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Associations Between Duration of Participation in Four Sports Categories and Academic and Psychosocial Adjustment in Adolescence

Daphné Blain[1], François Poulin[1], and Anne-Sophie Denault[2]
[1] Département de psychologie, Université du Québec à Montréal
[2] Département des fondements et pratiques en éducation, Université Laval

This study examines the links between the duration of participation in four sports categories from ages 13 to 17—collision team, low-contact team, individual and aesthetic sports—and academic and psychosocial adjustment at age 17. A sample of 228 adolescents (67% males) displaying a high level of externalising problems at age 5 based on teacher and parent ratings, placing them at risk of later adjustment problems, was assessed. Sports participation was collected once, during the last year of secondary school, using a retrospective assessment. Adolescents identified the organised sports in which they previously participated in each year of secondary school and reported their educational aspirations, internalising/externalising problems, alcohol use and prosocial behaviours. Covariates included sex, family income, parental education and baseline levels of adjustment collected in elementary school. Collision team sports were associated with lower levels of internalising problems and higher levels of alcohol use. Aesthetic sports were associated with higher levels of prosocial behaviours. Low-contact team sports were associated with higher educational aspirations, particularly for adolescents from lower/middle-income families. Possible explanations based on the subcultures of sports categories are suggested.

Public Significance Statement
Sports categories differ in their links to academic and psychosocial adjustment for adolescents at risk of externalising problems. Our study reveals that (a) collision team sports are associated with less internalising problems and more alcohol use, (b) aesthetic sports are associated with more prosocial behaviours and (c) low-contact team sports are associated with more educational aspirations for adolescents from lower/middle-income families. Parents and policymakers should be informed of these differential associations.

Keywords: adolescence, sports, psychosocial outcomes, educational aspirations, socioeconomic status

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Organised sports can foster positive development in adolescence by promoting physical health and providing playful and safe learning environments during this critical period of transitions and identity development (Brière et al., 2018; Graupensperger et al., 2021). Organised sports are structured adult-led physical activities characterised by regulated rules, formal practice and performance evaluation (Hoffmann et al., 2022). Longitudinal studies suggest that organised sports participation during adolescence is associated with fewer anxious and depressive symptoms, higher academic achievement and increased alcohol use (Dyer et al., 2017; Kwan et al., 2014; Panza et al., 2020). However, existing studies tend to treat all sports as a single entity, overlooking their specific attributes,

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Daphné Blain https://orcid.org/0000-0003-1249-5947
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Correspondence concerning this article should be addressed to Daphné Blain, Département de psychologie, Université du Québec à Montréal, Succursale Centre-Ville, Case Postale 8888, Montréal, QC H3C 3P8, Canada. Email: blain.daphne@courrier.uqam.ca

even though distinct categories of organised sports may have different developmental outcomes (Graupensperger et al., 2021; Hoffmann et al., 2022). Moreover, only a few studies explored the specific impact of sports on the well-being of adolescents identified early on as being at risk of presenting externalising problems and considered variations depending on family income. It is thus advisable to inform targeted prevention and intervention programs tailored to the specific needs of these youths. This study examined the links between the duration of participation from ages 13 to 17 in four categories of sports (collision team, low-contact team, individual and aesthetic sports) and academic and psychosocial adjustment at age 17 among adolescents at risk of externalising problems. The moderating role of family income on these links was also investigated.

Categorisation of Organised Sports

Multiple criteria can be used to categorise sports. In a study conducted among children by the present authors (Blain et al., 2023), sports categories were created based on subculture and shared characteristics likely to explain their differential associations with psychosocial adjustment. Categories included martial arts, team, individual and aesthetic sports. This study included the current at-risk sample integrated in a larger normative community sample. Based on longitudinal data from ages 6 to 10, the duration of participation in team and aesthetic sports was linked with lower internalising problems. For children from lower income families, individual sports were linked to fewer externalising problems. These findings highlighted the importance of examining specific sports categories to understand their associations with youth adjustment.

Even though these categories were useful for sports that were popular during childhood, in adolescence, some of these sports become less prevalent. For instance, although some youths participate in martial arts from childhood to adolescence, many seem to drop out of this sport. Moreover, physical contact is not allowed in some team sports during childhood, but it becomes part of the game in adolescence. Therefore, in this study, four categories were investigated for adolescents' sports participation: collision team sports (e.g. football, ice hockey), low-contact team sports (e.g. soccer, basketball), individual sports (e.g. swimming, badminton) and aesthetic sports (e.g. dance, cheerleading).

Team Sports: Collision Versus Low Contact

Team sports are characterised by interdependent behaviours and cooperation during play to achieve a common goal, that is, accumulating more points than the opposing team (Moeijes et al., 2018). They have often been examined as a whole without distinguishing the level of physical contact. However, a distinction between team sports involving intentional contact versus no (or low) contact may be warranted to further our understanding of the mixed associations found with academic and psychosocial outcomes in adolescence. For instance, during adolescence, team sports have been associated with better academic outcomes and lower depressive symptoms but also with increases in alcohol use (Eccles & Barber, 1999; Murray et al., 2021; Sabiston et al., 2016).

Collision team sports involve intentional, legal and expected body-to-body contact with the opposing team members as part of the game strategy, which carries a greater risk of injury (Oldham et al., 2022; Rice & Council on Sports Medicine and Fitness, 2008). Traditional masculine norms, including emotional restriction, toughness and normalised risk-taking behaviour, are expected to be upheld by the players, possibly contributing to pressures to hide the pain from injuries and cope alone (Kennedy et al., 2021; Veliz et al., 2017; Walsh et al., 2021). By contrast, low-contact team sports involve no contact or unintentional contact, as players perform in a shared space (Oldham et al., 2022; Rice & Council on Sports Medicine and Fitness, 2008). Frequent modelling of good sportsmanship and a sense of relatedness with others are usually part of low-contact team sports (Bolter & Kipp, 2018; Hoffmann et al., 2022). Considering these subcultures, both collision and low-contact team sports could potentially be associated with fewer internalising problems, while only collision team sports might be associated with more externalising problems and alcohol use.

A few studies conducted with adolescents made this distinction. Among youths aged 10–12, collision/contact sports have been linked to fewer internalising problems 1 year later compared with noncontact sports (Moeijes et al., 2018). However, collision sports have also been associated with more externalising problems in male collegiate athletes than contact and low-contact sports (Visek et al., 2010). Among adolescents aged 10–15, collision/contact sports have also been linked to more competitive aggression and anger, but not to more general aggression outside of sports, when compared with noncontact sports (Huđin et al., 2020). In addition, adolescents aged 17–18 who participated in collision/contact sports had higher odds of engaging in binge drinking 1–4 years later compared with those who did not participate (Veliz et al., 2017). Together, these results suggest that the links between team sports and adjustment in adolescence could differ depending on whether or not they involve deliberate contact.

Individual Sports

Individual sports involve adolescents performing alone against opponents, which can contribute to heightened self-awareness and performance pressure (Moeijes et al., 2018). Given that adolescents must rely solely on their technical skills, they tend to attribute failures to internal factors (Hoffmann et al., 2022). The pressure to outperform others can also create competition and the lack of social support, especially from fellow club members who can also be competitors (Pluhar et al., 2019). Cross-sectional studies have reported positive associations between individual sports participation and symptoms of anxiety, depression and withdrawal (Hoffmann et al., 2022; Pluhar et al., 2019). By contrast, longitudinal studies suggest that individual sports participation during adolescence is not associated with symptoms of depression and anxiety in late adolescence (Graupensperger et al., 2021; Sabiston et al., 2016). Moreover, individual sports participation has been associated with more attentional and social problems than nonparticipation, but no association was found concerning rule-breaking and aggressive behaviours (Hoffmann et al., 2022). Concerning academic outcomes, individual sports were found to be positively associated with academic performance in Grades 7 and 9 (Ishihara et al., 2020). Prior findings also suggest that hours spent in individual sports are associated with less alcohol use in adolescence (Denault & Poulin, 2018). However, prior studies have often aggregated martial arts and aesthetic sports within individual sports despite their distinct

subcultures, leading to confusion regarding individual sports' unique associations with adolescents' adjustment.

Aesthetic Sports

Aesthetic sports intertwine artistic expression (e.g. musicality, costumes) with physical attributes, where judges evaluate both movements' technical precision and routines' creativity during competitions. The aesthetic sports subculture tends to emphasise an ideal thin body, often subjectively linked with peak performance and competitiveness (Doria & Numer, 2022). Chapa et al.'s (2022) meta-analysis found higher drive for thinness and disordered eating behaviours in aesthetic sports athletes than in nonaesthetic sports athletes. This places them at greater risk of experiencing mental health issues, such as anxiety, depression, perfectionism and decreased self-esteem (Doria & Numer, 2022). By contrast, studies on adolescent dancers, gymnasts and synchronised swimmers have found associations between these sports and positive psychosocial outcomes, including lower anxiety levels, enhanced social support, anger release, optimism towards challenges, life skills development and reduced aggression, negativism, verbal hostility and irritability (Burkhardt & Brennan, 2012; Sysoeva et al., 2009; White & Bennie, 2015). However, most studies on aesthetic sports and adjustment have focused on internalising problems. Further examination of diverse academic and psychosocial indicators is warranted.

Overall, the reviewed studies suggest that sports categories might be associated differentially with academic and psychosocial outcomes in adolescence given their specific subculture. This study also adds to previous research by looking at these associations among a sample of youths identified as at risk of externalising problems during their childhood.

The Importance of Looking at Youths at Risk of Externalising Problems

Most studies on sports participation during adolescence have been conducted on normative, middle-class students (Kwan et al., 2014; Panza et al., 2020). However, several longitudinal studies showed that children presenting high levels of externalising problems are likely to display these problems throughout their development and to experience more problematic academic and psychosocial outcomes once they reach the end of adolescence (Kjeldsen et al., 2021; Vitaro et al., 2005). Participating in organised sports is one strategy that parents, schools or communities can offer youths on such a developmental trajectory. For example, within a sample of adolescents at risk for juvenile delinquency, Spruit et al. (2018) found that the group who received a sport-based intervention program had fewer police registrations as suspects 16 months after the start of the program compared with a control group.

Various processes have been proposed to explain the associations between organised sports participation and positive adjustment, such as the regulated environment, the supervision and support provided by the coaches, a sense of connection and belonging with peers, identity development and skills transfer (Brière et al., 2018; Graupensperger et al., 2021). The promotion of good sportsmanship, the practice of self-discipline and emotional control and the reduction of time spent in unsupervised activities or with deviant peers could also play a role (Bolter & Kipp, 2018; Holt et al., 2011). Given these processes, at-risk adolescents will likely benefit from participating in organised sports. Examining specific sports categories among these youths is important given their risk of presenting externalising problems during adolescence.

The Moderating Role of Family Income

The links between sports categories and academic and psychosocial adjustment could vary among adolescents depending on their family income. In Canada, 73% of youths aged 5–19 who come from families earning more than $100,000/year participate in sports compared with 60% earning less than $60,000 (Canadian Fitness and Lifestyle Research Institute [CFLRI], 2022). Families with limited financial resources encounter multiple barriers to sports participation including registration, equipment and competition expenses, cost increasing as abilities improve, transportation needs and restricted access to nearby sports facilities (Clark et al., 2022; Holt et al., 2011). Despite this, adolescents from low-income families could benefit the most from organised sports participation (Heath et al., 2022). Sports participation offers opportunities to develop positive relationships, social capital, social skills, teamwork, feelings of dignity and a sense of belonging to a valued group. It also provides occasions for mentorship and inclusive experiences within a supportive and nurturing environment (Clark et al., 2022; Heath et al., 2022; Holt et al., 2011). Given that family income may restrict some associations between sports categories and children's adjustment (Blain et al., 2023), a similar influence could be expected for adolescents.

The Present Study

The first aim of this study was to examine the associations between the duration of participation in four categories of sports, namely, collision team sports, low-contact team sports, individual sports and aesthetic sports, from ages 13 to 17 and academic and psychosocial adjustments—academic aspirations, internalising and externalising problems, alcohol consumption and prosocial behaviours—at the age of 17. The study used a sample of adolescents who were identified at age 5 (kindergarten) as being at risk for externalising problems. Duration of participation in a sports category was operationalised as the number of years of participation from ages 13 to 17 (from the beginning to the end of secondary school). Duration is relevant when examining the said associations because developing supportive relationships and skills in an organised activity context requires time (Bohnert et al., 2010). Given that adolescents might participate in more than one category of sports, they were examined simultaneously to verify their compound contribution. In addition, to address selection effects, control variables were included in the analyses, namely, the baseline level of each outcome variable assessed in childhood, as it could act as an antecedent of sports participation (Brière et al., 2018); parental education and income given their known associations with sports participation and psychosocial adjustment (CFLRI, 2022); and the adolescent's sex given documented sex differences in sports participation and psychosocial adjustment (Keyes & Platt, 2024; Plaza et al., 2017).

Many associations were investigated in an exploratory manner, considering the prior mixed findings and the simultaneous examination of these sports categories, which were relatively unexplored in previous research. Nevertheless, four hypotheses were formulated based on the different sports subcultures and prior research. For

collision team sports, associations were expected with lower levels of internalising problems and higher levels of externalising problems and alcohol use (Hypothesis 1 [H1]). For low-contact team sports, associations were expected with lower levels of internalising problems (Hypothesis 2 [H2]). For individual sports, associations were expected with higher levels of educational aspirations and lower levels of alcohol use (Hypothesis 3 [H3]). For aesthetic sports, associations were expected with higher levels of internalising problems and prosocial behaviours and lower levels of externalising problems (Hypothesis 4 [H4]).

The second objective was to examine the moderating role of family income on these associations. This was tested in an exploratory manner. However, considering prior research, positive associations between sports participation and academic and psychosocial outcomes were expected to be stronger among at-risk adolescents from lower income families (Hypothesis 5 [H5]).

Method

Participants

The data used came from a broader longitudinal project aimed at examining the influence of a program implemented in kindergarten and designed to prevent violence and school dropout (for details, see Poulin et al., 2013). In Québec, Canada, students complete 1 year of kindergarten (ages 5 through 6) and 6 years of elementary school (ages 6 through 12) before entering 5 years of secondary school (ages 12 through 17). In three consecutive cohorts (2002, 2003 and 2004), children from 250 classes in 40 elementary schools in a large city (see Poulin et al., 2013) were screened and recruited if they displayed a high level of externalising problems in the fall of their kindergarten year. The screening instrument was derived from the Preschool Behaviour Questionnaire (Tremblay et al., 1987). Parents and teachers rated the same 18 items on a 3-point Likert scale (0 = *never or not true* to 2 = *often or very true*), targeting oppositional defiant disorder, conduct disorder, attention-deficit/hyperactivity disorder and indirect aggression. The total score for this instrument ranged from 0 to 36 (Cronbach's α of .83 for parents and .93 for teachers). Children whose total score on the screening instrument was above the 65th percentile, both on teacher and parent ratings, were identified as displaying a high level of externalising problems: 15% of the larger sample met this criterion. The screened sample included 320 at-risk kindergartners (69% males/31% females; M_{age} = 5.42 years; SD = 0.31). Most were born in Canada (95%) and spoke French at home (94%). In kindergarten, 71% of these children lived with biological parents, and the average gross family income was $51,200.

The screened participants at age 5 were invited to take part in several follow-up assessments during elementary school and one assessment at the end of high school (age 17). Among them, 77% (n = 246) completed this last assessment. Of this sample, 18 participants had to be removed because they provided incomplete information on sports participation during the interview (see procedure below). The final sample thus included 228 at-risk adolescents (67% males/33% females; M_{age} = 17.09 years; SD = 0.38). Chi-square and t tests were performed to check whether this distribution of participants (n = 228) differed from the rest of the initial sample (n = 92) using data collected in kindergarten. The sex proportions did not differ between the two groups, $\chi^2(1, N = 320) = 0.54$, $p = .464$. However, adolescents included in the analyses came from families with higher annual income, $t(277) = -3.13$, $p = .002$, and higher parental education levels, $t(284) = -2.96$, $p = .003$, than those who were excluded.

Procedure and Design

For control variables assessed at age 5, a parent completed a sociodemographic questionnaire at the beginning of the school year. For baseline variables assessed at ages 9 and 10, teachers completed questionnaires on students' academic and psychosocial adjustment at the end of the school year. Questionnaires were distributed and collected at school by research assistants. For the duration of sports participation from ages 13 to 17 and outcomes at age 17, adolescents took part in a structured interview. They completed questionnaires during a home visit by a research assistant in the last month of the school year. Written parental consent was obtained for each year of data collection. Adolescents, parents and teachers received gift certificates or money for their participation. The Institutional Ethics Committee for Research Involving Human Subjects at the authors' university-granted ethical approval.

Measures

Duration of Participation in Organised Sports From Ages 13 to 17

During a structured interview, adolescents' participation in organised sports was assessed retrospectively at age 17 (i.e. Grade 11, the last year of high school). Participants first reported their participation in organised activities for the current year (Grade 11), followed by the preceding year (Grade 10) and so on until they provided information for each of the 5 years (until Grade 7). Participants could list up to six organised activities per year; none reported more than five per year. After identifying the activities, adolescents answered a series of questions on each activity. For an activity to be considered organised, it had to meet the following criteria: supervised by an adult, practiced for at least 30 min weekly and sustained for at least 1 month. Organised sports activities were then classified into four categories: collision team, low-contact team, individual and aesthetic sports. Each sport was classified into only one category (see online Supplemental Material). Collision team sports were practiced for at least 1 year out of five by 22% (n = 50) of the sample, low-contact team sports by 28% (n = 62), individual sports by 16% (n = 36) and aesthetic sports by 10% (n = 23). To quantify the duration of participation in each category, we assigned a score of 1 if a participant reported engaging in any sport within that category for a specific year and 0 if they did not. We then summed the scores from ages 13 to 17, resulting in a duration score ranging from 0 to 5 years. Consequently, four duration scores (one for each sports category) were computed for each participant.

Academic and Psychosocial Adjustment at Age 17

Educational Aspirations. Educational aspirations were reported by adolescents based on the question: "What is the highest level of education you would like to reach?" using a 5-point scale reflecting the levels of education in Québec, Canada: 1 = *I want to stop before I finish high school*, 2 = *I want to complete high school*, 3 = *I want to*

complete vocational training, 4 = *I want to study at college* and 5 = *I want to study at university*.

Internalising and Externalising Problems. Internalising and externalising problems were self-reported on the Mental Health and Social Inadaptation Assessment for Adolescents (Côté et al., 2017). Adolescents answered items on a 3-point Likert scale (0 = *never true* to 2 = *always true*) based on their experience over the past 12 months. The internalising problems score was computed by averaging 25 items on social phobia, generalised anxiety and depression (α = .90), for example, "I felt sad and unhappy." The externalising problems score was obtained by averaging the scores of 63 items on attention-deficit/hyperactivity disorder, conduct disorder, oppositional defiant disorder, delinquency and aggression (α = .92), for example, "I felt very restless, moving all the time."

Alcohol Use. Adolescents reported alcohol use in the last 12 months on a 7-point Likert scale (1 = *I have not consumed alcohol in the past 12 months* to 7 = *I have consumed alcohol every day in the past 12 months*).

Prosocial Behaviours. Prosocial behaviours were self-reported on the Mental Health and Social Inadaptation Assessment for Adolescents (Côté et al., 2017). Adolescents answered seven items on leadership, prosocial behaviour and social intelligence on a 3-point Likert scale (0 = *never true* to 2 = *always true*) based on the past 12 months. The score was computed by averaging those items (α = .77), for example, "When someone got hurt, I didn't hesitate to help."

Covariates at Ages 9 and 10

Teachers in Grade 3 (age 9) and Grade 4 (age 10) were asked to rate children's academic achievement (baseline for educational aspirations at age 17) compared with children their age on a 5-point Likert scale (1 = *well below average* to 5 = *well above average*). Teachers in Grades 3 and 4 were also asked to assess internalising and externalising problems and prosocial behaviours using the Social Behaviour Questionnaire (Institut de la statistique du Québec, 2004). The Social Behaviour Questionnaire presents good psychometric properties (Collet et al., 2023) and is completed by rating items on a 6-point Likert scale (1 = *never or not at all true* to 6 = *often or very true*). The internalising problems subscale (baseline for internalising problems at age 17) included 23 items measuring symptoms related to anxiety, depression and social withdrawal (α = .89 at age 9 and .85 at age 10), for example, "seemed unhappy or sad." The externalising problems subscale (baseline for externalising problems and alcohol use at age 17) included 35 items on aggression, opposition, behaviour problems, hyperactivity and inattention (α = .97 at age 9 and .97 at age 10), for example, "could not sit still, was agitated or hyperactive." The prosocial behaviour subscale (baseline for prosocial behaviour at age 17) included 17 items on leadership, prosocial behaviour and social intelligence (α = .85 at age, .85 at age 10), for example, "comforted a child [friend, brother or sister] who was crying or upset." An average score of the items was calculated for each subscale and year. Finally, mean scores were computed by combining scores at ages 9 and 10 for academic achievement (r = .69), internalising problems (r = .44), externalising problems (r = .60) and prosocial behaviours (r = .25). This approach was chosen to ensure the optimal use of the data, reducing missing data and providing a more comprehensive view of each participant's baseline adjustment across different contexts (from two teachers' perspectives and two classroom contexts), rather than relying on a single assessment. When data were available from only one time point, the score from that time point was used. Alcohol use was not measured at ages 9 and 10 given the low prevalence of this behaviour at these young ages.

Demographic Covariates

At age 5, one parent, usually the mother, provided demographic information. The child's sex was coded as 0 = female and 1 = male. Annual family income was reported on a 9-point scale ranging from less than $20,000 to over $100,000. Mother's and father's education was reported as the number of years of education. The average of the mother's and father's education scores (r = .35) was used as a measure of parental education level.

Analytic Strategy

Five linear regressions (one for each outcome at age 17) were conducted to verify the predictive associations between the duration of participation in each of the four organised sports categories and academic and psychosocial adjustment at age 17. For the first objective, the four sports variables and the covariates (baseline, sex, parental education and family income) were regressed on the outcome. The four sports variables were entered simultaneously into the regressions to verify their unique contribution beyond participation in the other sports categories. For the second objective (moderating role of family income), we examined the sample slopes at different standard deviations of the annual family income: (a) −2 *SD* = *less than $20,000*, which represented participants below the poverty line according to the Canadian poverty line in 2002 (Statistique Canada, 2022); (b) −1 *SD* = *approximately from $30,000 to $39,999*; (c) *M* = *approximately from $50,000 to $59,999* and (d) +1 *SD* = *approximately from $90,000 to $99,999*. The four interaction terms "Duration of Participation × Family Income" (one for each sports category) were included in the models, as were the covariates (baseline, sex and parental education). All models were tested on R's linear regression program using the z scores for continuous variables—except for sex—to facilitate the interpretation of the coefficients. Missing data were estimated using the full information maximum likelihood method.

Results

Preliminary and Descriptive Analyses

Table 1 presents the descriptive statistics for all variables. All the variables respected the assumption of normality, with skewness and kurtosis values consistently below 2, except for the externalising problems variable at age 17 (Gravetter & Wallnau, 2014). To address the positively skewed distribution of this variable, we conducted the analyses using the untransformed variable and a normalised version obtained through logarithmic transformation. Because the results were similar in terms of the direction and significance of associations, we retained only the analyses with the untransformed variable. As for the outcomes, the table indicates that more years of participation in both low-contact team sports and aesthetic sports correlated with higher levels of educational aspirations at age 17. More years of participation in collision team sports also correlated with lower levels

Table 1
Descriptive Statistics for the Predictors, Outcomes and Control Variables

Study variable	*M* (*SD*)	Correlation															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Duration of participation in organised sports from ages 13 to 17																	
1. Collision team sports[a]	0.78 (1.62)	—															
2. Low-contact team sports[a]	0.70 (1.40)	.00	—														
3. Individual sports[a]	0.38 (1.03)	−.14*	−.03	—													
4. Aesthetic sports[a]	0.31 (1.04)	−.14*	−.06	−.01	—												
Adjustment at age 17																	
5. Internalising problems[a]	0.69 (0.37)	−.25***	−.02	−.02	.09	—											
6. Externalising problems[a]	0.37 (0.20)	−.03	.07	.04	−.05	.40***	—										
7. Prosocial behaviors[a]	1.29 (0.41)	−.03	.09	.04	.23***	.07	−.09	—									
8. Educational aspirations[b]	4.23 (1.00)	.11	.21***	.04	.19**	−.01	−.18**	.24***	—								
9. Alcohol use[a]	3.32 (1.42)	.23***	.01	.04	.00	.02	.37***	−.06	.02	—							
Covariates at ages 9 and 10																	
10. Internalising problems[c]	2.22 (0.64)	−.13	−.14*	−.07	−.07	−.01	−.10	−.12	−.17*	−.17*	—						
11. Externalising problems[c]	2.28 (0.79)	−.02	−.04	.03	−.10	−.07	.15*	−.17*	−.10	−.09	.43***	—					
12. Prosocial behaviors[c]	2.48 (0.71)	.01	.07	.04	.13	.04	.04	.29***	.23***	.11	−.21**	−.03	—				
13. Academic performance[c]	2.91 (1.06)	.05	.15*	.00	.20**	−.04	−.05	.14*	.42***	.12	−.44***	−.32***	.27***	—			
Covariates at age 5																	
14. Child's sex[a]	67.50	.29***	−.09	−.06	−.35***	−.28***	.07	−.31***	−.14*	−.02	.11	.23***	−.27***	−.07	—		
15. Family income[d]	5.41 (2.52)	.13	.03	−.02	.03	−.14*	−.09	−.08	.23***	.09	−.09	−.08	−.06	.18*	.13	—	
16. Parental education[c]	15.12 (3.23)	.17*	−.02	.12	.04	−.12	−.11	−.01	.38***	−.04	−.11	−.05	.02	.23***	.10	.45***	—

Note. Duration of participation in organised sports = mean number of years of participation from ages 13 to 17; child's sex = percentage of males.
[a] $n = 228$. [b] $n = 226$. [c] $n = 210$. [d] $n = 207$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

of internalising problems and higher levels of alcohol use at age 17. None of the sports variables correlated with externalising problems at age 17, and more years of participation in aesthetic sports correlated with higher levels of prosocial behaviours at age 17.

For correlations between the years of participation in the different categories of sports, more years in collision team sports correlated with fewer years in individual sports and aesthetic sports. It should be noted that no adolescents had participated in all four categories throughout the study period, with only one adolescent (0.4%) engaged in sports across three categories over the 5-year duration. Around 16% of the adolescents were involved in two categories and 42.1% in one category over the 5 years. Among the 228 adolescents included in the analysis, 95 (41.7%) reported no sports participation during the entire study period.

Concerning the control variables, higher parental education correlated with collision team sports participation. Higher family income and parental education correlated with higher levels of educational aspirations at age 17, as did higher family income with lower internalising problems at age 17. Females reported higher levels of educational aspirations, internalising problems and prosocial behaviours at age 17. Males practiced collision team sports for more years than females, and females practiced aesthetic sports for more years than males. Given these sex differences, we examined whether sex could moderate some associations. Partly due to the unbalanced distribution of males and females in the sports categories in our sample, none of the interaction terms reached significance. Consequently, sex was treated as a control variable.

Association Between Sports Categories and Academic and Psychosocial Adjustment

Results after controlling for baseline and demographics show some significant associations for educational aspirations, internalising problems, alcohol use and prosocial behaviours among our sample of at-risk adolescents (see Table 2). More years of participation in low-contact team sports were associated with higher levels of educational aspirations. More years of participation in collision team sports were associated with lower levels of internalising problems and higher levels of alcohol use. More years of participation in aesthetic sports were associated with higher levels of prosocial behaviours. None of the sports categories was associated with externalising problems. All variables in the models explained 33.7%, 12.3%, 5.2%, 9.0% and 16.6% of the variance in educational aspirations, internalising problems, externalising problems, alcohol use and prosocial behaviours, respectively. Because our models were fully saturated, they all had a comparative fit index/Tucker–Lewis index of 1 and a root-mean-square error of approximation of 0.

Moderating Role of Family Income

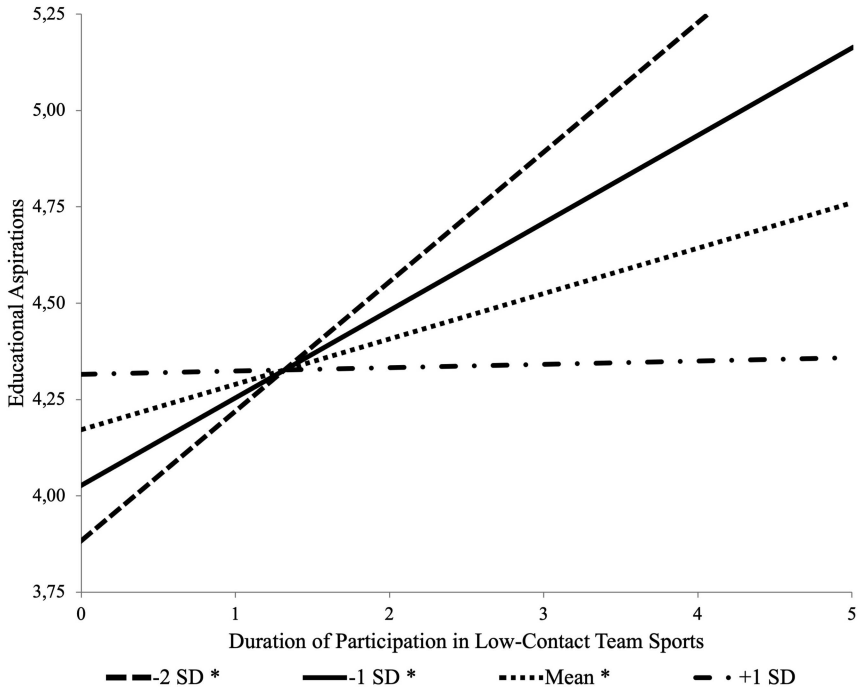
Results revealed that family income significantly moderated the association between low-contact team sports and educational aspirations among our sample of at-risk adolescents after controlling for the covariates (interaction term: $\beta = -.15$, $SE = 0.06$, $z = -2.68$, $p = .007$; 95% CI [−0.267, −0.041]; see Figure 1). More years of participation in low-contact team sports were only associated with higher levels of educational aspirations for at-risk adolescents from families with incomes below the poverty line ($\beta = .48$, $p < .001$), adolescents at −1 *SD* ($\beta = .32$, $p < .001$) and adolescents at the mean

Table 2
Results From the Regression Analyses

Independant variable	Educational aspiration				Internalising problem				Externalising problem				Alcohol use				Prosocial behaviour			
	b	*SE*	*z*	*p*	95% CI	*b*	*SE*	*z*	*p*	95% CI	*b*	*SE*	*z*	*p*	95% CI	*b*	*SE*	*z*	*p*	95% CI
Collision team sports	.10	.06	1.67	.094	[−.02, .21]	−.18	.07	−2.68	.007	[−.31, −.05]	−.02	.07	−0.22	.829	[−.15, .12]	.27	.07	3.91	<.001	[.13, .40]	.06	.07	0.85	.395	[−.07, .18]
Noncontact team sports	.17	.06	2.94	.003	[.06, .28]	−.04	.06	−0.69	.489	[−.17, .08]	.09	.07	1.34	.181	[−.04, .22]	.01	.06	0.12	.905	[−.12, .13]	.07	.06	1.09	.275	[−.05, .19]
Individual sports	.02	.06	0.37	.710	[−.09, .13]	−.06	.06	−0.95	.342	[−.19, .07]	.05	.07	0.74	.457	[−.08, .18]	.10	.07	1.48	.139	[−.03, .22]	.03	.06	0.42	.677	[−.10, .15]
Aesthetic sports	.09	.06	1.56	.118	[−.02, .21]	−.01	.07	−0.14	.890	[−.14, .12]	−.01	.07	−0.09	.931	[−.14, .13]	.02	.07	0.27	.789	[−.12, .15]	.14	.07	2.18	.029	[.01, .27]
Child's sex	−.30	.13	−2.27	.023	[−.55, −.04]	−.47	.15	−3.11	.002	[−.76, −.17]	.15	.16	0.93	.353	[−.16, .46]	−.07	.16	−0.47	.642	[−.38, .23]	−.44	.15	−2.94	.003	[−.73, −.15]
Family income	.05	.07	0.78	.434	[−.08, .18]	−.08	.07	−1.15	.251	[−.23, .06]	−.06	.08	−0.76	.450	[−.22, .10]	.13	.08	1.71	.087	[−.02, .28]	−.07	.07	−0.98	.326	[−.21, .07]
Parental education	.29	.07	4.35	<.001	[.16, .42]	−.03	.07	−0.42	.675	[−.17, .11]	−.09	.08	−1.16	.245	[−.25, .06]	−.15	.08	−1.93	.053	[−.30, .00]	0.02	.08	0.31	.755	[−.12, .17]
Baseline adjustment	.29	.06	4.81	<.001	[.17, .41]	−.03	.07	−0.48	.629	[−.17, .10]	.13	.07	1.85	.064	[−.01, .27]	−.08	.07	−1.11	.266	[−.21, .06]	0.21	.07	3.09	.002	[.08, .34]

Note. $n = 228$. The tested models were fully saturated. *SE* = standard error; CI = confidence interval.

Figure 1
Moderating Role of Family Income



* $p < .05$.

(β = .17, p = .003). This association was not significant for at-risk adolescents from families with incomes at +1 *SD* (β = .01, p = .880). No other interaction terms were found significant.

Discussion

Very scant research has been conducted on the associations between duration of participation in subculture-based sports categories and academic and psychosocial adjustment among adolescents at risk of externalising problems. This study aimed to examine these associations, as well as the possible moderating role of family income. Our results revealed that collision team sports, low-contact team sports and aesthetic sports had distinct and unique associations with educational aspirations, internalising problems, alcohol use and prosocial behaviours among at-risk adolescents and that family income moderated the associations between low-contact team sports and educational aspirations. These findings fill a significant gap in the literature by nuancing the often-found associations between sports participation and adjustment in adolescence and by providing new insights for parents, school staff and policymakers as to which categories of sports are important for youths at risk of externalising problems.

The Two Faces of Collision Team Sports

The results support our hypothesis for collision team sports, suggesting that duration of participation in this category would be associated with lower levels of internalising problems (H1). This finding is consistent with prior research linking collision sports to fewer internalising problems than noncontact sports (Moeijes et al., 2018). This association may be related to the adherence to traditional masculine norms within collision team sports, as it may contribute to adolescent boys attaining higher social status, a factor previously associated with fewer internalising problems (Kennedy et al., 2021; Vidal & Latkin, 2020). However, adherence to masculine norms could also contribute to boys reporting fewer internalising problems than they experience because they are generally more associated with girls (Keyes & Platt, 2024). It is worth noting that almost all the adolescents who reported participating in this sport category were males (except two).

The results also support our hypothesis that duration of participation in collision team sports would be associated with higher levels of alcohol use (H1). This finding is consistent with a longitudinal study that found a link between collision team sports participation in adolescence and subsequent binge drinking (Veliz et al., 2017). This result is of particular interest given that the legal drinking age in Québec, where the participants live, is 18 years old, not 17. A possible explanation of this link is that adolescents at risk of externalising problems may be more attracted to collision team sports given the opportunity for physical intensity that could serve as an outlet for their externalising tendencies (Oldham et al., 2022). Once in this risk-taking and tough culture, they may learn new sorts of problems like alcohol use by modelling peers (Kennedy et al., 2021; Veliz et al., 2017). The popularity of youth who participate in these sports may also contribute to their increased alcohol use (Malamut et al., 2021): Popular adolescents could be more invited

to unsupervised social gatherings, such as parties, where alcohol consumption is more common. Moreover, alcohol may help athletes cope with physical and emotional pain given the higher prevalence of injuries and the emotional restriction promoted by traditional masculine norms in collision team sports (Kennedy et al., 2021; Veliz et al., 2017; Walsh et al., 2021). This result adds precision to prior findings suggesting a link between team sports participation and increased alcohol use among adolescents without distinguishing the level of contact involved (Denault & Poulin, 2018; Murray et al., 2021). It appears that the specific collision aspect of team sports, in contrast to nondeliberate or no-contact team sports and their accompanying subculture, is a significant risk factor for alcohol use.

Aesthetic Sports Are Supportive of Prosocial Behaviours

Our results support the hypothesis suggesting an association between the duration of participation in aesthetic sports and heightened levels of prosocial behaviours (H4). This finding is consistent with prior research on adolescent gymnasts, which found links with characteristics associated with prosocial behaviours such as enhanced social support and self-efficacy (White & Bennie, 2015). Moreover, some theoretical perspectives propose that interactive and coordinated movement patterns prevalent in aesthetic sports—marked by elements such as imitation, synchronous movement and motoric cooperation inherent in choreographies—are an important base for the development of empathy and prosocial behaviour (Behrends et al., 2012). Creativity in aesthetic sports may further explain this association given that other creative activities have been linked to prosocial behaviours (Montgomery & Maunders, 2015). However, our result deviates from a recent study concluding that dancing does not increase prosocial behaviours (Tarr & Dunbar, 2024). Methodological differences may explain this disagreement as that study involved a single introductory dance activity as opposed to multiple years of participation in aesthetic sports in ours. This result suggests that sustained engagement in aesthetic sports may foster higher levels of prosocial behaviours among adolescents at risk of externalising problems.

Low-Contact Team Sports Are Supportive of Educational Aspirations Under Certain Conditions

Results indicate that family income moderates the link between duration of participation in low-contact team sports and educational aspirations. This supports our hypothesis (H5) that some associations would be stronger among at-risk adolescents from lower income families. Despite encountering more barriers in sports participation (CFLRI, 2022), it appears that at-risk adolescents from medium- and lower income families who participate in low-contact team sports express higher educational aspirations. A potential explanation lies in the association between peer support and higher educational aspirations given that the low-contact team sports subculture emphasises social modelling, collaboration and relatedness (Berzin, 2010; Hoffmann et al., 2022). This type of sport could indeed bring adolescents to meet prosocial peers they might not otherwise have met. Additionally, the financial capacity to pursue postsecondary education as well as parental influence is reflected in educational aspirations. Previous research underscores that even middle-income families ($45,000–$75,000 annual incomes) reported struggling to save money for their children's higher education (Napolitano et al., 2014). In Québec, Canada, scholarships for student-athletes often help reduce education costs (Sports Québec, 2023). Therefore, consistent participation in low-contact team sports during secondary school could facilitate these adolescents' envisioning continuing their sport at postsecondary institutions by alleviating financial limitations. Adding nuance to prior research on team sports and academic outcomes (Eccles & Barber, 1999), our findings suggest that only low-contact team sports, not collision team sports, are associated with higher educational aspirations among adolescents at risk of externalising problems and that this link is moderated by family income.

Unsupported Hypotheses

Our study found no association between collision team sports and externalising problems among at-risk adolescents, contrary to expectations (H1) and prior research (Visek et al., 2010). However, despite links to more competitive aggression and anger, collisions sports showed no corresponding link with aggression outside of sports in adolescence (Huđin et al., 2020). A possible explanation is that collision team sports may offer adolescents at risk of externalising problems a positive outlet to channel their energy, regulate their emotions and cultivate positive socialisation and behaviours (Huđin et al., 2020).

Our study found no association with internalising problems for low-contact team sports, contrary to expectations (H2) and prior research (Sabiston et al., 2016). As mentioned, the collision aspect of certain team sports and their subculture may be an important factor to explain the link between team sports and internalising problems for at-risk adolescents.

Our study found no association between individual sports and educational aspirations and alcohol use for at-risk adolescents, contrary to expectations (H3) and prior findings (Denault & Poulin, 2018; Ishihara et al., 2020). However, the studies that supported our expectations aggregated martial arts and aesthetic sports within individual sports, potentially obscuring unique associations, and they did not examine at-risk participants. This result highlights the importance of distinguishing sports categories and considering the specific study population when interpreting associations with adjustment.

Finally, for aesthetic sports, we found no association with internalising and externalising problems, contrary to expectations (H4) and prior research (Sysoeva et al., 2009; White & Bennie, 2015). The presence of both protective factors (like creativity) and risk factors (like body image dissatisfaction) within this subculture may explain the absence of association for internalising problems (Chapa et al., 2022; White & Bennie, 2015). Differences in sample characteristics and methodology (e.g. age groups, risk status for externalising problems, focus on one sport vs. a category of sports) likely contributed to results' discrepancy for externalising problems when compared with prior studies.

Strengths, Limitations and Future Research

This study's strengths include controlling for sociodemographic covariates and baseline levels of outcomes, enhancing robustness by

addressing potential selection effects and behaviours stability over time. The simultaneous examination of four sports categories also ensures that the associations found were specific to a particular sports category and not to sports participation in general. Finally, this study provides information about the links between sports participation and academic and psychosocial adjustment for at-risk adolescents, a population with unique needs rarely examined in the organised sports context.

Despite these strengths, some limitations remain. First, the study's correlational design hinders conclusions regarding causality. Although employing a longitudinal design with controls for baseline levels enhances confidence in the temporal sequence of the associations, we acknowledge that this approach does not constitute experimental evidence of directional causality. Second, while the retrospective measure of sports participation could have led to recall bias, the binary nature of our operationalisation (i.e. participation or not in sports each year) likely minimises this risk. Moreover, recall of concrete behaviours, such as sports participation, is generally more reliable than recall of subjective experiences, like depressive symptoms. Our results' robustness is further supported by findings from studies like that of Jivraj et al. (2020), which show consistency in the direction and significance of results between retrospective and prospective measures for salient and objective life events. Third, generalisability is limited by the sociodemographic homogeneity of participants (predominantly White, educated, industrialised, rich and democratic individuals from the same Canadian province and all French speaking; Arnett, 2008), attrition and the relatively small number of participants in each sports category. Retained participants were more likely to come from higher income, well-educated families than lost or excluded participants, prompting us to interpret our results with caution, attrition being a stumbling block in longitudinal studies (Young et al., 2006). The distribution of boys and girls in each sports category is also uneven, reflecting gender stereotypes. Fourth, the study does not allow comparisons between at-risk and non-at-risk youth, limiting conclusions about what is specific to at-risk youth in our results, which future studies should explore. Fifth, although the correlation between the baseline measures of prosocial behaviours in Grades 3 and 4 was positive and significant, it was lower than for other behaviours. Variations in teacher assessments and classroom contexts may have contributed to the lower stability in prosocial behaviours over time.

Future research should use larger, more representative samples to verify, extend and generalise our findings. Research should also consider various participation dimensions (e.g. breadth, intensity, engagement) when examining these sports categories concurrently, as it could result in different associations. Studies should examine underlying processes that might explain our findings, such as traditional masculine norms and social status in collision team sports, peer support in low-contact team sports and creativity in aesthetic sports. Finally, although we found no moderating role of sex, further research with more participants, a measure of gender identity and a more even distribution of boys and girls in each sports category would be warranted.

Conclusions and Practical Implications

Our findings provide a more nuanced picture of the links between sports participation and academic and psychosocial adjustment among adolescents at risk of externalising problems. They also reiterate the importance of examining sports categories based on different subcultures. Controlling for baseline levels of outcomes, the child's sex, parental education and family income, duration of participation in collision team sports seems to protect at-risk adolescents from later internalising problems. However, it does seem to increase their alcohol use. Moreover, duration of participation in aesthetic sports seems to support at-risk adolescents' later prosocial behaviours. Finally, duration of participation in low-contact team sports seems to support later educational aspirations for at-risk adolescents from medium- and lower income families. These findings underscore the complex interplay between sports participation and adolescent development, highlighting the importance of better understanding of these unique associations. Parents, school staff and stakeholders should be informed of these associations to increase awareness on the differential benefits and risks of sports participation among adolescents at risk of externalising problems. Some sports categories could be prioritised based on these adolescents' needs and preferences, which could differ from adolescents without previous externalising problems. The results also offer valuable insights for designing and implementing sport-based prevention programs in school and community settings, such as interventions targeting alcohol use in collision team sports. Finally, greater accessibility to low-contact team sports should be advocated either by introducing new programs in schools or by funding existing programs in communities. Enabling more adolescents from medium- and lower income families to participate in low-contact team sports might help them develop higher educational aspirations, which could, in turn, help them in their educational paths.

Résumé

Cette étude examine les liens entre la durée de participation à quatre catégories de sports entre 13 et 17 ans—sports d'équipe de collision, sports d'équipe avec peu ou sans contact, sports individuels et sports esthétiques—et l'adaptation scolaire et psychosociale à 17 ans. Un échantillon de 228 adolescents (67% de garçons) présentant un niveau élevé de problèmes extériorisés à 5 ans selon les évaluations des enseignants et des parents, les plaçant à risque de problèmes d'adaptation ultérieurs, a été évalué. La participation sportive a été consignée une fois, au cours de la dernière année de l'école secondaire, à l'aide d'une évaluation rétrospective. Les adolescents ont indiqué les sports organisés auxquels ils avaient participé au cours de chaque année de l'école secondaire et ont fait part de leurs aspirations scolaires, de leurs problèmes extériorisés/intériorisés, de leur consommation d'alcool et de leurs comportements prosociaux. Les covariables comprenaient le sexe, le revenu familial, le niveau d'éducation des parents et les niveaux de base d'adaptation recueillis à l'école primaire. Les sports d'équipe de collision ont été associés à des niveaux plus faibles de problèmes intériorisés et à des niveaux plus élevés de consommation d'alcool. Les sports esthétiques ont été associés à des niveaux plus élevés de comportements prosociaux. Les sports d'équipe avec peu ou sans contact ont été associés à des aspirations scolaires plus élevées, en particulier chez les adolescents issus de familles à revenu faible ou moyen. De possibles explications basées sur les sous-cultures des catégories sportives sont suggérées.

Mots-clés : adolescence, sports, adaptation psychosociale, aspirations scolaires, statut socio-économique

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