

**Children's Organized Sports Participation and Psychosocial Adjustment: Associations
with Categories of Sports**

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Abstract

This study examined the association between duration of participation in four sports categories— team sports, individual sports, martial arts, aesthetic sports—and psychosocial adjustment and whether family income moderated this association. A sample of 468 children (36.1% girls) was assessed annually from kindergarten to grade 4. The number of years of participation was computed for each sports category, and internalizing and externalizing problems and prosocial behaviors were assessed in kindergarten and at the end of grade 4. Adjustment in kindergarten, sex, and parental education were included as covariates. Team and aesthetic sports were found to be associated with lower levels of internalizing problems. Family income also moderated the association between individual sports and externalizing problems, as these sports were associated with lower problems for children from lower-income families. Parents and policymakers should be informed of these differential associations and greater accessibility to individual sports should be advocated.

Keywords: organized sports, childhood, internalizing and externalizing problems, prosocial behavior, family income

Public significance statements: The benefits of sports participation vary depending on the type of sports children engage in. Our study reveals that participating in team and aesthetic sports during childhood is associated with decreased internalizing problems, while individual sports participation is associated with decreased externalizing problems for children from lower-income families. These findings highlight the importance of considering specific sports categories when examining associations between organized sports participation and children's psychosocial adjustment.

Children's Organized Sports Participation and Psychosocial Adjustment: Associations with Categories of Sports

Some organized sports categories may be more beneficial than others for improving developmental outcomes in childhood (Hoffmann et al., 2022). Organized sports are adult-led physical activities characterized by rules, formal practice, and performance evaluation (Logan et al., 2019). In the province of Québec (Canada), approximately 79% of children aged 5 to 10 participated in organized sports in 2014-2016 (Canadian Fitness & Lifestyle Research Institute [CFLRI], 2018b). Childhood participation in organized sports has been associated with fewer internalizing and externalizing problems and more prosocial behaviors (Logan et al., 2019). However, sports are generally examined as a whole, even though some sports categories (e.g., team vs. individual sports) may be associated with better psychosocial outcomes than others (Moeijes et al., 2019). Moreover, these categories may be associated differently with adjustment depending on socioeconomic status (Heath et al., 2018). To fill these gaps in the literature, we verified the longitudinal associations between the duration of participation in four sports categories during childhood and three indicators of psychosocial adjustment: internalizing problems, externalizing problems, and prosocial behaviors. We also investigated the potential moderating effect of family income on these associations. Understanding which sports categories have the most beneficial associations with childhood psychosocial adjustment is important for the development of informed sport-based prevention and intervention programs.

Longitudinal Links Between Organized Sports and Psychosocial Adjustment

Several longitudinal studies have found associations between participation in organized sports during childhood and positive psychosocial adjustment. For instance, Brière et al. (2019) found that being in a consistent participation trajectory from ages 6 to 10 was associated with

having lower levels of emotional distress, anxiety, shyness, and social withdrawal at age 12 than being in a low/inconsistent participation trajectory. Findlay and Coplan (2008) showed that participation at age 10 was associated with lower anxiety levels in shy children one year later. Simpkins et al. (2005) also reported that children engaged in higher levels of organized sports from ages 6-9 and 8-11 were rated by teachers as less likely to be delinquent in adolescence. Finally, Moeijes et al. (2018) showed that a moderate or high frequency of participation among children aged 10 to 12 was associated with more prosocial behaviors one year later. These studies suggest that organized sports participation is associated with positive adjustment among children. However, sports are not homogenous. In this study, we proposed that sports can be categorized according to their unique subculture and that a more focused approach to these distinct subcultures could shed new light on the link between children's organized sports participation and psychosocial adjustment.

Categorization of Organized Sports

Sports can be categorized based on multiple criteria, such as whether they are team or individual sports, entail physical contact, or take place indoors or outdoors (Moeijes et al., 2019). This study explored a categorization based on the specific subculture likely to prevail in each sports category. Four categories were examined: team sports (e.g., baseball, soccer, hockey), individual sports (e.g., swimming, skiing, tennis), martial arts (e.g., karate, judo, taekwondo), and aesthetic sports (e.g., dance, gymnastics, figure skating). We differentiated between team and individual sports based on the varying roles of cooperation, competition, and bonding among participants in these two categories of sport (Landkammer et al., 2019). Besides whether or not they could be classified as team or individual sports, we grouped martial arts (Gubbels et al., 2016; Harwood et al., 2017) and aesthetic sports (Krentz & Warschburger, 2011; Paixão et al.,

2020) into separate categories based on the emphasis on Asian traditions, on the one hand, and physical appearance and “showcase,” on the other hand. We believed these characteristics were more important than their “team” or “individual” nature to explain their potential differential associations with children’s psychosocial adjustment. Each category groups sports that share similar characteristics and rules that make their subculture unique.

Team Sports

Team sports include sports where participants must cooperate to achieve a common goal, i.e., accumulating more points than the opposing team. Further, team sports are characterized by interdependent behaviors during play (Landkammer et al., 2019; Moeijes et al., 2018). The frequent modeling of good sportsmanship, the feeling of relatedness with others, and the social nature of team sports have been proposed to explain the association between higher involvement in team sports and better psychosocial adjustment (Bolter & Kipp, 2018; Hoffmann et al., 2022; Pluhar et al., 2019). Team sports participation in childhood and adolescence has been associated with fewer anxiety, depressive symptoms, and mental health problems, and greater social acceptance and personal self-efficacy compared with individual sports participation or non-participation (Eime et al., 2013; Hoffmann et al., 2022; Pluhar et al., 2019). However, some results have been mixed. While participation in team sports has not been linked to aggression beyond non-participation (McHale et al., 2005), boys participating in team sports were found to exhibit more aggression and emotional reactivity than those involved in individual sports (Johnson & Rosen, 2000), and girls participating in team sports were found to engage in fewer rule-breaking behaviors than those not participating in any sport (Hoffmann et al., 2022). Moreover, team sports participation has been linked to higher levels of prosocial behaviors owing to the promotion of fair play, the opportunities for positive social interactions with

teammates, and support from coaches (Bolter & Kipp, 2018; Rutten et al., 2008). Though studies have suggested significant links between team sports and internalizing problems and prosocial behaviors, little research has been conducted on younger children. In addition, the association with externalizing problems has been inconsistent across studies and needs to be clarified (Hoffmann et al., 2022; Johnson & Rosen, 2000; McHale et al., 2005).

Individual Sports

In individual sports, children perform alone, focusing on improving their own technical skills (Moeijes et al., 2018). Given that their performance relies only on themselves, children may be exposed to unpleasant emotions such as shame or guilt when they fail or make mistakes, enhancing their self-awareness and the pressure to perform at their best (Hoffmann et al., 2022). Children may also experience a lack of social support from other club members. Even if they train together, they are required to outperform others during performance, which can create competition (Eime et al., 2013; Landkammer et al., 2019). Research has shown that participation in individual sports is associated with more symptoms of anxiety and depression (Nixdorf et al., 2016; Pluhar et al., 2019). For externalizing problems and prosocial behaviors, Koepp and Gershoff (2021) found that individual sports did not predict growth in children's inhibitory or social self-control. Moeijes et al. (2019) also found no association between individual sports and children's externalizing problems and prosocial behaviors. In contrast, Hoffmann et al. (2022) found that individual sports participation in childhood was associated with higher social problems (e.g. "being disliked by peers") than no-sport participation. Participation in individual sports thus seems to be linked to more internalizing problems, while findings for externalizing problems and prosocial behaviors have been inconsistent. Given that prior studies have often

aggregated martial arts and aesthetic sports with individual sports (e.g., gymnastics), this could lead to some confusion regarding their unique associations with children's adjustment.

Martial Arts

Martial arts are embedded in Asian traditions and share features such as katas, controlled behaviors, and respect for self and others (Harwood et al., 2017). According to some researchers, multiple aspects of the martial arts philosophy, such as the focus on moral code, self-control and integrity, could explain why they contribute to a positive psychosocial adjustment (Fung & Lee, 2018; Xu et al., 2022). However, studies conducted in childhood have reached divergent conclusions. For instance, Bueno et al. (2022) found that participation in martial arts school-based programs was associated with lower levels of internalizing symptoms. In addition, martial arts have been associated with lower levels of externalizing problems and improved social skills (Bueno et al., 2022; Harwood et al., 2017). In contrast, a study revealed that practicing martial arts was not associated with internalizing problems, externalizing problems, and prosocial behaviors (Strayhorn & Strayhorn, 2009). Further, a meta-analysis that considered publication biases found that participation in martial arts was related to more externalizing problems than non-participation (Gubbels et al., 2016). One recurring limitation of these studies has been to combine martial arts with combat sports such as wrestling and boxing that do not share the same philosophy. Indeed, a systematic review concluded that traditional martial arts participation, which involves meditation, philosophy, or kata, was linked to lower levels of anger and aggression. Yet, no such link was found when martial arts and combat sports were examined together (Lafuente et al., 2021). Therefore, it is reasonable to expect that the spiritual and mental development promoted by the traditional martial arts approach might prevent or reduce psychosocial problems.

Aesthetic Sports

Aesthetic sports emphasize artistic expression and usually involve choreographies and costumes. During competition, the technical quality of movements is evaluated by judges, as is the creativity of the routines. Given this notion of performance and “showcase”, the aesthetic sports subculture tends to emphasize physical appearance and thinness, even among children (Krentz & Warschburger, 2011; Paixão et al., 2020). Davison et al. (2002) found that girls aged 5-7 years participating in aesthetic sports reported higher levels of weight-related concerns than those in non-aesthetic or no sports. In contrast, a systematic review concluded that dance classes among 5- to 21-year-olds were linked to lower anxiety levels (Burkhardt & Brennan, 2012). A qualitative study also suggested that the social support between gymnasts, the release of anger, an optimistic view of challenges, and the development of life skills promoted psychosocial adjustment (White & Bennie, 2015). This is consistent with Sysoeva et al.’s study (2009) suggesting that synchronized swimmers aged 10-26 reported lower levels of aggression, negativism, irritability, and verbal hostility than did non-participants. However, most studies investigating the link between aesthetic sports and psychosocial adjustment have been conducted among adolescents and adults. It has yet to be tested among younger children. In addition, very few studies have focused on externalizing problems and prosocial behaviors.

The Moderating Effect of Family Income

Sports categories could have differential associations with psychosocial adjustment for children from lower- or higher-income families. In Canada, approximately 80% of children with the highest household income (\geq \$100,000) participate in sports, compared with approximately 60% of those with the lowest ($<$ \$20,000; CFLRI, 2018a). Low-income families face multiple barriers when it comes to sports participation: registration and equipment costs, increasing costs

as children's abilities improve, competition costs, transportation needs, limited access to sports facilities in their neighborhoods, and time constraints such as parents' multiple jobs (Clark et al., 2019; Holt et al., 2011). Despite these barriers, children from low-income families often benefit the most from participating in organized sports (Heath et al., 2018). Sports participation can foster positive relationships, social capital, feelings of dignity, a sense of belonging to a valued group, and inclusive experiences, as well as provide mentoring opportunities and promote teamwork and social skills in a safe and caring environment (Clark et al., 2019; Heath et al., 2018; Holt et al., 2011; Martin & Dowson, 2009). As a result, sports participation can positively impact these children's self-confidence, emotional control, discipline, and academic performance (Clark et al., 2019; Holt et al., 2011). Examining the moderating effect of family income might be of particular interest when it comes to different sports categories. Determining which sports categories are more protective for children from lower-income families could help parents, school staff, and stakeholders prioritize some categories of sports. Certain prevalent features of categories might be especially beneficial for these children, such as the sense of community afforded by team sports or the opportunity for mentoring afforded by individual sports.

Current Study

Using a prospective longitudinal study, we first examined the association between duration of participation in four sports categories— team sports, individual sports, martial arts, and aesthetic sports —and psychosocial adjustment. Duration of participation in a sports category was operationalized as the number of years of participation from kindergarten to grade 4. Even though multiple dimensions can be used to operationalize sports participation (e.g., breadth, intensity, engagement), duration is relevant for various reasons when examining associations between sports participation and adjustment. Most importantly, it takes time to

develop supportive relationships and skills in an organized activity context (Bohnert et al., 2010). The four participation variables were examined simultaneously to verify the unique contribution of each sports category to adjustment. Consistent with prior research, three indicators of psychosocial adjustment were examined in kindergarten and at the end of grade 4, namely, internalizing problems, externalizing problems, and prosocial behaviors. Covariates were included in the analyses to account for selection effects: the outcome variable at baseline in kindergarten, as it could also act as an antecedent of sports participation (Aumètre & Poulin, 2016); parents' education and income, as these have been linked to sports participation (CFLRI, 2018b); and the child's sex, based on documented sex differences in sports participation and psychosocial adjustment (Allès-Jardel & Mouraille, 2003; Jacobs et al., 2005).

Given the mixed prior findings and the concurrent examination of these sports categories being relatively unexplored in previous research, most of the links were examined in an exploratory manner. Nevertheless, we made some hypotheses based on the different sports subcultures and prior research. For team sports, based on prior research, we expected associations with lower levels of internalizing problems and higher levels of prosocial behaviors and, based on the subculture, an association with lower levels of externalizing problems (H1). For individual sports, based on prior research and the subculture, we expected an association with higher levels of internalizing problems and no association with externalizing problems and prosocial behaviors (H2). For martial arts, based on prior research, we expected an association with higher levels of prosocial behaviors, and based on the subculture, an association with lower levels of externalizing problems (H3). For aesthetic sports, based on prior research, we expected an association with lower levels of internalizing problems (H4).

Second, we examined the moderating effect of family income on the associations between duration of participation in the sports categories and psychosocial adjustment. This moderating effect was tested in an exploratory manner given the lack of previous examination with these sports categories. Nevertheless, based on prior research, we expected the beneficial effects of sports participation to be more pronounced among children from lower-income families (H5).

Method

Participants

This study is part of a larger longitudinal project on the effectiveness of a violence and school dropout prevention program implemented in kindergarten (see Poulin et al., 2013). Three cohorts of children were recruited in three consecutive years from 250 kindergarten classes in 40 elementary schools in a city near Montréal, Canada. Three to six children were recruited from each classroom for a total of 1038 children (62% boys; mean age = 5.4 years; $SD = 3.7$). Children were then assessed annually from kindergarten to Grade 4. In kindergarten, 72% of the children were living in an intact family. The average gross family income was \$60,900 per year. Approximately 7% of participants had an annual family income of less than \$20,000 and 18% had an annual income of more than \$100,000. All children spoke French and 85.5% were born in Canada. Of the remaining participants, 1.8% were born in Asia, 1% in North or South America, 1% in Europe, and 0.3% in Africa. Information was missing for about 10% of the children.

In Grade 4, 540 children (52% of the initial sample) were still involved in the longitudinal study. During the study, participants were solicited each year and some of them temporally left the study and came back for a subsequent wave of data collection. Psychosocial adjustment was measured in kindergarten and Grade 4. Sports participation was assessed

annually (five times). Among the 540 children, 65.4% had data for all five assessments of sports participation, 21.3% for four, 6.5% for three, 3.7% for two, 2.6% for one, and 0.6% for none. To deal with missing data and because participation in a specific sports category each year was a nominal variable that could not be estimated, participants were included in the analyses if they had sports participation data on at least four of the five time points. In total, 468 of the 540 children (63.9% boys) met this criterion and were included in our analysis sample. Analyses were performed to verify whether these participants ($n = 468$) differed from the rest of the initial sample ($n = 570$) using data collected in kindergarten. The sex distribution did not differ between the two groups, $\chi^2(1, N = 1038) = 1.37, p = .243$. Participants included in the analyses were more likely to come from families with higher annual incomes, $t(915) = -4.95, p < .001$, and to have parents with higher education levels, $t(936) = -3.98, p < .001$. They also had fewer internalizing problems, $t(1009) = 2.74, p = .006$, and more externalizing problems, $t(1009) = -3.81, p < .001$, than non-retained participants, but they did not differ with respect to prosocial behaviors $t(1000) = -.96, p = .340$. Finally, they were more likely to participate in team sports, $\chi^2(1, N = 1038) = 27.26, p < .001$, martial arts, $\chi^2(1, N = 1038) = 12.84, p < .001$, and individual sports, $\chi^2(1, N = 1038) = 3.89, p = .049$, but not in aesthetic sports, $\chi^2(1, N = 1038) = 1.54, p = .214$.

Procedure and Design

Teachers completed questionnaires on children's psychosocial adjustment in October of kindergarten and May of Grade 4. One parent, usually the mother, completed questionnaires about their child's participation in organized sports in May of each year. The parent also completed a sociodemographic questionnaire in October of kindergarten. Parent and teacher questionnaires were distributed (and collected) at school by research assistants. Teachers sent the questionnaires to parents, who returned them in sealed envelopes. Written parental consent was

obtained for all the children each year. Parents and teachers received gift certificates for participating in the research project. The Institutional Ethics Committee for Research Involving Human Subjects at the authors' university granted ethical approval.

Measures

Participation in Organized Sports from Kindergarten to Grade 4

Each year, parents were asked to complete a survey regarding organized activities in which their child was currently participating. They could list up to four organized activities each year. A pilot study confirmed that very few children in this age range participated in more than four activities. Activities that were not supervised by an adult, practiced for less than a month or practiced less than 30 minutes per week were excluded; these represented less than 5% of the reported activities. The sports reported by the parents were then classified into four categories: team sports, individual sports, martial arts, and aesthetic sports. Each sport was classified into only one category (for more information, see supplemental online material). Team sports were practiced by over two-thirds of the sample ($n = 320$), individual sports by about half ($n = 248$), and martial arts and aesthetic sports by about one-third ($n = 147$ for both). The most common sports were soccer for team sports, swimming for individual sports, karate for martial arts, and dance for aesthetic sports. Each year, children were given a score of 1 if they participated in any sport in each category and 0 if they did not. The scores were then summed across the five years of the study (kindergarten to Grade 4) for each sports category to obtain an overall score ranging from 0 to 5. For participants with available sports participation data on four out of five time points, we calculated the relative number of years of participation based on the proportion of years they actively participated in each category. For example, if a child participated in two out

of four years, his or her score would be 2.5 out of five years. Four variables were thus calculated to reflect the duration of participation (in number of years) in each category.

Psychosocial Adjustment in Kindergarten and Grade 4

The *Social Behaviour Questionnaire* was developed for the Québec Longitudinal Study of Child Development (Institut de la statistique du Québec, 2001) by combining items from different validated measures (Achenbach, 1991; Boyle et al., 1993; Tremblay et al., 1987). The questionnaire was completed by the child's teacher, who was asked to complete the items on a six-point Likert scale (1 = *never or not at all true* to 6 = *often or very true*). The internalizing problems subscale included 23 items covering symptoms of anxiety, depression, and social withdrawal, $\alpha = .89$ (e.g., "seemed unhappy or sad"). The externalizing problems subscale included 35 items on aggression, opposition, behavior problems, hyperactivity, and inattention, $\alpha = .97$ (e.g., "could not sit still, was agitated or hyperactive"). The prosocial behavior subscale included 17 items on leadership, prosocial behavior, and social intelligence, $\alpha = .85$ (e.g., "comforted a child (friend, brother or sister) who was crying or upset"). A mean of the items was calculated for each subscale. Internalizing and externalizing problems variables were positively skewed, with a concentration of children with low scores. A logarithmic transformation was used for these variables in kindergarten and Grade 4. We tested the final models with both the transformed and untransformed variables and the results were almost identical. Therefore, we kept the transformed variables to respect the normality hypothesis.

Covariates in Kindergarten

Demographic information was provided by a parent, usually the mother, at the beginning of kindergarten. The child's sex was coded 0 for a girl and 1 for a boy. Annual family income was reported on a 9-point scale (1 = *less than \$20,000* to 9 = *more than \$100,000*). Mother's and

father's education was reported as the number of years of education. The averaged mother's and father's education scores were used as the indicator of parental education level.

Analytic Strategy

Three multiple linear regressions were conducted to verify the predictive association between the number of years of participation in each of the four organized sports categories examined simultaneously and, respectively, internalizing problems, externalizing problems, and prosocial behaviors in Grade 4. For the first objective, we used a two-step procedure. First, the four sports participation variables were regressed on the outcome. These four variables were entered simultaneously into the regression models to control for sports participation in general and verify whether a sports category had a unique association with psychosocial outcomes beyond participation in other sports categories. Second, the covariates (baseline, sex, parental education, and family income) and the four participation variables were regressed on the outcome. This two-step procedure aimed to verify whether any significant association in the first step persisted after including the covariates. For the second objective (moderating effect of family income), we examined the sample slopes at different standard deviations of the annual family income: (a) $-2 SD = \textit{approximately less than } \$19,999$, which represented participants below the poverty line according to the Canadian poverty line in 2002 (Statistique Canada, 2022); (b) $-1 SD = \textit{approximately from } \$40,000 \textit{ to } \$49,999$; (c) $\textit{mean} = \textit{approximately from } \$60,000 \textit{ to } \$79,999$, and (d) $+1 SD = \textit{approximately from } \$90,000 \textit{ to } \$99,999$. The four interaction terms "Categories of sports x Family income" were included in the regressions. The covariates (baseline, sex, and parental education) were also included in these regressions. All models were tested with Mplus 7 using robust maximum likelihood estimation to address distributional assumptions, full information maximum likelihood (FIML) estimation to deal with

missing data, and z-scores of the variables to facilitate the interpretation of the results (Muthén & Muthén, 2012).

Results

Preliminary and Descriptive Analyses

Table 1 presents the descriptive statistics for all variables. The table indicates that more years of participation in both team and individual sports correlated with lower levels of internalizing problems in grade 4. More years of participation in martial arts correlated with higher levels of internalizing and externalizing problems in grade 4. More years of participation in aesthetic sports correlated with lower levels of internalizing problems and externalizing problems in grade 4 and with higher levels of prosocial behaviors in grade 4. More years of participation in team sports correlated with more years of participation in individual sports, and more years of participation in aesthetic sports correlated with fewer years of participation in team sports and martial arts. Moreover, very few children had participated in all four categories (2.8%), even though some children had participated in three (22%) or two (38.9%) categories over the five years. Of the 468 children included in the sample, 33 (7.1%) reported no participation in sports during the study's five years. Concerning the control variables, higher family income and parental education were both correlated with more years of participation in team sports, individual sports, and aesthetic sports. Higher family income and parental education were both correlated with lower levels of internalizing and externalizing problems in grade 4. Boys practiced team sports and martial arts for more years than girls, and girls practiced aesthetic sports for more years than boys. Given these sex differences, we also verified whether sex could act as a moderator of the association between the four sports categories and each outcome. None

of the interaction effects was significant, possibly due to the unbalanced distribution of boys and girls in the sports categories in our sample. As a result, sex was considered as a control variable.

Association Between Sports Categories and Psychosocial Adjustment

In the first regressions without the covariates, some significant associations were found for each dimension of psychosocial adjustment, although all the effect sizes were small (see Table 2). For internalizing problems, the sports variables explained 7.5% of the variance. More years of participation in team sports, individual sports, and aesthetic sports were all significantly associated with lower levels of internalizing problem. For externalizing problems, the sports variables explained 5.9% of the variance. More years of participation in aesthetic sports was significantly associated with lower levels of externalizing problems. In contrast, more years of participation in martial arts was significantly associated with higher levels of these problems. Finally, the sports variables explained 2.1% of the variance for prosocial behaviors. More years of participation in aesthetic sports was significantly associated with higher levels of prosocial behaviors.

After entering the covariates in the models, some associations remained significant for internalizing problems, effect sizes remaining small (see Table 2). More years of participation in team sports and aesthetic sports predicted lower levels of internalizing problems after controlling for baseline and demographics. However, after baseline and demographics were controlled, sports categories were no longer associated with externalizing problems or prosocial behaviors. Overall, all the variables in the model accounted for 11.0%, 35.2%, and 7.6% of the variance in internalizing problems, externalizing problems, and prosocial behaviors, respectively.

Moderating Effect of Family Income

Results revealed that family income only significantly moderated the association between individual sports and externalizing problems, after controlling for the covariates (interaction term: $b = 0.088$, $SE = .041$, $z = 2.14$, $p = .032$; 95% CI = 0.007, 0.169, see Figure 1). More years of participation in individual sports were only associated with lower levels of externalizing problems for children from lower-income families: this association was significant for children from families with incomes below the poverty line ($b = -0.235$, $p = .024$) and children at $-1 SD$ ($b = -0.147$, $p = .032$), which approximates less than \$50,000. This association was not significant for children from families with incomes at the mean ($b = -0.058$, $p = .176$) or at $+1 SD$ ($b = 0.030$, $p = .543$). No interaction terms were significant for associations with internalizing problems and prosocial behaviors (for more information, see supplemental online material).

Discussion

Previous studies have documented multiple associations between children's sports participation and psychosocial adjustment (Brière et al., 2019; Moeijes et al., 2018). However, sports have generally been studied as a whole. Prior studies have rarely examined the specific contribution of different categories of organized sports beyond team and individual sports. In this study, we examined a categorization based on sports subcultures. Our results revealed that team, individual, and aesthetic sports have distinct and unique associations with internalizing and externalizing problems and that family income appears to moderate some of these links.

Team Sports and Aesthetic Sports are Protective of Internalizing Problems

For *team sports*, we expected a significant association with lower levels of internalizing problems and externalizing problems and with higher levels of prosocial behaviors (H1). Our hypothesis was supported for internalizing problems only, even after controlling for the covariates. This finding is consistent with previous studies. This association has been repeatedly

documented in childhood (Eime et al., 2013; Hoffmann et al., 2022; Pluhar et al., 2019), but not necessarily over multiple years and with other sports categories considered simultaneously. Our results thus suggest that consistent participation in team sports may have a unique beneficial effect on internalizing problems even when participation in other sports categories is considered. This association may be related to the social and interdependent nature at the core of the team sports subculture. The modeling of good sportsmanship (i.e., respect for rules, fairness, politeness to opponents, and courtesy in defeat), the cooperation and positive relationships with teammates, and the development of better self-perceived social acceptance and self-efficacy may explain this finding (Bolter & Kipp, 2018; Boone & Leadbeater, 2006; Landkammer et al., 2019). Prior research also suggests that children participating in team sports are more likely to be motivated by the enjoyment of the game rather than by goal-based reasons, which may lead to better adjustment (Pluhar et al., 2019).

For *aesthetic sports*, we expected a significant association with lower levels of internalizing problems (H4). Our results support this hypothesis, even after controlling for the covariates. This is consistent with findings in adolescence and adulthood, suggesting that aesthetic sports are associated with less negativism and more optimism in the face of challenges and serve as a distraction from external stressors and life-skill development activity (Sysoeva et al., 2009; White & Bennie, 2015). Another explanation is the use of creativity in aesthetic sports. These sports often involve choreographies that tell a story, have a theme and costumes, and are usually set to music. Prior studies revealed that creative activities promote well-being by being associated with lower levels of internalizing problems (Funch, 2021; Ruini et al., 2020).

Individual Sports are Protective of Externalizing Problems Under Certain Conditions

Our results suggested a moderating effect of family income on the link between individual sports and externalizing problems. Duration of participation in individual sports from kindergarten to Grade 4 was significantly associated with lower levels of externalizing problems in Grade 4 for children from lower-income families. This finding suggests that although children from lower-income families are less likely to participate in sports (CFLRI, 2018a), when they do, they are likely to show less externalizing problems. One possible explanation is that individual sports offer more mentoring opportunities than other sports categories (Heath et al., 2018; Martin & Dowson, 2009). Because the focus is on individual abilities, coaches perhaps give more attention and feedback to children individually. Because lower-income parents are more likely to face time constraints in supporting their children in their activities, this additional attention and modeling may greatly benefit children from these families (Clark et al., 2019; Holt et al., 2011). Other benefits associated with individual sports encompass enhanced emotional control and discipline, especially for children from lower-income backgrounds (Holt et al., 2011). By performing alone, children assume complete responsibility for both failure and success (Nixdorf et al., 2016). If they perform well, these sports can provide a new context for them to realize that they can succeed on their own if they practice enough and persevere. The positive consequences of their behaviors can reinforce their self-discipline and emotional control (e.g., control of impulsivity) in constructive activities, thereby decreasing their externalizing problems.

Non-Significant Findings: Selection Effects and Outcome Stability Over Time

No association was found between *team sports* and both externalizing problems and prosocial behaviors. This finding is inconsistent with our expectations (H1) and prior research that has repeatedly linked team sports participation with prosocial behaviors (Bolter & Kipp, 2018; Rutten et al., 2008). However, mixed findings have been reported with respect to

externalizing problems, including an absence of association. For example, McHale et al. (2005) reported that children involved in team sports were rated as aggressive as those who were not. A potential explanation for these non-significant associations may be the presence of both positive and negative norms in children's team sports. Team sports can expose individuals to peer pressure to behave according to group norms based on potential social sanctions (Crozier & Benson, 2020). These norms establish positive or challenging developmental situations that can play a role in the association between team sports and, respectively, externalizing problems and prosocial behaviors. For example, positive norms (e.g., good sportsmanship) could lead to more prosocial behaviors, while negative norms (e.g., aggression, disrespect) could lead to more externalizing problems (Crozier & Benson, 2020). It would then be important to measure group norms in future studies to better understand the association between team sports and externalizing problems and prosocial behaviors in childhood.

For *individual sports*, we expected a significant association with higher levels of internalizing problems and no association with prosocial behaviors (H2). Although no significant association emerged with prosocial behaviors, we found a negative association between individual sports and internalizing problems. However, this association disappeared when controlling for the covariates. A selection effect may have played a role in this result. Of the four sports categories, individual sports were the most highly correlated with family income and parental education. It is possible that the children's family background was more protective against internalizing problems than participation in individual sports over time.

Regarding *martial arts*, we expected significant associations with lower levels of externalizing problems and higher levels of prosocial behaviors (H3). However, the results did not support our hypothesis. Only a small and significant positive association emerged between

martial arts and externalizing problems in the model without the covariates. However, this association was no longer significant once the covariates were included. This is likely due to the stability of externalizing problems, coupled with the fact that boys are more likely to participate in martial arts and to have more externalizing problems than girls (Allès-Jardel & Mouraille, 2003; Jacobs et al., 2005). Strayhorn and Strayhorn (2009) found no change in internalizing problems, externalizing problems, and prosocial behaviors as a function of participation in martial arts. These authors hypothesized that this might reflect a non-homogeneous average of positive and negative effects based on how coaches taught martial arts. For instance, modern approaches more focused on following competition rules and applying combat techniques, might have more complex associations with psychosocial adjustment than traditional approaches more focused on spiritual and mental development (Lafuente et al., 2021). In future research, measuring the specific coaches' approach in martial arts activities would be important to better understand their association with children's adjustment.

Finally, for *aesthetic sports*, the significant associations with lower levels of externalizing problems and higher levels of prosocial behaviors were no longer significant after controlling for the covariates. Here again, results can be explained by a selection effect of the child's sex. Girls are over-represented in aesthetic sports and tend to have less externalizing problems and more prosocial behaviors than boys in childhood (Allès-Jardel & Mouraille, 2003; Jacobs et al., 2005; Longobardi et al., 2019). Gender-based socialization, and perhaps the stability of psychosocial adjustment over time, might thus be more important than aesthetic sports in explaining changes in externalizing problems and prosocial behaviors.

Strengths, Limitations, and Future Research

This study has methodological strengths. As opposed to many researchers who have assessed duration retrospectively, our five-year longitudinal design with multiple time points allowed us to measure duration of participation prospectively in each sports category (i.e., no recall) and to control for sociodemographic covariates and baseline levels of targeted outcomes. This method increased the robustness of the study by accounting for potential selection effects and stability of behaviors over time. Although this resulted in only a few significant findings, we can be confident that these findings are robust. We also simultaneously examined the contribution of four sports categories to psychosocial adjustment in childhood. This allowed us to control for overall sports participation and ensure that the associations found were due to a particular sports category and not to sports participation in general. Finally, data were collected using a multi-respondent procedure (parent report of sports and covariates, teacher ratings of psychosocial adjustment), which reduced the risk of method bias.

Our study also has some limitations. First, it is correlational, which limits any conclusions regarding causality. Second, we did not control for children's participation in other organized activities (e.g., performance and fine arts, clubs, non-organized physical activities), which are also likely to be associated with psychosocial adjustment. These activities should be added as a control in further research. Nevertheless, sports remain the most prevalent organized activity during childhood in Canada (Aumètre & Poulin, 2016). Third, the generalizability of our findings is limited given that (1) a large portion of the initial sample was lost over the course of the study or excluded from the analytical sample, and (2) participants were quite homogeneous in terms of sociodemographic characteristics (WEIRD characteristics, mainly originating from Québec, and all French-speaking; Arnett, 2008). Fourth, the measure of participation duration in each category could have been more accurate with multiple measurements throughout each year

to account for seasonal participation in sports (Bohnert et al., 2010). Fifth, our results on the moderating effect of family income should be interpreted with caution, as participants in our retained sample were more likely to come from families with higher annual incomes and to have parents with higher education than lost or excluded participants. Nevertheless, attrition due to failure to follow-up is a recurring difficulty in longitudinal studies, as mentioned, for example, in Young et al.'s (2006) study. Future studies should thus examine the association between sports categories and psychosocial adjustment in samples more representative of the general population.

In this study, we chose to categorize sports based on shared subcultures. In addition to team and individual sports, which have been examined concurrently previously, we also looked at martial arts and aesthetic sports, which have more defining characteristics than being only “team” or “individual” sports. Our results suggest that this approach is promising. However, further research is necessary to expand the validation of these sports categories across diverse samples and developmental stages. This would help determine if the approach can be applied to different populations and whether each category might have a distinct timeframe for associations with youths' adjustment. Further research should also examine these sports categories concurrently by considering breadth (e.g., number of sports practiced within a category) and intensity (e.g., number of hours per week) of participation, as well as engagement which includes the affective and cognitive components of participation beyond the behavioral component (Rose-Krasnor, 2009). Moreover, different participation profiles (e.g., a profile of children who participate only in team sports versus a profile of children who participate in team sports and aesthetic sports) should be examine in future studies. Children's and youths' own preferences for a particular sport should also be considered, as different motivation profiles have been associated with participation duration and may be linked to different psychosocial outcomes (Denault et al.,

2022). Moreover, studies could examine other outcomes, such as academic achievement, and some of the underlying processes that might explain our findings. For example, the contribution of social norms in team sports, mentoring in individual sports, coach approach in martial arts, and creativity in aesthetic sports could be explored. Finally, even though our preliminary analyses did not reveal a moderating effect of children's sex on the association between sports categories and adjustment, studies with a more balanced distribution of boys and girls in each sports category need to be carried out.

Conclusions and Practical Implications

Our study adds to previous research on the psychosocial benefits of organized sports participation in childhood by highlighting differential associations with different sports categories. Duration of participation in team and aesthetic sports seems to protect children from later internalizing problems even when the baseline level of problems, child's sex, parental education, and family income are controlled. Moreover, duration of participation in individual sports seems to protect children from low-income families from later externalizing problems. Parents, school staff, and stakeholders should be informed of these positive outcomes to increase awareness of the benefits of enrolling children in such activities. Different categories of organized sports could be prioritized based on children's fundamental needs and preferences, which are important for their participation motivation. Our results can also guide the implementation of sport-based prevention programs in school and community settings. Finally, greater accessibility to individual sports should be advocated to enable more children from lower-income families to participate, either by introducing new programs in schools or funding existing programs in communities.

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Table 1

Descriptive Statistics for the Predictors, Outcomes, and Control variables

Study variables	Mean (SD)	Correlations											
		1	2	3	4	5	6	7	8	9	10	11	12
Organized sports participation													
1. Team sports ^a	0.52 (1.15)												
2. Individual sports ^a	0.72 (1.44)	.11*											
3. Martial arts ^a	1.66 (1.91)	-.04	.03										
4. Aesthetic sports ^a	1.21 (1.71)	-.30***	.01	-.14**									
Internalizing problems													
5. Kindergarten ^a	2.07 (0.62)	-.08	-.05	.01	-.03								
6. Grade 4 ^a	2.03 (0.69)	-.17***	-.12*	.10*	-.13**	.16***							
Externalizing problems													
7. Kindergarten ^a	2.22 (0.93)	.04	-.03	.10*	-.14**	.32***	.22***						
8. Grade 4 ^a	1.89 (0.85)	-.01	-.09	.13**	-.19***	.12*	.46***	.55***					
Prosocial behaviors													
9. Kindergarten ^b	2.94 (0.76)	.09*	.08	-.09*	.10*	-.29***	-.15***	-.14**	-.10*				
10. Grade 4 ^a	2.87 (0.79)	-.01	.05	-.06	.12**	-.25***	-.27***	-.19***	-.15***	.24***			
Covariates in kindergarten													
11. Boys (%) ^a	63.90	.37***	.02	.20***	-.60***	.11*	.10*	.15***	.19***	-.16***	-.19***		
12. Family income ^c	—	.16***	.23***	.03	.13**	-.18***	-.17***	-.16***	-.22***	.16***	.08	.04	
13. Parental education ^d	15.73 (3.35)	.11*	.32***	.04	.15**	-.10*	-.16***	-.15***	-.21***	.06	.04	.01	.53***

Note. Organized sports participation = mean number of years of participation from kindergarten to grade 4.

^a*n* = 468. ^b*n* = 465. ^c*n* = 440. ^d*n* = 453.

* *p* < .05. ** *p* < .01. *** *p* < .001.

Table 2

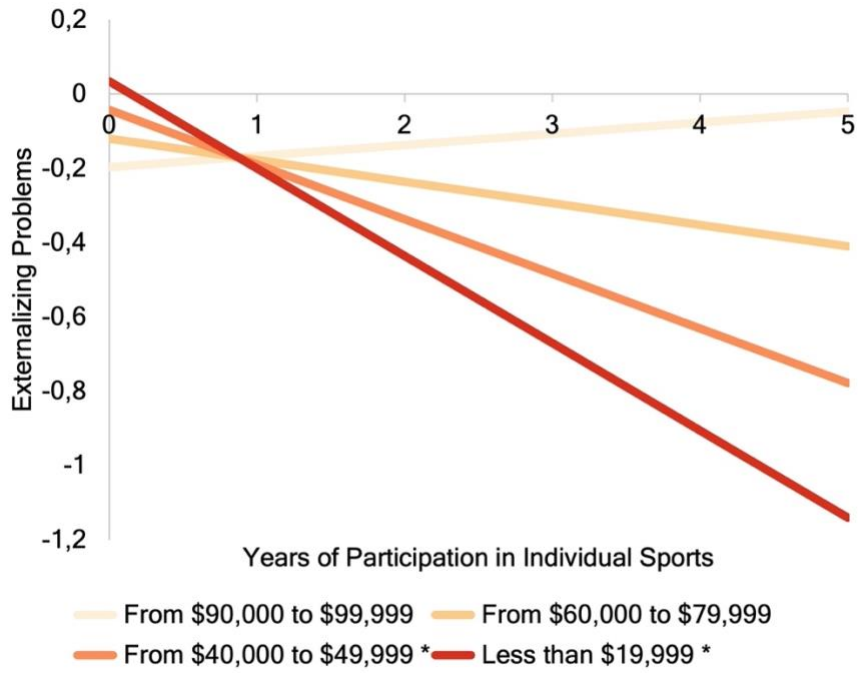
Results from the Regression Analyses

	Internalizing problems					Externalizing problems					Prosocial behaviors				
	β	SE	<i>z</i>	<i>p</i>	95% CI	β	SE	<i>z</i>	<i>p</i>	95% CI	β	SE	<i>z</i>	<i>p</i>	95% CI
Model 1 – No controls															
Team sports	-.207	.047	-4.40	<.001	-.29, -.12	-.060	.048	-1.26	.206	-.15, .03	.028	.048	0.58	.561	-.07, .14
Individual sports	-.095	.042	-2.23	.026	-.18, -.01	-.080	.043	-1.86	.063	-.16, .00	.049	.048	1.02	.308	-.05, .14
Martial arts	.069	.050	1.39	.166	-.03, .17	.104	.047	2.19	.029	.01, .20	-.046	.045	-1.03	.303	-.13, .04
Aesthetic sports	-.180	.046	-3.92	<.001	-.27, -.09	-.197	.041	-4.83	<.001	-.28, -.12	.124	.050	2.49	.013	.03, .22
Model 2 – Controls															
Child’s sex	.151	.130	1.16	.248	-.11, .41	.182	.099	1.84	.066	-.01, .37	-.294	.128	-2.29	.022	-.26, -.02
Family income	-.055	.055	-0.99	.318	-.16, .05	-.079	.047	-1.69	.091	-.17, .01	.038	.056	0.67	.502	-.07, .15
Parental education	-.074	.053	-1.39	.164	-.18, .03	-.075	.047	-1.57	.116	-.17, .02	.019	.057	0.33	.741	-.09, .13
Baseline adjustment	.103	.048	2.16	.031	.01, .20	.496	.041	12.14	<.001	.42, .58	.200	.053	3.80	<.001	.10, .30
Team sports	-.205	.052	-3.90	<.001	-.31, -.10	-.050	.043	-1.15	.249	-.14, .04	.019	.052	0.38	.708	-.08, .12
Individual sports	-.064	.047	-1.37	.171	-.16, .03	-.035	.042	-0.83	.406	-.12, .05	-.004	.051	-0.08	.933	-.10, .10
Martial arts	.074	.052	1.40	.160	-.03, .18	.079	.045	1.77	.077	-.01, .17	-.006	.046	-0.14	.889	-.10, .08
Aesthetic sports	-.119	.057	-2.08	.037	-.23, -.01	-.053	.041	-1.30	.195	-.13, .03	.009	.056	0.17	.867	-.10, .12

Note. Model 1, *n* = 468. Model 2, *n* = 438 for internalizing and externalizing problems, *n* = 436 for prosocial behaviors. The tested models were fully saturated.

Figure 1

Moderating Effect of Family Income



Note. * $p < .05$.