

University of Groningen

## Characteristics of sports participation and psychosocial health in children

Moeijes, Janet; Van Busschbach, Joeske T; Lockhart, Krista L; Bosscher, Ruud J; Twisk, Jos W R

*Published in:*  
European Journal of Sport Science

*DOI:*  
[10.1080/17461391.2018.1510988](https://doi.org/10.1080/17461391.2018.1510988)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2019

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Moeijes, J., Van Busschbach, J. T., Lockhart, K. L., Bosscher, R. J., & Twisk, J. W. R. (2019). Characteristics of sports participation and psychosocial health in children: Results of a cross-sectional study. *European Journal of Sport Science*, 19(3), 365-374. <https://doi.org/10.1080/17461391.2018.1510988>

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*



## Characteristics of sports participation and psychosocial health in children: Results of a cross-sectional study

Janet Moeijes, Joeske T. Van Busschbach, Krista L. Lockhart, Ruud J. Bosscher & Jos W. R. Twisk

To cite this article: Janet Moeijes, Joeske T. Van Busschbach, Krista L. Lockhart, Ruud J. Bosscher & Jos W. R. Twisk (2019) Characteristics of sports participation and psychosocial health in children: Results of a cross-sectional study, *European Journal of Sport Science*, 19:3, 365-374, DOI: [10.1080/17461391.2018.1510988](https://doi.org/10.1080/17461391.2018.1510988)

To link to this article: <https://doi.org/10.1080/17461391.2018.1510988>



Published online: 17 Aug 2018.



Submit your article to this journal [↗](#)



Article views: 150



View Crossmark data [↗](#)

ORIGINAL ARTICLE

## Characteristics of sports participation and psychosocial health in children: Results of a cross-sectional study

JANET MOEIJES <sup>1,2</sup>, JOOSKE T. VAN BUSSCHBACH<sup>1,3</sup>, KRISTA L. LOCKHART<sup>1</sup>,  
RUUD J. BOSSCHER<sup>1</sup>, & JOS W. R. TWISK <sup>2</sup>

<sup>1</sup>Department of Human Movement and Education, Windesheim University of Applied Sciences, Zwolle, 8017CA, The Netherlands; <sup>2</sup>Department of Epidemiology and Biostatistics, Amsterdam Public Health Research Institute, Amsterdam UMC, Amsterdam, The Netherlands & <sup>3</sup>University Medical Center Groningen, University Center for Psychiatry, Groningen, The Netherlands

### Abstract

Several studies suggest that sports participation is beneficial for psychosocial health. There is, however, only a limited number of studies about the relationship of specific characteristics of sports participation with psychosocial health. The present study investigated associations between characteristics of sports participation and three aspects of psychosocial health, i.e. internalising problems, externalising problems and prosocial behaviour. The examined characteristics of sports participation pertained to individual versus team sports, indoor versus outdoor sports, involvement in competition or not, and contact sports versus non-contact sports. Cross-sectional data were collected from 1768 Dutch children aged 10–12 years who were member of a sports club. These children completed the Movement and Sports Monitor Questionnaire Youth aged 8–12 years (MSMQ) and the Strength and Difficulties Questionnaire (SDQ). Linear multilevel analyses and logistic generalised estimating equation were conducted. Children participating in team sports, outdoor sports, or competition showed fewer internalising problems than children engaged in individual sports, indoor sports, or only training. The associations with internalising problems were stronger for boys than for girls. Children participating in non-contact sports showed fewer externalising problems than children performing non-contact sports as well as contact sports. Children practising indoor sports or non-contact sports showed better prosocial behaviour than children doing outdoor or contact sports. In conclusion, the form of sports participation seemed to matter highly with respect to internalising problems, especially for boys, and, to a lesser extent, with respect to externalising problems and prosocial behaviour. This offers starting points for developing tailor-made sports programmes for children.

**Keywords:** *Team sports, outdoor sports, contact sports, internalising problems, externalising problems, prosocial behaviour*

### Highlights

- Characteristics of sports participation were associated with fewer internalising problems and, to a lesser extent, with fewer externalising problems and better prosocial behaviour.
- Participation in team sports, outdoor sports, or competition was, especially for boys, associated with fewer internalising problems compared to participation in individual sports, indoor sports, or only training.
- Participation in non-contact sports was associated with fewer externalising problems compared to participation in non-contact sports as well as contact sports.
- Participation in indoor sports or non-contact sports showed better prosocial behaviour compared to participation in outdoor or contact sports.

### Introduction

With a reported prevalence of 19–28%, psychosocial health problems impede daily and social functioning of many children (Havas, Bosma, Spreeuwenberg, & Feron, 2010).

According to A. Goodman, Lamping, and Ploubidis (2010) psychosocial health of a child is the combination of internalising problems, externalising problems, and prosocial behaviour. Internalising problems include emotional disorders such as depression, panic and anxiety disorders, and are

expressed in sadness, anxiety, fear, peer problems, and psychosomatic complaints (Eisenberg et al., 2001; Muris, Meesters, & Van den Berg, 2003). Externalising problems pertain to behavioural problems like aggression, truancy, delinquency, disruptive behaviour disorders including oppositional defiant disorder, conduct disorders, and attention-deficit/hyperactivity disorders (AD/HD). They are reflected in negative emotions such as irritability due to frustration and anger (Eisenberg et al., 2001; Muris et al., 2003). A child's prosocial behaviour refers to voluntary behaviour intended to benefit others such as helping peers, being kind to younger children or sharing food (Farrant, Devine, Maybery, & Fletcher, 2012).

To promote psychosocial health of children, it is critical to determine social and behavioural variables that are related to a child's psychosocial health (Martikainen, Bartley, & Lahelma, 2002). One of these relevant variables is sports participation.

Notwithstanding the scepticism of some sports scientists like Coalter (2015) who argues that sports participation can lead to health and psychosocial problems, there is a considerable number of studies reporting that children and adolescents who participate in sports show less psychosocial health problems (Ahn & Fedewa, 2011; Eime, Young, Harvey, Charity, & Payne, 2013). Most of these studies relate to internalising problems such as social anxiety (Schumacher Dimech & Seiler, 2011), self-esteem (Bowker, 2006), depression (McKercher, Schmidt, Sanderson, Dwyer, & Venn, 2012) or emotional well-being (Snyder et al., 2010). The remaining studies focus on associations of sports participation with prosocial behaviour (Rutten et al., 2011; Snyder et al., 2010) and to a lower extent on associations with externalising problems such as behavioural problems and hyperactivity (Denault & Déry, 2015). Very few studies pay concurrent attention to all three aspects of psychosocial health (Donaldson & Ronan, 2006).

In the literature about associations between psychosocial health and sports participation, a distinction is made between participation in school sports activities (Harrison & Narayan, 2003), extracurricular school sports activities (Schumacher Dimech & Seiler, 2011), and sports club activities (Bowker, 2006; Slutzky & Simpkins, 2009).

With respect to characteristics of sports participation, the few studies available on relationships between such characteristics and psychosocial health in children or adolescents focus on a person's frequency or duration of sports participation (McKercher et al., 2012; Slutzky & Simpkins, 2009), the distinction between individual and team sports (Slutzky & Simpkins, 2009; Vella, Cliff, Magee, &

Okely, 2015), and performing outdoor sports in the form of so-called green and blue exercises (Reed et al., 2013). As far as we know, no studies regarding psychosocial health in children or adolescents pay attention to other characteristics of sports participation common in sports research, such as the involvement in competition or not (Capranica & Millard-Stafford, 2011) and the distinction between contact and non-contact sports (Tsushima, Geling, Arnold, & Oshiro, 2016).

All in all, several studies in children or adolescents suggest that sports participation is beneficial for psychosocial health, but only a small number of them link specific characteristics of sports participation to psychosocial health. To fill this gap in the literature (Coalter, 2015), the present study was aimed at examining associations between four characteristics of sports participation and internalising problems, externalising problems, and prosocial behaviour in children aged 10–12 years. The study focuses on sports participation in terms of participation in sports club activities, which is the dominant form of children's sports participation in the Netherlands. The following characteristics of sports participation are taken into account: individual versus team sports, indoor versus outdoor sports, involvement in competition or not, and contact versus non-contact sports.

## Methods

### *Participants*

Data from a cross-sectional study which focused on associations between sports participation and psychosocial health in fourth and fifth-grade children from 73 Dutch primary schools (response rate 63%) in both urban and rural regions in the Netherlands were used. Data were collected from 1894 children (response rate 72%) between November 2011 and April 2014.

### *Design and procedures*

The participating primary schools were located in neighbourhoods with various SES levels that were representative of the situation in all Dutch neighbourhoods. Most of the schools, namely 69.9%, were located in moderate SES neighbourhoods. For the remaining schools, 9.6% and 20.5% were situated in low SES neighbourhoods and high SES neighbourhoods respectively. This situation corresponds to a large extent with the situation throughout the Netherlands. Of all Dutch primary school children, approximately 71.8%, 11.6% and 16.6% live in

moderate SES neighbourhoods, low SES neighbourhoods and high SES neighbourhoods respectively (National Dutch Central Organization of Statistics, 2016).

Primary schools were first approached by telephone and email. Interested schools received an email with detailed information and were contacted again over the phone one week later to provide additional details and to make an appointment. If permission was granted, the school sent parents and guardians of the children written information about the aim, nature, and practice of the research. Written informed consent from parent or guardian was a prerequisite to participate in this investigation.

At the initial meeting, participating children were given a booklet containing questionnaires to be completed at school. The completed questionnaires were collected one week later. Subsequently, anthropometric data were obtained during school time.

### Measures

*Dependent variables.* Childrens' psychosocial health was measured with the self-rated version of the Strengths and Difficulties Questionnaire (SDQ) (R. Goodman, 2001). The SDQ is a validated screening instrument concerning children's and adolescents' psychosocial health (R. Goodman, 2001; Muris et al., 2003). The SDQ is a 25-items questionnaire organised into three subscales, i.e. internalising problems, externalising problems, and prosocial behaviour. Each item has three response categories with 0 = not true, 1 = somewhat true, and 2 = certainly true (A. Goodman et al., 2010). Subscale scores are computed by summing up the scores on relevant items, after recoding reversed items. The internalising problems subscale includes ten items such as "I am often unhappy, down-hearted or tearful" and "Other people of my age generally like me". The externalising problems subscale also contains ten items such as "I fight a lot. I can make other people do what I want" and "I am easily distracted, I find it difficult to concentrate". In both subscales, with a range from 0 to 20 points, higher scores indicate more problems (A. Goodman et al., 2010). The prosocial behaviour scale has five items, such as "I usually share with others (food, games, pens, etc.)" and "I am helpful if someone is hurt, upset or feeling ill". In the prosocial behaviour subscale, with a range of 0 to 10 points, a higher score indicates better prosocial behaviour.

The guidelines prescribed by the official manual of the SDQ (Youth in Mind, 2012) on subscale calculation and missing data were followed. The internal consistency of the internalising problems subscale,

the externalising problems subscale and the prosocial behaviour subscale is reflected in Cronbach's alphas of 0.66, 0.76, and 0.66 respectively (A. Goodman et al., 2010). Although the alpha's for the internalising problems and prosocial behaviour subscales are too low from a clinical point of view (Cicchetti, 1994), internal consistency of all three subscales can be considered as satisfactory for scientific purposes (Ponterotto & Ruckdeschel, 2007). The test-retest reliability of the Dutch-language self-report version of the SDQ subscales expressed in an intra-class correlation coefficient (ICC) is 0.76 or higher, except for the prosocial behaviour subscale with an ICC of 0.59 (Muris et al., 2003). Studies in Australian and Chinese children report an ICC-score of 0.69 and 0.83 respectively on the latter subscale (Liu et al., 2013; Mellor, 2004). The ICC-scores on the SDQ subscales can be considered as satisfactory for both clinical and scientific purposes (Cicchetti, 1994; Muris et al., 2003).

The three outcome variables were not only used as continuous variables but were also dichotomised using the clinical cut-off values from the official SDQ manual distinguishing normal health from borderline and poor health (Youth in Mind, 2012), whereby the last two categories have been merged under the heading 'abnormal health'. Value 0 of the dichotomised variables indicated a 'normal' degree of internalising problems (0–8 points), a 'normal' degree of externalising problems (0–8 points) or a 'normal' degree of prosocial behaviour (6 points or higher). Value 1 of the dichotomised variables indicated an 'abnormal' situation which refers to both borderline scores (9–12 points for internalising problems, 9–11 points for externalising problems, and 5–7 points for prosocial behaviour) and worse scores (13–20 points for internalising problems, 12–20 points for externalising problems, and 0 to 4 points for prosocial behaviour).

*Independent variables.* Sports participation was assessed by the self-report Movement and Sports Monitor Questionnaire – Youth Aged 8–12 Years (MSMQ) (Ooijendijk, Wendel-Vos, & De Vries, 2007). This questionnaire contains, amongst others, questions about membership of a sports club and frequency of sports participation. A question concerning the sport(s) in which the child participated was added. The validation of the questions about sports participation was described in an earlier publication of the authors of this article (Moeijes, Van Busschbach, Fortuin, Bosscher, & Twisk, 2017).

Four variables indicating characteristics of sports participation were measured. The first is individual versus team sports. A team sport is practised by two

or more persons who cooperate to get an optimal result and perceive each other as allies. An individual sport is exercised by one single person who acts on his own and perceives other participants as opponents. The second variable is indoor versus outdoor sports. The third variable refers to involvement in competition, which is the case if the child takes not only part in training activities but also in at least one match a year. The fourth variable focuses on physical contact with opponents. A distinction was made between sports where there is no contact between opponents (called “non-contact sports”), such as volleyball and swimming, and sports where contact between opponents is inevitable, such as soccer or basketball, or where physical contact is part of the sport itself, such as in judo or wrestling (together subsumed under the heading of “contact sports”).

#### *Covariates*

Covariates were age (continuous), sex (dichotomous), body mass index (BMI; continuous), household composition (dichotomous), neighbourhood socioeconomic status (SES; continuous) and frequency of sports participation (continuous). Parents or guardians reported the child’s date of birth and his or her sex. Height and weight were assessed using validated scales during school visits by the researchers. Height was measured by the Seca 201 or 203 system (Basel, Switzerland) and weight by the Seca Sensa 804 (Basel, Switzerland) or the digital scale Tanita BC 601 (Tokyo, Japan). BMI was calculated as weight divided by height squared ( $\text{kg}/\text{m}^2$ ). Household composition indicates whether a child lived in a two-parent family or in another type of household, for instance, a one-parent family. SES of the child’s parents or guardians was based on ZIP-codes and status score per ZIP-code derived from the Dutch Social and Cultural Planning Office in the year 2010 (Knol, Boelhouwer, & Ross, 2010).

#### *Statistical analyses*

To compare the sample of children with complete data with that of children with missing data, independent t-tests and chi-square tests were conducted.

Because of the clustered nature of our sample (two-level structure, i.e. children grouped in schools), linear multilevel regression analyses were conducted to analyse associations between characteristics of sports participation and each of the three outcome variables (i.e. internalising problems, externalising problems, and prosocial behaviour). Logistic

generalised estimating equations (GEE) with an exchangeable correlation structure were conducted for the three dichotomous outcome variables.

Analyses were done in four steps: univariable analyses, multivariable analyses with the covariates included, analyses further adjusted for frequency of sports participation and, finally, in search for effect modifications, with interaction terms for all covariates, included separately. In the last step, sex, age, BMI, SES, and household composition were taken into account as possible effect modifiers. Because of skewness to the right, the continuous outcome of internalising problems was log transformed before analyses.

For all analyses, a two-tailed significance level of  $p < .05$  was considered statistically significant, and SPSS and STATA were used for the analyses.

## **Results**

From the 1894 children who were involved in the study, 1768 fully completed the questionnaires, while 126 (6.7%) were excluded due to missing data. No significant differences between the included and excluded children were observed for sex, age, BMI, membership of a sports club, weekly frequency of participation in organised sports activities, and the outcome variables. [Table I](#) presents descriptive information about the study sample.

With regard to internalising problems, externalising problems and prosocial behaviour, the group of children with abnormal scores constituted 5.4%, 15.5%, and 6.5% of the sample respectively. [Table II](#) presents the results of the linear multilevel regression analyses and logistic GEE analyses relating sports characteristics to the three outcome variables.

#### *Internalising problems*

[Table II](#) shows that participation in team sports ( $B = -0.09$ ,  $p = .02$ ,  $CI = -0.16$  to  $-0.01$ ;  $OR = 0.66$ ,  $p = .06$ ,  $CI = 0.43$ – $1.01$ ), outdoor sports ( $B = -0.12$ ,  $p = .002$ ,  $CI = -0.19$  to  $-0.04$ ;  $OR = 0.79$ ,  $p = .32$ ,  $CI = 0.49$ – $1.27$ ), or training as well as competition ( $B = -0.11$ ,  $p = .01$ ,  $CI = -0.19$  to  $-0.02$ ;  $OR = 1.04$ ,  $p = .89$ ,  $CI = 0.60$ – $1.82$ ), was associated with fewer internalising problems. The associations of sports characteristics with internalising problems were only significant for the continuous outcome and not when the two groups based on the clinical cut-off scores for internalising problems were compared.

Because sex was found to be an effect modifier in most analyses, in addition, results were presented for boys and girls separately ([Table III](#)). It can be seen that most associations between sports

Table I. General characteristics of the sample ( $n = 1768$ )

Demographic variables	Specification	Frequency (%)	Mean $\pm$ s
Sex	Boys	871 (49.3)	
	Girls	897 (50.7)	
Age			11.4 $\pm$ 0.72
BMI			17.93 $\pm$ 2.61
SES			0.32 $\pm$ 0.97
Two parents household	No	321 (18.2)	
	Yes	1447 (81.4)	
Weekly frequency of sports participation			3.04 $\pm$ 1.48
Individual versus team sports	Individual sports	454 (25.7)	
	Team sports	970 (54.9)	
	Individual sports as well as team sports	344 (19.5)	
Indoor versus outdoor sports	Indoor sports	625 (35.4)	
	Outdoor sports	899 (50.8)	
	Indoor sports as well as outdoor sports	244 (13.8)	
Involvement in competition	Only training	387 (21.9)	
	Training as well as competition	1381 (78.1)	
Physical contact with opponents	Non-contact sports	693 (39.2)	
	Contacts sports	815 (46.1)	
	Non-contact sports as well as contact sports	260 (14.7)	
Aspects of psychosocial health	Internalising problems (0–20 points)		3.63 $\pm$ 2.74
	Normal ( $\leq$ 8 points)	1669 (94.4)	
	Abnormal ( $>$ 8 points)	99 (5.6)	
	Externalising problems (0–20 points)		5.39 $\pm$ 3.07
	Normal ( $\leq$ 8 points)	1490 (84.3)	
	Abnormal ( $>$ 8 points)	278 (15.7)	
Prosocial behaviour (0–10 points)	Prosocial behaviour (0–10 points)		8.06 $\pm$ 1.57
	Normal ( $\geq$ 6 points)	1657 (93.7)	
	Abnormal ( $<$ 6 points)	111 (6.3)	

characteristics and internalising problems were stronger for boys.

*Externalising problems*

Regarding externalising problems (Table II), only one sports characteristic was significantly associated with externalising problems. Participation in non-contact sports as well as contact sports was associated with more externalising problems ( $B = 0.54, p = .03, CI = 0.04-1.03; OR = 1.09, p = .77, CI = 0.61-1.93$ ). This association was only significant for the continuous outcome.

No consequent pattern of effect modifications was observed.

*Prosocial behaviour*

Regarding prosocial behaviour (Table II), children participating in outdoor sports ( $B = -0.19, p = .03, CI = -0.36$  to  $-0.02; OR = 1.28, p = .30, CI = 0.80-1.24$ ), children participating in contact sports ( $B = -0.18, p = .05, CI = -0.35-0.00; OR = 1.18, p = .47, CI = 0.75-1.88$ ), and children participating in non-contact sports as well as contact sports ( $B =$

$-0.36, p = .01, CI = -0.61-0.11; OR = 1.77, p = .11, CI = 0.88-3.53$ ) had worse prosocial behaviour. The associations of the characteristics with prosocial behaviour were only significant for the continuous outcome.

No consequent pattern of effect modification was observed for the covariates.

**Discussion**

The aim of this study was to explore associations between certain characteristics of sports participation and psychosocial health in children aged 10–12 years. The results showed that the characteristics of sports participation examined in this study were highly associated with internalising problems, especially for boys, and to a lesser extent with externalising problems and prosocial behaviour.

Internalising problems proved to be associated with three of the four examined characteristics of sports participation when all children were taken into account, and all four characteristics when only boys were taken into account. Our finding that fewer internalising problems were associated with team sports compared with individual sports is in

Table II. Associations between characteristics of sports activities and outcome measures

		Linear multilevel regression analyses						Logistic multilevel regression analyses					
		Crude analysis			Adjusted <sup>a</sup>			Crude analysis			Adjusted <sup>a</sup>		
		<i>B</i> <sup>b</sup>	<i>p</i>	CI	<i>B</i> <sup>b</sup>	<i>p</i>	CI	OR	<i>p</i>	CI	OR	<i>p</i>	CI
Internalising problems	Team sports <sup>c</sup>	-0.14	<.001	-0.21 to -0.06	-0.09	.02	-0.16 to -0.01	0.59	.01	0.40-0.87	0.66	.06	0.43-1.01
	Individual sports as well as team sports <sup>c</sup>	-0.08	.07	-0.18-0.01	0.00	.95	-0.10-0.11	0.66	.23	0.33-1.30	0.78	.54	0.35-1.75
	Outdoor sports <sup>d</sup>	-0.20	<.001	-0.27 to -0.14	-0.12	.002	-0.19 to -0.04	0.63	.03	0.42-0.95	0.79	.32	0.49-1.27
	Indoor sports as well as outdoor sports <sup>d</sup>	-0.05	.32	-0.14-0.05	0.02	.77	-0.09-0.12	0.54	.06	0.29-1.01	0.60	.09	0.33-1.09
	Training as well as competition <sup>c</sup>	-0.19	<.001	-0.27 to -0.12	-0.11	.01	-0.19 to -0.02	0.74	.15	0.49-1.11	1.04	.89	0.60-1.82
	Contact sports <sup>f</sup>	-0.16	<.001	-0.23 to -0.09	-0.07	.08	-0.14-0.01	0.63	.02	0.42-0.94	0.77	.30	0.47-1.26
	Non-contact sports as well as contact sports <sup>f</sup>	-0.07	.16	-0.16-0.02	0.07	.20	-0.04-0.18	0.56	.10	0.29-1.11	0.71	.43	0.31-1.63
Externalising problems	Team sports <sup>c</sup>	0.03	.86	-0.31-0.37	-0.12	.50	-0.47-0.23	0.85	.33	0.60-1.19	0.75	.09	0.53-1.05
	Individual sports as well as team sports <sup>c</sup>	-0.22	.32	-0.65-0.21	-0.41	.09	-0.89-0.07	0.75	.18	0.49-1.14	0.65	.09	0.42-1.02
	Outdoor sports <sup>d</sup>	0.26	.11	-0.06-0.57	0.07	.69	-0.27-0.41	1.14	.42	0.83-1.58	0.96	.82	0.70-1.32
	Indoor sports as well as outdoor sports <sup>d</sup>	0.12	.59	-0.33-0.58	0.06	.81	-0.43-0.55	1.06	.77	0.70-1.61	1.03	.85	0.70-1.54
	Training as well as competition <sup>c</sup>	0.08	.65	-0.27-0.43	-0.12	.57	-0.52-0.28	1.08	.65	0.78-1.48	0.94	.74	0.64-1.38
	Contact sports <sup>f</sup>	0.42	.01	0.11-0.73	0.23	.19	-0.11-0.58	1.18	.39	0.82-1.70	0.96	.82	0.64-1.43
	Non-contact sports as well as contact sports <sup>f</sup>	0.57	.01	0.14-1.01	0.54	.03	0.04-1.03	1.21	.40	0.77-1.90	1.09	.77	0.61-1.93
Prosocial behaviour	Team sports <sup>c</sup>	-0.15	.08	-0.33-0.02	-0.09	.34	-0.26-0.09	1.41	.17	0.87-2.28	1.30	.29	0.80-2.12
	Individual sports as well as team sports <sup>c</sup>	-0.06	.58	-0.28-0.16	-0.02	.17	-0.41-0.07	1.41	.26	0.78-2.56	1.54	.25	0.74-3.20
	Outdoor sports <sup>d</sup>	-0.27	<.001	-0.54 to -0.21	-0.19	.03	-0.36 to -0.02	1.67	.03	1.06-2.61	1.28	.30	0.80-2.04
	Indoor sports as well as outdoor sports <sup>d</sup>	-0.07	.58	-0.29-0.16	-0.19	.21	-0.40-0.09	0.81	.60	0.37-1.78	0.77	.53	0.35-1.72
	Training as well as competition <sup>c</sup>	-0.06	.51	-0.24-0.12	0.04	.73	-0.17-0.24	0.97	.90	0.64-1.48	0.76	.31	0.44-1.29
	Contact sports <sup>f</sup>	-0.41	<.001	-0.57 to -0.26	-0.18	.05	-0.35 to 0.00	1.60	.03	1.05-2.43	1.18	.47	0.75-1.88
	Non-contact sports as well as contact sports <sup>f</sup>	-0.32	.004	-0.54 to -0.10	-0.36	.01	-0.61 to -0.11	1.83	.04	1.04-3.21	1.77	.11	0.88-3.53

<sup>a</sup>Adjusted for sex, age, BMI, neighbourhood SES, household composition and frequency of sports participation.

<sup>b</sup>Unstandardized regression coefficient.

<sup>c</sup>The reference group is individual sports.

<sup>d</sup>The reference group is indoor sports.

<sup>e</sup>The reference group is only training.

<sup>f</sup>The reference group is non-contact sports.



Table III. Associations between characteristics of sports activities and internalising problems stratified for sex

	Boys						Girls					
	Linear multilevel regression analyses			GEE			Linear multilevel regression analyses			GEE		
	Adjusted <sup>a</sup>			Adjusted <sup>a</sup>			Adjusted <sup>a</sup>			Adjusted <sup>a</sup>		
	B <sup>b</sup>	p	CI	OR	p	CI	B <sup>b</sup>	p	CI	OR	p	CI
Team sports <sup>c</sup>	-0.16	.01	-0.27 to -0.04	0.30	.001	0.15-0.61	-0.03	.57	-0.12-0.08	1.17	.66	0.58-2.39
Individual sports as well as team sports <sup>c</sup>	0.02	.80	-0.14-0.20	0.27	.07	0.06-1.13	-0.02	.80	-0.14-0.11	1.29	.61	0.49-3.41
Outdoor sports <sup>d</sup>	-0.17	.003	-0.29 to -0.06	0.34	.01	0.16-0.73	-0.06	.18	-0.16-0.03	1.35	.33	0.74-2.47
Indoor sports as well as outdoor sports <sup>d</sup>	-0.06	.55	-0.25-0.13	0.32	.18	0.06-1.65	0.06	.36	-0.06-0.18	0.73	.39	0.36-1.49
Training as well as competition <sup>e</sup>	-0.19	.01	-0.33 to -0.04	0.59	.21	0.29-1.35	-0.06	.28	-0.16-0.05	1.34	.44	0.63-2.84
Contact sports <sup>f</sup>	-0.08	.18	-0.20-0.04	0.43	.02	0.21-0.86	-0.02	.73	-0.11-0.08	1.21	.59	0.60-2.41
Non-contact sports as well as contact sports <sup>f</sup>	0.21	.02	0.03-0.38	0.64	.51	0.16-2.46	-0.06	.41	-0.19-0.08	0.65	.40	0.24-1.77

<sup>a</sup>Adjusted for age, BMI, neighbourhood SES, household composition and frequency of sports participation.

<sup>b</sup>Unstandardized regression coefficient.

<sup>c</sup>The reference group is individual sports.

<sup>d</sup>The reference group is indoor sports.

<sup>e</sup>The reference group is only training.

<sup>f</sup>The reference group is non-contact sports.

line with other studies about children. Slutzky and Simpkins (2009), Schumacher Dimech and Seiler (2011), and Vella et al. (2015) also observed that participation in team sports was associated with fewer internalising problems in children. A possible explanation may be that participating in team sports give more possibilities for positive confirmation by peers than participating in individual sports. Positive confirmation by peers may foster the sports self-concept (Slutzky & Simpkins, 2009). A better sports self-concept is beneficial for one's self-esteem (Bowker, 2006), which provides protection against internalising problems (Slutzky & Simpkins, 2009).

Another finding was that children participating in outdoor sports have fewer internalising problems than children participating in indoor sports. This finding is in line with some studies in the field of outdoor exercise. Barton, Bragg, Wood, and Pretty (2016) observed that being active outdoors was associated with less depressive feelings in adults. An explanation for this might be that being outdoors has by itself a beneficial influence on someone's brain (Mantler & Logan, 2015) and this added with the effect of sports activity could explain the positive influence of outdoor sports on his or her mood, resulting in less depressive feelings (Barton et al., 2016). Another explanation may be that being active outdoor gives more opportunity to sun exposure (Sarris, O'Neil, Coulson, Schweitzer, &

Berk, 2014), which might enhance vitamin D levels (Föcker et al., 2017). Although the results of studies in adults come up with inconsistent support (Sarris et al., 2014), there are indications that low vitamin D levels are associated with depressed mood in children (Föcker et al., 2017).

Furthermore, we found that participation in training activities and competition was associated with fewer internalising problems than participation in training activities only. As far as we know, no other studies found this association in children. A few studies in adolescents offer, however, clues for an explanation. In spite of not winning all matches, participation in competition gives a child more possibilities for achieving success experiences and therefore for developing positive self-esteem. Through competition, the child learns to set goals and develops a sense of control (Breistøl, Clench-Aas, Van Roy, & Raanaas, 2017).

The most interesting finding was that the associations of all four examined sports characteristics were stronger for boys than for girls. The observed sex effect was in line with previous studies. Ahn and Fedewa (2011) reported that boys benefited more from sports than did girls. An explanation may be that, in general, boys derive more self-esteem from success in sports activities than girls did (Bowker, 2006). Bowker (2006) reported that satisfaction with his physical competence (such as skills or fitness) has a positive influence on a boy's

self-esteem, whereas satisfaction with their physical appearance (such as body or weight) was more significant for most girls. Furthermore, Plaza, Boiché, Brunel, and Ruchaud (2016) pointed out that boys, as well as girls, are susceptible to stereotypes. The impact of sports participation on children's self-esteem is related to their sex because participation in sports in Western society is probably still largely considered to be a male activity (Plaza et al., 2016).

With respect to externalising problems, it was only found that children participating in non-contact sports had fewer externalising problems than children participating in non-contact sports as well as contact sports. No associations were found for the other three characteristics of sports participation. An explanation for the limited number of associations might be that externalising problems are a consequence of a lack of effortful control (Wang, Eisenberg, Valiente, & Spinrad, 2016). Effortful control refers to "the ability to willfully or voluntarily inhibit, activate, or change (modulate) attention and behaviour, as well as executive functioning tasks of planning, detecting errors, and integrating information relevant to selecting behaviour" (Eisenberg, Smith, & Spinrad, 2004). As effortful control is a feature of a person's temperament which mainly develops from 2 to 7 years (Schermerhorn et al., 2013), it is understandable that the form of sports participation showed associations with externalising problems to only a limited extent. The children in our sample, aged 10–12 years, had already developed such stability in their effortful control that this feature of their temperament could only be influenced by sports participation to a limited extent.

Prosocial behaviour, not commonly measured as an aspect of psychosocial health, appeared to be positively associated with participating in indoor sports and participating in non-contact sports. In indoor sports, children need to take into account the physical aspects of a hall, such as walls and the solid floors, in their actions toward opponents. The somewhat risky situation in halls increases the risk of accidents and might explain why children participating in indoor sports showed better prosocial behaviour than outdoor athletes.

Our finding of the positive association between participation in non-contact sports and prosocial behaviour is in line with Rutten et al. (2011), who found the same association for adolescents. In our view, a possible explanation for this association might be that in non-contact sports, a context is created in which children learn to compete with others without beating their opponents by physical actions. Children are not involved in a physical fight that might obstruct the development of prosocial behaviour.

### *Strengths and limitations*

Several studies in children or adolescents report that sports participation is conducive to psychosocial health, but only a limited number of them link the specific form of sports participation to psychosocial health. The present study filled this gap in the literature (Coalter, 2015) by examining associations between four specific characteristics of sports participation and psychosocial health in children aged 10–12 years. The observed associations between the form of sports participation and psychosocial health constitute a first step towards the development of tailor-made sports programmes for children.

Because of its cross-sectional nature, the study only showed associations. It provided no insight into the causal relationships between sports participation and psychosocial health, which is a common limitation in research in this area (Coalter, 2015; Eime et al., 2013). Our study did not clarify the mechanisms and processes underlying the observed associations between the form of sports participation and psychosocial health. In this respect, follow-up studies with a qualitative or mixed methods design are desirable.

### **Conclusions**

Data from a sample of 1768 children aged 10–12 years suggested that the form of sports participation matter highly with respect to internalising problems, especially for boys, and to a lesser extent, with respect to externalising problems and prosocial behaviour. These results are to a considerable degree in line with those of other studies and can largely be understood on the basis of underlying explanatory mechanisms that relate, amongst others, to a child's sports self-concept and effortful control. The results offer starting points for developing tailor-made sports programmes for children. Future research should preferably have a qualitative or mixed methods design.

### **Disclosure statement**

No potential conflict of interest was reported by the authors.

### **Ethical approval**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical approval was obtained from the

Medical Ethics Committee of VU University Amsterdam (12/151).

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

## Funding

No external funding was secured for this study.

## ORCID

Janet Moeijes  <http://orcid.org/0000-0002-1491-0246>

Jos W. R. Twisk  <http://orcid.org/0000-0001-9617-1020>

## References

- Ahn, S., & Fedewa, A. L. (2011). A meta-analysis of the relationship between children's physical activity and mental health. *Journal of Pediatric Psychology, 36*(4), 385–397. doi:10.1093/jpepsy/jsq107
- Barton, J., Bragg, R., Wood, C., & Pretty, J. (2016). *Green exercise: Linking nature, health and well-being*. New York: Routledge.
- Bowker, A. (2006). The relationship between sports participation and self-esteem during early adolescence. *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement, 38*(3), 214–229. doi:10.1037/cjbs2006009
- Breistøl, S., Clench-Aas, J., Van Roy, B., & Raanaas, R. K. (2017). Association between participating in noncompetitive or competitive sports and mental health among adolescents—a Norwegian population-based cross-sectional study. *Scandinavian Journal of Child and Adolescent Psychiatry and Psychology, 5*(1), 28–38.
- Capranica, L., & Millard-Stafford, M. L. (2011). Youth sport specialization: How to manage competition and training? *International Journal of Sports Physiology and Performance, 6*(4), 572–579. doi:10.1123/ijpspp.6.4.572
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment, 6*(4), 284–290.
- Coalter, F. (2015). Sport-for-change: Some thoughts from a sceptic. *Social Inclusion, 3*(3), 19–23.
- Denault, A.-S., & Déry, M. (2015). Participation in organized activities and conduct problems in elementary school: The mediating effect of social skills. *Journal of Emotional and Behavioral Disorders, 23*(3), 167–179. doi:10.1177/1063426614543950
- Donaldson, S. J., & Ronan, K. R. (2006). The effects of sports participation on young adolescents' emotional well-being. *Adolescence, 41*(162), 369–389.
- Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity, 10*(1), 98–119. doi:10.1186/1479-5868-10-98
- Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., ... Guthrie, I. K. (2001). The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development, 72*(4), 1112–1134. doi:10.1111/1467-8624.00337
- Eisenberg, N., Smith, C. L., & Spinrad, T. L. (2004). Effortful control: Relations with emotion regulation, adjustment, and socialization in childhood. In K. Vohs & R. Baumeister (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 263–283). New York, NY: The Guilford Press.
- Farrant, B. M., Devine, T. A., Maybery, M. T., & Fletcher, J. (2012). Empathy, perspective taking and prosocial behaviour: The importance of parenting practices. *Infant and Child Development, 21*(2), 175–188. doi:10.1002/icd.740
- Föcker, M., Antel, J., Ring, S., Hahn, D., Kanal, Ö, Öztürk, D., ... Libuda, L. (2017). Vitamin D and mental health in children and adolescents. *European Child & Adolescent Psychiatry, 26*(9), 1043–1066.
- Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(11), 1337–1345.
- Goodman, A., Lamping, D. L., & Ploubidis, G. B. (2010). When to use broader internalising and externalising subscales instead of the hypothesised five subscales on the strengths and difficulties questionnaire (SDQ): Data from British parents, teachers and children. *Journal of Abnormal Child Psychology, 38*(8), 1179–1191. doi:10.1007/s10802-010-9434-x
- Harrison, P. A., & Narayan, G. (2003). Differences in behavior, psychological factors, and environmental factors associated with participation in school sports and other activities in adolescence. *Journal of School Health, 73*(3), 113–120. doi:10.1111/j.1746-1561.2003.tb03585.x
- Havas, J., Bosma, H., Spreeuwenberg, C., & Feron, F. J. (2010). Mental health problems of Dutch adolescents: The association with adolescents' and their parents' educational level. *The European Journal of Public Health, 20*(3), 258–264. doi:10.1093/eurpub/ckp172
- Knol, F., Boelhouwer, J., & Ross, J. A. (2010). Statusontwikkeling van wijken in Nederland 1998–2010 [Status development of neighborhoods in the Netherland 1998–2010]. Retrieved from [http://www.scp.nl/Publicaties/Alle\\_publicaties/Publicaties\\_2012/Statusontwikkeling\\_van\\_wijken\\_in\\_Nederland\\_1998\\_2010](http://www.scp.nl/Publicaties/Alle_publicaties/Publicaties_2012/Statusontwikkeling_van_wijken_in_Nederland_1998_2010)
- Liu, S.-K., Chien, Y.-L., Shang, C.-Y., Lin, C.-H., Liu, Y.-C., & Gau, S. S.-F. (2013). Psychometric properties of the Chinese version of strength and difficulties questionnaire. *Comprehensive Psychiatry, 54*(6), 720–730. doi:10.1016/j.comppsy.2013.01.002
- Mantler, A., & Logan, A. C. (2015). Natural environments and mental health. *Advances in Integrative Medicine, 2*(1), 5–12.
- Martikainen, P., Bartley, M., & Lahelma, E. (2002). Psychosocial determinants of health in social epidemiology. *International Journal of Epidemiology, 31*(6), 1091–1093.
- McKercher, C., Schmidt, M. D., Sanderson, K., Dwyer, T., & Venn, A. J. (2012). Physical activity and depressed mood in primary and secondary school-children. *Mental Health and Physical Activity, 5*(1), 50–56. doi:10.1016/j.mhpa.2012.03.004
- Mellor, D. (2004). Furthering the use of the strengths and difficulties questionnaire: Reliability with younger child respondents. *Psychological Assessment, 16*(4), 396–401. doi:10.1037/1040-3590.16.4.396
- Moeijes, J., Van Busschbach, J. T., Fortuin, B., Bosscher, R. J., & Twisk, J. W. (2017). Sports participation and psychosocial health in elementary school children: A cross-sectional study. *Health Behavior and Policy Review, 4*(6), 582–592. doi:10.14485/HBPR.4.6.8
- Muris, P., Meesters, C., & Van den Berg, F. (2003). The strengths and difficulties questionnaire (SDQ). *European Child & Adolescent Psychiatry, 12*(1), 1–8. doi:10.1007/s00787-003-0298-2
- National Dutch Central Organization of Statistics. (2016). *Welvaart in Nederland* [Prosperity in the Netherlands].

- Retrieved from Den Haag: [https://www.cbs.nl/-/media/\\_pdf/2016/26/2016welvaartinonderland.pdf](https://www.cbs.nl/-/media/_pdf/2016/26/2016welvaartinonderland.pdf)
- Ooijendijk, W., Wendel-Vos, W., & De Vries, S. (2007). *Consensus Vragenlijsten Sport en Bewegen (KvL//B&G 2007.089)* [Consensus Questionnaires Sports and Movement (KvL//B&G 2007.089)]. Retrieved from TNO.nl: [publications.tno.nl/publication/34620748/tp3vGb/ooijendijk-2007-advies.pdf](http://publications.tno.nl/publication/34620748/tp3vGb/ooijendijk-2007-advies.pdf)
- Plaza, M., Boiché, J., Brunel, L., & Ruchaud, F. (2016). Sport = male ... But Not All sports: Investigating the gender stereotypes of sport activities at the explicit and implicit levels. *Sex Roles, 76*(3), 202–217. doi:10.1007/s11199-016-0650-x
- Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. *Perceptual and Motor Skills, 105*(3), 997–1014.
- Reed, K., Wood, C., Barton, J., Pretty, J. N., Cohen, D., & Sandercock, G. R. (2013). A repeated measures experiment of green exercise to improve self-esteem in UK school children. *PLoS ONE, 8*(7), e69176.
- Rutten, E. A., Schuengel, C., Dirks, E., Stams, G. J. J., Biesta, G. J., & Hoeksma, J. B. (2011). Predictors of antisocial and prosocial behavior in an adolescent sports context. *Social Development, 20*(2), 294–315. doi:10.1111/j.1467-9507.2010.00598.x
- Sarris, J., O'Neil, A., Coulson, C. E., Schweitzer, I., & Berk, M. (2014). Lifestyle medicine for depression. *BMC Psychiatry, 14*(1), 107.
- Schermerhorn, A. C., Bates, J. E., Goodnight, J. A., Lansford, J. E., Dodge, K. A., & Pettit, G. S. (2013). Temperament moderates associations between exposure to stress and children's externalizing problems. *Child Development, 84*(5), 1579–1593. doi:10.1111/cdev.12076
- Schumacher Dimech, A., & Seiler, R. (2011). Extra-curricular sport participation: A potential buffer against social anxiety symptoms in primary school children. *Psychology of Sport and Exercise, 12*(4), 347–354. doi:10.1016/j.psychsport.2011.03.007
- Slutzky, C. B., & Simpkins, S. D. (2009). The link between children's sport participation and self-esteem: Exploring the mediating role of sport self-concept. *Psychology of Sport and Exercise, 10*(3), 381–389. doi:10.1016/j.psychsport.2008.09.006
- Snyder, A. R., Martinez, J. C., Bay, R. C., Parsons, J. T., Sauers, E. L., & Valovich McLeod, T. C. (2010). Health-related quality of life differs between adolescent athletes and adolescent nonathletes. *Journal of Sport Rehabilitation, 19*(3), 237–248. doi:10.1123/jsr.19.3.237
- Tsushima, W. T., Geling, O., Arnold, M., & Oshiro, R. (2016). Are there subconcussive neuropsychological effects in youth sports? An exploratory study of high-and low-contact sports. *Applied Neuropsychology: Child, 5*(2), 149–155. doi:10.1080/21622965.2015.1052813
- Vella, S. A., Cliff, D. P., Magee, C. A., & Okely, A. D. (2015). Associations between sports participation and psychological difficulties during childhood: A two-year follow up. *Journal of Science and Medicine in Sport, 18*(3), 304–309. doi:10.1016/j.jsams.2014.05.006
- Wang, F. L., Eisenberg, N., Valiente, C., & Spinrad, T. L. (2016). Role of temperament in early adolescent pure and co-occurring internalizing and externalizing problems using a bifactor model: Moderation by parenting and gender. *Development and Psychopathology, 28*(4pt2), 1487–1504. doi:10.1017/S0954579415001224
- Youth in Mind. (2012). Manual SDQ. Retrieved from <http://www.sdqinfo.com/>