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Physical Fitness and Bullying in Physical Education Classroom
Aptitud Física y Bullying en el Aula de Educación Física

Carmen Galán-Arroyo, Noelia Mayordomo-Pinilla, Antonio Castillo-Paredes, Jorge Rojo-Ramos
Universidad de Extremadura (España), Universidad de Las Américas (Chile)

Abstract. The rate of sedentary lifestyles and physical inactivity has been increasing in recent years, posing a risk to the health of the entire population since physical fitness, a predictor of mortality, has worsened. On the other hand, bullying rates in schools have continued to show an upward trend, representing a problem of social interest, since the mental health of those who suffer from it suffers. Science has identified physical activity as a regulator of behavior. This article aims to identify profiles that suffer or exercise this bullying, by exploring the differences between sexes, school location and educational stage, and the correlation between self-perceived physical fitness and bullying dimensions. The Kolmogorov-Smirnov test was used to determine the characteristics of the data, the Mann Whitney-U test was used to explore the differences between variables, and Spearman's test was used for the correlations between the FP VAS A and EBIPQ. Inverse correlations were found between the victim dimension and the dimensions of the FP VAS A, with a higher incidence in high school girls and urban settings.
Keywords: fitness health; harassment; physical activity; school; adolescence

Resumen. El índice de sedentarismo y de inactividad física ha ido aumentando en los últimos años, lo que supone un riesgo para la salud de toda la población ya que la condición física, predictor de mortalidad, ha empeorado. Por otro lado, los índices de acoso escolar han seguido mostrando una tendencia ascendente, representando un problema de interés social, ya que la salud mental de quienes lo padecen se resiente. La ciencia ha identificado la actividad física como un regulador del comportamiento. Este artículo tiene como objetivo identificar perfiles que sufren o ejercen este acoso, explorando las diferencias entre sexos, ubicación escolar y etapa educativa, y la correlación entre la aptitud física autopercibida y las dimensiones del acoso. Se utilizó la prueba de Kolmogorov-Smirnov para determinar las características de los datos, la prueba de Mann Whitney-U para explorar las diferencias entre variables y la prueba de Spearman para las correlaciones entre la FP VAS A y el EBIPQ. Se encontraron correlaciones inversas entre la dimensión víctima y las dimensiones de la FP VAS A, con mayor incidencia en niñas de secundaria y entornos urbanos.
Palabras clave: salud física; acoso; actividad física; escuela; adolescencia

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Jorge Rojo-Ramos
jorgerr@unex.es

Introduction

Physical fitness (PF) is defined as the set of attributes that allow people to perform activities of daily living with vigor without ending up with excessive fatigue. Also, having enough energy to enjoy the activities they do in their free time. In addition to having the ability to overcome unexpected environmental disturbances that may appear, conditioned, on the one hand, by genetic factors and on the other hand, by environmental factors and lifestyles. Physical exercise is key to the development of this (Caspersen et al., 1985; Ortega et al., 2008). FP is commonly confused with physical activity, which refers to any type of movement performed by means of musculoskeletal tissue that requires caloric expenditure. And FP is also confused with the concept of physical exercise, which is defined as organised and planned physical activity with the aim of improving or maintaining FP (Bouça-Machado et al., 2020). Over the years, human beings have been decreasing the amount of physical activity performed daily to the point where more than 25% of the world's population does not meet the minimum physical activity requirements recommended by the World Health Organization (WHO), a number that has not improved since 2001 (World Health Organization, 2020, 2022). This type of behavior has consequences on the health of the individual, since physical activity is correlated with PF; therefore, if a minimum level of physical activity is not achieved, cardiorespiratory, musculoskeletal, circulatory, psycho-neurological, and endocrine capacities are affected, giving rise to various diseases and the appearance of risk factors such as diabetes, hypertension, and high cholesterol (Blair, 2009). In addition, studies in this context have found that physical activity is involved in students' emotional regulation and behavior (Greco, 2021). Therefore, PF is a strong predictor of mortality at all ages as well as a protective factor against all these pathologies and risk scenarios (Haskell et al., 2009). Despite the benefits of physical activity at the physical, mental, social, and physiological levels (Aparicio García-Molina et al., 2010; Á. Denche-Zamorano et al., 2022; Eigenschenk et al., 2019), sedentary behavior is also very high in Spain. According to the Spanish National Health Survey (ENSE), more than a third of individuals over 15 years of age spend most of their time sitting and more than 40% of them stand without making much effort, establishing that almost 80% of respondents spend most of their time sitting or making very light efforts; regarding the younger population, 14% of children spend their free time in a sedentary manner (Ministerio de Sanidad Consumo y Bienestar Social, 2018), posing an added problem: the adolescent stage and childhood are two sensitive periods in which the personality begins to develop, establishing critical periods for the formation of habits that can later be continued over time (Telama, Risto Yang et al., 2014), so the promotion of physical activity to improve FP is very important at these ages so that in the future they can maintain it, and it can function as a disease prevention. In

this sense, physical education is highly recommended to encourage the promotion of active habits.

To measure FP, various analyses and medical tests are available that provide accurate results, but they can be prohibitively expensive. To address this issue, the scientific community has created and validated a scale that allows for visual assessment of adolescents' self-perception of their FP. This scale measures the physical condition that each subject perceives about themselves and it is known as the Visual Analogue Fitness Perception Scale for Adolescents (FP VAS A) (Mendoza-Muñoz et al., 2021).

On the other hand, physical education has a very important social and relational component for the identification of conflictive behaviors among students. School bullying, also known as bullying, is defined as the repetitive action of harmful behavior of a person or group of people towards an individual, which can occur in any context, although one of the most common is in the school environment, with the aim of damaging the image and social relations of this person, causing physical, material, psychological, and social damage (Cook et al., 2010; Walters, 2021). The consequences for victims of this phenomenon are very harmful and can lead to the development of different types of disorders, such as anxiety, depression, eating disorders, personality disorders, suicidal thoughts, isolation, and self-harm (Carvalho et al., 2021; Jimenez-Barbero et al., 2020). Despite attempts by the educational community to make the school context a safe environment, bullying rates in Europe have a wide range, ranging from 10 to 50% depending on the country (Husky et al., 2020). Although Spain is below the European average for this type of bullying, there are still cases; therefore, this problem continues to exist (OECD, 2019). Studies carried out in this regard show that traditional bullying is still more common in Spain than cyberbullying (Pichel et al., 2021); and to quantify the magnitude of the problem, the European Bullying Intervention Project Questionnaire (EBIP-Q) (Ortega-Ruiz et al., 2016), was created to quantify both victims and bullies. Several studies have analyzed the relationship between school bullying and the practice of physical activity, concluding that the practice of physical exercise contributes positively to factors such as self-esteem and perceived self-efficacy, as well as to the transmission of prosocial values. These factors are fundamental in the prevention of conflictive behaviors such as bullying and bullying victimization; therefore, physical exercise has been identified as a key tool to prevent these negative attitudes (Pelegrín Muñoz et al., 2010).

To better contextualize this article, it should be noted that the education system in Spain is divided into three stages: primary education, compulsory secondary education, and baccalaureate. Primary education consists of six grades and is compulsory for students aged 6 to 12 years, with compulsory physical education. Secondary education is compulsory and consists of four years for students from 12 to 16 years of age, with physical education compulsory for all students. Finally, the baccalaureate is a voluntary stage that lasts for two years and is intended for students from 16 to 18 years of age, where only the first year has compulsory physical education and is voluntary in the second year.

Due to the multiple environmental factors that condition and influence both variables (FP and Bullying), this study intends to explore the significant differences between sexes, educational stages, and school location in relation to the scores obtained in the EBIPQ questionnaire and the FP VAS A scale, as well as to search for correlations between the dimensions of these two tools to identify protective or predictive factors of bullying.

Materials and Methods

Participants

The sample consisted of 1155 secondary school pupils from Extremadura's public and private institutions. A convenience sampling method was used for recruiting. Table 1 presents the participant's sociodemographic data.

Table 1.
Sociodemographic information about the participants (N = 1155).

Variables	Categories	N	%
Educational Stage	CSE	877	75.9
	Baccalaureate	278	24.1
Sex	Male	564	48.8
	Female	591	51.2
Center Environment	Rural	368	31.9
	Urban	787	68.1
Center type	Public	869	75.2
	Private	286	24.8

N: number, %: percentage.

Instruments

A preliminary questionnaire was created that asked questions on the students' educational stage, sex, school environment, and type of school they attended in order to gather sociodemographic information about the participating sample.

Then, the Spanish version of the European Bullying Intervention Project Questionnaire (EBIPQ) was used (Ortega-Ruiz et al., 2016). It consists of 14 items spanning two main dimensions, seven of which (Dimension 1) indicate qualities connected to victimization and seven of which (Dimension 2) indicate characteristics related to aggressiveness. Beating, insulting, threatening, stealing, swearing, excluding, or spreading rumors are some of the activities that fall under both categories. Each question is formatted using a Likert scale with a score between 0 and 4, where 0 denotes "Never" and 4 denotes "Always," with a time range of the two months prior.

The student body was then given the Visual Analogical Fitness Perception Scale for Adolescents (Mendoza-Muñoz et al., 2021) (FP VAS A). This instrument is a visual analog scale that evaluate participants' assessments of their degree of PF according to five different standards: general fitness, cardiorespiratory fitness, muscular strength, speed-agility, and flexibility. Each item is scored on a scale from 0 ("very poor level") to 10 ("excellent level"). This measure scored highly for concurrent validity and reliability during its initial testing.

Procedure

The database of the Department of Education and Employment of the Regional Government of Extremadura was accessed in order to find out which schools provide physical education courses for Secondary Education through Baccalaureate (from 12 to 18 years of age). The physical education instructors at these facilities were contacted through email and requested to answer via the same medium on their readiness to arrange for a researcher to visit so they could distribute the questionnaire to the pupils who had their parents' informed consent. The study's objectives, the parents' informed consent, and the instrument models used were all described in the email. If the instructors were willing to collaborate, they had to respond to the email by scheduling a time for a researcher to visit the school and, after getting parental consent, interview the students about cyberbullying. Initial access to the questionnaire was provided to the students via a tablet, and each item was explained to them one at a time so they wouldn't have any doubts when responding. In order to prepare the data for a second researcher's later, blind analysis, the researchers sorted, cleansed, and anonymized the data after every questionnaire had been gathered.

A protocol adhering to the guidelines of the Declaration of Helsinki was approved by the Biosafety and Bioethics Committee of the University of Extremadura in Spain (Registration Code 71/2022).

Statistical Analysis

SPSS statistical program version 23 for MAC (IBM SPSS, Chicago, IL, USA) was used to process the data. First, the normality of the distribution of the data of the continuous variables was checked using the Kolmogorov-Smirnov test, indicating that normality was not met, so nonparametric statistical tests were applied later. To analyze the possible differences between the scores of the EBIPQ and FP VAS A dimensions according to the sex and educational stage of the students, the Mann-Whitney U test was used. Similarly, Spearman's rho test was used to analyze the correlations between the scores for each dimension of the questionnaires. To interpret the correlation coefficients, the thresholds proposed by Mondragón-Barrera (Mondragón Barrera, 2014) were followed: from 0.01 to 0.10 (low correlation), from 0.11 to 0.50 (medium correlation), from 0.51 to 0.75 (considerable correlation), from 0.76 to 0.90 (very high correlation) and from 0.91 to 1.00 (perfect correlation). Finally, Cronbach's alpha was used to analyze the reliability of each instrument. To interpret the reliability test values, the thresholds established by Nunnally Bernstein (Nunnally & Bernstein, 1994) were taken as a reference: <0.70 (low), 0.71 to 0.90 (satisfactory) and >0.91 (excellent).

Results

Table 2 shows the descriptive statistics for both dimensions of the EBIPQ, exploring the possible differences between the categories of educational stage, sex, and school environment. In reference to the educational stage, the dimension corresponding to victimization behaviors presented very similar values in both groups *(p= 0.80)*; however, aggressive behaviors seemed to be more recurrent in the baccalaureate stage than in CSE *(p= <0.01)*. If we observe the sex of the students, victimization behaviors seem to be more prevalent in females *(IQR= 0.8),* while the male sex carries out a greater number of aggressions *(IQR= 0.7)*. Finally, the environment of the center does not seem to affect the scores obtained in the first dimension *(p=0.28);* however, differences are found in terms of aggressive behaviors, which are more recurrent in urban schools *(p= <0.01)*.

Table 2.
Descriptive EBIPQ findings by educational level, sex, and center environment.

Item	Educational Stage			Sex			Center Environment		
	CSE Me (IQR)	Baccalaureate Me (IQR)	p	Men Me (IQR)	Women Me (IQR)	p	Rural Me (IQR)	Urban Me (IQR)	p
1. Victimization	1.86 (0.9)	1.86 (0.9)	0.80	1.71 (0.8)	1.86 (0.7)	<0.01**	1.86 (0.9)	1.86 (0.9)	0.28
2. Aggression	1.43 (0.6)	1.50 (0.7)	<0.01**	1.43 (0.7)	1.43 (0.6)	<0.01**	1.29 (0.6)	1.43 (0.7)	<0.01

Me = median value; IQR = interquartile range. Differences are significant at ** p < 0.01; * p < 0.05. Each score is obtained is based on a Likert scale (0–4): 0 is "Never" and 4 "Always".

Likewise, the different self-perceived physical capacities of the students are shown in Table 3. Both categories pertaining to educational stage and school environment did not show significant differences across the items. On the other hand, male students expressed higher scores on most of the items with respect to their female peers, except for flexibility, where girls perceived themselves as more competent.

Table 3.
Results of the FP VAS A described in terms of educational level, sex, and center environment.

FP VAS A	Educational Stage			Sex			Center Environment		
	CSE Me (IQR)	Baccalaureate Me (IQR)	p	Men Me (IQR)	Women Me (IQR)	p	Rural Me (IQR)	Urban Me (IQR)	p
1. General Condition	7.00 (2.0)	7.00 (2.0)	0.58	8.00 (2.0)	7.00 (3.0)	<0.01**	7.00 (2)	7.00 (2)	0.47
2. Cardio-Respiratory	7.00 (4.0)	7.00 (3.0)	0.05	8.00 (3.0)	7.00 (3.0)	<0.01**	7.00 (3)	7.00 (4)	0.84
3. Muscular Strength	7.00 (3.0)	7.00 (3.0)	0.29	7.00 (2.0)	6.00 (4.0)	<0.01**	7.00 (2)	7.00 (3)	0.25
4. Speed-Agility	7.00 (3.0)	7.00 (3.0)	0.33	8.00 (3.0)	7.00 (3.0)	<0.01**	7.00 (3)	7.00 (3)	0.72
5. Physical	6.00 (4.0)	6.00 (4.0)	0.13	6.00 (3.0)	7.00 (3.0)	<0.01**	6.00 (4)	6.00 (4)	0.79

Me = median value; IQR = interquartile range. Differences are significant at ** p < 0.01. Each score obtained is based on a Likert scale (1–10): 1 is "Very poor level" and 10 "Excellent level".

Similarly, possible correlations between the EBIPQ dimensions and VAS and PF scores were assessed (Table 4). At the general level, victimization behaviors were associated with self-perceived PF in a mean, inverse, and significant way *(-0.18, -0.15 -0.27, -0.14, -0.19, -0.13-0.20*. However, there was no significant correlation between aggression and PF *(-0.04),* either at the general level or in any of the categories of the variables analyzed. Likewise, in both educational stages, there was a relationship between victimization behaviors and PF, both being inverse, mean, and significant, with higher coefficients being obtained by students belonging to Baccalaureate. In addition, the sex categories showed mean, inverse, and significant association coefficients between the first dimension of the EBIPQ and the FP VAS A score, with females obtaining higher values than males. Finally, school environment also expressed associations of the same characteristics between victimization behaviors and PF, with higher correlation values in urban environments.

Table 4.
Correlations between dimensions of bullying and self-perceived physical condition, according to educational stage, sex and center environment.

EBIPQ Dimensions	FP VAS A ρ *(p)*	Educational Stage		Sex		Center Environment	
		CSE Me (IQR)	Baccalaureate Me (IQR)	Men Me (IQR)	Women Me (IQR)	Rural Me (IQR)	Urban Me (IQR)
1. Victimization	-0.18**	-0.15**	-0.27**	-0.14**	-0.19**	-0.13*	-0.20**
2. Aggression	-0.04	-0.04	-0.04	-0.02	-0.10	-0.07	-0.04

Differences are significant at ** p < 0.01.

Similarly, associations between the items of the visual scale and the EBIPQ's scoring indicated a variety of outcomes (Table 5). On one hand, and at a general level, only the first three items showed significant inverse correlations (-0.10, -0.17, -0.13), with the first one being low and the next two items being medium. When observing the educational stage, secondary school students obtained mean, inverse, and significant relationships in the items referring to general condition, cardiorespiratory capacity, and muscular strength *(-0.10, -0.15, -0.14)*. However, in high school students, only significant associations were found between cardiorespiratory capacity and EBIPQ (-0.22), characterized by mean and inverse relationships. Again, in the school environment categories, significant associations were found between the first three items of the scale and FP VAS A, all of which were mean and inverse. However, general PF and muscular strength showed higher coefficients in the rural setting (-0.17), whereas urban students showed higher values for cardiorespiratory capacity.

Table 5.
Correlations between FP VAS A items and EBIPQ score as a function of the variables explored.

FP VAS A Items	EBIPQ ρ *(p)*	Educational Stage		Sex		Center Environment	
		CSE Me (IQR)	Baccalaureate Me (IQR)	Men Me (IQR)	Women Me (IQR)	Rural Me (IQR)	Urban Me (IQR)
1. General Condition	-0.10**	-0.10**	-0.11	-0.05	-0.14**	-0.11*	-0.10**
2. Cardio-respiratory	-0.17**	-0.15**	-0.22**	-0.11**	-0.21**	-0.12**	-0.19**
3. Muscular Strength	-0.13**	-0.14**	-0.11	-0.12**	-0.14**	-0.17**	-0.11**
4. Speed-Agility	-0.04	-0.03	-0.06	-0.02	-0.05	-0.06	-0.03
5. Flexibility	-0.03	-0.05	-0.02	-0.01	-0.07	-0.06	-0.07*

Differences are significant at ** p < 0.01; * p < 0.05.

Finally, possible correlations between the EBIPQ dimensions and each of the items belonging to the visual scale were examined (Table 6). Victimization behaviors were significantly inversely and negatively associated with the general condition *(-0.17)*, cardiorespiratory capacity *(-0.20),* and muscle strength *(-0.18)*. Likewise, speed was significant when related to the first dimension of the EBIQ but in a low manner *(-0.09)*. As for aggressive behaviors, they were only significantly related to cardiorespiratory capacity *(-0.10),* the coefficient being characterized by being low and inverse.

Table 6.
Correlations between EBIPQ dimensions and FP VAS A items scores.

ECIPQ Dimensions	FP VAS A Scale				
	General Physical Condition ρ *(p)*	Cardio-Respiratory Fitness ρ *(p)*	Muscular Strength ρ *(p)*	Speed-Agility ρ *(p)*	Flexibility ρ *(p)*
1. Victimization	-0.17**	-0.20**	-0.18**	-0.09**	-0.02
2. Aggresion	0.01	-0.10**	-0.03	0.05	-0.05

Differences are significant at ** p < 0.01; * p < 0.05.

Discussion

The main objective of this work is to search for protective factors or predictors of bullying to find profiles within this phenomenon to design strategies to reduce the incidence of bullying. To this end, we explored the differences between sexes, educational stage, and school location in the scores obtained in the EBIPQ questionnaire and

the FP VAS A scale, as well as the correlations between both tools and their dimensions.

In the first analysis that compared the scores obtained in the EBIPQ questionnaire with the three central variables of the study, significant differences were found in the educational stage, with high school students scoring higher than high school students, indicating that older students exercise more bullying actions. The scientific literature finds similar results, explaining that this may be due to greater recognition and social acceptance among their peers, where they are granted greater power over others, or even as a remedy to increase their self-esteem (Romera et al., 2016; Ruiz-Hernández et al., 2022). Other studies suggest that this behavior is due to superiority in age and development over their peers of lower ages, where they feel more powerful to subdue them (Jain et al., 2018). As for sex differences, significant differences were identified in both dimensions: girls scored higher on the victim dimension, whereas boys scored higher on the aggressor dimension. Previous studies have not found a consensus on the behavior of sex in the dimensions of bullying, since some studies have found that boys have a higher incidence in both dimensions, claiming that violent acts usually occur between people of the same sex, so that the same sex is the aggressor and the victim (Obregon-Cuesta et al., 2022; Ruiz-Hernández et al., 2022; UNESCO, 2019). Other studies found results similar to those obtained in this study, where girls suffer more and boys do more (González-Cabrera et al., 2020; Pichel et al., 2021), finding sex as a modifying variable of this phenomenon. Finally, differences between rural and urban environments were examined, and significant variations were observed in the aggression dimension, with those in urban centers obtaining higher scores. However, the scientific community has not reached an agreement regarding the impact of the environment on student behavior, as some researchers have obtained results similar to those of this study (Bauman, 2010; Cabrera et al., 2022), while others have found a higher level of victimization in rural than in urban areas (Rodríguez-Álvarez et al., 2022), or even results contrary to those found in this study, where students in rural settings are more involved in bullying than their counterparts in urban settings (Smokowski et al., 2013). Given the limited number of articles that analyzed bullying depending on the environment in which the school is located, it is difficult to reach conclusions or explain this behavior.

Second, a descriptive analysis of the dimensions of the FP VAS A scale was performed, together with the differences between the three variables. Regarding sex, the results revealed significant differences in all dimensions of this scale. Males presented a higher perception in all subgroups of the scale, indicating a higher perception of their own PF, except for flexibility, where girls reported a higher self-perception. Other studies focused in this context have also found similar results, where males have a higher perception of their overall PF, cardiorespiratory fitness, muscular strength, speed, and agility, while females have a higher capacity for flexibility (Beasley & Garn, 2013; López Gallego et al., 2016). Some authors explain these results through the hypothesis that the superiority of women in flexibility is due to the increased muscle mass of men, which makes them stronger, but at the same time less flexible, in addition to the biologically marked differences between sexes (Bale et al., 1992; Docherty & Bell, 1985). In line with this argument, the social perception of sport is related to the sex perspective: traditionally, a type of physical activity has been assigned to each sex according to the biological advantages of each, with sports that emphasize strength, speed and endurance being assigned to the male sex, while those that emphasize coordination and flexibility have been assigned to the female sex (Monforte & Úbeda-Colomer, 2019). Although this pattern is not exclusive and is increasingly repeated, it may explain why each sex has a better perception of these skills if they are part of the sport they practice.

In the analysis of the correlations between the EBIPQ questionnaire and the FPVASA scale, significant inverse correlations were found in the victim dimension, indicating that the higher the student's perception of PF, the lower the probability of being bullied. This suggests a protective effect towards this type of harassment, and the scientific literature explains it through the social aspect of sport and PF, through the recognition of skills and increased self-esteem (Martínez et al., 2020; Vaughan-Johnston et al., 2020; Waasdorp et al., 2019). These correlations are repeated for all variables in the victim dimension: the correlations are stronger in the high school stage, in the female sex, and in the urban environment. These results showed a protective effect in all groups, especially in those mentioned above, highlighting the importance of the perception of PF to avoid this type of harassment. Research on the effect of physical activity and sport on emotional regulation, physical self-perception, and self-esteem explains the improvement in these parameters in those who engage in continuous physical activity (Benitez-Sillero et al., 2022; A. Denche-Zamorano et al., 2023). Similarly, correlations between FP VAS A dimensions and EBIPQ scores were explored, and significant negative correlations were found between general condition, cardiorespiratory function, and muscle strength, describing a protector for victims and a predictor for bullies. Similarly, correlations between FP VAS A dimensions and EBIPQ scores were explored, and significant negative correlations were found between general fitness, cardiorespiratory fitness, and muscle strength, describing a protector for victims and predictor for bullies (García-Hermoso et al., 2020). Therefore, PF can be used in schools and institutes to reduce both victims and aggressors. By dimension, the correlations were higher, significant, and inverse in primary school, although significant correlations also appeared in cardiorespiratory function in high school. One explanation for these results is the decrease in physical activity during late adolescence, with those who continue to practice physical activity gaining social recognition, thus increasing their level of PF (Alasqah et al., 2021; Caracuel et al., 2020).

Finally, in the analysis of the correlation between the dimensions of the EBIPQ and the dimensions of the FP VAS A scale, significant negative correlations were found in the general physical condition on the victim's side, as well as in cardio-respiratory capacity, muscular strength and speed-agility. In the aggressor dimension, significant inverse correlations are only identified in cardiorespiratory fitness. These findings show, like those obtained in the other analyses, that they are a factor to be taken into account in the development of conflict behaviours and in the avoidance of these, since a high perception of physical condition increases physical self-concept, improving self-esteem and self-confidence, decreasing the probability of suffering bullying. (Benítez-Sillero et al., 2021).

So, the results obtained in this study show an inverse correlation between the EBIPQ questionnaire and the FP VAS A scale, demonstrating that a higher self-perception of PF by students is related to a lower score in the victim dimension; thus, PF acts as a protector against this type of bullying. On the other hand, it is females who have a higher score in the victim dimension in the baccalaureate stage, being those who scoreless in the first three dimensions of the FP VAS A scale, which have a higher negative correlation with the victim dimension, suggesting that this protective effect is more specific in this profile. Therefore, an increase in the level of these dimensions of PF would decrease the number of victims of bullying, and physical education can use these results to provide tools to students to increase PF or didactic units to improve the relationship between students and the school.

Limitations and future lines

There are several limitations to the study. First, it is not possible to establish cause-effect relationships since this research is a cross-sectional study. Non-probability convenience sampling was used to select participants, so care must be taken when presenting the results. Another important limitation is that it focuses on a specific region of Spain, so it cannot be representative of the whole country by sociocultural variables. And finally, the assessment of bullying and PF was assessed by means of self-questionnaires, with the limitations that these already entail. In this sense, it would be interesting to know the situation of bullying and FP in all regions of Spain in order to extrapolate the data, as well as to be able to make use of other more objective measurement instruments and to study these results in greater depth in order to establish possible causal relationships in future studies.

Practical implication

One of the conclusions of the study is that having low levels of physical fitness is related to the likelihood of being a victim of bullying. In this sense, it is important to know the state of each of the physical abilities so that the competent administration can provide the educational community with tools to implement them not only in the physical education classroom but also in other subjects through individualised or collective attention guides [30] in order to obtain optimal levels of physical fitness in both girls and boys in favour of an optimal inclusion in the classroom, trying to eradicate bullying.

And as PA improves all dimensions of physical fitness, it would be interesting for the educational community to encourage the practice of PA not only during Physical Education classes, which could be extended, but also in the breaks between classes, with active breaks and extracurricular sports activities, especially for girls, in order to reduce bullying and serve to break down gender stereotypes, offering alternatives that allow the consolidation of healthy sports habits.

Conclusions

This study analyzed the relationship between bullying and self-perceived PF. These results indicate that PF may act as a protective factor against bullying. Specifically, a significant inverse correlation was found between the EBIPQ and FP VAS A scores in this dimension. The EBIPQ assesses bullying and victimization, whereas the FP VAS focuses on students' self-perception of PF. This suggests that higher students' perceptions of PF are related to lower scores on the bullying victimization dimension. It was also observed that females scored higher on the victim dimension, those who were in the high school stage, and in the urban setting. In addition, females scored lower on the first three dimensions of the FPVAS A scale, which had a higher negative correlation with the victim dimension. These dimensions refer to general fitness, cardiorespiratory fitness, and muscular strength, suggesting that the protective effect of PF is specific to this profile. Consequently, improving PF through physical education can be an effective strategy to reduce the number of bullying victims, especially in females during the high school stage in the urban environment, and can be useful in designing bullying prevention strategies and improving the relationship among students.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of University of Extremadura (protocol code 71/2022) for studies involving humans.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest

The authors declare no conflict of interest."

References

Alasqah, I., Mahmud, I., East, L., & Usher, K. (2021). Patterns of physical activity and dietary habits among adolescents in Saudi Arabia: A systematic review. *International Journal of Health Sciences-Ijhs*, *15*(2), 39-48.

Aparicio García-Molina, V. A., Carbonell-Baeza, A., & Delgado-Fernández, M. (2010). Health benefits of physical activity in older people. *Revista Internacional de Medicina y Ciencias de la Actividad Fisica y del Deporte*, *10*(40), 556-576.

Bale, P., Mayhe, J., Piper, F. C., Ball, T. E., & Willman, M. K. (1992). Biological and performance variables in relation to age. *Journal Sports Medicine Physical Fitness*, *32*, 142-148.

Bauman, S. (2010). Cyberbullying in a Rural Intermediate School: An Exploratory Study. *The Journal of Early Adolescence*, *30*(6), 803-833. https://doi.org/10.1177/0272431609350927

Beasley, E. K., & Garn, A. C. (2013). An Investigation of Adolescent Girls' Global Self-Concept, Physical Self-Concept, Identified Regulation, and Leisure-Time Physical Activity in Physical Education. *Journal of Teaching in Physical Education*, *32*(3), 237-252. https://doi.org/10.1123/jtpe.32.3.237

Benitez-Sillero, J. D., Ortega-Ruiz, R., & Romera, E. M. (2022). Victimization in bullying and cyberbullying and organized physical activity: The mediating effect of physical self-concept in adolescents. *European Journal of Developmental Psychology*, *19*(6), 810-827. https://doi.org/10.1080/17405629.2021.1967136

Benítez-Sillero, J. de D., Corredor-Corredor, D., Ortega-Ruiz, R., & Córdoba-Alcaide, F. (2021). Behaviours involved in the role of victim and aggressor in bullying: Relationship with physical fitness in adolescents. *PLOS ONE*, *16*(11), e0259087. https://doi.org/10.1371/journal.pone.0259087

Blair, S. N. (2009). Physical inactivity: The biggest public health problem of the 21st century. *British Journal of Sports Medicine*, *43*(1), 1-2.

Bouça-Machado, R., Rosário, A., Caldeira, D., Castro Caldas, A., Guerreiro, D., Venturelli, M., Tinazzi, M., Schena, F., & J. Ferreira, J. (2020). Physical Activity, Exercise, and Physiotherapy in Parkinson's Disease: Defining the Concepts. *Movement Disorders Clinical Practice*, *7*(1), 7-15. https://doi.org/10.1002/mdc3.12849

Cabrera, M. C., Larrañaga, E., & Yubero, S. (2022). Bullying/Cyberbullying in Secondary Education: A Comparison Between Secondary Schools in Rural and Urban Contexts. *Child and Adolescent Social Work Journal*. https://doi.org/10.1007/s10560-022-00882-0

Caracuel, R., Padial-Ruz, R., Torres, B., & Cepero González, M. (2020). The influence of healthy habits acquired by school-age adolescents in relation to physical education classes. *Joural of Human Sport and Exercise*, *15*. https://doi.org/10.14198/jhse.2020.15.Proc4.02

Carvalho, M., Branquinho, C., & de Matos, M. G. (2021). Cyberbullying and Bullying: Impact on Psychological Symptoms and Well-Being. *Child Indicators Research*, *14*(1), 435-452. https://doi.org/10.1007/s12187-020-09756-2

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, *100*(2), 126-131.

Cook, C. R., Williams, K. R., Guerra, N. G., Kim, T. E., & Sadek, S. (2010). Predictors of bullying and victimization in childhood and adolescence: A meta-analytic investigation. *School Psychology Quarterly*, *25*(2), 65-83. https://doi.org/10.1037/a0020149

Denche-Zamorano, Á., Barrios-Fernandez, S., Gómez-Galán, R., Franco-García, J. M., Carlos-Vivas, J., Mendoza-Muñoz, M., Rojo-Ramos, J., Vega-Muñoz, A., Contreras-Barraza, N., Gianikellis, K., & Muñoz-Bermejo, L. (2022). Associations between Physical Activity Level and Mental Health in the Spanish Population: A Cross-Sectional Study. *Healthcare*, *10*(8), Article 8. https://doi.org/10.3390/healthcare10081442

Denche-Zamorano, A., Mayordomo-Pinilla, N., Galán-Arroyo, C., Mañanas-Iglesias, C., Adsuar, J. C., & Rojo-Ramos, J. (2023). Differences in Self-Concept and Its Dimensions in Students of the Third Cycle of Primary School, Obligatory Secondary Education, and Baccalaureate. *Healthcare*, *11*(7), Article 7. https://doi.org/10.3390/healthcare11070987

Docherty, D., & Bell, R. D. (1985). The relationship

between flexibility and linearity measures in boys and girls 6 15 years of age. *Journal of Human Movement Studies*, *11*(5), 279-288.

Eigenschenk, B., Thomann, A., McClure, M., Davies, L., Gregory, M., Dettweiler, U., & Ingles, E. (2019). Benefits of Outdoor Sports for Society. A Systematic Literature Review and Reflections on Evidence. *International Journal of Environmental Research and Public Health*, *16*(6), 937. https://doi.org/10.3390/ijerph16060937

García-Hermoso, A., Hormazabal-Aguayo, I., Oriol-Granado, X., Fernández-Vergara, O., & del Pozo Cruz, B. (2020). Bullying victimization, physical inactivity and sedentary behavior among children and adolescents: A meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 114. https://doi.org/10.1186/s12966-020-01016-4

González-Cabrera, J., Sánchez-Álvarez, N., Calvete, E., León-Mejía, A., Orue, I., & Machimbarrena, J. M. (2020). Psychometric properties of the triangulated version of the European Bullying Intervention Project Questionnaire: Prevalence across seven roles. *Psychology in the Schools*, *57*(1), 78-90. https://doi.org/10.1002/pits.22320

Greco, G. (2021). Multilateral teaching in physical education improves resilience and self-efficacy in adolescents and could help reduce bullying behaviors. *Physical Culture and Sport. Studies and Research*, *90*(1), 1-9. https://doi.org/10.2478/pcssr-2021-0008

Haskell, W. L., Blair, S. N., & Hill, J. O. (2009). Physical activity: Health outcomes and importance for public health policy. *Preventive Medicine*, *49*(4), 280-282. https://doi.org/10.1016/j.ypmed.2009.05.002

Husky, M. M., Delbasty, E., Bitfoi, A., Carta, M. G., Goelitz, D., Koç, C., Lesinskiene, S., Mihova, Z., Otten, R., & Kovess-Masfety, V. (2020). Bullying involvement and self-reported mental health in elementary school children across Europe. *Child Abuse & Neglect*, *107*, 104601. https://doi.org/10.1016/j.chiabu.2020.104601

Jain, S., Cohen, A. K., Paglisotti, T., Subramanyam, M. A., Chopel, A., & Miller, E. (2018). School climate and physical adolescent relationship abuse: Differences by sex, socioeconomic status, and bullying. *Journal of Adolescence*, *66*(1), 71-82. https://doi.org/10.1016/j.adolescence.2018.05.001

Jimenez-Barbero, J. A., Jimenez-Loaisa, A., Gonzalez-Cutre, D., Beltran-Carrillo, V. J., Llor-Zaragoza, L., & Antonio Ruiz-Hernandez, J. (2020). Physical education and school bullying: A systematic review. *Physical Education and Sport Pedagogy*, *25*(1), 79-100. https://doi.org/10.1080/17408989.2019.1688775

López Gallego, F., Lara Sánchez, A. J., Espejo Vacas, N., & Cachón Zagalaz, J. (2016). Influence of gender, age and level of physical activity over Physical Condition of Students in Primary Education. Bibliographic Review. *Retos: nuevas tendencias en educación física, deporte y recreación*, *29*, 129-133.

Martínez, J., Rodríguez-Hidalgo, A. J., & Zych, I. (2020). Bullying and Cyberbullying in Adolescents from Disadvantaged Areas: Validation of Questionnaires; Prevalence Rates; and Relationship to Self-Esteem, Empathy and Social Skills. *International Journal of Environmental Research and Public Health*, *17*(17), Article 17. https://doi.org/10.3390/ijerph17176199

Mendoza-Muñoz, M., Adsuar, J. C., Mendoza-Muñoz, D. M., Polero, P., & Carlos-Vivas, J. (2021). Concurrent Validity and Reliability of a Novel Visual Analogue Fitness Perception Scale for Adolescents (FP VAS A). *International Journal of Environmental Research and Public Health*, *18*(7), Article 7. https://doi.org/10.3390/ijerph18073457

Ministerio de Sanidad Consumo y Bienestar Social. (2018). *ENSE Encuesta Nacional de Salud España 2017 (Spanish Health National Survey 2017)*. Gobierno de España.

Mondragón Barrera, M. A. (2014). Use of the correlation Spearman in a study of ontervention in physiotherapy. *Movimiento Científico*, *8*(1), Article 1. https://doi.org/10.33881/2011-7191.mct.08111

Monforte, J., & Úbeda-Colomer, J. (2019). «Like a girl»: A provocative study on gender stereotypes in physical education. *Retos*.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill. http://hdl.handle.net/123456789/11061

Obregon-Cuesta, A. I., Mínguez-Mínguez, L. A., León-del-Barco, B., Mendo-Lázaro, S., Fernández-Solana, J., González-Bernal, J. J., & González-Santos, J. (2022).

Bullying in Adolescents: Differences between Gender and School Year and Relationship with Academic Performance. *International Journal of Environmental Research and Public Health*, *19*(15), Article 15. https://doi.org/10.3390/ijerph19159301

OECD. (2019). *PISA 2018 Results (Volume III): What School Life Means for Students' Lives*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/education/pisa-2018-results-volume-iii_acd78851-en

Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjöström, M. (2008). Physical fitness in childhood and adolescence: A powerful marker of health. *International Journal of Obesity*, *32*(1), 1-11. https://doi.org/10.1038/sj.ijo.0803774

Ortega-Ruiz, R., Del Rey, R., & Casas, J. A. (2016). Assessing bullying and cyberbullying: Spanish validation of EBIPQ and ECIPQ. *Psicología Educativa*, *22*(1), 71-79. https://doi.org/10.1016/j.pse.2016.01.004

Pelegrín Muñoz, A., Garcés de Los Fayos Ruiz, E. J., & Cantón Chirivella, E. (2010). Study of prosocial and antisocial behaviors: Comparison between children and adolescents who do and do not practice sports. *Informació psicològica*, *99 (Mayo-agosto: La violencia en distintos ámbitos)*, 64-78.

Pichel, R., Foody, M., O'Higgins Norman, J., Feijóo, S., Varela, J., & Rial, A. (2021). Bullying, Cyberbullying and the Overlap: What Does Age Have to Do with It? *Sustainability*, *13*(15), Article 15. https://doi.org/10.3390/su13158527

Rodríguez-Álvarez, J. M., Navarro, R., & Yubero, S. (2022). Bullying/cyberbullying in 5th and 6th year of primary education: Differences between rural and urban areas. *Psicología Educativa*, *28*(2), 117-126. https://doi.org/10.5093/psed2021a18

Romera, E.-M., Cano, J.-J., García-Fernández, C.-M., & Ortega-Ruiz, R. (2016). Cyberbullying: Social competence, motivation and peer relationships. *Comunicar: Revista Científica de Comunicación y Educación*, *24*(48), 71-79. https://doi.org/10.3916/C48-2016-07

Ruiz-Hernández, J. A., Ruiz-Fernández, C. M., Pina López, D., Llor-Zaragoza, L., Pagán-Escribano, M., Jiménez-Barbero, J. A., & Puente-López, E. (2022). Evaluation of School Climate Behaviors in the School Context: CONVIVE Questionnaire. *Youth & Society*, *54*(5), 833-857. https://doi.org/10.1177/0044118X21997852

Smokowski, P. R., Cotter, K. L., Robertson, C., & Guo, S. (2013). Demographic, Psychological, and School Environment Correlates of Bullying Victimization and School Hassles in Rural Youth. *Journal of Criminology*, *2013*, 1-13. https://doi.org/10.1155/2013/137583

Telama, Risto Yang, X., Leskinen, E., Kankaanpaä, A., & Hirvensalo, Mirja Tammelin, Tuija Viikari, Jorma S. A., Raitakari, O. T. (2014). Tracking of Physical Activity from Early Childhood through Youth into Adulthood. *Medicine & Science in Sports & Exercise*, *46*(5), 955-962. https://doi.org/10.1249/MSS.0000000000000181

UNESCO. (2019). *Behind the numbers: Ending school violence and bullying*. https://unesdoc.unesco.org/ark:/48223/pf0000366483

Vaughan-Johnston, T. I., Lambe, L., Craig, W., & Jacobson, J. A. (2020). Self-esteem importance beliefs: A new perspective on adolescent self-esteem. *Self and Identity*, *19*(8), 967-988. https://doi.org/10.1080/15298868.2019.1711157

Waasdorp, T. E., Mehari, K. R., Milam, A. J., & Bradshaw, C. P. (2019). Health-related Risks for Involvement in Bullying among Middle and High School Youth. *Journal of Child and Family Studies*, *28*(9), 2606-2617. https://doi.org/10.1007/s10826-018-1260-8

Walters, G. D. (2021). School-Age Bullying Victimization and Perpetration: A Meta-Analysis of Prospective Studies and Research. *Trauma, Violence, & Abuse*, *22*(5), 1129-1139. https://doi.org/10.1177/1524838020906513

World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behaviour*. World Health Organization. https://www.who.int/publications/i/item/9789240015128

World Health Organization. (2022, octubre 5). *Physical Activity: Key facts*. Physical activity. https://www.who.int/es/news-room/fact-sheets/detail/physical-activity