



Original research

Associations between sports participation and psychological difficulties during childhood: A two-year follow up

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ARTICLE INFO

Article history:

Received 15 December 2013

Received in revised form 25 March 2014

Accepted 4 May 2014

Available online 20 May 2014

Keywords:

Internalising problems

Externalising problems

Athletes

Mental health

Health behaviour

Exercise

ABSTRACT

Objectives: This paper assessed the associations between sports participation and the development of psychological strengths and difficulties during childhood.

Design: Two-year follow up study of a sample of 4042 Australian children who were followed from age 8 years to 10 years.

Methods: Parents reported children's participation in organised sports, and completed the Strengths and Difficulties Questionnaire. Univariate general linear models were used to examine the association between changes in sports participation and psychological strengths and difficulties at 10 years, adjusting for psychological strengths and difficulties at age 8.

Results: Children who maintained participation in sport had lower rates of parent-reported psychological difficulties at 10 years compared with children who dropped out of sport. Less internalising problems were also reported for children who participated in organised sports compared to children who dropped out of sports and children who did not participate in sports. These relationships did not differ by BMI, socioeconomic status, or parental education.

Conclusions: Greater psychological difficulties are experienced by children who drop out of sports, and greater social and emotional problems are experienced by children who drop out of sports and who do not participate in organised sports. Due consideration should be given to the quality and implementation of sporting programs to ensure that they provide benefits to mental health. Due consideration should also be given to the potential psychological difficulties being experienced by children who drop out of organised sports as a higher level of psychological difficulties may be experienced prior to or subsequent to dropout.

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1. Introduction

Half of all psychological disorders have their onset before the age of 14 years.¹ Childhood psychological disorders persist through childhood and adolescence,² and are recognised as one of the most prominent contributors to the global burden of disease among young people.³ As a result there is a recognised need for targeted early prevention and intervention,¹ with programs aimed at protecting and enhancing the psychological health of children a key component of this need.⁴ It is well documented that physically active children have better mental health, constituted by a stronger self-esteem, and are less likely to suffer from mental health problems such as depression and anxiety than children who are

inactive.⁵ Furthermore, aerobic-based activities of at least a moderate intensity appear most beneficial, with even greater benefits for activities of a higher intensity.⁶ Sports participation may be one such outlet for moderate-to-vigorous physical activity (MVPA), and is popular among children. For example, two-thirds of all Australian children aged 5–14 years participate in some form of organised sport each year.⁷

Beyond measures of depression and anxiety, sports participation is associated with many positive developmental outcomes that may contribute to the protection and enhancement of mental health. These include increased physical and cognitive competence, self-esteem, teamwork, social skills, discipline, responsibility, and empathy.⁸ However, participation in organised sports has also been shown to have some adverse effects on participants. For example, sports participation is linked to poorer psychosocial development, including lower self-esteem, perceptions of pressure, and immoral behaviour.⁸

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Numerous studies have investigated the associations between sports participation and mental health. A recent systematic review shows that only three of these have been longitudinal studies of children, and none have adjusted for levels of physical activity.⁹ It is therefore unknown whether the benefits to mental health that are described by such studies are due to sport participation, or to the physical activity that is inherent in sports. The purpose of this study was to examine the associations between changes in participation in organised sports and psychological strengths and difficulties during childhood over a two year period. Specifically, we investigated potential differences in the development of psychological strengths and difficulties between children who participated in extracurricular sports, those who did not participate, those who dropped out during childhood, and those who took up sports participation later in childhood.

2. Methods

Data were obtained from the Kindergarten (K) cohort of the Longitudinal Study of Australian Children (LSAC). LSAC is a longitudinal examination of the social, environmental and economic impacts on development and wellbeing in a national sample of children. Children were randomly selected from the Medicare database which is the most comprehensive database of the Australian population. Data are collected every two years by trained professionals using face-to-face interviews with the children's primary parent (in more than 96% of cases this is the child's mother), parental self-report questionnaires, and parent-reported time-use diaries. At Wave 1 (2004), 4983 children aged 4–5 years were included in the K-Cohort, representing a total response rate of 50%. This study used data obtained during Waves 3 (2008) and 4 (2010), when information on the children's sport participation was first collected. In total, 4164 children were included in Wave 4, representing an attrition rate of 16.4% across the 4 Waves. Ethics approval for the LSAC study was given by the Australian Institute of Family Studies Ethics Committee.

Children's mental health was assessed using the parent-report version of the Strengths and Difficulties Questionnaire (SDQ).¹⁰ The SDQ is a brief behavioural screening tool incorporating 25 items over 5 subscales (5 items each): emotional symptoms; conduct problems; hyperactivity/inattention; peer relationship problems; and, prosocial behaviour. Each item is scored on a 3-point Likert Scale (*not true, somewhat true, certainly true*). Example items include: *Often unhappy, downhearted or tearful* (emotional symptoms); *Often has temper tantrums or hot tempers* (conduct problems); *often fidgeting or squirming* (hyperactivity); *picked on or bullied by other children* (peer problems); and, *often volunteers to help others* (prosocial behaviour). Scores for each item (0, 1, or 2) are added to compute subscale scores. The subscale scores are subsequently used to compute a total difficulties score (the sum of the 20 items pertaining to behavioural difficulties) and a prosocial behaviour score. In low risk and general population samples such as the current study, it is recommended that a three-subscale model of the SDQ be used, assessing (1) internalising problems (the sum of the emotional symptoms and peer relationship problems subscales), (2) externalising problems (the sum of the conduct problems and hyperactivity/inattention subscales), and (3) prosocial behaviours.¹¹ This model has been used here. The SDQ is sensitive to change among children, making it appropriate for longitudinal studies.¹² Continuous SDQ scores provide meaningful epidemiological data, with a one-point increase in total difficulty score representing increased odds of a psychological disorder (odds ratio 1.14–1.28).¹³ The parent-report version of the SDQ has been shown to be at least as good as a semi-structured interview in detecting behavioural problems,¹⁴ and strong

psychometric properties have been reported in studies across several countries.¹⁵

Sports participation was measured using two parent-reported items pertaining to the child's regular participation in organised extracurricular team and individual sports at both baseline (age 8) and follow-up (age 10). Parents were asked "In the last 12 months, has (your) child regularly participated in team sport (e.g. football, cricket or netball)?" and subsequently, "In the last 12 months, has (your) child regularly participated in individual sport (e.g. tennis, karate or gymnastics)?" 'Regularly' was defined as at least once per week for three months or more (e.g., a sports season). School sports were excluded. 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 item. Using these data children were categorised as belonging to one of four groups: (1) regularly participating in sports at both baseline and follow-up ('participants'); (2) did not regularly participate in any sport at baseline or follow-up ('non-participants'); (3) dropped out of sport between baseline and follow-up ('dropouts'); and, (4) commenced regular participation in sport between baseline and follow-up ('commencers').

The following covariates were included in the analyses: child sex, pubertal progression, Body Mass Index (BMI), physical activity level, neighbourhood socio-economic position (SEP), and home-level SEP. Participants' sex, age and home postcode were reported by the primary parent at baseline. A measure of neighbourhood SEP (derived from postcode of residence) was determined according to the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage.¹⁶ Self-reported education of the primary parent was used as a proxy measure of household SEP, as was family income. Primary parent education was categorised as 'did not finish high school', 'high school completion', or 'tertiary education'. Family income was self-reported by the primary parent in dollars per week and was standardised to household size by dividing by the square root of the number of people residing in the house.¹⁷ Time in physical activity was derived from the parent-reported time-use diary by summing time in organised physical activity, active free play, and active transport. Weighted weekday and weekend day time were used to calculate weekly time spent in physical activity.

Each child had their height and weight measured by trained researchers at baseline and data were used to calculate 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.^{18,19} Pubertal progression at baseline was measured using the mean of three (boys) or four (girls) items that were adapted from the Pubertal Development Scale for parental report.²⁰ These items have been shown to predict SDQ scores in this sample.²¹ Items assessed the development of adult type body odour, the development of body hair, skin changes (such as acne), and breast development (girls only). Items were scored on a 4-point Likert Scale from 1 (*Has not started yet*) to 4 (*Seems complete*).

Univariate general linear models were used to examine the association between sports participation and children's mental health at 10 years, adjusting for all covariates including the relevant baseline SDQ total or subscale score. Pre-specified interactions were then included one at a time to examine whether the relationship between sports participation and mental health was moderated by sex, primary parent highest level of education, standardised household income, or BMI. Pairwise comparisons using Bonferroni adjustments were performed post hoc using the estimated marginal means of the SDQ total and subscale scores, adjusted for all covariates, to determine the source of potential significant

differences. Cohen's *d* was used to estimate effect sizes of pairwise comparisons and values of 0.2, 0.5, and 0.8 are generally considered small, medium and large effects, respectively.²² Statistical significance was set at $p < .05$ for all main effects. Given the unreliability of interaction terms, significance for all interaction terms was set as $p < .01$ in order to reduce the chance of a Type I error. Data were analysed using SPSS statistical software (version 19, IBM, New York, United States).

3. Results

In total, 4042 participants had complete sports participation data and were included in the final sample. A further 1729 participants were excluded due to missing covariate data, primarily a result of a low response rates for the time-use-diary ($\approx 75\%$).²³ Children with missing covariate data had lower standardised household income ($t = -7.014, p < .001$), were of a lower neighbourhood SEP ($t = -7.344, p < .001$), higher BMI ($t = 3.259, p = .001$) and had higher SDQ total difficulty scores at baseline ($t = 6.501, p = .001$) and follow-up ($t = 7.002, p < .001$).

At baseline, the mean (SD) age of all participants was 8.26 (0.44) years, and the mean (SD) BMI was 17.57 kg/m² (2.80). There were no significant differences between boys and girls by BMI, weight status, primary parent education, standardised household income, or neighbourhood SEP. At baseline, girls were reported to have undergone greater pubertal progression ($t = 9.883, p < .001$), and to have lower levels of physical activity ($t = 3.324, p = .001$), lower total difficulty scores ($t = 10.60, p < .001$), less internalising problems ($t = 2.507, p = .012$), and less externalising problems ($t = 14.906, p < .001$), as well as greater prosocial behaviour scores ($t = 13.873, p < .001$) than boys. Mean baseline and follow-up scores for total difficulty, internalising problems, externalising problems, and prosocial behaviour, stratified by demographic characteristics of the sample are reported in Table 1. Mean scores for all groups over total and subscale scores fell within the 'normal' range (as opposed to borderline or abnormal ranges).

Estimated marginal means for SDQ total difficulties, internalising problems, externalising problems, and prosocial behaviour scores stratified by sports participation group are given in Table 2. General linear models showed a significant main effect of sports participation for total difficulties scores ($F_{(3,2301)} = 3.81, p = .01$) and internalising problems scores ($F_{(3,2302)} = 4.93, p = .002$). Pairwise comparisons showed that sports participants had lower total difficulty scores than dropouts ($p = .024, d = 0.20$) and lower internalising problems scores than both dropouts ($p = .015, d = 0.19$) and nonparticipants ($p = .034, d = 0.17$). There were no differences by type of sports participation for externalising problems or prosocial behaviours. Estimated marginal means and 95% confidence intervals for each of these comparisons are given in Table 2. There were no differences in the relationship between sports participation and any SDQ subscale by sex, primary parent's highest education, standardised household income, or BMI.

4. Discussion

This study examined the associations between extracurricular organised sport participation and psychological strengths and difficulties in a sample of Australian children over a two year period. Most children (69%) were sport participants at ages 8 and 10 years, 10% of children dropped out of organised sports in that time, while 10% commenced participation, and 12% were nonparticipants. In line with previous Australian data, small increases in children's psychological difficulties were evident with age.²⁴ After adjusting for psychological difficulties at age 8, children who dropped out of sport between the ages of 8 and 10 years had greater total

difficulties and greater internalising problems at 10 years of age than children who maintained regular participation in sport. Furthermore, children who maintained regular participation in sport were reported to have less internalising problems than non-participants at age 10. There were no differences between groups on measures of externalising problems or prosocial behaviours. All differences were independent of children's level of physical activity.

Of note is that dropout from organised sports between the ages of 8 and 10 years is associated with greater total psychological difficulties at age 10 when compared with children who maintain regular participation. This is important because 10% of children were found to drop out of sports at this age and based on current participation rates, if this number were to remain constant throughout childhood and adolescence it would translate to approximately 250,000 young Australians dropping out of organised sports every year.^{7,25} However, drop out from sports is likely to be much higher than this during adolescence.²⁶ Based on the epidemiological data derived from the SDQ, the relative increase in risk for these young Australians to be diagnosed with a psychiatric disorder within three years is approximately 10–20%.¹³ It is unclear from the current data whether dropout from sports causes greater psychological difficulties or the onset of greater psychological difficulties causes dropout. Nonetheless, children who drop out of organised sports should be monitored for potential psychiatric diagnoses due to this increase in risk.

The greater psychological difficulties reported to be experienced by dropouts are constituted by greater internalising problems, but not externalising problems. This is consistent with our finding that sports participants also had lesser internalising problems than nonparticipants, with no reported differences in externalising problems. Internalising problems represent social and emotional difficulties, while externalising problems represent difficulties with behavioural conduct and hyperactivity/inattention¹¹. It is unclear why drop out from sports may be associated with social and emotional problems, but not with conduct or attention difficulties. However, it may be that a common mechanism such as bullying underpins both dropout and social/emotional problems, but may not be linked with conduct or attention difficulties. In evidence of this, negative experiences such as bullying are not uncommon in Australian extracurricular sports,²⁷ and are likely to underpin dropout from organised sports amongst children.²⁶ Alternatively, one potential mechanism by which sport may protect against the development of social and emotional problems during childhood is by facilitating the acquisition of developmental assets such as communication skills, interpersonal skills, and self-esteem.²⁸ Thus, children who engage in prolonged participation in organised sports may possess a greater range of psychosocial skills which serve to protect them against the development of social and emotional difficulties. In contrast, these skills may have no bearing on conduct or attention difficulties.

Despite prosocial behaviours being typically associated with sports participation,²⁸ this study found no association between sports participation and parent-reported prosocial behaviours. This is in contrast to previous cross-sectional research which shows that children who participate in sport display higher levels of prosocial behaviour than nonparticipants.²⁹ It may be that alternate extracurricular activities such as community or religious groups also provide important experiences for the development of prosocial norms. In fact, such activities have been linked with a greater extent of prosocial learning experiences than organised sports during adolescence.³⁰ This is consistent with current data which show small increases in prosocial behaviours amongst all groups of sports participation, including nonparticipants.

This study extends important findings regarding the relationship between sports participation and mental health into

Table 1
Mean unadjusted SDQ subscale scores at baseline (age 8) and follow-up (age 10) stratified by demographic data and study variables.

Characteristics (missing data)	N (%)	HH inc [\$ /wk (SD)]	SEP (SD)	PA [mins/wk (SD)]	Mean SDQ scores at baseline and follow-up (SD)							
					Total difficulties		Internalising problems		Externalising problems		Prosocial behaviours	
					BL ^a	FU ^b	BL ^c	FU ^d	BL ^d	FU ^e	BL ^f	FU ^f
Total sample	4042 (100)	913 (620)	1012 (66)	797 (619)	7.50 (5.31)	7.85 (5.53)	3.04 (2.86)	3.37 (3.09)	4.45 (3.34)	4.48 (3.35)	8.24 (1.74)	8.50 (1.66)
Sex (0)												
Boys	2069 (51)	909 (609)	1013 (63)	838 (620)	8.37 (5.61)	8.60 (5.81)	3.14 (2.95)	3.43 (3.22)	5.23 (3.54)	5.18 (3.48)	7.86 (1.83)	8.17 (1.78)
Girls	1973 (49)	916 (632)	1011 (68)	754 (616)	6.60 (4.83)	7.06 (5.09)	2.95 (2.76)	3.31 (2.95)	3.65 (2.92)	3.75 (3.04)	8.63 (1.53)	8.86 (1.44)
Parental education (0)												
<High school	1553 (38)	717 (419)	996 (68)	772 (640)	8.59 (5.72)	8.95 (5.82)	3.48 (3.03)	3.82 (3.26)	5.11 (3.54)	5.14 (3.46)	8.15 (1.76)	8.47 (1.66)
High school	482 (12)	846 (518)	1009 (58)	780 (574)	7.60 (5.45)	7.78 (5.48)	2.94 (2.89)	3.15 (2.95)	4.67 (3.41)	4.63 (3.39)	8.24 (1.77)	8.55 (1.67)
Tertiary	2007 (50)	1083 (719)	1026 (63)	816 (616)	6.66 (4.79)	7.02 (5.15)	2.74 (2.68)	3.08 (2.95)	3.92 (3.07)	3.94 (3.16)	8.31 (1.70)	8.52 (1.66)
Weight status (37)												
Underweight	212 (5)	878 (455)	1013 (86)	749 (739)	7.39 (5.14)	7.67 (5.69)	3.10 (2.71)	3.32 (3.14)	4.29 (3.39)	4.36 (3.48)	8.22 (1.83)	8.65 (1.69)
Healthy weight	2855 (71)	929 (616)	1016 (62)	825 (621)	7.32 (5.23)	7.60 (5.37)	2.89 (2.78)	3.16 (2.97)	4.43 (3.36)	4.45 (3.33)	8.22 (1.72)	8.47 (1.66)
Overweight	695 (17)	900 (666)	1008 (71)	716 (567)	7.81 (5.47)	8.28 (5.81)	3.26 (2.96)	3.73 (3.20)	4.56 (3.28)	4.56 (3.42)	8.34 (1.69)	8.63 (1.57)
Obese	243 (6)	815 (659)	994 (60)	717 (597)	8.70 (5.65)	9.53 (5.86)	4.06 (3.26)	4.72 (3.50)	4.66 (3.19)	4.80 (3.22)	8.32 (1.79)	8.44 (1.84)
Sports participation (0)												
Participants	2777 (69)	1003 (648)	1020 (60)	828 (611)	6.91 (5.02)	7.28 (5.17)	2.66 (2.67)	3.00 (2.86)	4.25 (3.21)	4.28 (3.21)	8.30 (1.70)	8.54 (1.61)
Commencers	413 (10)	754 (526)	997 (65)	687 (548)	8.47 (5.36)	8.78 (5.87)	3.80 (2.97)	4.09 (3.28)	4.68 (3.28)	4.70 (3.48)	8.24 (1.72)	8.61 (1.69)
Dropouts	389 (10)	782 (440)	1005 (64)	731 (622)	8.36 (5.38)	8.80 (5.87)	3.60 (2.95)	3.93 (3.27)	4.76 (3.39)	4.87 (3.54)	8.17 (1.76)	8.40 (1.73)
Non-participants	463 (12)	714 (524)	993 (82)	721 (718)	9.09 (6.11)	9.63 (6.35)	4.05 (3.28)	4.50 (3.56)	5.05 (3.80)	5.13 (3.75)	8.03 (1.83)	8.30 (1.82)

HH inc: standardised household income; SEP: neighbourhood socioeconomic position as measured by the SEIFA index; PA: physical activity.

^a Score range 0–35.

^b Score range 0–33.

^c Score range 0–20.

^d Score range 0–19.

^e Score range 0–18.

^f Score range 0–10.

Table 2
Mean adjusted[#] SDQ total and subscale scores at follow-up (age 10) stratified by type of sports participation.

	Mean SDQ score (95% CI)				
	N (%)	Total difficulties ^a	Internalising problems ^b	Externalising problems ^c	Prosocial behaviours ^d
Participants	2777 (69)	7.24 (7.08–7.41)	3.08 (2.97–3.19)	4.14 (4.04–4.24)	8.54 (8.48–8.61)
Commencers	413 (10)	7.40 (6.91–7.89)	3.17 (2.85–3.49)	4.30 (4.00–4.59)	8.67 (8.49–8.86)
Dropouts	389 (10)	7.98 (7.41–8.45)	3.59 (3.28–3.89)	4.48 (4.19–5.76)	8.39 (8.21–8.57)
Nonparticipants	463 (12)	7.80 (7.33–8.27)	3.54 (3.24–3.85)	4.33 (4.05–4.61)	8.43 (8.26–8.61)

^a Score range 0–33.

^b Score range 0–19.

^c Score range 0–18.

^d Score range 0–10.

[#] Marginal means were estimated using general linear models, and were adjusted for sex, BMI, parental education, household income, neighbourhood SEP, physical activity, and baseline scores.

childhood. There are however, several limitations. This study assessed only children from 8 to 10 years of age and the results may not be generalisable beyond this age range. Further, the collection of data from only two time points makes causal attributions impossible, and it is unclear if sports participation causes lesser psychological difficulties. A large amount of missing data and high non-response rates could have biased the findings. As such, the findings may not be generalisable to children of low socioeconomic areas and cannot be considered representative of the population. Longer periods of observation may be required to fully elucidate the impact of sports participation on the development of psychological difficulties during childhood. Furthermore, while the measure used in this study ensured that a minimum level of engagement in extracurricular sports was met in order to constitute sports participation, levels of participation (for example in minutes per week) were not assessed. Thus, it is not possible to comment on potential dose–response relationships.

5. Conclusion

After adjusting for baseline levels of psychological difficulties, children who dropped out of extracurricular sports were reported to have a greater number of psychological difficulties than children who maintained regular participation. This is constituted by a greater number of internalising problems, with no differences evident between groups on externalising problems. Due consideration should be given to the quality and implementation of organised extracurricular sporting programs to ensure that they provide benefits to mental health. The key features of mental health enhancing sport programs include a clear and age-appropriate structure, supportive adult relationships, the provision of positive social norms, the promotion of empowerment and autonomy, and provision of skill-building opportunities.⁸ Further, sporting clubs, coaches, parents, and health practitioners should also give due consideration to the psychological difficulties being experienced by children who drop out of organised sports and be wary that a higher level of psychological difficulties may be experienced prior to or subsequent to dropout. This is important because 10% of children dropped out of sport in this study, with dropout rates likely to accelerate during adolescence.²⁶ Systematic processes for the assessment of psychological difficulties amongst children who drop out of organised sports is a priority. Future research should prioritise the exploration of causal mechanisms and potential mediating variables in the relationship between psychological difficulties and dropout from organised sports.

6. Practical Implications

- Children who drop out of organised sports should be monitored for psychological difficulties.

- Participation in organised sports during childhood is associated with better social and emotional health when compared with nonparticipation.
- Organised sports programs in Australia do not provide any additional benefit to behavioural conduct, attention, or prosocial behaviours than nonparticipation and/or alternate extracurricular programs.

Acknowledgements

The Longitudinal Study of Australian Children is conducted in partnership between the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). They were responsible for the design and conduct of the study, and the collection and management of data. The findings and views reported in this paper are those of the authors and should not be attributed to FaHCSIA, AIFS or the ABS. Dylan Cliff is funded by a National Heart Foundation of Australia - Postdoctoral Research Fellowship (PH 11S 6025). Anthony Okely is supported by a National Heart Foundation of Australia Career Development Fellowship (CR 11S 6099). Christopher Magee is supported by an Australian Research Council Discovery Grant (DP110100857).

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