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Sports participation and parent-reported health-related quality of life in children: Longitudinal associations

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Sports participation and parent-reported health-related quality of life in children: Longitudinal associations

Abstract

Objective

To investigate the longitudinal association between sports participation and parent-reported health-related quality of life (HRQOL) in children.

Study design

Cohort study that used data drawn from the Longitudinal Study of Australian Children in waves 3 (2008) and 4 (2010). Participants were a nationally representative sample of 4042 Australian children ages 8.25 (SD = 0.44) years at baseline and followed-up 24 months later.

Results

After we adjusted for multiple covariates, children who continued to participate in sports between the ages of 8 and 10 years had greater parent-reported HRQOL at age 10 ($Eta^2 = .02$) compared with children who did not participate in sports ($P \leq .001$), children who commenced participation after 8 years of age ($P = .004$), and children who dropped out of sports before reaching 10 years of age ($P = .04$). Children who participated in both team and individual sports ($P = .02$) or team sports alone ($P = .04$) had greater HRQOL compared with children who participated in individual sports alone ($Eta^2 = .01$). The benefits of sports participation were strongest for girls ($P < .05$; $Eta^2 = .003$).

Conclusions

Children's participation in developmentally appropriate team sports helps to protect HRQOL and should be encouraged at an early age and maintained for as long as possible.

Keywords

children, longitudinal, associations, sports, quality, participation, life, parent, related, reported, health

Disciplines

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Key Words: physical health; psychosocial health; school functioning; team sports; individual sports

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Abstract

Objective: To investigate the longitudinal association between sports participation and parent-reported health-related quality of life in children.

Study Design: Cohort study using data drawn from the Longitudinal Study of Australian Children in waves 3 (2008) and 4 (2010). Participants were a nationally representative sample of 4,042 Australian children aged 8.25 (SD = 0.44) years at baseline, and followed up 24 months later.

Results: After adjusting for multiple covariates, children who maintained participation in sport between the ages of 8 and 10 years had higher parent-reported health-related quality of life at age 10 (Eta^2 = .02) compared with: children who did not participate in sport (p = <.001); children who commenced participation after 8 years of age (p = .004); and, children who dropped out of sports prior to 10 years of age (p = .04). Children who participated in both team and individual sports (p = .02) or team sports alone (p = .04) had greater health-related quality of life compared to children who participated in individual sports alone (Eta^2 = .01). The benefits of sports participation were strongest for girls (p < .05; Eta^2 = .003).

Conclusions: Children's participation in developmentally-appropriate team sports helps to protect health-related quality of life and should be encouraged at an early age and maintained for as long as possible. This is particularly important for girls. The benefits are significant at a population level.

INTRODUCTION

Health-related quality of life (HRQOL) is an outcome of increasing importance to researchers, clinicians, and policy makers (1, 2). HRQOL encompasses an individual's perceptions, beliefs, expectations and experiences relative to their physical, social, and psychological health (3). In childhood, various chronic conditions and diseases including cancer (4), heart disease (5), and Type 1 and 2 diabetes (6) are associated with low levels of HRQOL. As such, it is important to investigate factors that may increase HRQOL. However, HRQOL is also an important health outcome in its own right (7), and for this reason, constructs known to predict children's HRQOL such as weight status (8) and physical activity (9) are also important areas of investigation.

Sport is one component of leisure-time physical activity that can contribute to health at a national level (10). Sports participation is common among children with around two-thirds of all U.S. children participating in at least one sport per year (11). Evidence suggests that sports participation could have benefits to HRQOL above and beyond those associated with physical activity (12, 13). The psychosocial health benefits of sports participation are evident among children and adolescents, including self-esteem, positive social interactions, and a reduction in depressive symptoms (13). Cross-sectional research demonstrates that adolescent athletes have higher HRQOL than the general adolescent population (14). This may be because sports participants undertake physical activity within an environment that facilitates positive social support such as that provided by coaches and teammates. Sports participation is also associated with the development of social skills and positive peer relationships (15), which may underpin increases in HRQOL. There may also be differences by type of sports participation, with team sports shown to be more strongly associated with psychosocial health among youth sport participants when compared with individual sports (13, 16). Furthermore, team sports have been shown to have greater impact on quality of life

in adult females than individual sports[11]. However, this literature is hindered by a lack of longitudinal evidence, and a focus on adolescent and adult populations (12-14, 17-19), with no known investigations of the temporal relationship between sports participation and HRQOL in children.

The purpose of this study was to extend the evidence base by examining the longitudinal associations between sports participation and HRQOL in childhood. We hypothesized that children who maintained sports participation from ages 8 to 10 years would report higher levels of HRQOL at age 10 - including total, physical, emotional, social, and school functioning - than children who dropped out of sports during this period, children who had never participated in sports, and children who commenced sports participation after the age of 8 years. We also hypothesized that children who maintained participation in team sports would report higher levels of HRQOL than children who maintained participation in individual sports.

METHOD

Study design and participants

The reporting of this study has followed the guidelines set out in the STROBE statement (20). Data were obtained from the K-cohort of the Longitudinal Study of Australian Children (LSAC) (21). LSAC is a nationally-representative longitudinal survey of Australian children examining the social, environmental and economic impacts on children's development and wellbeing. Data were collected by trained professionals from children's primary parent (the person most responsible for the care of the child, and was usually the child's mother) using face-to-face interviews, parental self-report questionnaires, and parent-reported-time use diaries. The K-cohort of LSAC included data from 4,983 children who were 4-5 years of age at Wave 1 in 2004. This study used data from Waves 3 (2008) and 4 (2010), as information on children's sport participation was not collected in Waves 1 and 2.

Wave 4 included 4,164 children. Cases were excluded where attrition had occurred from Wave 1. Data were included from a total of 4,042 children who had complete sport participation data from both Waves 3 and 4 when they were aged 8-9 and 10-11 years respectively. Ethics approval for the LSAC study was given by the Australian Institute of Family Studies Ethics Committee. Parents provided written informed consent.

Measures

Health-Related Quality of Life. As relevant child-reported data were not available in the respective waves of the LSAC, pediatric HRQOL was assessed using the parent-report version of the PedsQL 4.0 (7). The PedsQL assesses HRQOL with 23 items over 4 scales of physical (8 items), social, emotional, and school functioning (5 items each). Scales were used to compute total, physical, and psychosocial health summary scores. The parent-report version of the PedsQL has a high level of internal consistency in 8- to 12-year old children (22), and has been shown to result in almost identical scores to the child self-report version in an Australian sample (8).

Sports Participation. Sports participation was measured using two items assessing regular participation in team and individual sports at both Time 1 (Wave 3; aged 8 yrs) and Time 2 (Wave 4; aged 10 yrs). First, parents were asked "*In the last 12 months, has (your) child regularly participated in team sport (e.g. football, cricket or netball)?*" Second, parents were asked "*In the last 12 months, has (your) child regularly participated in individual sport (e.g. tennis, karate or gymnastics)?* 'Sport' was further specified as a regular activity undertaken outside of school as well as normal outside of school hours care. 'Regularly' was defined as at least once per week for three months or more (e.g., a sports season). Parents could answer either "yes" or "no" for each item, and children were defined as participating in sports if parents answered "yes" to at least one of the items. Using these data, children were categorized as belonging to one of 4 groups: (1) regularly participated in sports at both Time

1 and Time 2 (‘participants’); (2) did not regularly participate in any sport at Time 1 or Time 2 (‘non-participants’); (3) dropped out of sport between Time 1 and Time 2 (‘dropouts’); and, (4) commenced regular participation in sport between Time 1 and Time 2 (‘commencers’).

Covariates. Participants’ gender, age and home postcode were reported by the primary parent at Time 1. Based on the participants’ home postcode, a measure of neighbourhood socio-economic position (SEP) was determined according to the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (23). Self-reported education of the primary parent (usually the mother) was used as a proxy measure of household SEP, as was family income. Primary parent education was categorized as ‘did not finish high school’, ‘high school completion’, or ‘tertiary education’. Family income was self-reported by the primary parent for the whole family in dollars per week and was standardized to household size by dividing by the square root of the number of people residing in the house (24). The resulting variable had a slight positive skew (skewness statistic = 2.80).

Each child had their height and weight measured by trained researchers at Time 1; these data were used to calculate Body Mass Index (BMI; kg/m2). Height was measured using a portable rigid stadiometer (Model IP0955; Invicta Plastics, Leicester, UK), and weight was measured using digital scales (Model 79985; Springvale, Victoria, Australia). For descriptive purposes weight status was determined according to the Cole and International Obesity Task Force definitions (25, 26). Pubertal progression at Time 1 was measured using the mean of two parent-reported items. For boys, the development of adult type body odour and the development of body hair were assessed. For girls, skin changes (such as acne) and breast development were assessed. Items were scored on a 4-point Likert Scale from 1 (*Has not started yet*) to 4 (*Seems complete*).

Statistical Analyses

Data were analysed using IBM SPSS statistical software (version 19, IBM, New York, United States). Univariate general linear models, weighted by 2010 population weights specified in the LSAC dataset (27), were used to examine the association between sports participation and HRQOL (PedsQL full scale and subscale scores). Initially, an unadjusted model was used to examine potential differences by the four groups (participants, nonparticipants, dropouts, and commencers). Subsequently, a fully adjusted model was used, adjusting for the covariates identified above including baseline HRQOL (only fully adjusted models are reported). Pre-specified interactions were included one at a time to examine whether the relationship between sports participation and HRQOL differed by gender or BMI. Bonferroni analyses were performed post-hoc to examine the pairwise comparisons between groups of sports participation. For all analyses statistical significance was set at $p < .05$.

The second stage of the analyses focused only on children who had maintained regular participation in sports at both Time 1 and Time 2; this allowed for an examination of the potential differences between types of sport participation (i.e., team versus individual). These children were subsequently categorized as belonging to one of three groups: regular participation in both team sports and individual sports at both Time 1 and Time 2 (team and individual sports); regular participation in team sports only (team sport only); and, regular participation in individual sports only (individual sport only). These relationships were examined using the same analytic approach reported above, and included the same covariates.

RESULTS

Participants

For descriptive purposes, unadjusted PedsQL scores at age 10 are reported in Table 1 and are stratified by selected demographic characteristics. In total, 4,042 participants had complete data on sports participation at both time points and were included in the sample.

Participants with missing data at these time points (n = 122) were more likely to have a parent that had not finished high school. There were no other differences according to study variables (27, 28). Further, a total of 793 (19.6%) participants were excluded from analyses using the fully adjusted model due to missing data on one or more covariates. This resulted in 3,249 participants included in fully adjusted analyses. Independent samples *t*-tests showed that those participants who were excluded due to missing covariate data had lower standardized household income ($M_{difference}$ = -139.92, t = -5.33, $p < .001$), were of a lower neighborhood SEP ($M_{difference}$ = -12.44, t = -4.83, $p < .001$), and reported lower PedsQL scores at baseline (Total score: $M_{difference}$ = -1.94, t = -2.94, p = .003; Physical health: $M_{difference}$ = -2.56, t = -3.26, $p < .001$; Psychosocial health: $M_{difference}$ = -1.57, t = -2.36, p = .018).

At baseline, the mean (SD) age of participants was 8.3 (0.4) years, and the mean (SD) BMI was 17.5 (2.8). There were no significant differences between boys and girls by baseline BMI, primary parent education, standardized household income, or neighbourhood SEP. At baseline, girls were reported to have higher psychosocial functioning and school functioning than boys ($p < .05$). Baseline PedsQL scores, adjusted for all covariates, are given in Table 2.

Adjusted Models

The estimated marginal means for PedsQL total and subscale scores by group, adjusted for all covariates and weighted by population weights, are reported in Table 3. As in the unadjusted analyses, children who maintained any form of sports participation (participants) had higher PedsQL total and subscale scores than nonparticipants, dropouts, and commencers at 2-year follow-up (Eta^2 = .02; $p < .05$), with no other significant differences between these three latter groups ($p > .05$). The specific differences between groups are also noted in Table 3. Of those who maintained their sports participation throughout the 2-year period, HRQOL was significantly higher at follow-up for children who

participated in only team sports, or in both team and individual sport ($Eta^2 = .01$; $p = .006$). This general pattern was not observed for the physical health subscale where there was no difference at follow-up by type of sport participation ($p > .05$), and for the emotional functioning subscale where higher scores at follow-up were predicted by participation in both team and individual sports compared to only team sports ($p = .03$) and only individual sports ($p = .001$).

Interaction Analyses

Compared to boys, girls who were nonparticipants or dropouts had significantly lower HRQOL at 2-year follow up for total HRQOL, psychosocial functioning, and social functioning ($Eta^2 = .003$; $p < .05$). These relationships are shown in Figure 1. No interactions were observed between type of sports participation (team/individual/both) and gender on PedsQL total or subscale scores. There were no significant interactions between sports participation (participants/nonparticipants/dropouts/commencers) or type (team/individual/both) and BMI on PedsQL total or subscale scores ($p > .05$).

DISCUSSION

This study has shown that, after accounting for baseline HRQOL, children who maintain participation in sports between the ages of 8- and10-years report a higher HRQOL at age 10 than children who do not participate in sports, children who drop out of sports, and children who commence participation after the age of 8-years. Differences are potentially due to a protective effect experienced by sports participants. The magnitude of total HRQOL differences between sport participants and non-participants at age 10 (approximately 5 units) is greater than the minimal change required for a clinically meaningful difference of 4.5 units (22). Furthermore, this is less than the difference reported between obese and healthy weight youth (approximately 7.5 units) (8), and greater than those reported between older adolescents in the highest and lowest tertiles of both physical activity and sedentary

behaviour (approximately 3 units) (29). Consistent with previous findings in alternate populations and using alternate outcomes, children who participate in team sports generally maintain higher HRQOL scores than children who only participated in individual sports (12, 13).

These findings suggest that sports participation may provide a protective effect for HRQOL, and are important because they extend the existing HRQOL literature by observing effects longitudinally and amongst children. Longitudinal data has enabled us to demonstrate that children who commence sport later than 8 years of age, drop out of sport before 10-years of age, or don't participate at all over this period have lower HRQOL total and subscale scores than children who maintain sports participation over this period. This suggests that the HRQOL-related benefits derived from sports participation during childhood are cumulative, with the maintenance of HRQOL more likely with consistent participation. The benefits of sports participation are also relatively temporal as they may disappear if sports participation is ceased. In order to maintain HRQOL, results suggest that children participate in sports at an early age and effective strategies be implemented to maintain their participation. As a result, dropout from sports during childhood and adolescence is a significant issue capable of contributing to poorer health at a national level.

Physical activity is one factor that underpins the HRQOL benefits associated with sports participation. However, it is likely that the social context surrounding sports environments also contributes to positive social functioning (30, 31). Developmental assets derived from sports participation such as teamwork and accountability to others may underpin this relationship (32). Furthermore, the interpersonal and competitive nature of sports whereby children pursue clearly defined objectives as part of a team may provide developmental experiences that allow opportunities for the practice of emotional regulation (33). Similarly, both sports participation and physical activity have been associated with

cognitive development in childhood and adolescence (33, 34). This may underpin the associated benefits to school functioning. Lastly, sports participation may be more important for girls than boys, particularly for the social developmental experiences obtained during sports participation which appear to underpin significant overall HRQOL differences by gender.

Consistent with a body of research among child and adolescent sport participants examining a range of psychosocial health outcomes (13), we found greater HRQOL for children who participated in team sports compared to individual sports. Behavioural regulation over time in pursuit of common goals and in collaboration with others has been argued as a key to positive development in children (35). This perhaps represents the key difference between team and individual sports. While children participate in many individual sports as part of a group (such as gymnastics and swimming) they perhaps lack the collaborative goal-striving, and perhaps the nuanced social cohesion, of team sports (36). The only exception to these findings are the physical health benefits associated with both team and individual sports, perhaps due to the common element of physical activity. This is supported by literature which shows that both team and individual sports have strong physical health benefits, however sport has additional psychosocial benefits for children and adolescents (13).

While this study addresses limitations in previous research and extends important findings related to HRQOL into childhood, there are several limitations. This study assessed only a small window in childhood so results may not be generalizable beyond the ages of 8-10 years. Replication and extension beyond this age group is needed. In addition, longer periods of observation may be needed to determine the full extent of the potential influence of sports participation on HRQOL. Further, while the measure of sports participation ensured that minimum levels of engagement were required to constitute participation in sports, it is

not possible to ascertain potential dose-response relationships. Further, the PedsQL is a parent-reported measure of the functional status of children with a focus on difficulties and problems. It is possible that sports participation can do more than alleviate functional difficulties and problems, however, this could not be captured by the PedsQL. Parent-reported HRQOL has been shown to be highly correlated with children's self-reported HRQOL and is sensitive to the incidence and severity of health conditions such as obesity and heart disease (5, 8). Lastly, a considerable proportion of children were excluded due to missing data (19.6%), with these children more likely to have a lower HRQOL, as well as a lower household and neighborhood level SEP at baseline. The present results may therefore be biased, and may not be generalizable to children from lower socio-economic backgrounds.

Conclusion. After accounting for baseline HRQOL, the HRQOL of children who maintain participation in sports from ages 8 to 10 is higher than those who do not participate. These results are greater than those evident for physical activity alone, while participation in team sports appears particularly beneficial. This may be because children who participate in sports maintain their HRQOL while nonparticipants experience decreases in HRQOL. Although the differences are relatively small, with two-thirds of U.S. and Australian children currently participating in organized sports (11, 37) even small decreases in HRQOL are of significance at a population level. To maximise HRQOL, children should be encouraged to participate in developmentally-appropriate team sports from an early age, and their participation maintained for as long as possible. Effective strategies to prevent dropout from childhood sports should be a priority, especially in countries where participation in sports in this age group is already high. Further research is needed to understand why team sports result in greater benefits to HRQOL, and to test the limits of this relationship by age and dose.

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Abbreviations and acronyms: BMI – Body Mass Index; HRQOL – Health-related quality of life; LSAC – Longitudinal Study of Australian Children; PedsQL – Pediatric Quality of Life Scale; SEP – Socioeconomic position.

Figure Legends

Figure 1. PedsQL total, psychosocial and social functioning scores by gender.

Table 1. Description of study sample: Mean PedsQL total and subscale scores at follow up (age 10), stratified by demographic data and study variables.

Characteristics (Missing Data)	N (%)	Mean PedsQL Scores at Time 2 (SD)					
		Total Score	**Physical Health**	**Psychosocial Health**	**Social Functioning**	**Emotional Functioning**	**School Functioning**
Total sample	4,042 (100)						
Sex (0)							
Male	2,069 (51)	77.1 (14.6)	79.5 (19.3)	75.7 (14.6)	80.1 (19.2)	73.9 (16.6)	73.3 (16.5)
Female	1,973 (49)	78.3 (14.1)	79.1 (18.9)	77.8 (13.7)	80.7 (17.6)	74.3 (16.3)	78.4 (16.5)
Primary Parent Education (0)							
< High School	1,553 (38)	75.7 (15.3)	76.6 (21.0)	75.1 (14.8)	78.3 (19.4)	73.5 (14.9)	73.6 (17.2)
High School	482 (12)	79.0 (13.9)	81.3 (17.9)	77.7 (14.0)	81.5 (18.5)	75.7 (16.5)	76.0 (15.9)
Tertiary	2007 (50)	78.8 (13.5)	80.8 (17.6)	77.8 (13.6)	81.7 (17.6)	74.2 (16.1)	77.4 (16.3)
Weight Status at age 8[#] (37)							
Underweight	212 (5)	78.4 (14.3)	80.0 (19.2)	77.5 (14.4)	81.5 (17.8)	74.2 (17.1)	76.8 (16.3)
Healthy Weight	2,855 (71)	78.7 (13.9)	80.8 (18.3)	77.6 (13.8)	81.7 (17.8)	74.7 (16.1)	76.3 (16.4)
Overweight	695 (17)	75.9 (14.8)	76.5 (19.8)	75.5 (14.7)	78.4 (19.2)	73.4 (17.1)	74.9 (17.1)
Obese	243 (6)	69.9 (15.9)	68.9 (22.2)	70.5 (15.4)	69.8 (21.2)	70.0 (17.6)	71.6 (18.0)
Sports Participation (0)							
Participants	2,777 (69)	79.2 (13.4)	81.2 (18.1)	78.2 (13.3)	82.3 (17.2)	75.0 (15.8)	77.2 (15.8)
Commencers	413 (10)	74.4 (15.9)	75.3 (21.1)	73.9 (15.8)	76.0 (21.3)	72.7 (17.3)	73.2 (18.8)
Dropouts	389 (10)	75.6 (14.8)	77.2 (19.5)	74.7 (14.9)	78.1 (19.1)	72.8 (17.5)	73.3 (17.4)
Non-participants	463 (12)	72.7 (15.9)	73.2 (20.9)	72.4 (15.7)	74.7 (20.5)	71.1 (18.1)	71.5 (17.9)
Type of Sports Participation* (0)							
Team and Individual	929 (23)	80.9 (12.4)	83.3 (16.2)	79.6 (12.7)	83.9 (16.5)	76.2 (15.1)	78.7 (15.3)
Team Only	539 (13)	79.4 (13.8)	81.4 (18.5)	78.3 (13.5)	83.1 (17.3)	75.7 (15.7)	76.1 (15.8)
Individual Only	286 (7)	75.9 (14.0)	77.9 (19.1)	74.9 (14.0)	77.6 (18.4)	71.8 (16.2)	75.3 (16.8)

***** Type of Sports Participation is given only for those participants whose sports participation remained unchanged from ages 8 to 10 years.

[#] BMI cut points for weight status: Underweight (Boys <14.15, Girls < 14.02); Healthy Weight (Boys 14.16 - 18.43, Girls 14.03 - 18.34); Overweight (Boys 18.44 - 21.59, Girls 18.35 - 21.57); Obese (Boys >21.60, Girls > 21.58)

Table 2. Adjusted mean PedsQL total and subscale scores at baseline (age 8) stratified by type of sports participation.

	Mean[#] PedsQL Score (95% CI)					
	Total	**Physical**	**Psychosocial**	**Social**	**Emotional**	**School**
Participation Group						
Participants	79.7 (79.1-80.2)	84.6 (84.0-85.3)	77.0 (76.4-77.6)	80.5 (79.7-81.3)	73.2 (72.5-73.9)	77.4 (76.7-78.1)
Non-participants	76.2 (74.9-77.4)	81.1 (79.7-82.5)	73.5 (72.2-74.9)	74.7 (73.0-76.5)	73.2 (71.6-74.8)	72.6 (71.0-74.3)
Dropouts	76.7 (75.3-78.0)	81.1 (80.3-83.3)	73.9 (72.4-75.4)	76.7 (74.9-78.6)	71.8 (70.1-73.5)	73.2 (71.4-74.9)
Commencers	76.3 (75.0-77.6)	81.4 (79.9-82.9)	73.5 (72.1-75.0)	75.7 (73.9-77.5)	71.4 (69.7-73.0)	73.9 (72.2-75.7)
Sports Type						
Team and individual	80.9 (79.9-81.8)	85.9 (84.8-86.9)	78.2 (77.1-79.3)	81.8 (80.4-83.1)	73.8 (72.5-75.0)	79.1 (77.8-80.4)
Team sport only	81.2 (80.1-82.3)	86.0 (84.8-87.2)	78.6 (77.4-79.9)	82.6 (81.0-84.2)	75.0 (73.5-76.5)	78.3 (76.8-79.8)
Individual sport only	77.0 (75.6-78.5)	81.3 (79.7-82.9)	74.7 (73.1-76.4)	77.7 (75.6-79.8)	71.1 (69.1-73.0)	75.6 (73.6-77.5)

[#]Marginal means were estimated using general linear models, and were adjusted for sex, neighbourhood SEP, household income, parental education, BMI, and pubertal status, and were weighted by population weights.

Table 3. Adjusted mean PedsQL total and subscale scores at follow up (age 10) stratified by type of sports participation.

	Mean* PedsQL Score (95% CI)					
	Total	**Physical**	**Psychosocial**	**Social**	**Emotional**	**School**
Participation Group						
Participants	78.2 (78.0-79.2)	79.9 (79.1-80.7)	76.9 (76.4-77.4)	80.5 (79.8-81.3)	74.5 (73.9-75.1)	76.05 (75.41-76.7)
Non-participants	73.4 (72.0-74.8)	75.3 (73.5-77.1)	74.3 (73.2-75.5)	77.0 (75.4-78.6)	72.1 (70.8-73.5)	73.20 (71.77-74.6)
Dropouts	74.9 (73.4-76.4)	77.5 (75.6-79.4)	75.0 (73.8-76.2)	78.4 (76.6-80.1)	72.9 (71.4-74.3)	73.48 (71.94-75.0)
Commencers	74.2 (73.7-75.7)	76.7 (74.8-78.5)	74.7 (73.5-75.9)	77.5 (75.8-79.2)	73.6 (72.2-75.0)	72.70 (71.20-74.2)
F value (*p* value)	<.001[a]	.001[b]	<.001[a]	<.001[b]	.007[c]	<.001[a]
Sports Type						
Team and individual	80.4 (79.4-81.3)	79.3 (78.5-80.3)	82.3 (80.9-83.6)	83.7 (82.4-84.9)	76.5 (75.4-77.5)	78.2 (77.0-79.3)
Team sport only	79.3 (78.2-80.4)	78.4 (77.3-79.4)	81.2 (79.6-82.8)	83.0 (81.5-84.4)	74.6 (73.4-75.8)	77.7 (76.4-79.0)
Individual sport only	77.1 (75.7-78.5)	75.6 (74.2-76.9)	79.6 (77.5-81.7)	78.7 (76.8-80.6)	72.5 (70.9-74.1)	75.0 (73.3-76.7)
F value (*p* value)	.001[d]	.122	<.001[d]	<.001[d]	<.001[e]	.010[d]

*Marginal means were estimated using general linear models, and were adjusted for sex, neighbourhood SEP, household income, parental education, BMI, pubertal status, and baseline PedsQL scores, and were weighted by population weights.

[a]Participants significantly higher than other groups.

[b]Participants significantly higher than non-participants and commencers

[c]Participants significantly higher than non-participants

[d]Individual sport only significantly lower than all other groups.

[e]Team and individual significantly higher than individual sport only.