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Gender differences in barriers to sports participation on the transition from adolescence to young adulthood in a mediterranean region

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A B S T R A C T

Objective: This study explored gender differences in perceived barriers to physical activity across adolescence and their impact on sport participation.
Methods: A 3-year longitudinal survey followed Spanish secondary school students ($n = 180$) into their first year of university (2012–2014). Data were collected on sociodemographic variables, perceived barriers to physical activity, and sport participation. Gender differences and effect sizes were assessed using Odds Ratios (ORs) and Cohen's D.
Results: In high school, sport participation was 45 % for girls and 68 % for boys, decreasing to 12 % and 10 % respectively at university. Barriers to physical activity were reported by 59 % of students in high school and 63 % at university, more frequently by girls (OR = 3.66 in high school; OR = 3.15 at university). Among those who never perceived barriers, sport participation was close to 80 %. When barriers emerged only at university, participation dropped to 29 %. Sport participation was consistently lower in girls across all scenarios. The most common barriers were lack of time and too much homework, while cost-related barriers became more prominent at university.
Conclusions: Understanding how physical activity barriers change by gender during the transition to university is key to designing effective interventions. For girls, early prevention is essential. University-emerging barriers strongly reduce sport involvement regardless of gender.

1. Introduction

Worsening adolescent mental health is a deep current concern (Vermeulen et al., 2020). Beyond adolescents' unique sensitivities to social-emotional disorders (Rapee et al., 2019), Voldovotz's recent work (Vodovotz et al., 2024) suggests that three further globally operating factors are driving a 'multisystem inflammatory map'; climate change, unrestrained access to information and isolating personal behavior. Expressed as 'polycrisis' (Tooze, 2021), these processes exaggerate chronic inflammation, leading to impaired healing and widespread dysfunction. With distinctive developmental trajectories and needs, there are concerns that these effects are evident at earlier ages and with deeper consequences for girls (Marquez, 2024).

Impaired decision-making and problems with engaging in functional services are important signals of the shared impact of the polycrisis. As evidence of the polycrisis, almost one in four (21.2 %) United Kingdom adolescents are refusing to attend school (Long and Roberts, 2024) and across the European Union up to 90 % of adolescents drop out from sport; disproportionate rates are found in females at earlier ages (Emmonds et al., 2024).

Within a unique developmental period (Orben and Blakemore, 2023), adolescent engagement in sport is regarded as a powerful developmental tool for enhancing physical, social and cognitive health. For girls, this is especially important as they are more likely to experience poor mental health than boys (Dittman et al., 2023). As a near-universal influence in the adolescent exposome (Vermeulen et al., 2020) – the combined set of factors affecting development (Nelson, 2022) – involvement in sport-based opportunities has important cumulative effects for academic and social integration. Yet, the growing concerns about adolescent well-being, and about not being able to arrest concerning rates of drop-out from developmental programs, suggest delivery of sports as promoted by sports' governing bodies (Martinez et al., 2024) needs improvement.

Regular engagement in physical activity in organized settings generates positive impacts on adolescents' body composition, cardiovascular fitness, and self-rated health (Karchynskaya et al., 2022). Thus, the

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promotion of sport participation is acknowledged as a key Public Health strategy to tackle the consistent significant physical activity decline on the transition to adulthood (Aira et al., 2021; Hallal et al., 2012). This is especially relevant among girls who show higher decreases in physical activity and rates of sport abandonment than boys (Delfa-De-La-Morena et al., 2022; Farooq et al., 2020). This rate of drop-out is worrying as over 85 % of adolescent girls worldwide fail to meet the recommended 60 min of daily moderate-vigorous physical activity (Hopkins et al., 2022).

Adolescents' engagement in sports is influenced by their perceived barriers to physical activity (Ishaq and Rafique, 2020). While the number of perceived barriers to physical activity increases across adolescence, barriers differ across ages (Gyurcsik et al., 2006) and between genders (Rosselli et al., 2020). Girls report perceiving barriers about twice as often as boys (Rosselli et al., 2020). Identifying changes on the perceived barriers to physical activity by gender on the transition from adolescence to adulthood is a key issue to inform gender-based interventions aimed at promoting effective sport participation on this life transition. However, few observational studies have monitored adolescents' changes on the perceived barriers to physical activity over time and between genders from adolescence to adulthood (Tapia-Serrano et al., 2022). This study is a secondary data analysis from a dataset of barriers to physical activity recorded between 2012 and 2014 in a sample of adolescents on their way to university. The analysis of existing data in adolescents in relation to their sport participation and the barriers encountered to their sport practice, analyzed according to gender, is an excellent source for identifying patterns and generate new hypothesis to enhance adolescents' support for sport participation in the future.

Given gender is considered a key determinant for physical activity (Delfa-De-La-Morena et al., 2022), this study provides evidence-based information to support the effective development of sport interventions across the ages of 16, 17 and 18 years old, tailored to adolescent gender. This study identifies the most prevalent barriers for physical activity across adolescence by gender and assesses their influence in sport participation when reaching university-based adulthood.

2. Method

2.1. Study design and sample recruitment

A three-years longitudinal study was designed. A sample of Spanish adolescents from the county of Osona (Barcelona) were followed from secondary school to university (16, 17 and 18 years of age). Recruitment procedures have been described in detail elsewhere (Prat et al., 2020). Briefly, participants completed the survey in the classroom as part of a course when they were 16 and 17 years old. At age 18, they completed the survey using online devices. Of an initial potential sample of 695 teenagers, 662 responded in Year one, 480 in Year two, and 180 in Year three (95 %, 69 %, 26 % response rate, respectively). Only university undergraduate students who completed the survey in Years one, two, and three were included in this study. Data were collected (2012–2014) on high schools and universities using a 28-item survey that gathered data on (i) sociodemographic variables (age, gender, height, weight, and place of residence), (ii) sport participation, and (iii) perceived barriers to physical activity. The Ethics Committee of our institution approved the study (2011), and all participants signed a written informed consent every year before completing the survey.

2.2. Variables

2.2.1. Sport participation

Sport participation and type of sport were asked using the following question based on previous adolescent research (Kowalski and Crocker, 2001)*: Do you currently practice any sport?* Prior to the question, sport participation was defined as 'purposeful active participation in sports-related physical activities performed during leisure time' (Scheerder et al., 2011; Scheerder et al., 2005). Combining answers from high school and university we generated four categories: (i) had never practiced sport, (ii) had abandoned sport on the transition from adolescence to young adulthood, (iii) had started doing sport during this transition period and, (iv) had always practiced sport.

2.2.2. Perceived barriers to physical activity

Perceived barriers to physical activity were assessed using a 23-item questionnaire based on previous adolescent research (Sas-Nowosielski, 2008). The first question was *Does the following barrier prevent you from being physically active"*. A three-point of choice Likert-scale was used to obtain an ordinal measure for each barrier. Barriers were scored as (1) *strongly disagree*; (2) *sometimes*; (3) *strongly agree.* The internal consistency of the questionnaire showed standardized Cronbach's alpha reliability coefficients ranging from 0.64 to .81 (Sas-Nowosielski, 2008). For data analysis, the perceived barriers to physical activity were categorized into two main groups: (1) *Strongly agree,* (2) sometimes or strongly disagree.

Changes in barriers to physical activity over high school and university were categorized into four different possibilities: (i) ever perceived some barrier to physical activity, (ii) never perceived any barrier during High School but emerged at university, (iii) perceived some barrier during High School but not at university and, (iv) never perceived any barrier to physical activity.

2.3. Statistical analysis

Data analyses were stratified by gender. Descriptive statistics used relative frequencies (prevalence), means, and standard deviations (SD).

Relationships between the prevalence of barriers (individual barriers and the summary variable "having any barrier") to physical activity and gender, assessment point (High School or University), and sport participation were examined using Chi-square tests and Odds Ratios (OR) with 95 % confidence intervals (CI). ORs were also interpreted as effect sizes following Cohen's rules: OR < 1.44 (very small), ≥ 1.44 to <2.48 (small), ≥ 2.48 to 4.27 (medium), and ≥ 4.27 (large) (Cohen, 1988).

The number of perceived barriers to physical activity was analyzed among participants who reported at least one barrier. Differences in the number of barriers by gender and assessment point (within genders) were assessed using independent-sample Student's *t*-tests. Effect sizes were calculated using Cohen's D coefficient.

To examine how the evolution of perceived barriers influenced sport participation from high school to university, we fitted a generalized linear mixed model (GLMM) with a binomial distribution. The dependent variable was sport participation (yes/no), measured at both time points. Independent variables included student status, barrier evolution, and gender. An interaction term between time and barrier evolution was included to test whether the impact of barriers changed over time. A random intercept for each participant was added to account for the repeated measures. Although this model helped guide interpretation, convergence warnings and limited sample size reduced its reliability for inferential purposes. Therefore, descriptive analyses remained the main analytical approach.

The level of significance was set at $p < .05$. All statistical analyses were performed using R and the packages lme4 and ggplot2.

3. Results

3.1. Descriptive statistics

One hundred and eighty students participated, 56 % girls. At baseline (high school) the mean age was 17.2 (SD = 0.5) years, BMI mean was 21.2 (SD = 2.7) kg/m^2. Sport participation among boys was 68 % in high school, and 58 % at university (−10 %). In girls, 45 % in high school and

33 % at university (−12 %).

3.2. Gender-based barriers from high school to university

At high school, 59.4 % of adolescents perceived at least one barrier to physical activity, increasing slightly to 63.3 % at university. Girls were more likely to report at least one barrier to physical activity than boys either at high school (73 % vs 42.5 % respectively; OR = 3.66 95 % CI 1.96–6.84, medium effect size) and at university (75 % vs 48.8 % respectively; OR = 3.15 95 % CI 1.68–5.92, medium effect size).

The number of barriers to physical activity reported were significantly higher for girls compared to boys either at high school (2.9 vs. 1.9 barriers) or at university (4.2 vs. 2.8 barriers) (Table 1). Comparing the number of barriers reported within gender, at university, the total number of barriers to physical activity significantly increased in girls (2.9 vs. 4.2 barriers; $p < .01$), but not in boys (1.9 to 2.8 barriers).

3.3. Gender-based prevalence of barriers from high school to university

In girls, the most prevalent barriers to physical activity at high school were: not having time (29 %), having too much homework (29 %), followed by facilities being too far away (16 %) or bad weather (16 %). At university, not having time (44 %; +15 %) or having too much homework (39 %; +10 %) showed a significant increase and were still the most prevalent, followed by the excessive cost of equipment (29 %; +16 %) (Fig. 1).

In boys, the most prevalent barriers to physical activity at high school were: not having time (13 %), having other interests (10 %) and not liking sports (9 %). At university, boys still perceived lack of time as the most prevalent barrier (20 %; +7 %), followed by having too much homework (16 %; +8 %) and having other interests (14 %; +4 %) (Fig. 1).

For every barrier where statistically significant gender prevalence differences were observed, prevalence was highest in girls (Table 2). In five of the barriers, this gender difference remained significant throughout the first year of university. These physical activity barriers were: *I don't have energy* ($OR_{high\ school}$ = n.d.; $OR_{University} = 8$); *I am not fit enough* (OR $OR_{high\ school} = 5.3$; $OR_{University} = 6.3$); *Too much homework* (OR $OR_{high\ school} = 5.0$; $OR_{University} = 3.3$); *Having no time* (OR $OR_{high\ school} = 2.9$; $OR_{University} = 3.1$) and *Facilities were too far away* (OR $OR_{high\ school} = 7.4$; $OR_{University} = 6.9$).

3.4. Changes in barriers from high school to university

More than one in two girls (58 %) reported having barriers to physical activity on the transition to university, while 10 % never reported any barriers. In boys, 28 % reported barriers to physical activity in their transition, while 36 % of boys reported having no barriers (Fig. 2). One in five (21.2 %) boys and 17 % of the girls reported only having barriers in high school while 15 % of the boys and 15 % of the girls only reported barriers at university (Fig. 2). For girls, physical activity barriers emerged earlier than in boys: 75 % of girls reported barriers in high school (17 % had it only in high school but in 58 % of the cases, they also remained during the university years). Among boys it was 49 % (21 % and 28 % respectively).

From those who reported barriers only in high school, the most common perceived barriers were *"having no time"* and *"having too much homework"*. When barriers to physical activity emerged at university, in girls *"having no time"* and *"having too much homework"* were the main barriers to physical activity that appeared on the way to the university (47 % each), followed by costs linked to *facilities* (29 %) and *equipment* (12 %). In boys, the main barriers that appeared were *Having no time* (35 %), *Having too much homework* (24 %), *Facilities are too expensive* (18 %), and *Equipment is too expensive* (18 %). Finally, from girls who recurrently identified barriers to physical activity *Having too much homework* was the main barrier in high school (40 %), while *Having no time* become the main barrier at university (62 %; +24 %), along with *Facilities are too expensive* (41 %; +24 %). In boys, *Having no time* (32 %), *Having too much homework* (23 %) and *I don't like* (23 %) were the main barriers in high school; *Having too much homework* intensified at university (41 %; +18 %).

Table 1
Number of perceived barriers to physical activity reported in high school and university among students who identified at least one barrier (Spain, 2012–2014).

	Gender	n	Mean	95 % CI (mean)
High School	Boys	34	1.9	1.4–2.5
	Girls	73	2.9	2.5–3.3
				Difference: 1.0 (0.3–1.7), $p = .01$, $d = 0.55$
University	Boys	39	2.8	2.0–3.7
	Girls	75	4.2	3.5–4.9
				Difference: 1.4 (0.3–2.5), $p = .01$, $d = 0.49$

3.5. Sport participation and associated barriers in the transition from secondary to tertiary education

Fig. 3 shows the relationship between changes in perceived barriers for physical activity and sport participation by gender. Nearly 80 % of adolescents who reported no barriers - neither in high school nor university - to physical activity maintained their sport participation during the transition period, with no notable gender differences.

When barriers were only present in high school, sport participation increased slightly at university (+8 %), although initial levels were lower in girls than in boys (33 % vs. 75 %).

In contrast, when barriers emerged at university, sport involvement decreased by nearly 29 % in both girls and boys. This pattern was consistent with results from an exploratory model, although it was not used for inferential purposes. Finally, among those who recurrently identified barriers to physical activity, sport involvement was similar in boys and girls and declined in the transition to university (Fig. 3).

4. Discussion

This study set out to establish the most prevalent barriers for physical activity across adolescence by gender and assessed their influence in sport participation within a longitudinal mixed sample study spanning three years. The principal finding is that the factors creating the context for sport engagement are more prevalent among older individuals and more commonly reported among females. Further, rates of engagement with sport declined in the first year of university. This is particularly important, as withdrawal from the sport context is associated with an increased likelihood of a decline in physical activity levels (Aira et al., 2021; Hallal et al., 2012; Deforche et al., 2015; Wengreen and Moncur, 2009).

While these findings may seem like old wine presented as new, they present a new challenge to sports providers in community and educational settings. In the context of the polycrisis (Rapee et al., 2019; Orben and Blakemore, 2023), the current generation of adolescents are facing distinctive challenges to those affecting earlier generations. As a result of the contexts created by adults, this means that adults need to generate better structural offers to ensure continued engagement and to deliver on the developmental promise of organized sport and informal physical activity. Fundamentally, dropping out from organized activities is seen as a 'normal' response by growing numbers of young people during this transition period. Compared with boys, girls exhibit a higher overall prevalence of barriers, identify a greater number of them—as reported in previous studies (Rosselli et al., 2020)—and experience these barriers at an earlier age. Furthermore, for each specific barrier proposed, prevalence among girls is consistently equal to or greater than that

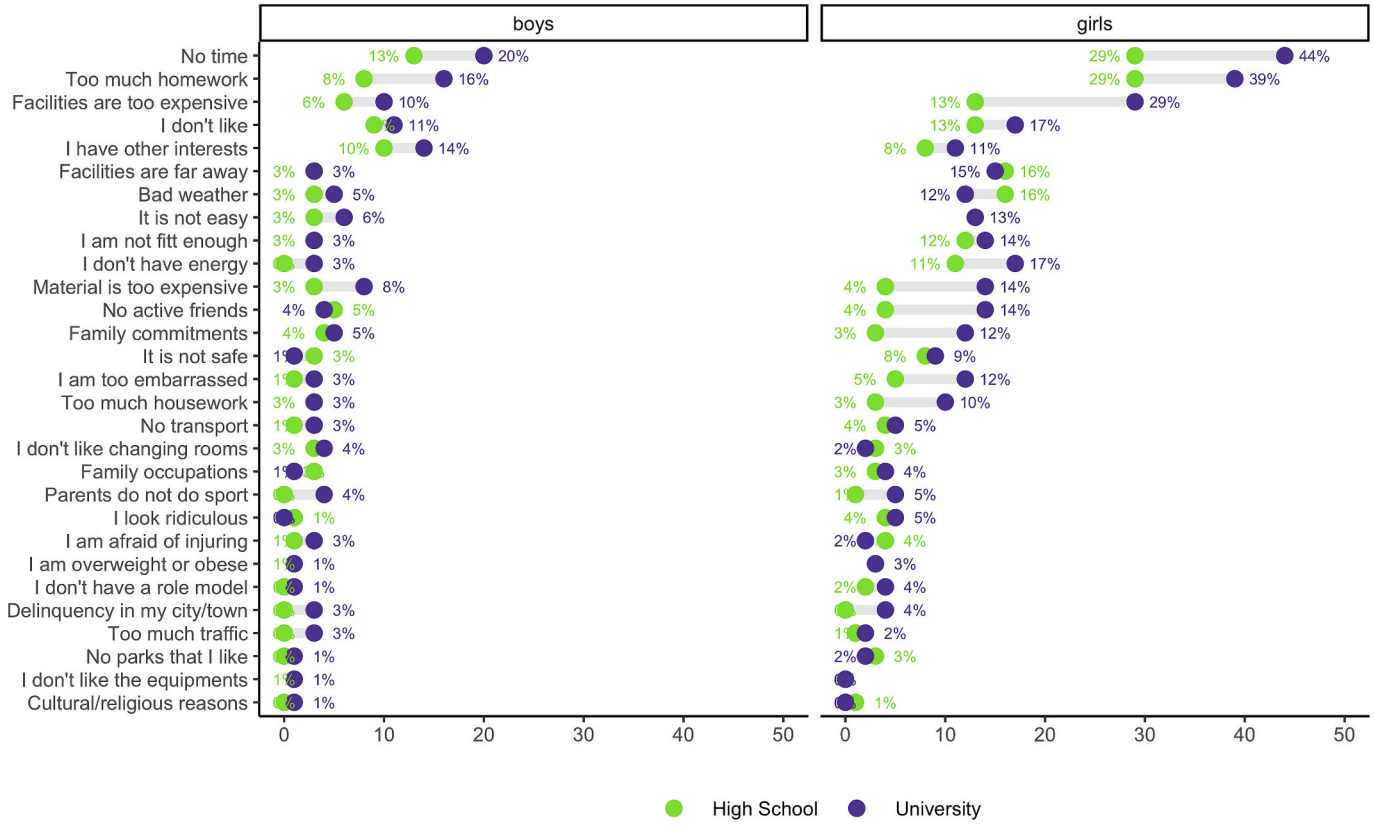

Fig. 1. Prevalence (%) of perceived barriers to physical activity reported by girls and boys in high school and university (Spain, 2012–2014).

Table 2
Gender differences in prevalence of perceived barriers to physical activity among adolescents in Spain (2012–2014).

	Boys	Girls				
	%	%	*p*-value[a]	OR girls vs. boys	95 % CI	
High School						
Is not easy	3	13	0.01	5.8**	1.3	26.6
I don't have energy	0	11	<0.01	–	–	–
I'm not fit enough	3	12	0.02	5.3**	1.2	24.5
Too much homework	8	29	<0.01	5.0**	2.0	12.9
No time	13	29	0.01	2.9*	1.3	6.3
Facilities are far away	3	16	<0.01	7.4**	1.7	33.4
Bad weather	3	16	<0.01	7.4**	1.7	33.4
University						
I don't have energy	2.5	17	<0.01	8.0**	1.8	35.7
I'm too embarrassed	2.5	12	0.02	5.3**	1.2	24.5
I'm not fit enough	2.5	14	0.01	6.3**	1.4	28.8
Too much homework	16.3	39	<0.01	3.3*	1.6	6.8
No time	20	44	<0.01	3.1*	1.6	6.2
No active friends	3.8	14	0.02	4.2*	1.2	15.1
Facilities are too expensive	10	29	<0.01	3.7*	1.6	8.6
Facilities are far away	2.5	15	<0.01	6.9**	1.5	31.1

(a): Chi-square p-value **: large effect size; *: medium effect size.

observed in boys. The next steps following this research propose many opportunities. A major new challenge is to establish an evidence-base for effective responses to the new peri-COVID-19 context and to track these responses over time. It is also likely that specific sequences of intervention content will need to be developed. Given the exaggerated social needs of this specific generation of adolescents (Rapee et al., 2019; Orben and Blakemore, 2023), it will be valuable to establish the impact of different socially-oriented interventions, especially those emphasizing respect, inclusion and belonging; this may be beyond any current preferences for competition and/or specialization.

The findings can also be contextualized to the three elements of the polycrisis. To address the declines in sporting engagement, the findings propose actionable opportunities. Regarding the climate emergency, and as an example, because weather conditions are flooding grass-based pitches, attention is needed on building regular engagement and habit formation on different venues (Maher et al., 2021). In other contexts, rising temperatures may require indoor provision. To respond to unfettered access to social media, sporting agencies may be wise to adopt new forms of socially-oriented recruitment and delivery to reflect age-appropriate needs (Orben et al., 2024). To avoid the escalation of one-off lapses into fully-fledged relapse and even drop-out, coaches and providers will need to upskill with regard to re-engagement. Further, non-sporting agencies may be recruited to routinely encourage young people to stay active and to transition between sports when they become problematic. This recognizes the newly established importance of ensuring access (Albarracín et al., 2024), and of expanding how sport providers understand and operationalize experiences of welcoming and belonging.

This study presents longitudinal data based on a medium-sized sample. In general, longitudinal studies addressing these issues are rare; this is one of the first longitudinal studies of Spanish adolescents to address these issues across this important developmental stage. Given that perceived barriers to physical activity evolve with age, it is important to integrate a life-course perspective in perceived barriers interventions whenever possible. Future studies could include different type of exercise, and not only sport participation.

Importantly, the findings corroborate existing research, whether cross-sectional (Espedalen and Seippel, 2024), multidimensional (Szakál, 2022) or longitudinal (Aira et al., 2021). Importantly, even without a control group, our findings are likely to relate to the developmental needs of many Westernized adolescents. A particular strength is that the longitudinal design identifies rising pressures in the same

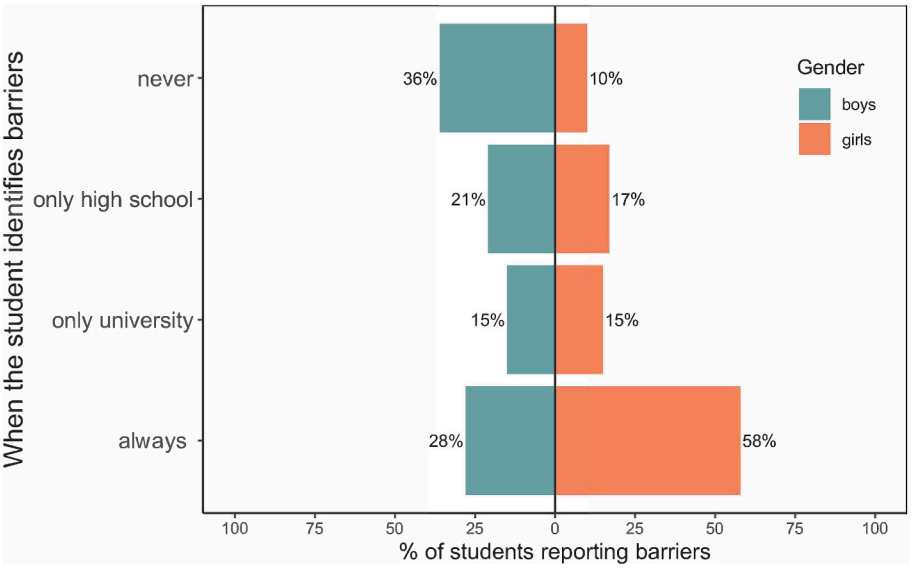

Fig. 2. Distribution of students by gender and assessment point (high school or university) where barriers to physical activity were reported (Spain, 2012–2014). *Categories refer to when barriers to physical activity were identified: never (at neither high school nor university), only in high school, only in university, and always (at both high school and university).*

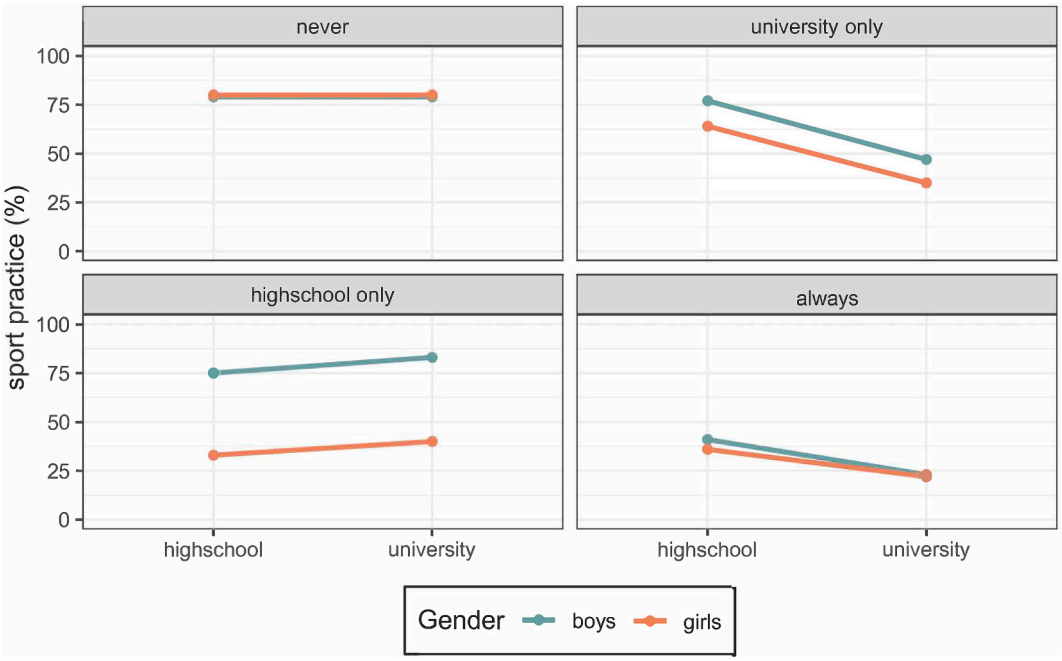

Fig. 3. Sports participation as a function of the presence and progression of perceived barriers from high school to university, disaggregated by gender (%) (Spain, 2012–2014).

individuals and links these pressures to reduced engagement in sport and, therefore, physical activity. Yet, using questionnaires does not offset the risk that responses reflected acute events rather than wider influences. We should also consider that just as factors are reported, it does not necessarily follow they are causal; they may remain associative. Some factors may even support adaptive and positive disengagement, allowing the opportunity to do something more developmentally appropriate or valued.

The present study needs to be interpreted considering several limitations. The analysis is based on self-report data. Although recall bias is common and would require validation against objective measures (i.e. inclinometers or accelerometers), self-report tools provide the opportunity to describe the context of the perceived barrier to physical activity. In the future, self-report and objective methods should be combined to accurately assess patterns in sport participation across this life period. The analysis is based on data collected a decade ago—an aspect that, rather than being a limitation, offers a unique strength. In the context of limited recent longitudinal studies on this age group, such historical data provide a rare opportunity to examine long-term trends and shifts in youth sport participation. The enduring relevance of these findings is further underscored by recent European research documenting a consistent decline in children's physical activity levels over the past 20 years, a trend exacerbated by the COVID-19 pandemic (Emmonds et al., 2024). This research shows that sport participation

typically peaks between the ages of 12 and 14 before declining sharply, with patterns varying by gender and sport type. Although sport dropout is often temporary and context-dependent, it is influenced by a range of factors including changing interests, time constraints, performance pressure, and academic demands (Emmonds et al., 2024; Delfa-De-La-Morena et al., 2022). These findings align with the present study, which contributes more granular, age- and gender-specific insights, adding a valuable longitudinal dimension to the existing literature. Moreover, the use of retrospective data not only enhances our understanding of past patterns but also supports the efficient design of future sport interventions for adolescents. Similar retrospective approaches have been successfully employed to inform physical activity programs in university settings (Nelson et al., 2008; *Eurostat*, 2021), demonstrating their practical utility in shaping evidence-based strategies.

This sample is also focused on the transition to university. University students are likely to transition into sedentary desk-based jobs upon graduation, being potentially exposed to high levels of sedentary behavior at work and outside work (Nelson et al., 2008). Considering almost 84 % of adults aged 20–24 years in the European Union (2022) had completed at least an upper secondary level of education (*Eurostat*, 2021), future research should focus on the transition to early adulthood beyond university.

5. Conclusion

In summary, longitudinal tracking of dropout from sport provides evidence of the 'Multiscale inflammatory map' (Vodovotz et al., 2024) and the 'polycrisis' (Tooze, 2021). It is noteworthy to mention that many of the critical challenges confronting contemporary societies—such as climate change, widespread and often unregulated access to social media, the increasing normalization and availability of recreational drugs, and patterns of demographic instability—were already emerging or well-established prior to the onset of the COVID-19 pandemic. However, these issues had not, until recently, been conceptualized collectively as components of a broader, interconnected phenomenon now referred to as the "polycrisis." More fundamentally, from a developmental and public health perspective, it is important to recognize that the concept of the exposome—the totality of environmental exposures across the lifespan—implies that each cohort of children and young people is shaped by a unique constellation of socio-environmental stressors. In this sense, while the terminology may be new, successive generations have each encountered their own form of polycrisis. The distinguishing factor today may not be the existence of complex, intersecting challenges, but rather the growing recognition of their systemic interdependence and cumulative impact on development and wellbeing. Seen in this way, dropping-out from sport activities, catalyzed by barriers, can represent a canary in the coal mine, signaling wider societal problems. Even prior to the COVID-19 pandemic, we observed accelerating dropout rates from sport-based programs, reflecting broader trends influenced by a range of structural and psychosocial barriers.

On the other hand, newly emergent barriers at university—such as feelings of insecurity in masculinized spaces and perceived unsuitability of demanding sports—may present particular challenges to continued engagement in sport and reaffirm the importance of differentiating the treatment of barriers based on gender. This needs to be done earlier for females than males but continued throughout adolescence to consider the patterns of multiscale stressors, responses, and health at the individual and population levels, over the short-, mid- and long-term.

Authors statements

The Ethics Committee of the University of Vic-Central University of Catalonia approved the study (2011), and all participants signed a written informed consent every year before completing the survey.

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During the preparation of this work the authors used ChatGPT (OpenAI) to assist in improving the clarity and language of this manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT authorship contribution statement

I. Arumi-Prat: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **E. Cirera-Viñolas:** Writing – original draft, Visualization, Methodology, Formal analysis, Data curation. **J. McKenna:** Writing – review & editing, Supervision, Conceptualization. **A. Puig-Ribera:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

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

Data availability

The data that has been used is confidential.

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