	5.09	.72
Quality (F3)	9	.88	11.77	.75	.93	4.03	.86
Men: CR= .95; AVE= .70	10	.89	12.64	.79	.89	2.70	.80
Women: CR= .96; AVE= .71	11	.86	11.27	.73	.89	3.53	.79
Loyalty (F4)	12	.86	12.24	.75	.91	3.95	.82
Men: CR= .95; AVE= .65	13	.88	11.60	.77	.92	4.29	.84
Women: CR= .94; AVE= .59	14	.80	12.64	.64	.78	4.43	.60

Note: CR=composite reliability; AVE=average extracted variance; β=beta values

After determining that all values were appropriate, a structural model was constructed from the set of five hypotheses that make up the study differentiating by gender. All data from the confirmatory factor analysis were found to be correct for both males (x2/gl=3.92; RMSEA=.04; NFI=.99; NNFI=.99; CFI=.99; IFI=.99) and females (x2/gl=2.39; RMSEA=.09; NFI=.91; NNFI=.93; CFI=.94; IFI=.95).

In terms of explanatory capacity, in the case of men (see Figure 1) corporate image is explained up to 82% by brand awareness (B=.90; T=28. 87*); perceived quality is explained up to 84% by the corporate image (B=.68; T=8.57*) and awareness (B=.26; T=3.28*); and loyalty is explained up to 80% by the corporate image (B=.60; T=8.50*) and quality (B=.31; T=4.57*).

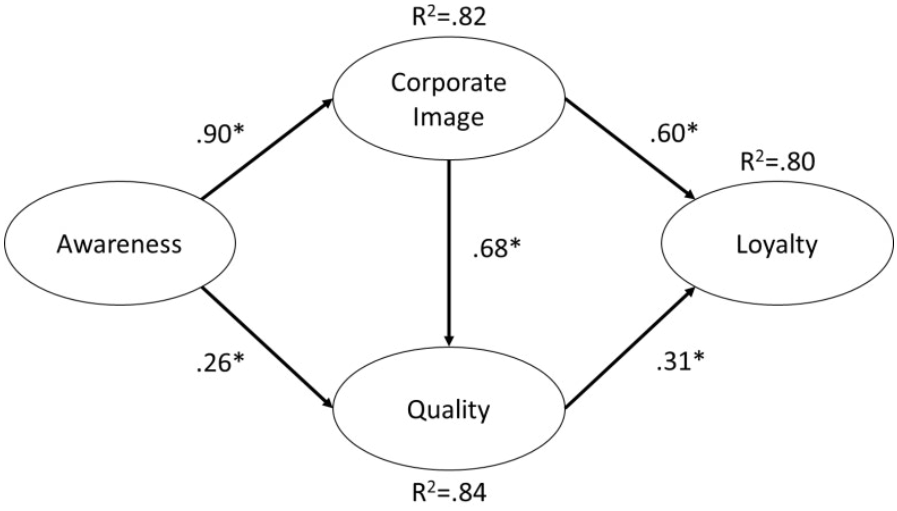

Figure 1. Structural Model Men

In the case of women (see Figure 2), corporate image is explained up to 53% by brand awareness (B=.73; T=7.26*); quality is explained up to 77% by corporate image (B=.71; T=5.87*) and brand awareness (B=.22; T=2.08*) and loyalty is explained up to 61% by quality (B=.43; T=2.07*) and corporate image (B=.39; T=1.64*).

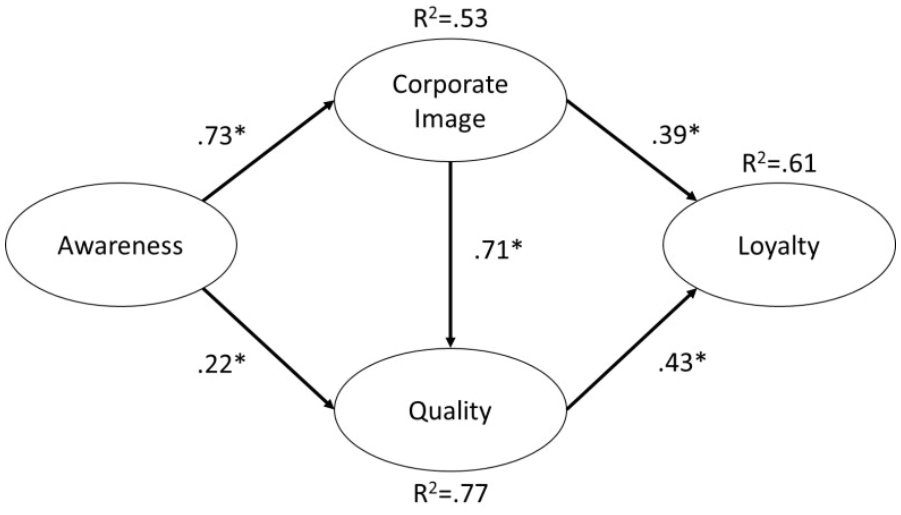

Figure 2. Structural Model Women

Therefore, as can be seen in Table 7 below, the five hypotheses proposed in the study, which arise from the proposed relationships between the different variables, have been supported in all genders.

Table 7. Summary of hypotheses

Hypotheses	Male B (*T* value)	Female B (*T* value)	Results
H1: Awareness → Corporate Image	.90 (28.87*)	.73 (7.26*)	Supported
H2: Awareness → Quality	.26 (3.28*)	.22 (2.08*)	Supported
H3: Corporate Image → Quality	.68 (8.57*)	.71 (5.87*)	Supported
H4: Corporate Image → Loyalty	.60 (8.50*)	.39 (1.64*)	Supported
H5: Quality → Loyalty	.31 (4.57*)	.43 (2.07*)	Supported

Note: β=beta values

Discussion

A review of the existing literature reveals very few studies dealing with brand perception in esports, but even fewer if we focus on gender. Branding is a particularly important asset for esports (Gawrysiak et al., 2020) as it provides the attraction of sponsors, the main source of this ecosystem (Giakoni-Ramírez et al., 2021).

The study by Amor et al. (2022b) analyses different brand variables to see if they are predictors of recommendation by differentiating the sample by gender in an esports event. As in this study, it obtains differences in terms of the gender distinction, obtaining similar results between the general calculation and the sample of men, and differences with the sample of women. In addition, it concludes that there are no significant differences between the overall ratings of women and men, the same result as in this study. Continuing with brand studies in relation to gender, Xue et al. (2020) proposed a structural model for purchase intention in which the loyalty variable would function as a mediator, adding gender as a mediator as well. In the results they obtained, the model was generally supported, but when including gender, they found that the perceived warmth variable only influenced women and not men, causing it to mediate purchase intention, unlike perceived competence which was not influenced by gender. Again, in the study by Gilal et al. (2022) they propose gender as a mediator in a model that sought to examine the relationships between types of congruence and consumers' passion for service brands. Again, they found that gender is a differentiator in determining the weight of the variables, as in this study.

Regarding recent studies on brand awareness in esports, the focus has largely been on the profile of sponsors, the primary source of funding for these events. For instance, research conducted by Calapez et al. (2024) concluded that users who identify more closely with competition organizers exhibit a greater predisposition towards sponsor brands. Another noteworthy study is that of De Zoeten and Könecke (2023), which examines viewers' perception of static sponsors introduced within esports, depending on their screen position.

Regarding the proposed hypotheses, hypothesis H1 was corroborated, indicating that brand awareness has a positive influence on the corporate image. These results are in line with recent research (Chatterjee et al., 2021; Saydan & Dülek, 2019). Hypothesis H2 was also corroborated, so brand awareness has a positive influence on overall quality. In the research by Zhao et al. (2022), they use the variable of overall quality as a mediator between awareness and loyalty, also corroborating hypothesis H5 put forward in this study, although studies can also be found that consider that it is quality that influences brand awareness (Dabbous & Barakat, 2020). Hypothesis H3 was also corroborated, so the corporate image has a positive influence on overall quality. This result is consistent with the study by Lin and Yin (2022) and Kim et al. (2015), which analyses it on an online video game which is the closest to this study on an app. There are also other previous studies suggesting that it is quality that influences the image (Wu et al., 2011). Hypothesis H4 was also corroborated, so the corporate image has a positive influence on brand loyalty. These results are consistent with previous research (Chen & Wu, 2022; Xu et al., 2022) and recent ones where it can be observed how the image, besides increasing user loyalty, also affects their preferences and purchasing decisions (Philip et al., 2024). In studies such as Safirda and Salim (2024), it is demonstrated that corporate image exerts a directly positive influence on loyalty. Although this study does not explicitly examine the relationship between corporate image and quality, it also establishes a connection between the latter and loyalty, once again demonstrating a positive influence. These findings support our hypotheses H4 and H5. Additionally, hypothesis H5 has been confirmed by additional research, such as the study by Yulisetiarini and Mawarni (2021), where it is evidenced that quality has a positive impact on loyalty.

Conclusions

The results of the study allow us to conclude, firstly, that there are no significant differences in the assessments

related to the perceptions of the variables of awareness, corporate image, quality and loyalty between genders. Despite this, it can be seen that the average rating of men is slightly higher in the last three variables mentioned. On the other hand, after checking the results of the structural models, they demonstrate the importance of brand awareness in improving perceptions of corporate image and the perceived quality of the brand. Likewise, the influence of the corporate image on the quality perceived by the users has been supported, as well as the influence of the corporate image and the perceived quality on the loyalty of the users of the esports tournament application.

Looking at the comparison of the structural model for men and women, the hypotheses have been supported in all cases for both genders. However, in terms of the weight of the variables and the percentage of explanation, there are differences that may be of interest to management. In the case of the structural model for men, all the variables are explained to a greater extent than in the case of women, with an explanatory minimum of 80% and 53%, respectively. For this reason, the variables proposed seem to be more useful in explaining male perceptions and loyalty. If we look at the explanatory weights of the hypotheses, brand awareness in explaining corporate image weighs more in the case of men than in women. On the other hand, the weight of corporate image to explain quality is greater in the case of women, while in the explanation of loyalty, quality weighs more in women while corporate image weighs more in men. Although in both men and women, quality and corporate image significantly predict loyalty, these differences could be explained precisely by the subject matter of the study: gender. Women seem to value more the experience that the service is provided properly. On the other hand, men seem to be more sensitive to the perception of the event as a whole, valuing more the corporate part of the organizing entity. In the case of women, the model has less explanatory capacity in relation to the variables of interest. This may be due precisely to the different situation they have in the field, which may lead them to have different opinions or value other aspects. This shows that although all the relationships have been supported in both cases, the variables do not behave equally between genders, so the information may be relevant to propose more personalized marketing strategies that can be more effective in attracting and retaining users.

Implications for Research, Management, and Society

The implications of the study appear at diverse levels. First, the study has implications for research, since analysis of esports branding is scarce, even more if we want to include the results considering gender. Fortunately, this field continues to grow and more publications are appearing to help the agents involved in these types of brands and events by providing literature and tools that can be useful.

On the other hand, the study has practical implications for management. The study of branding has been shown to be influential in understanding consumer behaviour in the context of sports, and the data show that in the esports environment as well. Studies such as this one allow us to understand how brand variables are perceived and how they influence loyalty based on gender. This benefits, on the one hand, managers, who with this information can plan more effective marketing strategies. Managers can know which variables are relevant to understand the variables of interest and highlight what differences exist based on gender. In this way, they can propose more specific strategies that better address the interests and needs of each gender. On the other hand, it is also beneficial for esports users, who will receive better services adapted to their interests and needs, so they will find in this virtual space more alternatives that can satisfy them. This is interesting especially in trying to attract and retain female users, who are the least likely to participate, partly due to perceived barriers and gender stereotypes.

Finally, the study also has social implications. Esports is a context in which gender gaps still exist, with considerable differences in participation. In fact, in this study only 6% of respondents were female. Moreover, it is an area where gender stereotypes are still visible and where there have even been cases of bullying or verbal violence against women participating in competitions. Studies such as this one help to understand these situations of inequality. The intention is to be able to improve and create virtual sports spaces where there can be greater participation of all genders, or at least that those who are interested do not feel limited by these perceived barriers. If we can understand gender differences in consumer behaviour in this context, we will be able to create more inclusive apps, generate more diverse content, and, in the end, everyone will be able to find their place and receive a better user experience in the virtual environment. In addition, studies such as this one highlight the problems of inequality that exist in the field of sports, raising awareness and encouraging debate about these situations, which contributes to improving these deficiencies in the sports industry by implementing more equitable practices.

Limitations and Future Lines of Research

Although our study provides valuable insights into brand perception in esports, it is essential to recognize its limitations to interpret the findings accurately and

guide future research directions. Firstly, it is important to note that our analysis focused on a single esports application, which may limit the generalization of our findings. To enhance the robustness and applicability of our conclusions, future research should aim to analyze multiple applications across different contexts and in non-Spanish-speaking countries. By broadening the scope of our investigation, we can better understand how brand perception varies across different cultural and regional settings. Moreover, our study emphasizes the need to consider longitudinal data and conduct follow-up studies to assess whether the identified issues evolve over time. Monitoring trends and changes in brand perception can provide valuable insights into the effectiveness of strategies implemented by esports applications and sponsors. Furthermore, while our study examined several brand variables, there may be other factors influencing brand loyalty that were not explored in this study. Future research should consider incorporating additional variables, such as consumer attitudes, brand personality, or social media presence, to provide a comprehensive understanding of the dynamics of brand loyalty within the esports industry.

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