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Systematic Review

Influence and Relationship of Physical Activity before, during and after the School Day on Bullying and Cyberbullying in Young People: A Systematic Review

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Abstract: The aim of this systematic review was to analyze the influence of the practice of Physical Activity (PA) before, during and after school hours on bullying and cyberbullying in children and adolescents. Studies were identified in four databases (PubMed, SCOPUS, Web of Science, ERIC) from January 2013 to March 2024. A total of 29 studies met the inclusion criteria. Seventeen studies used a cross-sectional design to explore the association between these variables, and 12 articles had a longitudinal design with PA interventions. The review found that PA is associated with significant improvements in bullying and cyberbullying, reduced depressive symptoms, and strengthened social relationships, responsibility, and self-esteem. PA before the school day may be effective in reducing bullying victimization. During the school day, it promotes affective behaviors related to bullying, such as empathy and respect for others, and optimizes psychological factors such as self-concept and self-esteem. After-school PA reduces bullying and disruptive behaviors in non-educational contexts. It is recommended to implement PA programs that address social, emotional and behavioral aspects throughout the day, with Educational Centers and Physical Education as the central axis. Didactic recommendations for implementing PA programs against bullying/cyberbullying in school and extracurricular contexts are included.

Keywords: physical education; bullying; cyberbullying; children; adolescents

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Citation: Rusillo-Magdaleno, A.; Moral-García, J.E.; Brandão-Loureiro, V.; Martínez-López, E.J. Influence and Relationship of Physical Activity before, during and after the School Day on Bullying and Cyberbullying in Young People: A Systematic Review. *Educ. Sci.* **2024**, *14*, 1094. https://doi.org/10.3390/educsci14101094

Academic Editor: Federico Corni

Received: 23 July 2024
Revised: 27 September 2024
Accepted: 1 October 2024
Published: 8 October 2024

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1. Introduction

Bullying is defined as aggressive behavior intended to physically, psychologically and socially harm another person [1,2]. It is linked to serious consequences, such as violent and disruptive behavior, as well as psychological problems such as low self-esteem, anxiety and depression [1,3,4]. Bullying can manifest itself through physical, verbal or psychological aggression, all of which significantly affect the psychoemotional well-being of victims [5–7]. Globally, around 30% of students report having experienced bullying, although this prevalence varies by region and culture [8]. The rise of technology and social media has shifted traditional bullying to cyberbullying, where new technologies are used to harm a victim who cannot easily defend himself or herself [9,10]. Like traditional bullying, cyberbullying can involve verbal harassment or threats of physical harm [11,12]. The Internet and mobile devices facilitate anonymity and depersonalization, amplifying the reach and impact of cyberbullying [9,13]. Internationally, cyberbullying shows high prevalence rates, with victimization ranging from 13.99% to 57.5%, and aggression ranging from 6% to 46.3% [14].

Given that bullying or cyberbullying can be negatively related to the motor competence and/or morphotype of schoolchildren in the educational environment [15,16], at times such as arrival and departure from school, during recess periods or in physical education classes [17,18], participation in PA has been identified as a potential protective factor against

bullying, fostering social and emotional skills such as empathy and self-regulation that contribute to the reduction of aggressive behaviors [7,19]. In structured settings, such as physical education classes, PA may reduce the likelihood of bullying by promoting cooperative behaviors and social connectedness [2,20], suggesting that regular PA appears to be inversely related to bullying and cyberbullying victimization [21,22]. Recent studies suggest that those who actively participate in organized sports or physical activities have lower rates of victimization, partly due to improved physical self-concept, which reduces the perceived vulnerability to bullies [21]. However, lack of participation in physical activities or a high level of sedentary lifestyle is associated with higher victimization in both traditional bullying and cyberbullying, due to factors such as social isolation and low self-esteem [22].

The relationship between PA and bullying may vary according to developmental period and school stage, following different patterns. In the early years, with schoolchildren aged 6–12 years, engaging in regular PA appears to be related to a lower prevalence of bullying. Participation in organized sports promotes social skills and values such as respect and empathy, which reduces the likelihood of being a victim or perpetrator of bullying [23], and children who comply with PA recommendations have a lower risk of being victimized, due to factors such as greater social integration and better self-perception [24]. In secondary education (13–16 years), the dynamics between PA and bullying, including its manifestations in the digital domain, become more complex. Adolescents who engage in competitive sports tend to have stronger coping mechanisms against cyberbullying, as these activities foster resilience and group cooperation [21]. However, some studies suggest that a higher frequency of competitive PA may be related to aggressive behaviors in some adolescents, which could increase their involvement in the bullying role [23]. These differences could be due to changes in social and emotional structure that occur during adolescence, where power conflicts and self-assertion play a more predominant role in bullying behavior in both physical and digital environments [25], with cyberbullying being more prevalent among adolescents, partly due to the increased use of electronic devices and social networks [26]. In summary, PA interventions in childhood do not usually focus on reducing cyberbullying, as this is not a prevalent problem among younger children. However, in adolescence, interventions that promote PA could be effective not only in reducing relational bullying, but also in preventing cyberbullying by improving self-esteem and fostering a sense of belonging within organized sports groups [21].

In this line, previous studies show that PA performed before, during or after school hours can produce benefits in the physical, mental and socio-emotional health of children and adolescents [21,27–32]. However, we are not aware of any study that has aggregated and analyzed the relationship between the type of PA and the timing of the PA stimulus on bullying/cyberbullying at these early ages.

Firstly, there are PA stimuli before the start of the school day, for example, with active commuting to the educational center or through active starts [22,33]. This PA improves physical-mental activation, emotional well-being and social interaction among students, in addition to reducing aggressive behaviors and fostering positive relationships [21,29]. This PA can also foster a favorable mood throughout the school day and reduce the incidence of bullying [31]. On the other hand, one of the key moments and where young people spend the most time throughout the day is during the school day [34]. Recess, active breaks or physically active classes can have an impact on improving classroom behavior [35], lead to a reduction in disciplinary infractions and create a more positive environment [36]. In addition, the PE class is a key moment for the detection, control, reduction and prevention of bullying situations [37,38]. Bullying can be detected and affected in various situations such as team selection, cooperative and competitive activities, physical skill exercises or during the use of private spaces where students may feel vulnerable [37]. However, the practice of non-competitive team sports seems to foster healthy social relationships and reduce the risk of aggressive behaviors among adolescents [23].

Therefore, the well-targeted physical education class can be used as a preventive measure against bullying [21,32], creating an inclusive and safe environment in schools [27,29,39]. It can provide students with an ideal learning environment for the development of social skills and friendship [40,41], prioritizing cooperation over excessive competition [42], fostering empathy and inclusiveness [40,43] and providing opportunities for students with a priori 'perpetrator' characteristics to develop more pro-social behaviors, and for 'victims' to improve their self-confidence and group participation [39].

Another of the moments where PA practice is the cause or acts as prevention of confrontations or bullying situations is during after-school activities [2,44]. After-school activities, on multi-sport fields or gymnasiums, are a key venue for bullying and cyberbullying among youth [45]. Nearly one-third of bullying experiences occur outside the school environment [45]. The prevalence of bullying and cyberbullying behaviors in relation to after-school PA participation is classified according to the practice of various types of sports and modality [46]. Sometimes, in these post-school day moments, the prevalence of bullying and/or cyberbullying increases due to less structured environments or abusive internet use [47,48]. However, after-school PA may also be related to a decrease in bullying [49], because voluntary PA practice fosters the development of positive social and emotional skills [50]. Therefore, PA can play an important role in the formation of resilient and socioemotionally aware students in bullying situations, promoting a safe and healthy environment [2].

Finally, there may be some important covariates that affect the relationship between PA and bullying/cyberbullying. First, the Primary and Secondary Education stages coincide with the intensive use of technologies and social networks [51], leading to a higher exposure to bullying and cyberbullying risks [52]. In this sense, it seems that both age and sex could decisively impact the perception and experience of bullying, as well as the types and frequency of PA [53]. Also, socioeconomic status could play an important role because opportunities for PA and bullying experiences may vary significantly between different socioeconomic contexts [54,55]. The complexity of assessing the effects of PA, due to contextual and personal factors, highlights the need to analyze the specific timing of its practice around the school day.

Previous research has analyzed the impact of PA practice on bullying behaviors during the school day [56,57]. However, there are no known systematic reviews focused on analyzing the possible impact of the type and timing of PA (before, during, and after the school day) on youth bullying/cyberbullying. Therefore, the research question is the following: Can the type and timing of PA influence the incidence of bullying and cyberbullying in young people in primary and secondary education?

Based on the above, the aim of this systematic review was to analyze the influence and relationship of PA practice before, during and after school on bullying and cyberbullying in primary and secondary school students. Educational proposals are included with concrete practical recommendations for their implementation in the school and family context.

2. Materials and Methods

This systematic review shares the same structure as previous reviews [32,58] and follows PRISMA'S guidelines [59]. A comprehensive search was performed in four databases (PubMed, SCOPUS, Web of Science, ERIC) for relevant articles published between January 2013 to July 2024. Table 1 shows the main terms and search strings that were used: (1) Physical activity (physical activity academic lessons, physical active program, physically active classes, physical education, active lesson break, active break, active pauses, recess, recreation, cooperative games, active movement, active displacement, active pre-school programs, extracurricular activities, after school activities, extracurricular sport); (2) Bullying (bullying, cyberbullying, bullying school); (3) Children (children, childhood, adolescents, students, school, high school).

Table 1. Database search strategy.

Database	Search Strategy	Limits	Filtered Items
PubMed	("physical activity academic lessons" OR "physical active programme" OR "physically active classes" OR "physical education" OR "active lesson break" OR "active break" OR "active pauses" OR recess OR recreation OR "cooperative games" OR "active movement" OR "active displacement" OR "active pre-school programs" OR "extracurricular activities" OR "after school activities" OR "extracurricular sport") AND (bullying OR cyberbullying OR "bullying school") AND (child, OR children OR childhood OR adolescent OR students OR school OR "secondary school")	Articles published from 1 January 2013 to 31 July 2024 Age: 6–18 years Language: English and Spanish Journal article	241
Scopus			177
Web of Science			260
ERIC			219

Selection criteria

Articles retrieved during the searches were selected using the following criteria: (1) full-text report published in a peer-reviewed journal; (2) conducted in pre-school, in-school, and after-school activities in children and adolescents aged 6 to 18 years; (3) written in English or Spanish; (4) used a cross-sectional or two-group intervention design; (5) ethnicity was not an exclusion criterion.

Data extraction and reliability

The search was conducted by three independent reviewers (XXX). They read the titles and abstracts of all retrieved articles. A meeting was held to resolve disagreements about eligibility. Information on author, title, objective, sample size, age, country, design, measurement, confounders, main results, and conclusions were extracted from all studies. The results of studies potentially relevant to the selected topics were reviewed.

Assessments of quality and level of evidence

According to a review study, only one third of systematic reviews in education present tools for quality assessment of the studies analyzed [60]. Based on this information, the present systematic review presented a quality assessment performed on the basis of other standardized assessment lists [61] and our selection criteria (Table 2). Items were scored as follows: 2 = fully reported; 1 = partially reported; 0 = not reported or unclear. The list consisted of six items related to population, setting, measurements, design, confounders, and outcome reporting. The total quality scores of the studies were calculated by summing the scores of the individual items (range: 0–12) and were used to categorize the level of evidence provided: studies with a total quality score > 9 were classified as high quality, those scoring 5–8 were classified as medium quality, and those scoring <5 were classified as low quality, and thus were not included in the detailed analysis for this paper.

Table 2. List of included studies with quality scores.

	Authors	A	B	C	D	E	F	Total Score	Quality Level
1	Aguilar-Herrero et al. [20]	2	2	1	2	0	0	7	MQ
2	Benítez-Sillero et al. [62]	2	2	2	2	2	2	12	HQ
3	Benítez-Sillero et al. [21]	2	2	2	2	2	0	10	HQ
4	Benítez-Sillero et al. [63]	2	2	2	2	2	1	11	HQ
5	Carraro et al. [64]	2	2	1	2	2	0	9	HQ
6	Case et al. [65]	2	2	1	2	2	0	9	HQ
7	Corral-Pernía et al. [66]	2	2	2	2	2	1	11	HQ
8	Driessens [67]	2	2	1	2	2	0	9	HQ
9	Evans et al. [68]	2	2	2	2	2	2	12	HQ
10	Fung & Lee [69]	2	2	1	2	2	0	9	HQ
11	Garnett et al. [70]	2	2	1	2	2	0	9	HQ
12	Greco [71]	2	2	2	2	2	0	10	HQ
13	Holbrook et al. [72]	2	2	1	2	2	0	9	HQ
14	Hormazábal-Aguayo et al. [73]	2	2	2	2	2	2	12	HQ
15	Khitaryan et al. [74]	2	2	2	2	1	0	9	HQ

Table 2. *Cont.*

	Authors	A	B	C	D	E	F	Total Score	Quality Level
16	Mannocci et al. [75]	2	2	2	2	2	1	11	HQ
17	Mayfield et al. [76]	2	2	2	2	2	0	10	HQ
18	Menéndez-Santurio & Fernández-Río [77]	2	2	1	2	2	0	9	HQ
19	Montero-Carretero et al. [38]	2	2	2	2	2	0	10	HQ
20	Montero-Carretero et al. [78]	2	2	2	2	2	0	10	HQ
21	Nery et al. [79]	2	2	2	2	2	2	12	HQ
22	Oliveira et al. [19]	2	2	2	2	2	0	10	HQ
23	Park et al. [80]	2	2	1	2	2	0	9	HQ
24	Philippot et al. [81]	2	2	2	2	0	0	8	MQ
25	Rojo-Ramos et al. [82]	2	2	2	2	2	0	10	HQ
26	Roman & Taylor [83]	2	2	2	2	2	1	11	HQ
27	Savucu et al. [84]	2	2	2	2	2	0	10	HQ
28	Vveinhardt & Fominiene [85]	2	2	2	2	2	0	10	HQ
29	Vveinhardt & Fominiene [86]	2	2	2	2	2	0	10	HQ
30	Widyastari et al. [87]	2	2	1	2	2	0	9	HQ

Note: High quality (HQ) = 9–12. Medium quality (MQ) = 5–8. A. The study was a full report published in a peer-reviewed journal. B. The study is conducted in school, pre-school, or after-school activities. C. The PA and the selected bullying was clearly described. D. The sample was of primary school youth between 6 and 18 years old. E. The study had a cross-sectional or interventional design with a control group or condition. F. The data were adjusted for confounding factors.

3. Results

Figure 1 shows the flow of the search results through the systematic review process. The initial search retrieved 897 articles that were reduced to 877 by the elimination of duplicates. Subsequently, with examination of titles and abstracts, 89 studies were excluded. In the last step, 757 papers were excluded because the population, age, design, or language did not meet the selection criteria. Therefore, 30 studies were included in the systematic review. Seventeen (56.67%) had a cross-sectional design and thirteen (43.33%) had a longitudinal design. Two (7.4%) of the papers were classified as medium quality and the rest as high quality.

The review covers data from 60,782 primary and secondary students; 7767 students belong to primary education, 44,932 to secondary education, and three studies do not differ in primary or secondary (8144). The sample of the studies ranged from 11 participants [81] to 13,695 [67]. The studies covered 15 different countries of origin. Nine studies were conducted in Spain, four in Italy, four in the United States, two in Lithuania and one study was analyzed in Chile, Belgium, Brazil, China, England, South Korea, Thailand, Turkey, Canada, Portugal and Armenia. Table 3 shows the main characteristics of the studies analyzed before school hours, Table 4 shows the mains characteristics of the studies analyzed during school hours and Table 5 shows the mains characteristics of the studies analyzed after school hours.

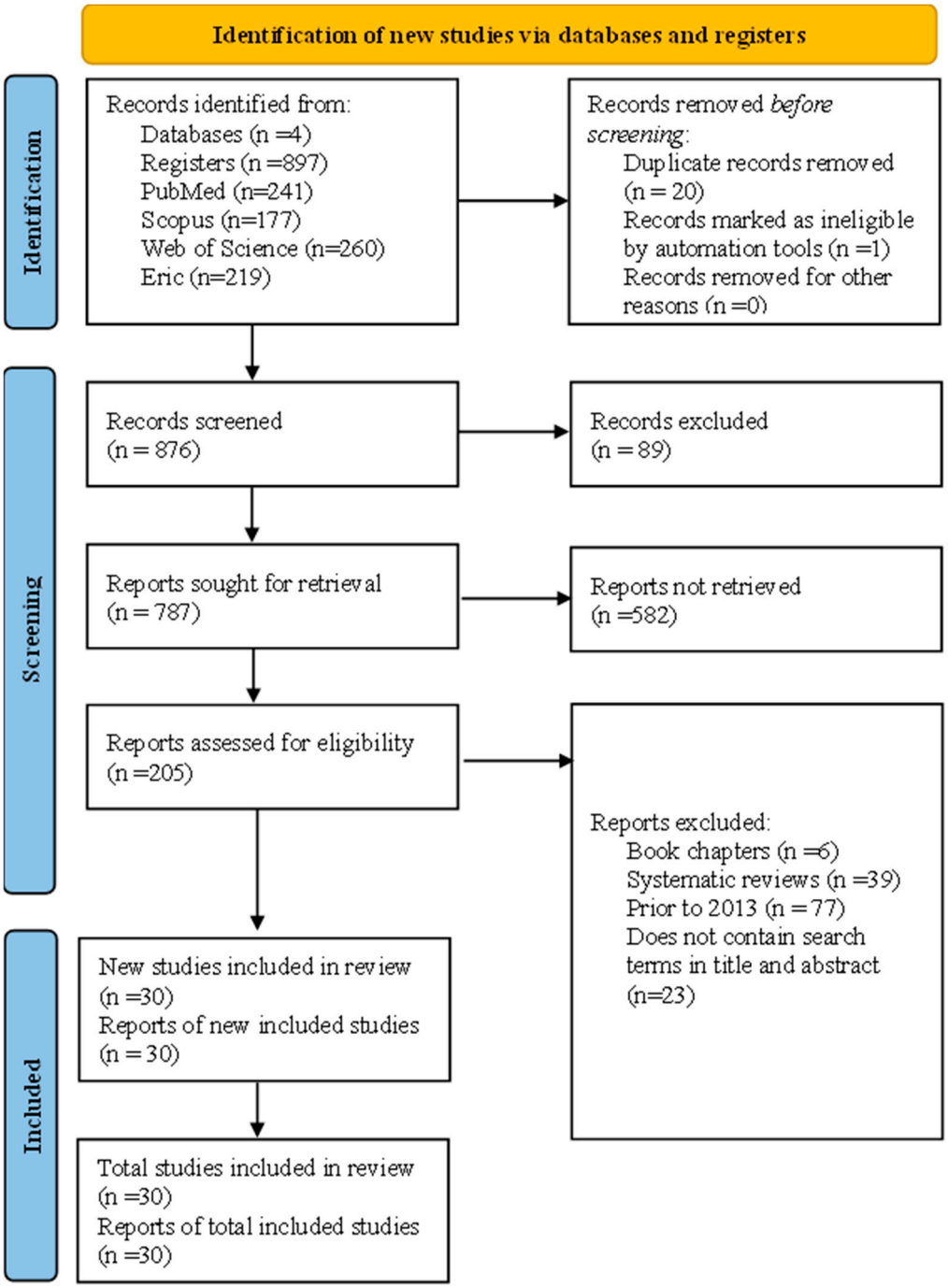


Figure 1. Search results through systematic review process.

Table 3. Main characteristics of the analyzed studies before school hours.

Physical Activity before School Hours						
	Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Cross-Sectional studies	Garnett et al., 2017 [70]/A mixed-methods evaluation of the Move it Move it! before-school incentive-based physical activity programme	Cross-sectional/Move it Move it! (25 min/day, 3 days/week)/No confounders	129 students/8–11 years/United States	Move it Move it! Program: run or walk in playground in school during 25 min/MVPA	Cornell's school climate bullying survey (Cornell, 2015)	Results assessing the relationship between kilometers walked and bullying victimization suggest that students who reported less bullying victimization had, on average, run/walked more kilometers compared to their peers who reported more bullying victimization
Longitudinal studies	Hormazábal-Aguayo et al., 2019 [73]/Can a before-school physical activity program decrease bullying victimization in disadvantaged children? The Active-Start Study	Intervention randomized controlled trial design/Active-Start intervention (30 min/day, 5 days/week, 8 week)/Confounders: age, sex, weight status, PHV and school	146 students/8–10 years/Chile	Two groups: EG (n = 88): Active-Start intervention CG (n = 58): no Active-Start intervention/Daily PA: sports games adapted to the age of the participants, playground games, dancing and other recreational and cooperative activities/MVPA	Scale extracted from the Single School Well-being Questionnaire-CUBE (Ministerio de Educación del Perú—MINEDU, 2013)	The influence of the PA program on the categories of bullying victimization shows a statistically significant reduction in the likelihood of physical bullying (OR = 0.18; 95% CI, 0.04–0.82; $p = 0.027$) and verbal bullying (OR = 0.13; 95% CI, 0.02–0.97; $p = 0.046$) after the 8 weeks

Table 4. Main characteristics of the studies analyzed during school hours.

	Physical Activity during School Hours					
	Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Cross-Sectional studies	Montero-Carretero et al., 2020 [38]/Predicting Bullying through Motivation and Teaching Styles in Physical Education	Cross-sectional design/No confounders	608 students/11–15 years/Spain	Cross-sectional. IV: Support style of the PE teacher. DV: Perpetration and victimization of bullying	The Spanish version of the European Bullying Intervention Project	Autonomy-supportive style negatively predicted bullying perpetration and bullying victimization. These results underscore the potential responsibility of physical education teachers in the fight against bullying, and by supporting autonomy and avoiding a controlling style, they can help reduce bullying perpetration and victimization
	Mannocci et al., 2023 [75]/"Fare male farsi male" project—Are cyberbullying and cyber victimisation associated with physical activity levels? A cross-sectional study in a sample of Italian adolescents	Cross-sectional design/Confounder: sex, age, educational level, time of use of technology, tobacco addiction	2112 students/12–18 years/Italy	Cross-sectional, IV: Cyberbullying. DV: Levels of PA	Italian version of the European Cyberbullying Intervention Project Questionnaire (ECIPQ)	The study indicated that sex was a risk factor for being a victim of cyberbullying, while spending one hour or less on the Internet, not smoking and being female were protective factors against cyberbullying. As for PA at the vigorous level, it seems to be related to less involvement in cyberaggressions
	Benítez-Sillero et al., 2022 [66]/Victimization in bullying and cyberbullying and organized physical activity: The mediating effect of physical self-concept in adolescents	Cross-sectional design/Confounders: gender and age	870 students/12–19 years/Spain	Cross-sectional. IV: Victimization and cybervictimization. DV: PA and physical self-concept	Spanish version of the "European Bullying Intervention Project Questionnaire (EBIPQ)" and the cyberbullying scale of the "European Cyberbullying Intervention Project Questionnaire (ECIPQ)"	A negative relationship was found between PA and both victimization and cybervictimization. Physical self-concept had a stronger relationship with PA in boys

Table 4. *Cont.*

Physical Activity during School Hours					
Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Menéndez-Santurio & Fernández-Río, 2018 [77]/Attitudes towards violence and the important role of students in the physical education classroom	Prospective ex post facto cross-sectional and correlational design/No Confounders	918 students/12–18 years/Spain	Cross-sectional. IV: Students' perceptions of PE classes. DV: Attitudes toward violence in class	"Violence Attitude Level Scale"	Negative correlations were found between the important role of the student body and attitudes towards violence. The results of the linear regression analysis showed that the important role of the student body significantly and negatively predicted attitudes towards gratuitous violence, violence linked to self-protection, and general violence
Roman & Taylor, 2013 [83]/A Multilevel Assessment of School Climate, Bullying Victimization, and Physical Activity	Cross-sectional design, multilevel modeling/Confounders: sociodemographic variables	7786 students/12–16 years/United States	Cross-sectional. IV: bullying victimization. DV: PE class days	To measure bullying victimization Bully/Victim Questionnaire	Students who reported being bullied were less likely to report participating in PA more than 1 day per week. Bullying victimization had a significant negative association with days in PE classes
Corral-Pernía et al., 2018 [66]/Bullying and cyberbullying according to moderate vigorous physical activity (MVPA) in secondary school students	Cross-sectional design/Confounders: age	54 students/12–18 years/Spain	Cross-sectional. IV: Bullying and cyberbullying victim and perpetrator. DV: Moderate to vigorous PA	For measuring bullying "European Bullying Intervention Project Questionnaire (EBIP-Q)", for measuring cyberbullying "European Cyberbullying Intervention Project Questionnaire (ECIP-Q)"	Involvement in bullying was 22.2%. Involvement in cyberbullying was 5.6%. No significant differences were found according to gender in relation to involvement in bullying or cyberbullying. The average time spent performing moderate to vigorous PA (MVPA) was 810.76 min per week. No significant correlations were found between MVPA and bullying or cyberbullying

Table 4. *Cont.*

	Physical Activity during School Hours					
	Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
	Rojo-Ramos et al., 2024 [82]/Impact of motor self-efficacy on cyberbullying in adolescents and pre-adolescents in physical education	Cross-sectional design with convenience sampling/No confounder	1232 students/8–18 years/Spain	Cross-sectional. IV: Motor Self-Efficacy. DV: Cyberbullying	The European Cyberbullying Intervention Project Questionnaire (ECIP-Q)	The higher the level of self-efficacy, the lower the level of abuse and victimization. Therefore, physical activity could be considered to act as a regulator of cyberbullying
Longitudinal studies	Philippot et al., 2021 [81]/Effect of Physical Exercise Training on Bullying and Depression in a Classroom: A Case Report	Intervention, randomly selected design/(50 min/day, 4 days/week, 5 week)/No confounders	11 students/9–11 years/Belgium	Program of physical activity low or moderate-high intensity: games that feeling of movement, postural control, awareness of body, and slow relay races with balancing, mime games, and walk/run plays while perpetuating equilibration, and cooperative, interactive games focused on fun and social contact without a focus on performance	Self-perception profile for children was used in its French version to document the way each child assessed his skills (social, athletic, school, physical, behavioral, and self-esteem) before and after the intervention (Harter, 1985)	A five-week program of low- to moderate-intensity physical exercise was able to reduce symptoms of depression and anxiety in a nonclinical sample of preadolescents attending elementary school. The intervention appeared to be especially beneficial for a bullied individual
	Aguilar-Herrero et al., 2021 [20]/Effectiveness of educational program in physical education to promote socioaffective skills and prevent violence in primary school	Intervention, quasi-experimental design/(60 min/day, 2 days/week, 6 week)/No confounders	58 students/10–12 years/Spain	Physical activity program based on Corporal Expression	Socio-affective skills questionnaire for secondary school students (Armada-Crespo, 2017)	Comparison of means after the intervention (posttest) showed differences for the dimensions of social relationship ($p = 0.000$), respect-responsibility ($p = 0.001$), self-esteem ($p = 0.000$) and aggression victimization ($p = 0.000$)

Table 4. *Cont.*

Physical Activity during School Hours					
Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Oliveira et al., 2017 [19]/Cooperative games as a pedagogical strategy for decreasing bullying in physical education: notable changes in behavior	Intervention quasi-experimental design/(60 min/day, 2 days/week, 12 weeks)/No confounders	120 students/9–11 years/Brazil	Physical activity program based on cooperative games	Two behavior log sheet, verbal aggression, physical aggression	The cooperative games managed to reduce the cases of physical and verbal bullying in an expressive way. For verbal bullying before the intervention, means were calculated as 21 $\pm$ 5.7 events and after 3.2 $\pm$ 1.92 (p = 0.0002)
Benítez-Sillero et al., 2020 [62]/Intervention programme to prevent bullying in adolescents in physical education classes (PREBULLPE): a quasi-experimental study	Longitudinal, ex post facto, quasi-experimental, pre–post design/(60 min/day, 5 days/weeks, 3 weeks)/Confounders: sex and school grade	764 students/12–19 years/Spain	Two groups: EG (n = 439): program to prevent bullying in adolescents in physical education classes (PREBULLPE) CG (n = 325): no program PREBULLPE	Spanish version of the European Bullying Intervention Project Questionnaire (EBIPQ)	Victimization and aggression in bullying and cybervictimization decreased significantly more in the quasi-experimental group than in the control group
Mayfield et al., 2017 [76]/Effectiveness of a Playground Intervention for Antisocial, Prosocial, and Physical Activity Behaviors	Longitudinal cluster-randomized design/(15 min/day, 5 days/week, 8 weeks)/No confounders	3588 students/8–11 years/United States	Four groups: two experimental groups: EG: Peaceful Playground Two control groups: no intervention of Peaceful Playground	Activity levels of students were assessed by direct observation using SOPLAY	The main influence of the intervention indicated no differences in sedentary behaviors or MVPA between the intervention and control schools. A significant increase in prosocial verbal interactions was observed in control schools, contrary to expectations
Carraro et al., 2014 [64]/Brief report: Play fighting to curb self-reported aggression in young adolescents	Longitudinal, ex post facto, quasi-experimental/pre–post design/(45 min/day, 2 days/week, 4 weeks)/No confounders	210 students/13–15 years/Italy	Two groups: EG (n = 103): wrestling games program. CG (n = 107): volleyball lessons	AQ-12 (Aggression Questionnaire) to measure aggression	A significant effect over time was found on the AQ-12 subscales pre- and post-intervention. In the fighting game group, but not in the volleyball group, there was a significant decrease in all subscales of the AQ-12: Physical Aggression, Verbal Aggression, Anger, and Hostility. All were large effects with Cohen's d > 0.50

Table 4. *Cont.*

Physical Activity during School Hours					
Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Fung & Lee, 2018 [69]/Effectiveness of Chinese Martial Arts and Philosophy to Reduce Reactive and Proactive Aggression in Schoolchildren	Longitudinal, quasi-experimental design/pre-post design, (90 min/day, 1 day/week, 24 weeks)/No confounders	3511 students/8–10 years/China	Four groups: G1: skills only G2: philosophy only G3: skills and philosophy G4/CG: Physical fitness Chinese martial arts training, specifically Choy Li Fut, combined with philosophical training	Reactive-Proactive Aggression Questionnaire (RPQ) to assess aggression. In addition, the Child Behavioral Checklist-Youth Self-Report (CBCL-YSR) was used to assess behavioral problems, including aggressive behavior	Skills and philosophy training was the most effective intervention. Specifically, when the three types of martial arts intervention groups were compared with the placebo fitness group, only the skills and philosophy condition showed a significant reduction in self-assessments of reactive and proactive aggression, delinquent behavior, anxious/depressed symptoms, and attention problems at post-test and/or 6-month follow-up compared with baseline scores
Montero-Carretero et al., 2021 [78]/A-Judo: An Innovative Intervention Programme to Prevent Bullying Based on Self-Determination Theory—A Pilot Study	Longitudinal quasi-experimental design/(50 min/day, 2 days/week, 5 weeks)/No confounders	79 students/11–12 years/Spain	Two groups EG (n = 42): intervention program was called "A-Judo Programme". CG (n = 37): no information received	Spanish version of the "European Bullying Intervention Project Questionnaire (EBIP-Q)"	Significant changes with moderate to high effect sizes were observed in basic psychological needs, motivation, tolerance-respect, moral identity and bullying

Table 5. Main characteristics of the studies analysed after school hours.

	Physical Activity after School Hours					
	Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Cross-Sectional studies	Vveinhardt & Fominiene, 2022 [86]/Prevalence of bullying and harassment in youth sport: The case of different types of sport and participant role	Cross-sectional design/No confounders	1440 students/16–29 years/Lithuania	Cross-sectional. IV: Types of sports. DV: Bullying behavior in sports	"Bullying and harassment in sport questionnaire (BHISQ)". This questionnaire is based on several adapted scales, including the Illinois Bully Scale	In individual sports, three-fourths of respondents ascribe to one of three bullying-related roles, while one-fourth ascribe to none of the roles In combat sports, nearly four-fifths of respondents identify themselves as victims, observers or bullies. In team sports, two out of three respondents ascribe to one or more roles related to bullying. Almost one third of team sports participants identified themselves as victims. The highest manifestation of bullying occurs in team sports, where almost one-fifth of the respondents attributed themselves as bullies against members of their own team
	Holbrook et al., 2020 [72]/Sport participation moderates association between bullying and depressive symptoms in Italian adolescents	Cross-sectional based on data collected between February and April 2005/No confounders	4829 students/13–21 years/Italy	Cross-sectional. IV: Frequency of participation in sports. DV: Bullying victimization and depressive symptoms	EDIT (Epidemiology of Road Traffic Accidents) Questionnaire.	It was found that 18.7% of the students reported having been victims of bullying in the last year. Participation in sports had a buffering effect on the relationship between bullying and depressive symptoms
	Widyastari et al., 2022 [87]/Results from the Thailand 2022 report card on physical activity for children and youth	Cross-sectional, multistage random sampling/No confounders	6078 students/5–17 years/Thailand	Cross-sectional. IV: daily PA indicators and practices. DV: stress, anxiety, bullying	Subjective questionnaire of students on whether they had experienced any form of violence, scolding or insult, either intentional or unintentional, that made them feel unhappy, embarrassed, stressed and worried to the point of not wanting to go to school	During the pandemic, only 27% of Thai youths performed 60 min of PA daily. Fifteen percent accomplished less than 2 h of recreational screen time. 68% experienced bullying, affecting their desire to attend school. Two-thirds reported mild anxiety, and one-third, severe anxiety
	Savucu et al., 2017 [84]/Analysis on the Bullying Tendencies and Value Preferences of High School Students According To Level of Receiving Physical Education and Sports Course	Cross-sectional. Sample survey/No confounders	613 students/12–16 years/Turquía	Cross-sectional. IV: Physical education and sports course DV: Harassment trends and value preferences	"Harassment Tendencies Scale" developed by Dölek	Bullying tendencies differed by gender, number of physical education and sports courses, and family income. There is a moderate negative relationship between value scores and bullying tendencies. Students who take 6 or more hours of physical education and sports show greater bullying tendencies. Despite more hours of physical education, bullying tendencies are high in certain groups of students

Table 5. *Cont.*

Physical Activity after School Hours					
Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Case et al., 2016 [65]/Bullied Status and Physical Activity in Texas Adolescents	Cross-sectional based on data from the 2009–2011 SPAN (School Physical Activity and Nutrition) study/No confounder	6158 students/14–16 years/United States	Cross-sectional. VI: Harassment status. DV: PA recommendations	World Health Organization's School-Age Children's Health Behavior Survey	The results indicate that not meeting PA recommendations differed by gender and the interaction between bullying status and weight status. These findings illustrate possible differences in the associations between bullying status and not meeting PA recommendations among normal-weight, overweight, and obese adolescents, as well as between girls and boys
Benítez-Sillero et al., 2021 [21]/Relationship between Amount, Type, Enjoyment of Physical Activity and Physical Education Performance with Cyberbullying in Adolescents	Descriptive and cross-sectional design with non-probability based sampling/No confounder	867 students/12–19 years/Spain	Cross-sectional. VI: quantity, type and enjoyment of PA and Performance in Physical Education. DV: Cyberbullying in adolescents	Spanish version of European Cyberbullying Intervention Project Questionnaire (ECIPQ)	Lower participation in cyberaggressions of girls who do participate in physical activities in an organized way. There was significance in PA in their free time on this occasion with cybervictimization values
Evans et al., 2016 [68]/Bullying Victimization and Perpetration Among Adolescent Sport Teammates	Cross-sectional design/Confounders: gender of coach, gender of athlete, and type of sport	359 students/13–17 years/Canada and the United States	Cross-sectional. VI: Bullying behaviors. DV: Connections and relationships within the sports context	"Bullying in Sport Questionnaire (BSQ)", "Health Behaviors in School-aged Children (HBSC)" and the "Adolescent Peer Relations Instrument (APRI)"	Athletes who identified themselves as victims reported being bullied by their teammates, while athletes who identified themselves as perpetrators of bullying identified with their coach. Bullying and victimization occurred less frequently in sport with school, and in some cases were more frequent among males, on teams with a male coach, and in team sports compared to individual sports
Vveinhardt & Fominiene, 2020 [85]/Gender and age variables of bullying in organized sport: Is bullying "grown out of"?	Cross-sectional design/No confounders	382 students/16–29 years/Lithuania	Cross-sectional. IV: Participation in organized sports. DV: experience of bullying and harassment in sports	"Bullying and Harassment in Sport Questionnaire" (BHISQ)	Males showed a greater tendency toward antisocial and aggressive behaviors in sport compared to females. In addition, men experience and participate in bullying situations more frequently than women. Previous experiences of bullying are similar between genders, but men highlight more experiences in previous teams

Table 5. *Cont.*

	Physical Activity after School Hours					
	Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
	Nery et al., 2018 [79]/Bullying in youth sport training: A nationwide exploratory and descriptive research in Portugal	Cross-sectional design. Exploratory and descriptive research at the national level/Confounders: Type of sport, geographic area of the sports club, age of athletes, number of years in sports, number of friends in the peer group	1458 students/6–18 years/Portugal	Cross-sectional: IV: Participation in sports and sports training. DV: Incidence and nature of bullying behaviors in adolescent athletes	"Sport Violence Study and Prevention Questionnaire: Bullying in Sport"	About 10% of the athletes reported being victims, 11% participated in bullying episodes as bullies and 35% as bystanders. Harassment episodes were generally characterized by low frequency and duration and were most often verbal harassment within the sports club. However, when episodes were repeated and of long duration, this tended to generalize to multiple types of bullying (especially verbal and social) and multiple locations where episodes occurred, in sports clubs and also in competitions
Longitudinal studies	Greco 2021 [71]/Multilateral teaching in physical education improves resilience and self-efficacy in adolescents and could help reduce bullying behaviors	Longitudinal, quasi-experimental design/(90 min/day, 2 days/week, 12 weeks)/No confounders	60 students/14–16 years/Italy	Two groups: EG (n = 30): Psychoeducational activities program combined with physical exercise training and team games. CG (n = 30): No intervention program	The study used the Child and Youth Resilience Measure (CYRM-28) to assess various aspects of resilience and the Self-Efficacy Questionnaire for Children (SEQ-C) to measure different facets of self-efficacy	Significant improvements were found for resilience and self-efficacy scales in the experimental group. These results may help in the improvement of bullying behaviors
	Park et al., 2017 [80]/Effects of physical education, extracurricular sports activities, and leisure satisfaction on adolescent aggressive behavior: A latent growth modeling approach	Longitudinal design/Latent Growth Model (LGM) approach and secondary data from KYPS (Korea Youth Panel Survey), annual survey/No confounders	2647 students/12–18 years/South Korea	Latent growth model	The scales were adopted from the KYPS, as their validity and reliability had been previously confirmed	Adolescents' aggressive behavior decreased over time. The rate of change was significantly greater in females than in males. Extracurricular sports activities and leisure time satisfaction had a positive influence on this change in aggression

Table 5. *Cont.*

Physical Activity after School Hours					
Authors/Year/Title	**Study Design/Intervention (Duration)/ Confounders**	**Sample/Age (Years)/ Country**	**Groups/Physical Activity Measures/Intensity**	**Bullying Measures**	**Results**
Driessens, 2015 [67]/Extracurricular activity participation moderates impact of family and school factors on adolescents' disruptive behavioral problems	Longitudinal based on secondary data from the Longitudinal Study of Young People in England/No confounders	13,695 students/13–17 years/England	Intervention and experimental groups were not specified	The questionnaire used to measure bullying in the study was based on four yes/no questions identified by Mynard & Joseph as the major types of bullying	Associations were found between school factors, family factors, participation in extracurricular activities and the presence of disruptive behavior problems. Extracurricular activities attenuated the impact of school and family factors on the presence of disruptive behavior problems
Khitaryan et al., 2024 [74]/Judo as an alternative intervention model to prevent bullying at schools: a pilot study	Longitudinal design/(60 min/day, 1 day/week, 16 weeks)/No confounders	61 students/10–13 years/Armenia	Two experimental groups are presented. No control group	The Spielberger-Khanin State-Trait Anxiety Inventory, the D. Olweus Bullying Questionnaire, and a self-developed questionnaire aimed at self-assessment of qualities such as anxiety, physical and verbal aggression, etc.	This pilot study provides preliminary evidence that judo can serve as an effective alternative intervention for bullying prevention in schools. Judo has been found to be effective in helping individuals avoid bullying, largely due to its emphasis on self-defense, discipline, and confidence-building

3.1. Influence and Effect of PA before School Hours on Bullying and Cyberbullying

In relation to PA before school hours, the scientific literature is scarce. Only two studies have been found. The first study has a cross-sectional design. In this study, active travel to school was associated with bullying levels. It showed that students who traveled more distance by active travel suffered less bullying than those who traveled less [70]. The second study has a longitudinal design, specifically, a randomized controlled trial. The intervention was conducted with 30 min daily for 8 weeks, with a control and an experimental group. The results of this work exposed that those students who completed the 8-week program significantly reduced the probability of suffering bullying [73].

3.2. Influence and Effect of PA during the School Day on Bullying and Cyberbullying

Regarding PA within the school day and its influence and effect on bullying and cyberbullying, 15 studies were analyzed, seven of which had cross-sectional designs and eight longitudinal designs. First, the cross-sectional studies explore the correlations between PA, bullying and cyberbullying, and various risk and protective factors in the PE classroom. Montero-Carretero et al. [38] identify a negative relationship between an autonomy-promoting teaching style and the incidence of bullying. Mannocci et al. [75] identified that vigorous PA practice proved to be a protective factor, reducing the risk of cyberbullying. However, they argue that gender may be an important risk factor for cyberbullying, noting that women tend to be more vulnerable in these contexts. Benítez-Sillero et al. [63] and Menéndez-Santurio & Fernández-Río [77] support the findings on the benefits of PA, observing negative relationships between regular exercise and more positive perceptions towards physical education classes, which were associated with a decrease in both levels of victimization and attitudes towards violence. Roman & Taylor [83] suggest that a higher frequency of PE classes could be associated with a reduction in bullying victimization. This phenomenon could be related to the results of Rojo-Ramos et al. [82], who found negative relationships between the level of self-efficacy and victimization. However, Corral-Pernía et al. [66] found no significant correlations between moderate to vigorous intensity PA and bullying or cyberbullying, indicating that the relationship between PA and these behaviors may be complex.

On the other hand, PA-based interventions show a general trend towards reducing bullying and improving symptoms related to depression and anxiety. These interventions vary in terms of duration, frequency and type of activity, ranging from body expression programs to cooperative games, active recess or combat sports. The studies by Philippot et al. [81], Aguilar-Herrero et al. [20], Oliveira et al. [19] and Benítez-Sillero et al. [62], study PA stimuli in the PE classroom. In these studies, they highlight significant improvements in participants' behavior and highlight a significant reduction in bullying behavior through a quasi-experimental approach, emphasizing the potential efficacy of PA. However, Mayfield et al. [76] studied active recess encouragement and found no significant differences, suggesting the need for further research.

Lastly, research on combat sports applied fighting games, achieving a significant decrease in aggression after eight intervention sessions [64]. In a similar vein, Fung & Lee [69] highlighted the use of martial arts to mitigate reactive and proactive aggression, as well as emotional and attention problems, and Montero-Carretero et al. [78] focused on judo as a means to foster basic psychological needs and reduce bullying, with sessions designed to improve motivation, tolerance and respect.

3.3. Influence and Effect of after-School PA on Bullying and Cyberbullying

Finally, to analyze the influence and correlation of after-school PA on bullying and cyberbullying, 13 studies were analyzed, nine of which had cross-sectional designs and four longitudinal designs. The cross-sectional studies analyzed provide a broad view on the relationship between participation in extracurricular sports activities, and their impact on youth bullying.

Benítez-Sillero et al. [21] examined the relationship between PA and cyberbullying, finding differences in victimization according to the amount and type of PA practiced. In accordance with these results, Vveinhardt & Fominiene [86] exposed that bullying behaviors vary according to the type of sport practiced. In this line, Holbrook et al. [72] identified that team sports practiced after school hours can buffer the negative impact of bullying on the depressive symptoms of young people. For their part, Nery et al. [79] offered an exploratory view on the incidence of bullying in athletes, suggesting that about 50% of athletes are participants in bullying problems in their different roles.

From another perspective, Widyastari et al. [87] linked the daily practice of moderate to vigorous intensity PA with a reduction in the levels of stress, anxiety and bullying. Similarly, Savucu et al. [84] identified a negative correlation between school PA practice and bullying tendencies.

Additional studies such as Case et al. [65] observed that adherence to PA recommendations varied by sex and bullying status. Evans et al. [68] and Vveinhardt & Fominiene [85] investigated bullying dynamics in sport contexts, highlighting sex differences in favor of girls in antisocial and aggressive behaviors. Thus, these studies collectively underline the complex interaction between PA and bullying, highlighting the need for differentiated approaches depending on the type and amount of PA and sex-sensitive approaches in sport and educational program design.

In turn, the longitudinal studies reviewed provide an overview of the impact of various PA and educational programs on aggressive behavior and bullying among young people. Park et al. [80] used the latent growth model to show that regular participation in PA after the school day can decrease aggressive behavior over time. On the one hand, team sports have also shown significant benefits: Greco [71] observed how a twelve-week team game program produced improvements in participants' resilience and self-efficacy, suggesting that these activities are effective anti-bullying strategies. On the other hand, another study shows that individual sports that foster self-defense, discipline and confidence, such as judo, can both prevent and help to avoid bullying (Khitaryan et al.) [74]. Finally, Driessen [67] examined how school and family factors can influence disruptive behavior problems in after-school activities.

3.4. Influence of Covariates on the Effect of PA Stimuli at Different Times of the Day on Bullying and Cyberbullying

This systematic review has observed that 27.58% of the studies analyzed used confounding variables. The most commonly used covariates were socioeconomic status through maternal education [62,68,73,75,79] and participation in school-based bullying prevention programs [63,73]. Studies such as Benítez-Sillero et al. [62] and Hormazábal-Aguayo et al. [73] have shown that there is an influence of the mother's educational level and participation in school programs on victimization and bullying. On the other hand, sex appears as another important covariate [62,68,75,79]; however, two studies show no differences by sex [73,79]. Most of these studies found a greater effect of physical exercise on bullying prevention in girls than in boys [63,68,75].

The effect of sex suggests that the association between more time spent in PA and less victimization is more frequent in adolescent girls than in boys [66]. However, only one study associates more vigorous PA with better bullying prevention in boys [79]. This trend in favor of girls could be explained by the dose-response effect, i.e., boys are more active than girls and, therefore, the stimulus achieved, due to lower levels of PA, may not be sufficient to produce the same effect on bullying prevention in both sexes. Other possible covariates that could affect the association of PA with bullying prevention are the economic status of the student's household [75], heart rate [62], age [68,73], or body mass index (BMI) [66,68,79]. Research highlights the critical importance of including covariates to understand complex relationships between PA and bullying [66,79].

4. Discussion

The present systematic review aimed to analyze the influence and effect of PA stimuli before, during and after school hours on bullying and cyberbullying in students aged 6 to 18 years. A total of 30 studies with cross-sectional and longitudinal designs conducted between January 2013 and July 2024 met the inclusion criteria. In general, cooperative PA programs, team, body expression, body-to-body or group dynamics applied at different times of the day, have shown effectiveness in reducing bullying victimization and improving related aggression behaviors, as well as alleviating adverse psychological factors derived from bullying.

4.1. Physical Activity before School and Its Influence and Effect on Bullying and Cyberbullying

The results of the present systematic review show that students who perform PA programs before school significantly reduce school victimization [70,73]. Additionally, it has been shown that the practice of morning PA induces more significant changes in the brain, both at the molecular level and in brain function [88]. This phenomenon enhances cerebral blood flow by practicing PA [89] and is produced by a contraction of muscles, which leads to the release of messenger substances such as hormones or biochemical compounds into the blood [90,91]. These substances travel to the brain and induce various processes, including the release of neurotransmitters such as dopamine, serotonin, and norepinephrine [92,93]. These neurotransmitters are crucial for stress regulation and/or reward processes [94,95]. In addition to a higher integral activation of the subject early in the morning that could result in better socio-behavioral improvements [91].

From a psychosocial approach, group PA can also foster a sense of social cohesion and belonging, factors that are fundamental to improving interpersonal relationships among students [96]. The creation of these bonds can conditionally reduce bullying behaviors by strengthening supportive networks and mutual respect among participants [73]. In addition, PA contributes to improving self-esteem and self-efficacy, which may empower students to deal more assertively with conflict or bullying situations, and deter bullies from continuing their behaviors due to the change in power dynamics and trust within the group [97].

4.2. Physical Activity during the School Day and Its Influence and Effect on Bullying and Cyberbullying

PA during the school day is related to significant improvements in bullying behaviors, reduction in depressive symptoms, and strengthening of social relationships, responsibility, and self-esteem in boys and girls [19,20,62,63,72,75,77,81,83,87]. These results contrast with studies that indicate a relationship between lack of PA and an increased risk of school bullying, aggression, depression and anxiety [3,98–100], while others find no significant differences [23,66,76].

Bullying behaviors can be exacerbated or mitigated by factors such as teaching style, which when supportive of autonomy, promotes constructive conflict resolution as opposed to a more controlling style that can increase frustration and aggression among students [38]. Social and cultural expectations about sex roles, as well as the amount of PA, weight status, and family income, also influence school behavior [65,82,84]. Studies by De Luca et al. [101], Wang et al. [102] and Wei & Graber [32] corroborate that socioeconomic status and teaching style significantly affect bullying levels, highlighting that regular participation in PA can develop better social skills and self-esteem, contributing to a safer and more respectful school environment.

Teachers specialized in PE positively value the incorporation of exercise in the school routine for its psychosocial benefits. During exercise, endogenous endocannabinoids and opioids such as enkephalins, endorphins and dynorphins are released, which improve the functioning of the central nervous system and promote a balance between neurotoxic quinurenine and neuroprotective quinurenic acid, reducing disruptive behaviors [92,103,104].

These physiological changes may improve mood and foster greater emotional resilience, resulting in better conflict management and a reduction in the incidence of bullying.

In conclusion, the practice of PA not only improves the physical condition of students, but also enhances positive motivations and attitudes, reducing the incidence of school bullying [105]. In addition, it fosters respect, empathy and assertiveness [106,107]. The inclusion of sports and games that promote cooperation over competition is crucial, as it facilitates the internalization of core values and enhances socioemotional skills, creating an environment of mutual respect that can effectively prevent bullying and cyberbullying [57].

4.3. Physical Activity after School Hours and Its Influence and Effect on Bullying and Cyberbullying

After-school PA practice has been found to contribute to reduced levels of bullying, with significant variations by sex [32]. This variability in associations may be attributed to differences in the nature of bullying, whether traditional or cyberbullying, the predominant means used by each sex, and the psychological impact that bullying may have on the student body [108]. In turn, some authors have considered the practice of PA after school, specifically combat or team sports, as beneficial for the reduction of bullying and disruptive behaviors [49,109].

Additionally, this review has observed differences in bullying typologies depending on the role given to students in the sport context (participants in team sports, leaders, captains or substitutes and participants in individual sports) [37,46,77]. For example, according to Pill & Slee [110] and Salimi et al. [111] team games improve resilience, self-efficacy and reduce bullying levels [71] by promoting inclusion, mutual respect and empathy [112]. However, there is evidence that team sports can also perpetuate bullying behaviors [113,114] while individual sports such as wrestling, martial arts or judo tend to significantly reduce aggression [64,69,74,78] due to improved self-esteem and self-confidence [115]. Marracho et al. [46], for their part, expose that, depending on the work or level of demand of the athlete, individual sports can show bullying behaviors due to high levels of stress and anxiety.

Previous studies suggest that participation in structured and well-supervised after-school PA may be instrumental in promoting prosocial behavior and mitigating bullying [21,71,84]. Such correlations could be attributed to neuroplasticity mechanisms, involving increased gray matter volume in frontal areas and the hippocampus [116,117]. In addition, PA is reported to promote the release of neurotrophic factors and contribute to improved cerebrovascular health [117], with these changes being reflected in improved cognitive and behavioral functions [104] that may lead to increased empathy and prosocial behaviors among students, thus reducing bullying situations.

4.4. Inclusion of Covariates between Physical Activity and Bullying/Cyberbullying

Finally, the inclusion of covariates can provide a more detailed and nuanced analysis of the relationships between the main variables [118]. In this systematic review, studies such as those by Hormazábal-Aguayo et al. [73], Benítez-Sillero et al. [62,63], Mannoci et al. [75], Corral-Pernía et al. [66], Roman & Taylor [83], Evans et al. [68] and Nery et al. [79], evidence how the inclusion of covariates enriches the understanding of the dynamics between PA practice and the incidence of behaviors such as bullying, victimization and aggression, both in physical and digital environments. However, those studies included in this work that do not include covariates present significant associations that we do not know if they are mediated by other important variables. The non-inclusion of covariates may be due to methodological limitations, such as complexity in study design, difficulty in collecting additional data, and the challenge of advanced statistical analysis. Therefore, it is relevant to incorporate covariates to understand more precisely the dynamics that affect bullying behaviors, thus improving the effectiveness of educational interventions.

4.4.1. Practical Recommendations

General recommendations for addressing bullying and cyberbullying through PA may share common elements; however, some interventions may be more effective in specific groups due to developmental differences [22]. In primary education, interventions that emphasize collaboration and empathy in inclusive physical activities may be more appropriate for fostering early social skills [24], while in secondary education, where adolescents experience more complex social dynamics and greater use of technology, more personalized strategies that include approaches to emotional resilience and digital competence may be necessary [21]. The observed developmental differences suggest that future research should focus on exploring how cognitive, emotional and social changes at various stages of childhood and adolescence influence the effectiveness of interventions [119]. Considering these aspects could enrich the understanding of how to adapt bullying and cyberbullying prevention and mitigation strategies according to the developmental stage of students [120].

Based on the entire systematic review, a table summarizing the main recommendations for practical application to mitigate or reduce bullying behaviors through PA stimuli before, during or after the school day is presented (Table 6). This table is intended to serve as a valuable tool for educators, parents and education, PA and health professionals in the formulation of effective programs and policies that promote more inclusive, safe and healthy school environments for young people.

Table 6. Recommendations for physical activity before, during and after school time, to produce short and long-term results on bullying or cyberbullying in children or adolescents.

Time and Type of Physical Activity	Program	Type/Time/Program Intensity	Consequences on Bullying or Cyberbullying
Physical activity before school hours			
Active commuting to school	Move it Move it! (https://doi.org/10.1177/0017896916652432)	Active commuting to school: 25 min/day, 3 days/week/moderate intensity • Pedibus (school transportation on foot, where students are picked up to go to school by means of established routes and stops). • PiEfcitos Path (through active displacement, students achieve symbolic distances to be able to go to other centers and get rewards).	Reduction of problem behaviors, such as bullying, which contributes to a positive school climate.
Sports, cooperative and recreational games	Active-Start intervention (https://doi.org/10.1016/j.ijchp.2019.05.001)	Sports and cooperative games: 30 min/day, 5 days/week/moderate to vigorous intensity • Capture the flag game (the objective is to capture the opposing team's flag, and then move it back to your base next to yours to win the game). • Relay race (one child runs a certain distance, then passes the Witness to the next and so on until the race distance is completed). • Parachute game (participants move the parachute until the wave moves the ball in a circular path, preventing it from falling).	Lower levels of bullying victimization and improved school climate and pro-social environment.
Physical activity during school hours			
Active recess	Physical activity based on popular games and playful games. (https://doi.org/10.1111/josh.12506) (These same stimuli can be adapted and applied in a reduced version to active breaks and physically active classes)	Popular games, 15 min/day, 5 days/week/moderate to vigorous intensity • Hopscotch game (jumping on one or two legs, depending on the number of boxes at that level, you must avoid stepping on the box where the stone is. Once passed, you stop at a rest, remove the stone and continue jumping until the end). • Four corners game (one person is placed in each corner and another in the center, those in the corners must move from one side to the other or change corners, the player who is in the center must try to place himself in one of the corners that is free, and so the one who is left without a corner will be the one who is placed in the center). • Team handkerchief game (the person with the handkerchief will call out a number, the member of each team with that number must run to get the handkerchief and bring it back to where it was).	Reduced bullying, improved conflict resolution and increased self-regulatory behaviors.

Table 6. *Cont.*

Time and Type of Physical Activity	Program	Type/Time/Program Intensity	Consequences on Bullying or Cyberbullying
Physical Education Classes	Low to moderate intensity physical exercise program of cooperative and interactive games focused on fun and social contact. (http://doi.org/10.21926/obm.icm.2101002)	Cooperative games: 45 min/day, 4 days/week/low to moderate exercise intensity • Human figures (using their bodies and interacting with the bodies of their peers, they must create figures that represent an object). • Ball circle (pass the ball around the circle without dropping it on the ground, following certain rules, such as using only the feet or passing it in a specific direction). • Human Maze (the team must guide a blindfolded team member through a maze made of sports equipment with verbal instructions).	Effective in decreasing bullying tendencies in children and reduction in symptoms of depression and anxiety.
	Physical activity program based on Corporal Expression (https://doi.org/10.47197/retos.v0i41.82683)	Musical games, choreographies and theatrical games: 60 min/day, 2 days/week/moderate intensity • Who am I? (Mime games and theatrical performance). • Group choreography, chain dance. • Simon says (the organizer is Simon. The other children should gather around Simon, who gives instructions by saying, "Simon says..." telling the children to perform a physical action. Each child must perform the action. If the phrase is not preceded by "Simon says" the action must not be performed).	Bullying prevention measure and reinforcement of emotional behavior by strengthening interpersonal relationships among students, favoring their social skills and competencies.
	Cooperative games program (https://doi.org/10.7752/jpes.2017.03162)	Cooperatives games: 60 min/day, 2 days/week/moderate intensity • Weighted relay race (each team receives a mat. They must use the mat to carry a teammate without the person on the mat touching the ground). • Treasure hunt (this game focuses on finding an object cooperatively. Players solve clues to advance to the next step and ultimately find the treasure). • Cooperative Gymkhana (set of tests of skill or ingenuity performed in groups or teams along a course with a recreational objective).	Reducing physical and verbal harassment cases and aggressive attitudes.

Table 6. *Cont.*

Time and Type of Physical Activity	Program	Type/Time/Program Intensity	Consequences on Bullying or Cyberbullying
	Physical activity program based on methodological strategies of the physical education area (PREBULLPE). (https://doi.org/10.1080/17408989.2020.1799968)	Cooperative games, body expression games, motor story, symbolic games, relay games and competitive games: 45 min/day, 2 day/week/moderate to vigorous intensity • Animal race (each team must move like a specific animal (e.g., jump like a kangaroo, run like a cheetah, crawl like a crab) through an obstacle course). • Symbolic games (teams simulate a space mission. They must "navigate" through different stations representing planets, performing specific tasks at each station, such as collecting "rock samples" (balls) or overcoming a "meteor storm" (avoiding moving obstacles)). • Balloon battle (students are divided into two teams and each team has a number of balloons in their "territory". The goal is to launch the balloons into the opposing territory and prevent them from falling into their own. If a balloon lands in the territory, it must be thrown again).	Reducing bullying, victimization and aggression and cyberbullying victimization.
	Intervention program based on fighting games (https://doi.org/10.1016/j.adolescence.2014.09.009)	Body-to-body games and situations involving touching, physical contact and opposition: 45 min/day, 2 days/week/moderate to vigorous intensity • The sumo of balls (a large circle is drawn on the floor and a large ball is placed in the center. Two students compete to push the ball out of the circle using only their bodies without using their hands). • Contact race (students pair up and sit on the floor, back to back, with their arms interlocked. They must stand up together and move in coordination toward the goal, moving forward without letting go of each other). • The circle of strength (students form a circle and hold hands. In the center, one student tries to break the circle while the others try to keep it closed).	Prevent and reduce bullying behaviors and reduce aggressive behaviors.
	Program of Chinese Martial Arts and Philosophy (https://doi.org/10.1097/DBP.0000000000000565)	Martial skills, defense techniques and attack techniques: 90 min/day, 10 sessions/week/moderate to vigorous intensity • Karate circuit (students rotate through different stations, each focusing on a specific karate skill). • Self-defense (students practice self-defense techniques against multiple attackers. They learn to move strategically, use blocking and deflecting techniques, and remain calm under pressure). • Martial arts training (Taekwondo, Muay Thai, Jiu-jitsu, Kickboxing, Aikido, Capoeira, Sambo, Savate, Kendo).	Significant reduction in self-assessments of reactive and proactive aggression, delinquent behavior, anxiety/depressive symptoms, and attention problems.

Table 6. *Cont.*

Time and Type of Physical Activity	Program	Type/Time/Program Intensity	Consequences on Bullying or Cyberbullying
	A-Judo Program (https://doi.org/10.3390/su13052727)	Group dynamics, brainstorming, debates, guided discussions, viewing of videos, role-playing, critical reflections or case studies: 50 min/day, 2 days/week/moderate to vigorous intensity • Judo training (students practice judo techniques, focusing on throws, takedowns and ground control). • Card Castle Challenge (students are divided into teams and must build a card castle in a set amount of time. Each team must move around the area looking for and collecting hidden cards while performing physical tasks before returning to their home base and adding cards to the castle).	Improvement in autonomy, competence and affinity, motivation, tolerance-respect, moral identity and harassment.
Physical activity after school hours			
After-school physical activity programs	Multilateral education program (https://doi.org/10.2478/pcssr-2021-0008)	Team activities or games, cardiovascular endurance and flexibility activities: 90 min/day, 2 days/week/moderate to vigorous intensity • Group Yoga (postures designed to improve flexibility, strength and balance). • Chain Pilla-pilla (two children hold hands and create the first chain. They will have to touch others to join the group. The others will try to run away, when they are caught, they must join the chain). • Group bicycle route (a group of students make a bicycle route following the indications of a map, for this they must be guided cooperatively in space).	Significant improvements for levels of resilience, self-efficacy, promotion of prosocial attitudes, transmission of values and reduction of bullying victimization rates.

4.4.2. Limitations and Strengths

This systematic review shows some weaknesses; for example, as this is a topic of rigorous topicality, the literature is still scarce and this makes it difficult to standardize the proposals based on the time at which PA is performed and the type. Additionally, some programs show inaccuracy in their implementation. Another limitation could be the absence of covariates in some included studies. Another potential limitation may be the link between bullying and active travel to school, as there is a lack of studies focusing exclusively on this activity, which limits the understanding of its specific benefits. Furthermore, the practice of active travel may be hindered in areas where safety conditions are poor, either due to dangerous surroundings or lack of adequate infrastructure, which may deter both pupils and parents from allowing active travel. Another aspect to be taken into account is the possible confusion among participants when interpreting the concept of active travel. Therefore, for future research, it is crucial to be clear about the terms and contexts in which active travel occurs. Despite the above limitations, this is the first time that a systematic review classifies PA stimuli according to the time of practice and type of PA performed in children and adolescents, and compares them with bullying and cyberbullying. This review has analyzed cross-sectional and longitudinal designs, and provides a guide of practical recommendations suggesting the timing of implementation, duration and time of PA practice to decrease or prevent bullying and cyberbullying behaviors.

5. Conclusions

This review identified 30 studies that associated the relationships and consequences of PA practice stimuli before, during and after the school day with bullying and cyberbullying in children and adolescents. After an exhaustive analysis, it is shown that PA stimuli, mostly cooperative, at different times of the day, reduce victimization, improve aggression and disruptive behaviors of students, and alleviate the psychological factors resulting from bullying. However, the study of PA practice has clarified that the type of sport, the context in which it is performed, the role given to the students within the practice of PA, the pedagogical style or the school climate can significantly influence aggressive behaviors. Therefore, these findings underscore the need for holistic approaches throughout the day, including cooperative, socioemotional and behavioral aspects, since PA before and after school has been shown to significantly reduce behaviors related to bullying and cyberbullying.

Author Contributions: Conceptualization, A.R.-M., V.B.-L. and E.J.M.-L.; methodology, A.R.-M., V.B.-L. and E.J.M.-L.; software, A.R.-M. and E.J.M.-L.; validation, A.R.-M., J.E.M.-G., V.B.-L. and E.J.M.-L.; formal analysis, A.R.-M. and E.J.M.-L.; investigation, A.R.-M.; resources, A.R.-M., J.E.M.-G., V.B.-L. and E.J.M.-L.; data curation, A.R.-M. and E.J.M.-L.; writing—original draft preparation, A.R.-M.; writing—review and editing, A.R.-M., J.E.M.-G. and V.B.-L.; visualization, A.R.-M., J.E.M.-G. and V.B.-L.; supervision, J.E.M.-G., V.B.-L. and E.J.M.-L.; project administration, A.R.-M., J.E.M.-G., V.B.-L. and E.J.M.-L.; funding acquisition, E.J.M.-L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was partially supported by the Research Project I+D+i of the Spanish Ministry of Science and Innovation [Grant code: PID2022-137432OB-I00]. Support was also received from the Programa de Formación del Profesorado Universitario, implemented by the Ministry of Education, Culture and Sport of the Government of Spain [Grant code: AP-2020-03217].

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the University of Jaén (Spain) (protocol code: NOV.22/2.PRY approved on 13 January 2023) for studies involving humans.

Informed Consent Statement: Informed consent was obtained from all subjects and their guardians involved in the study.

Conflicts of Interest: The authors declare that they have no conflicts of interest.

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