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Barriers to high school and university students' physical activity: A systematic review

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Abstract

Physical inactivity commonly occurs throughout one's life, particularly during adolescence and young adulthood. Multiple factors can negatively influence participation in physical activity, but there has been no review examining the barriers to physical activity among high school and university students. Therefore, the aim of this systematic review was to summarize evidence of barriers to the practice of physical activity among high school and university students. The literature search was conducted without time limits using five databases, including CINAHL, Cochrane Library, Embase, PubMed, and Scopus. In total, 59 studies (37 with high school students [n = 22,908] and 22 with university students [n = 15,411]) were included. The main barriers identified in high school and university students were lack of time, lack of motivation, and lack of accessible places. These findings may be useful in designing and implementing evidence-informed interventions and programs for physical activity promotion in students.

1. Introduction

Chronic non-communicable diseases (e.g., cancer, diabetes, respiratory, and cardiovascular diseases) are a major current public health issue and responsible for more than 70% of worldwide mortality in adults [1, 2]. In adults, these diseases result in days of lost work and reduced productivity, in addition to affecting quality of life [3]. In children and adolescents, these diseases affect several domains (e.g., social, emotional, cognitive, physical) of wellness, which in turn creates the risk of decline in academic performance and school attendance [4]. Therefore, regular physical activity has been considered a significant factor in the prevention of chronic non-communicable diseases [5–7]. Recent studies have identified physical and psychological benefits associated with regular participation in physical activity. For example, physical benefits resulting from physical activity include body weight regulation [8, 9], blood pressure reduction [10], better bone health [11], and improved muscle strength and function [12].

Furthermore, psychological benefits of physical activity include reduced risk of dementia [13, 14]; reduction of depressive symptoms in youth [15]; improved cognition, brain function, and academic performance [16]; better mental health [17]; and development and preservation of cognitive health throughout life [18]. Regular participation in physical activity is, therefore, essential to maintaining and improving physical and psychological health across the lifespan.

Physical inactivity is described as the "inability to meet specific physical activity guidelines (e.g., 150–300 minutes of moderate intensity or 75–150 minutes of vigorous intensity physical activity per week)" [19–23]. The worldwide prevalence of physical inactivity among adults ranges from 12.3% to 43.7% [24]. Despite the well-documented health benefits of physical activity, most young people (10–24 years old as defined by the World Health Organization) [25] do not meet the physical activity recommendations; that is, more than 81% of adolescents in the world are considered physically inactive [26]. It has been shown that the participation in physical activity tends to decrease with age, and this decline starts in early adolescence [27, 28], with a more pronounced decline during late adolescence and early adulthood [29, 30]. Therefore, measures that can contribute to improved physical activity participation by both adolescents and young adults are encouraged.

Life events and transitions have been shown to have a negative effect on physical activity and other lifestyle behaviors. The transition of leaving school, therefore, is an important time to support individuals to prevent decline in physical activity [31]. Students (adolescents and young adults who attend school, college, or university), whatever the study level, constitute a group that is vulnerable to different lifestyle and behavioral changes [28, 31–34]. Evidence has shown that health behaviors adopted during late adolescence and early adulthood may continue later in life [35]. Individuals in late adolescence are at potential risk of considerable mental health deficits, which if not addressed, may continue to persist and increase in severity in early adulthood. Therefore, regular physical activity may serve as a protective factor against these mental health problems and improve cognitive function [36]. University is a very competitive environment in which students undergo physical and mental changes [37]. Some researchers have reported that starting college and university, particularly the first year, is associated with weight gain, unhealthy eating, sleep problems, and lack of physical activity [38–40]. In addition, previous reviews and large-scale studies have shown that the prevalence of physical inactivity is high in both school and university students [26, 41–45].

Barriers to the practice of physical activity can be broadly categorized into individual, behavioral, and environmental factors [46–49], which can be further grouped into six categories (dimensions): 1) socioeconomic and demographic factors; 2) psychological, emotional, and cognitive factors; 3) sociocultural factors; 4) environmental factors; 5) physical activity characteristics; and 6) behavioral attributes [50–53]. Multiple factors influence physical activity behavior, so the examination of such factors is important, particularly in individuals in late adolescence and early adulthood [54, 55]. As far as we know, only one systematic review from 2014 [56] and an updated systematic review [57] have been published on barriers to physical activity in adolescents. However, these reviews are limited to only studies covering a specific age group (adolescents between 13 and 18 years old) [56, 57], which excludes undergraduate university students. Therefore, there is a need for further research focusing on diverse populations (e.g., children, adolescents, university students) and study designs to advance the knowledge in this area [57, 58].

Although some reviews [59, 60] have examined the determinants of physical activity in relation to a specific category of factors (i.e., psychological, environmental), they are limited in scope. Understanding what factors affect physical activity is important as some have been linked to the success of programs and interventions aimed at improving physical activity and health [61]. Thus, this systematic review aimed to identify barriers to the practice of physical

activity among high school, college, and university students. The current systematic review includes different types of studies and covers a broad population group (ranging from high school students who are in their late adolescence to undergraduate students who have just transitioned into young adulthood) and study designs (both qualitative and quantitative). The information obtained from this review can provide a better understanding of the barriers encountered by students in meeting the recommended levels of physical activity, which may be helpful for designing and implementing evidence-informed interventions and programs for physical activity promotion as well as for informing environmental modifications to improve students' physical activity.

2. Methods

2.1 Protocol and registration

This systematic review follows the PRISMA guidelines [62] for identification, screening, eligibility, and inclusion of primary studies. The protocol for this review was recently published [58], and it was registered in the PROSPERO (CRD42020198899). Ethical approval was not required because this study does not involve any human participants.

2.2 Identification and selection of studies

The literature search was performed on November 5, 2021, using the following five bibliographic databases: CINAHL, Cochrane Library, Embase, PubMed, and Scopus. The search terms for the key concepts—"students," "high school/university," "barriers," and "physical activity"—were combined using Boolean operators (AND/OR), with no restriction on publication year. The search strategy was adapted for each database. The detailed search strategy is described in S1 Table. Secondary searches were performed by manually searching the reference lists of articles included in this review (reference lists of studies eligible for inclusion were searched to find potentially eligible studies).

The eligibility criteria were specified according to the Population, Exposure, Outcomes, and Study (PEOS) framework for the research question [63–65]: "P" referred to high school and/or university students, comprising adolescents or adults of both sexes aged between 10–30 years; "E" corresponded to barriers to physical activity; "O" constituted the practice of physical activity; and "S" referred to studies with qualitative and quantitative designs published during any year in peer-reviewed journals in English, Spanish, or Portuguese.

For this review, studies that targeted students in the aforementioned age group were eligible for inclusion. The World Health Organization defines "adolescents" as individuals aged 10–19 years and "youth" as individuals aged 15–24 years; thus, "young people" are individuals who range in age from 10 to 24 years [25]. The extension of the age range to 30 years was justified by the fact that this age range would also cover university students who are enrolled in undergraduate courses [66–68]. Therefore, the age up to 30 years was meant to cover undergraduate university students.

Physical activity is defined as "any bodily movement produced by skeletal muscles that requires energy expenditure" [69]. Physical activity broadly includes walking, cycling, swimming, playing sports, and performing recreational activities [7]. Barriers refer to factors that prevent or hinder an individual's participation in physical activity [46].

Systematic or narrative reviews; case studies; opinion articles; letters; replies; conference abstracts; theses or dissertations; book chapters; and studies that included people with physical and/or mental disabilities, groups with chronic diseases, and pregnant or lactating women were excluded. In addition, studies on specific and/or traditional communities (e.g., rural,

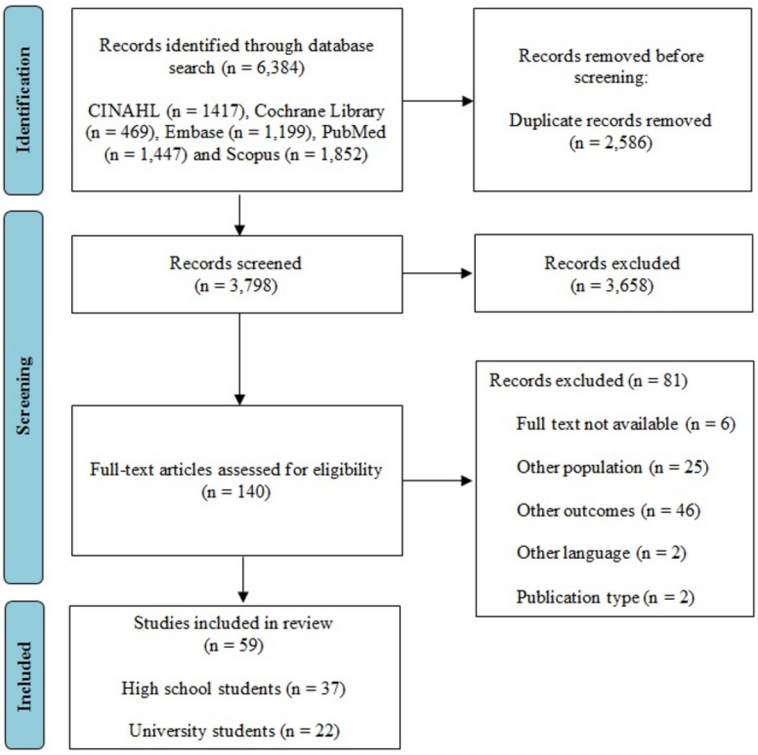

Fig 1. Preferred reporting items for systematic reviews and meta-analyses flow diagram for study selection.

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indigenous, refugees, isolated, and aboriginal) and studies with mixed age samples were excluded.

The results of the database searches were imported into the Mendeley software, where duplicate studies were identified and excluded. Two reviewers (RMFS and CRM), who were trained to screen articles, independently evaluated the titles and abstracts of the studies according to the eligibility criteria. After this stage, studies available online was assessed to determine their inclusion. Any disagreements were resolved by involving a third reviewer (MN). All the steps involving study screening were performed in the *Rayyan* [70] software. **Fig 1** shows the selection process of studies included in the current systematic review.

2.3. Data extraction

The following data were extracted from the included studies: author and year of publication, type of study, country, population, sex, age group, data collection instrument, and barriers to physical activity. We categorized the results into two groups: (a) high school students and (b) university students. The information was extracted independently by two reviewers (RMFS and CRM), and disagreements were resolved by a third reviewer (MN).

The factors included in the socioeconomic and demographic category were: age, sex, socioeconomic status, anthropometric characteristics, and ethnicity. The psychological, emotional, and cognitive category included: motivation for or interest in physical activity, benefits of physical activity, desire to exercise, mood disorders, perception of health and physical competence, lack of time, lack of desire, and laziness. The factors in the sociocultural category constituted: social support from family, friends/peers, and teachers or significant others. The environmental category included: access to equipment, climate, and program costs. The

factors in the physical activity characteristics category were: intensity and subjective feeling of physical effort. Finally, the behavioral attributes category included: history of previous activity and process of change [71].

2.4. Methodological quality and risk of bias

The quality of the evidence from cross-sectional and longitudinal studies was evaluated using the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) [72]. In accordance with the GRADE ProGDT online software, evidence was classified into high quality, moderate quality, low quality, and very low quality [73].

The risk of bias in quantitative studies was analyzed using the 27-item Downs and Black checklist [74]. As some items of this checklist were not applicable to observational study designs, a shorter version, adapted from a previous study, was used for cross-sectional (0–12 points) and longitudinal (0–16 points) designs [75]. Therefore, a subset of 16 questions (corresponding to Questions 1–3, 5–7, 9–12, 17, 18, 20, 21, 25, 26) was used. The score for each study was calculated as a percentage of the total score, and scores above 70% were considered "low risk of bias," while scores below 70% were considered "high risk of bias" [74].

The quality of evidence and the risk of bias in qualitative studies was classified using the 10-item Critical Appraisal Skills Program (CASP) qualitative research checklist [76]. The overall scores were classified as low quality (one star; 0–3 points), medium quality (two stars; 4–7 points), and high quality (three stars; 8–10 points) [77].

For all studies, information on the declaration of potential conflict of interests and ethical approval was extracted. The analysis of the quality of the evidence and bias risk was performed independently by two trained reviewers (RMFS and CRM), and disagreements were resolved by a third reviewer (MN). The reviewers were trained in the use of instruments to analyze quality of evidence and bias risk before beginning their assessment [78].

3. Results

3.1. Description of the selected studies

A total of 6,384 records were imported after searching literature in five databases. Of these, 2,586 duplicates were removed, and 3,658 were excluded based on title and abstract screening, leaving 140 studies for full-text assessment. Eighty-one irrelevant studies were excluded, leaving 59 studies for inclusion in the review (37 on high school students and 22 on university students) (**Fig 1**). No studies were found through secondary (i.e., reference) searching.

The studies were published between 1989 and 2021, with a majority published after 2010 (25 [67.5%] on high school and 17 [77.2%] on university students). Overall, the included studies were conducted in 31 countries (high school student studies: 23 countries, and university student studies: 15 countries). Studies on high school students were predominantly conducted in North America and Europe, whereas studies on university students were predominantly from Asia and North America. The details of studies per geographic region are presented in **Fig 2**.

The sample size in the studies ranged between 20 and 5,663. Sixteen (43.2%) studies on high school students [73–88] and 10 (45.5%) on university students [89–98] had participants ranging from 100–500. The age range for high school students was 10–16 years in 24 (64.8%) studies [79, 81, 82, 85, 86, 99–117] and 17–25 years for university students in 19 (86.3%) studies [89, 90, 92, 93, 95–98, 118–128]. Twenty-eight (75.6%) studies on high school students [79, 80, 82, 83, 85, 86, 88, 99–107, 113–117, 129–134, 138] and 17 (77.2%) on university students [89–92, 94, 95, 97, 98, 107, 108, 118–120, 126–128] consisted of participants of both sexes.

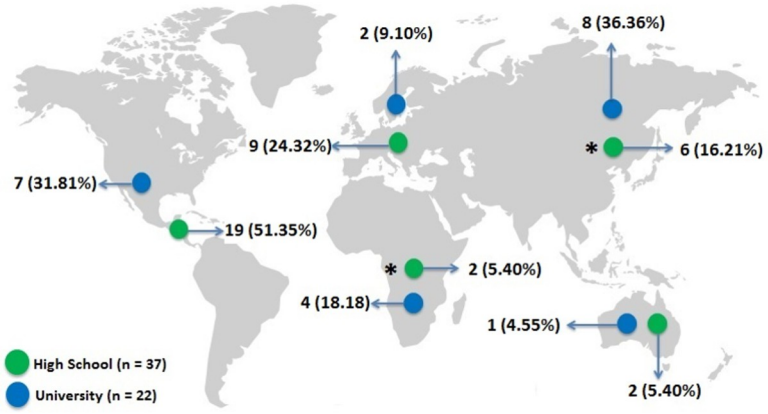

Fig 2. Total number of studies per geographic region (*one study on high school students was carried out in two continents). Figure available at https://br.freepik.com/vetores-gratis/.

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Seven (18.9%) studies on high school students [81, 108–112] and five (22.7%) on university students [93, 96, 121–123] included exclusively female participants.

The most commonly used study design was cross-sectional, used in 24 (64.8%) studies on high school [79–83, 87, 88, 99–102, 108–110, 116, 117, 129–135, 138] and 17 (77.2%) on university students [89–96, 118–121, 124, 125, 127, 128, 136]. The most frequently used methods for data collection were: questionnaires for 25 (67.5%) studies on high school and 17 (77.2%) for university students, followed by interviews, used in 10 (27.0%) studies on high school and five (22.7%) on university students. Questionnaires developed by the authors themselves were used in 11 (29.7%) studies on high school and six (27.2%) on university students.

The questionnaires examining barriers to physical activity in high school students were the Barriers to Physical Activity Questionnaire (n = 4, 10.8%) [129, 131, 134, 135] and Perceived Barriers to Physical Activity Questionnaire (n = 2, 5.4%) [79, 116]. The questionnaires examining barriers to physical activity in university students were the Exercise Benefits/Barriers Scale (n = 5, 22.7%) [89, 92, 94, 120, 121], A List of Possible Barriers to Physical Activity (n = 2, 9.0%) [127, 128] and Barriers to Being Active (n = 2, 9.0%) [118, 136, 137]. The detailed characteristics of the studies on high school and university students are shown in **Tables 1–3**.

For both high school and university students, the most frequently perceived barriers to physical activity were in the 1) psychological, emotional, and cognitive; 2) environmental; and 3) sociocultural categories. In particular, the psychological, emotional, and cognitive barriers were the most frequently reported in both quantitative and qualitative studies. In studies on high school students, 32 (86.4%) barriers belonged to the psychological, emotional, and cognitive category, whereas for university students, 18 (81.8%) corresponded to this category. **Table 4** presents the main barriers (factors) for each category according to study design.

3.2 Quality of studies and risk of bias

Thirty-four (91.8%) studies on high school students and 19 (86.3%) on university students had explicitly stated that they sought ethical approval. Conflicts of interest were declared in 10 (27.0%) studies on high school students and 10 (45.4%) on university students. The quality of the evidence for 16 (66.6%) studies on high school students and 15 (88.2%) on university students, using the cross-sectional and/or longitudinal design, was classified as "low quality." Sixteen qualitative studies had high methodological quality. Most studies on high school students

Table 1. Characteristics of studies on high school students and university students.

Characteristics	Categories	High school students n (%)	University students n (%)
Publication Year	Prior to 2001	2 (5.41%)	0 (0.00%)
	2002–2010	10 (27.03%)	5 (22.73%)
	2011–2021	25 (67.57%)	17 (77.27%)
Region* Africa	Algeria	1 (2.70%)	0 (0.00%)
	Egypt	0 (0.00%)	2 (9.09%)
	Libya	1 (2.70%)	0 (0.00%)
	Morocco	1 (2.70%)	0 (0.00%)
	South Africa	0 (0.00%)	2 (9.09%)
America	United States of America	7 (18.92%)	4 (18.18%)
	Canada	5 (13.51%)	1 (4.55%)
	Brazil	6 (16.22%)	1 (4.55%)
	Colombia	0 (0.00%)	1 (4.55%)
	Uruguay	1 (2.70%)	0 (0.00%)
Asia	India	1 (2.70%)	2 (9.09%)
	Iran	1 (2.70%)	0 (0.00%)
	Jordan	1 (2.70%)	0 (0.00%)
	Kuwait	1 (2.70%)	0 (0.00%)
	Oman	1 (2.70%)	0 (0.00%)
	Palestine	1 (2.70%)	0 (0.00%)
	Malaysia	1 (2.70%)	0 (0.00%)
	Syria	1 (2.70%)	0 (0.00%)
	United Arab Emirates	1 (2.70%)	1 (4.55%)
	Turkey	1 (2.70%)	0 (0.00%)
	China	0 (0.00%)	1 (4.55%)
	Pakistan	0 (0.00%)	1 (4.55%)
	Saudi Arabia	0 (0.00%)	2 (9.09%)
	Thailand	0 (0.00%)	1 (4.55%)
Europe	United Kingdom	3 (8.11%)	0 (0.00%)
	Spain	4 (10.81%)	0 (0.00%)
	Poland	1 (2.70%)	1 (4.55%)
	Italy	1 (2.70%)	0 (0.00%)
	Denmark	0 (0.00%)	1 (4.55%)
Oceania	Australia	1 (2.70%)	1 (4.55%)
	New Zealand	1 (2.70%)	0 (0.00%)
Sex	Both sexes	28 (75.68%)	17 (77.27%)
	Female sex only	7 (18.92%)	5 (22.73%)
	Male sex only	2 (5.41%)	0 (0.00%)
Main Result (barriers)	Lack of time	16 (43.24%)	11 (50.00%)
	Lack of social support	14 (37.84%)	3 (13.63%)
	Lack of accessible	7 (18.92%)	3 (13.63%)
	Lack of motivation	6 (16.22%)	4 (18.18%)

*the total is higher than 100% because one study with university students was carried out in seven countries.

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had a low risk of bias (i.e., they had scores above 70%), whereas most studies on university students had a high risk of bias (i.e., they had scores below 70%). The description for the quality of studies and risk of bias is presented in **Tables 5 and 6.**

Table 2. Characteristics of the studies examining barriers to physical activity in high school students.

Author (year) Country	Participants N (% male)	Age (mean or range)	*Barriers Dimensions	Main Results (barriers)
Cross-sectional (n = 24)				
Allison et al. (1999), Canada [79]	1,041 (51%)	14.9 years (mean)	PEC; SC	Time constraints due to school work (p = 0.004); Other interests (p = 0.001); Family activities (p = 0.001).
Akpinar (2020), Turkey [80]	384 (51%)	13–19 years	PEC; SC; EN	Lack of time; Lack of support; Safety issues.
Camargo et al. (2021), Brazil [131]	1,518 (40%)	15–18 years	PEC; SC; EN	Laziness, not having company and climate.
Dambros et al. (2011), Brazil [87]	424 (54%)	14–18 years	PEC; SC; EN	Time devoted to studies, absence of an exercise partner, poor weather and long work hours.
Dias et al. (2015), Brazil [135]	1,049 (60%)	14–19 years	PEC; EN	Prefer to do other things (p = 0.003); Feel lazy (p = < 0.001); Lack of facilities nearby (p = 0.01); Lack of motivation (p = < 0.001); So much homework (p = 0.01).
Fahlman et al. (2006), USA [109]	1,314 (0%)	16.2 ± 0.9 years	PAC; EN	Physical activity makes sweat too much or makes tired, safety issues in neighborhood
Fernandez et al. (2017), Spain [88]	143 (53%)	14–17 years	PEC	Life demands and lack of time (p = 0.113); Tiredness and laziness (p = 0.001); Body image (p = 0.001).
Garcia et al. (2011), Brazil [138]	118 (43%)	10–19 years	SC; EN	Lack of company or friends; Lack of places were adequate.
Gunnell et al. (2015), Canada [117]	507 (44%)	12.1 ± 0.6 years	PEC; EN	External (not having equipment); Internal (lack of interest in physical activity).
Hsu et al. (2011), USA [116]	350 (21%)	12.5 ± 0.6 years	PEC; SC	External (lack of family social support and peer (friend) support, family responsibility); Internal (lack of self-discipline, willpower, illness, disability, injury).
Jodkowska et al. (2015), Poland [102]	3,346 (47%)	10–16 years	PEC; SC	Boys (p < 0.001): lack of time, skills, willpower and support; Girls (p < 0.001): lack of skills, energy, support and time.
Musaiger et al. (2013), Algeria, Jordan, Kuwait, Libya, Palestine, Syria and the United Arab Emirates, [132]	4,698 (47%)	15–18 years	PEC; SC	Lack of motivation to do physical activity; Less support from teachers; Lack of time to do physical activity.
Pandolfo et al. (2016), Brazil [129]	348 (53%)	14–19 years	PEC; EN	Lack of time (p = 0.001); Adverse weather conditions (p = 0.002).
Padehban et al. (2018), Iran [99]	280 (54%)	13–15 years	PEC; SC; EN	Lack of relatives supports (53.6%); To being far from sports places (35%); Lack of enough self-confidence (33.2%).
Portela-Pinto et al. (2019), Spain [133]	852(49%)	12–17 years	PEC	Fatigue or laziness.
Robbins et al.(2003), USA [110]	77 (0%)	11–14 years	PEC	Ashamed of physical appearance when exercising and lack of motivation.
Robbins et al. (2009), USA [100]	206 (50%)	11–14 years	PEC	Minor aches and pains from activity 2.29 ± 1.04; Tiredness 2.26 ± 1.01; Too busy 2.18 ± 1.07.
Rosselli et al. (2020), Italy [130]	368(58%)	18.3 ± 0.7 years	PEC	Lack of time; Lack of energy; Lack of willpower.
Santos et al.(2010), Brazil [134]	1,609 (40%)	14–18 years	PEC; SC	Lack of relatives supports; laziness and prefer to do other things.
Serrano et al. (2017), Spain [101]	248 (48%)	15.3 ± 1.8 years	PEC	Lack of time.
Sherar et al. (2009), United Kingdom [81]	221 (0%)	15.3 ± 0.63 years	PEC; EN	Lack of motivation\ lazy; Paid work; Illness or injury.
Tappe et al. (1989), USA [82]	236 (41%)	15.9 years (mean)	PEC; EN	Time constraints (p = 0.052); Unsuitable weather (p = 0.056); Interest or desire (p = 0.084); School and schoolwork (p = 0.092).
Youssef et al. (2013), Oman [83]	439 (48%)	15–18 years	PEC; SC; EN	Other recreational activities more entertaining (72.2%); Having limited energy to exercise (43.3%); Thinking that exercise was difficult and too tiring (40.1%); Agreed that parents give priority to academic success (71.5%); Not having leisure time due to academic responsibilities (65.4%).
Zaragoza et al. (2011), Spain [108]	714 (0%)	12–15 years	PEC; EN	Do not like physical activity (p = 0.001); Are not good at physical activity sports (p = 0.001); Lazy to do physical activity (p = 0.001); Insecurity doing outdoor physical activity (p < 0.001); There is no one to do physical activity (p < 0.001).
Longitudinal (n = 1)				

(*Continued*)

Table 2. (Continued)

Author (year) Country	Participants N (% male)	Age (mean or range)	*Barriers Dimensions	Main Results (barriers)
Eime et al. (2015), Australia [84]	440 (0%)	11–18 years	PEC	Lack of energy (p = 0.047); Lack of time due to other leisure activities (p = 0.006).
Qualitative (n = 12)				
Abdelghaffar et al. (2019), Morocco [113]	46 (50%)	14–16 years	PEC; SC; EN	Intrapersonal (e.g., motivating and limiting factors, physical activity awareness, and time constraints); Interpersonal/cultural (e.g., social support and gender and cultural norms); Environmental (e.g., access to opportunities).
Allison et al. (2005), Canada [103]	26 (100%)	15–16 years	PEC; SC; EN	External (e.g., influence of peers and family, issues of inaccessibility); Internal (e.g., television watching and computer and internet use).
Bélanger et al. (2011), Canada [85]	165 (35%)	10–12 years	EN	Lack of access.
Butt et al., (2011), United Kingdom [104]	1,163 (39%)	13–16 years	PEC; PAC	Lack of time and physical exertion.
Dwyer et al. (2006), Canada [111]	73 (0%)	15–16 years	PEC; SC; EN	Lack of time, involvement in technology-related activities, influence of peers, concern about safety and inaccessibility of facilities.
Hohepa et al. (2006), New Zealand [114]	44 (45%)	13–15 years	PEC; SC; EN	Lack of peer social support and low accessibility to, and availability of, physical activity opportunities.
Moore et al. (2010), USA [115]	50 (44%)	12.1 years (mean)	SC; EN	School policies, crime or danger.
Parobii et al. (2018), Uruguay [105]	65 (47%)	11–15 years	PEC; SC; EN	Lack of access and availability of physical activity opportunities both within and outside of school time, lack of places as well as equipment and infrastructure for engagement in physical activity, and lack of time and competing activities such as video games.
Robbins et al. (2010), USA [106]	40 (100%)	11–13 years	EN	Lack of equipment and places for physical activity.
Satija et al. (2018), India [86]	174 (47%)	12–16 years	PEC; SC; EN	Negative consequences of physical activity participation; Disapproval for participating in physical activity; Reduced opportunity for physical activity in schools.
Sharif Ishak et al. (2020), Malaysia [107]	72 (51%)	13–14 years	PEC; SC; EN	Time constraint, no motivation, physically unwell or tired, no companion, security issue at playground or exercise facilities, or venue, and weather.
Wetton et al. (2013), United Kingdom [112]	60 (0%)	15–16 years	PEC; SC	Internal factors (e.g., lack of ability and lack of enjoyment), Existing stereotypes (e.g., boys will always be better in sport, family context, media), Other hobbies (e.g., lack of time, prefers cooking and other artistic activities) and Teachers (e.g., lack of attention the teachers, always praise the best students).

*PEC: Psychological, Emotional and Cognitive; EN: Environmental; SC: Sociocultural; PAC: Physical Activity Characteristics.

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4. Discussion

This systematic review summarizes the findings of qualitative and quantitative research on barriers to physical activity and their dimensions in high school and university students. A total of 38,319 adolescents and young adults from 31 countries were part of the studies included in our review. The main barriers identified in high school and university students were lack of time, lack of motivation, and lack of accessible places.

The findings of the current review suggest that psychological, emotional, and cognitive factors were the most examined in quantitative studies (92.0% of studies with high school students and 94.0% with university students), whereas environmental (83.3% of studies with high school students) and sociocultural (75.0% of studies with university students) factors were most frequently studied in qualitative studies. Furthermore, the main barriers to physical activity in high school students were related to the following dimensions: psychological, emotional, and cognitive (lack of time and motivation); sociocultural (lack of social support); and

Table 3. Characteristics of the studies examining barriers to physical activity in university students.

Author (year), Country	Participants N (% male)	Age (mean or range)	*Barrier Dimensions	Main Results (barriers)
Cross-sectional (n = 17)				
Awadalla et al. (2014), Saudi Arabia [127]	1,257 (34%)	17–25 years	PEC; EN	Lack of safe sports places (p = 0.004).
Chan (2014), China [89]	193 (35%)	20.1 ± 1.3 years	PEC; PAC	Fatigue brought on by exercising, lack of time.
El-Bagoury et al. (2017), Egypt [90]	445 (41%)	20.3 ± 1.5 years	PEC	Lack of time.
El-Gilany et al. (2011), Egypt [128]	1,708 (50%)	17–25 years	PEC; EN	Lack of time; Lack of accessible and suitable sports place; Lack of safe sports places.
Frederick et al. (2020), USA [120]	862 (22%)	20.1 ± 1.4 years	PEC; EN; PAC	Lack of accessible and suitable sports place; Lack of time; Lack of support; Physical exertion.
Gawwad (2008), Saudi Arabia [91]	302 (50%)	20–26 years	PEC; EN	Lack of time and resources.
Grubbs et al. (2002), USA [92]	147 (18%)	18–24 years	PEC; PAC	Lack of time (2.79 ± 0.66); Physical exertion (2.71 ± 0.67).
Gyurcsik et al. (2004), Canada [93]	132 (0%)	17–19 years	PEC; EN	School workload too high to allow for physical activity, job cuts into physical activity time, weather is too cold and gets dark too early.
Kgokong et al. (2020), South Africa [94]	296 (17%)	18–29 years	PAC	Physical exertion.
Kulavic et al. (2013), USA [118]	746 (40%)	19.1 ± 1.2 years	PEC; EN	Fear of injury (p = 0.001); Lack of resources (p = 0.017); Lack of skill (p = 0.003).
Nishimwe-Niyimbanira et al. (2014), South Africa [124]	540 (46%)	19.9 ± 2 years	PEC; PAC	Physical exertion ($p < 0.001$); Time expenditure (p = 0.007).
Ramirez-Velez (2015), Colombia [136]	5,663 (59%)	18–30 years	PEC; EN	Fear of injury (87.0%); Lack of skill (79.8%); Lack of resources (64.3%).
Samara et al. (2015), Denmark [121]	94 (0%)	18–22 years	EN	Lack of designated areas available for physical activity (75.0%).
Silliman et al. (2004), USA [95]	471 (40%)	18–25 years	PEC	Lack of time (36.30%); Lack of motivation (21.86%).
Sousa et al. (2013), Brazil [119]	1,083 (45%)	17–23 years	PEC; SC; EN	Uncomfortable climate, overwork, family and study obligations.
Sukys et al. (2019), Poland [125]	709 (56%)	18–25 years	PEC; SC	Lack of support (2.56 ± 1.11); Lack of motivation (2.15 ± 0.97).
Vaz et al. (2003), India [96]	259 (0%)	20 ± 3 years	PEC	Lack of time (p = 0.290); Lack of motivation (p = 0.570).
Longitudinal (n = 1)				
Ranasinghe et al. (2016), Australia [97]	113 (33%)	20–25 years	PEC	Lack of time, lack of motivation and lack willpower.
Qualitative (n = 4)				
Anjali et al. (2018), India [126]	67 (28%)	18–24 years	PEC; SC; EN	Lack of time, constraint, tiredness, stress, family control, safety issues.
Burton et al. (2021), United Arab Emirates [122]	25 (0%)	18–25 years	SC	Lack of support.
Laar et al. (2019), Pakistan [123]	20 (0%)	19–24 years	SC; EN	Limitations of socioeconomic factors, religious values, and culture.
Wattanapisit et al. (2016), Thailand [98]	279 (37%)	20.9 ± 1.8 years	PEC	Study-related activities and overtime shift work.

*PEC: Psychological, Emotional and Cognitive; EN: Environmental; SC: Sociocultural; PAC: Physical Activity Characteristics.

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environmental (lack of accessible places). Previous studies have also identified these barriers and dimensions as the most common [139–141]. In addition, a recent systematic review identified these dimensions as the most common in terms of barriers to physical activity in adolescents [57]. For the environmental dimension, a previous study suggested that schools must work with community partners and officials to provide environments that optimally support physical activity in adolescent students [142].

The main barriers to physical activity in undergraduate university students were related to the following dimensions: psychological, emotional, and cognitive (lack of time and

Table 4. Main barriers for each dimension grouped by the study design.

High school students		Undergraduate university students	
Dimensions	**Barriers**	**Dimensions**	**Barriers**
Cross-sectional			
(n = 24)		(n = 17)	
PEC	Lack of time [75, 76, 78, 84, 86, 95, 129, 134, 138]; Lack of willpower [95, 112, 138]; Lack of motivation [77, 106, 134, 135]	PEC	Lack of time [91, 92, 99, 101, 116, 120, 124, 130]; Lack of motivation [91, 92, 121]
EN	Lack of accessible [135]	EN	Lack of accessible [116, 117, 124]
SC	Lack of social support [76, 83, 87, 95, 112, 126, 131, 134]	SC	Lack of social support [116, 121]
Longitudinal			
(n = 1)		(n = 1)	
PEC	Lack of time [84];	PEC	Lack of time [97]; Lack of willpower [97]; Lack of motivation [97]
Qualitative			
(n = 12)		(n = 4)	
PEC	Lack of time [96–98, 103, 107, 108]; Lack of motivation [103, 109]	PEC	Lack of time [94, 122]
EN	Lack of accessible [81, 96, 98, 107, 109, 110]		
SC	Lack of social support [96, 103, 107–110]	SC	Lack of social support [122]

*PEC: Psychological, Emotional and Cognitive; EN: Environmental; SC: Sociocultural.

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motivation); environmental (lack of accessible places); and socioeconomic and demographic (lack of financial resources). Barriers in the psychological, emotional, and cognitive category were identified in almost all parts of the world that were covered by the included studies. Among others, lack of time was the most cited barrier to physical activity in university students. Although no previous systematic reviews have identified barriers to physical activity among university students, some qualitative studies have shown the presence of motivational and time-related barriers as factors preventing university students from practicing physical activity [122, 143, 144]. Furthermore, barriers to physical activity are almost similar in reviews on different populations, for example in individuals from the Middle East and North Africa [145], pregnant women [146] and medical services professionals [147]. A recent systematic review showed that cultural values (e.g., general and gender norms) affect the practice of physical activity in specific countries (e.g., Arab countries) [148]. Further, it is important to note that access to university is restricted by socioeconomic status: adolescents and young adults with a lower socioeconomic level have less access to higher education, which may also be related to a greater social and cultural barrier to physical activity. Furthermore, socioeconomic barriers permeate all other barriers. For example, motivation for physical activity, knowledge of its benefits, time availability, social support from family, and access to equipment are negatively influenced by socioeconomic vulnerability [149].

Many behavior change theories [150–155], health behavior adoption theories [156, 157], and social ecological models [158, 159] have been used to promote active lifestyles in different population groups. However, behavior change is a complex and multifaceted phenomenon with multiple levels of influence [152]. Therefore, multilevel physical activity interventions targeting several components (e.g., individuals, social and physical environments, and policies) have been shown to have promising effects [160–163]. Intrinsic motivation is an important factor used to determine active participation in physical activity and sport [35]; thus, to increase adolescents' daily physical activity, special focus should be paid on increasing their intrinsic motivation [168]. Some studies have also pointed out the importance of context in

Table 5. Methodological quality and strength of evidence for studies examining barriers to physical activity in high school students.

			Downs and Black checklist																		GRADE
Quantitative study (year)	**Conflict of interests**	**Ethical approval**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Total**	**Score**	
Cross-sectional (n = 24)																					
Allison et al. [79]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●●○
Akpinar [80]	No	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Camargo et al. [131]	*o	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●●○
Dambros [87]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●○○
Dias et al. [135]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●●○
Fahlman et al. [109]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●●○
Fernandez et al. [88]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●○○
Garcia et al. [138]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●○○○
Gunnell et al. [117]	No	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●○○
Hsu et al. [116]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●○○
Jodkowska et al. [102]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●●○
Musaiger et al. [132]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●●○
Pandolfo et al. [129]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Padehban et al. [99]	No	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●○○○
Portela-Pinto et al. [133]	No	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Robbins et al. [110]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Robbins et al. [100]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Rosselli et al. [130]	No	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Santos et al. [134]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●●○
Serrano et al. [101]	*	*	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Sherar et al. [81]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Tappe et al. [82]	*	*	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Youssef et al. [83]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Zaragoza et al. [108]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●○○
Longitudinal (n = 1)																					
Eime et al. [84]	*	Yes	1	1	1	0	1	1	0	1	1	1	1	0	1	1	0	0	11/16	68%	●●○○
Qualitative study (n = 12)	**Conflict of interests**	**Ethical approval**																			**CASP**
Abdelghaffar et al. [113]	*	Yes	NA																		☆☆☆
Allison et al. [103]	No	Yes	NA																		☆☆☆
Bélanger et al. [85]	*	Yes	NA																		☆☆☆
Butt et al. [104]	*	Yes	NA																		☆☆☆
Dwyer et al. [111]	*	Yes	NA																		☆☆☆
Hohepa et al. [114]	No	*	NA																		☆☆☆
Moore et al. [115]	*	Yes	NA																		☆☆
Parobii et al. [105]	*	Yes	NA																		☆☆☆
Robbins et al. [106]	No	Yes	NA																		☆☆☆
Satija et al. [86]	*	Yes	NA																		☆☆☆
Sharif Ishak et al. [107]	*	Yes	NA																		☆☆☆
Wetton et al. [112]	No	Yes	NA																		☆☆☆

Downs and Black checklist: A) objective clearly stated; B) main outcomes clearly described; C) sample characteristics clearly defined; E) main findings clearly defined; F) random variability in estimates provided; G) lost to follow-up described; H) probability values reported; I) sample target representative of population; J) sample recruitment representative of population; L) study based on "data dredging," if applied; N) statistical tests used appropriately; and O) primary outcomes valid/reliable; (correspond to questions 1–3, 6–7, 9–12, 16, 18, 20).

* not reported. NA, not applicable.

GRADE: Grading of Recommendations, Assessment, Development and Evaluations, where cross-sectional and longitudinal studies with one filled circle = very low quality, two filled circles = low quality, three filled circles = moderate quality, and four filled circles = high quality.

CASP: Critical Appraisal Skills Programme Qualitative Research Checklist, where qualitative studies were classified as low (one star: 0–3 points), medium (two stars: 4–7 points), and high quality (three stars: 8–10 points).

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Table 6. Methodological quality and strength of evidence for studies examining barriers to physical activity in undergraduate university students.

			Downs and Black checklist																		GRADE
Study (year)	**Conflict of interests**	**Ethical approval**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**	**Total**	**Score**	
Cross-sectional (n = 17)																					
Awadalla et al. [127]	No	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●○○○
Chan [89]	*	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
El-Bagoury et al. [90]	No	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
El-Gilany et al. [128]	*	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Frederick et al. [120]	*o	Yes	1	1	1	0	1	0	-	1	1	1	-	1	1	-	0	-	09/12	75%	●●○○
Gawwad [91]	*	Yes	1	1	1	0	1	1	-	1	1	1	-	1	1	-	0	-	10/12	83%	●●○○
Grubbs et al. [92]	*	Yes	1	1	1	0	1	1	-	1	1	0	-	1	1	-	0	-	09/12	75%	●●○○
Gyurcsik et al. [93]	*	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Kgokong et al. [94]	*	*	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Kulavic et al. [118]	No	Yes	1	1	1	0	1	0	-	1	1	1	-	1	1	-	0	-	09/12	75%	●●○○
Nishimwe-Niyimbanira et al. [124]	*	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Ramirez-Velez [136]	*	*	1	1	1	0	1	0	-	1	1	1	-	1	1	-	0	-	09/12	75%	●●○○
Samara et al. [121]	*	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Silliman et al. [95]	No	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●○○○
Sousa et al. [119]	*	Yes	1	1	1	0	1	0	-	1	1	1	-	1	1	-	0	-	09/12	75%	●●○○
Sukys et al. [125]	No	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Vaz et al. [96]	*	*	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Longitudinal (n = 1)																					
Ranasinghe et al. [97]	No	Yes	1	1	1	0	1	0	-	1	1	0	-	1	1	-	0	-	08/12	66%	●●○○
Qualitative study (n = 4)	**Conflict of interests**	**Ethical approval**																			**CASP**
Anjali et al. [126]	*	Yes		NA																	☆☆☆
Burton et al. [122]	No	Yes		NA																	☆☆☆
Laar et al. [123]	No	Yes			NA																☆☆☆
Wattanapisit et al. [98]	No	Yes			NA																☆☆☆

Downs and Black checklist: A) objective clearly stated; B) main outcomes clearly described; C) sample characteristics clearly defined; E) main findings clearly defined; F) random variability in estimates provided; G) lost to follow-up described; H) probability values reported; I) sample target representative of population; J) sample recruitment representative of population; L) study based on "data dredging," if applied; N) statistical tests used appropriately; and O) primary outcomes valid/reliable; (correspond to questions 1–3, 6–7, 9–12, 16, 18, 20).

* not reported. NA, not applicable.

GRADE: Grading of Recommendations, Assessment, Development and Evaluations, where cross-sectional and longitudinal studies with one filled circle = very low quality, two filled circles = low quality, three filled circles = moderate quality, and four filled circles = high quality.

CASP: Critical Appraisal Skills Programme Qualitative Research Checklist, where qualitative studies were classified as low (one star: 0–3 points), medium (two stars: 4–7 points) and high quality (three stars: 8–10 points).

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understanding physical activity motivation and the role of culture in preventing participation in physical activity [160, 164–170].

Screen time was not identified as a barrier to physical activity, but it may be related to the "lack of time" barrier since spending more time on a device means having less time for other activities, including physical activity. A study with Spanish teenagers found that those who spent more time in front of screens spent less time performing physical activity [171]. In addition, screen time was reported as the main driver for adolescents' inability to meet the recommendation of moderate-to-vigorous physical activity in the United Kingdom [172]. Understanding the barriers to physical activity is important because it may provide information useful for creating public health and educational policies. Thus, actions and programs to

promote the practice of physical activity should always consider all dimensions of physical activity barriers, and special attention should be given to psychological, emotional, and cognitive factors.

The current study, as far as we know, is the first systematic review that summarizes the evidence (qualitative and quantitative) for barriers to physical activity practice in high school and university students. However, some limitations should be acknowledged. First, the heterogeneity across included studies did not allow a meta-analysis to be performed. Second, the majority of evidence on barriers to physical activity in high school and university students came from cross-sectional studies (69.49%), with two longitudinal studies. Third, there was a lack of standardization of instruments for identifying barriers to physical activity in students. Finally, gray literature was not included in the review. Therefore, future studies should be conducted with strong methodological rigor to generate better evidence, for example by using longitudinal designs, control bias, and a context-sensitive basis. The use of standardized global instruments for physical activity and barriers, mainly for university students, has also been advocated in a recent review [40].

5. Conclusion

The barriers to physical activity among high school and university students are mainly related to psychological, emotional, cognitive, environmental, and sociocultural factors. These findings suggest that future behavioral change interventions or interventions targeting barriers to physical activity should prioritize these dimensions. In addition, studies on the least explored dimensions (i.e., physical activity characteristics and behavioral attributes) are needed in the future.

Supporting information

S1 Checklist. Checklist PRISMA.
(DOCX)

S1 Table. Search strategy.
(DOCX)

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