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1 **Does sports club participation contribute to physical activity among children and**
2 **adolescents? A comparison across six European countries**

3 **Running title:** Sports clubs participation and physical activity
4

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29

30 **ABSTRACT**

31 **Aims:** Insufficient physical activity (PA) is one of the largest public health challenges of
32 our time and requires a multisectoral public-health response. PA recommendations state
33 that all children and adolescents should accumulate at least 60 minutes of moderate-to-
34 vigorous PA (MVPA) daily and carry out vigorous PA (VPA) three times weekly. While
35 participation in sports club activities is known to enhance the probability of reaching the
36 recommended overall PA level, less is known about the contribution of sports club
37 participation to VPA and few cross-national comparisons have been carried out.

38 The purpose of this paper is to study whether participation in sports club activities is
39 associated with meeting the overall PA and VPA recommendations among children and
40 adolescents across six European countries, namely Belgium (Flanders), Czech Republic,
41 Finland, France, Ireland and Sweden. **Methods:** Analysis were carried out on existing
42 self-reported national data sets using descriptive statistics and logistic regression.

43 **Results:** Results indicate that approximately two-thirds of children and adolescents take
44 part in sports clubs activities in given countries. Sports club participants were more
45 likely to meet the overall PA recommendations (OR 2.4-6.4). Sports club participants
46 were also more likely to reach VPA recommendation (OR 2.8-5.0) than non-
47 participants. **Conclusions:** The extent to which overall PA and/or VPA is gained
48 through sports club participation versus other settings needs to be further studied. Still, it
49 can be argued that sports clubs have an important position in PA promotion for younger
50 populations.

51 **Key words:** guidelines and recommendations, physical activity, public health, sport,
52 youth

53 **BACKGROUND**

54 There is strong evidence for the physical, mental and psychosocial benefits of physical
55 activity (PA) [1, 2] and the need for a multi-sectoral public-health response to physical
56 inactivity [3]. Global PA recommendations for health state that children and adolescents
57 should achieve at least 60 minutes of moderate-to-vigorous intensity PA (MVPA), most
58 of it aerobic, every day to improve cardiorespiratory and muscular fitness, bone health,
59 and cardiovascular and metabolic health biomarkers [4]. Vigorous intensity PA (VPA)
60 including muscle and bone strengthening activity should be incorporated at least three
61 times weekly. It is also highlighted that amounts of PA greater than 60 minutes provide
62 additional health benefits [4, 5].

63 International research has demonstrated that the majority of children and adolescents do
64 not reach these PA recommendations. A recent overview on the PA of children and
65 adolescents in 38 countries from all continents showed that on average sixty percent of
66 children and youth worldwide fail to meet the international recommendations for PA
67 [6]. About half of the countries reported that only a third or less of the children and
68 adolescents met the PA guidelines and some countries reported even lower levels,
69 highlighting an issue of insufficient PA during childhood across Europe.

70 Moreover, some universal trends in PA in relation to gender, age and family affluence
71 need to be considered, where boys, younger age groups and children from high
72 affluence groups reach the recommended level of PA more frequently than girls, older
73 age groups and low affluence groups respectively [7]. This combined knowledge is
74 alarming, particularly considering the health benefits of PA in regard to physical,
75 mental, and social health, and in the prevention of non-communicable diseases [8].

76 Therefore, the World Health Organisation [4] and the European Commission [9] as well
77 as national governments have set PA promotion as one of the priority aims in society,
78 especially with respect to children and adolescents. As health should be promoted where
79 people learn, work, play and love [10], PA should also be promoted in these different
80 settings. One setting that is particularly suitable for promoting PA is the sports club who
81 deliver organised sport to the 40-59% of children and adolescents in Europe who
82 participate in sports clubs [6]. In spite of the high diversity of sports policies in different
83 countries across Europe and in the population of sports clubs, it can be generalised that
84 sports clubs represent the very core and the local suppliers of the many sports systems in
85 this continent [11].

86 Participation in sports clubs can and should contribute to meeting PA guidelines. Some
87 research has demonstrated that children and adolescents participating in sport at a sports
88 club have higher levels of MVPA than non-participants [12]. However, some other
89 recent findings in European countries have also indicated that not all sports club
90 participants reach recommended PA levels [13, 14]. Among sports participants, boys are
91 more likely to reach the PA guidelines for MVPA than girls [15] and there are also
92 studies that show a positive relationship between sport participation and VPA [16, 17].

93 To date, no research has focussed on comparing overall PA levels and the additional
94 assessment of VPA of sports club participants and non-participants across several
95 European countries. Therefore, the purpose of this paper is to study whether
96 participation in sports club activities is associated with meeting the overall PA and VPA
97 recommendations among children and adolescents across six European countries with

98 some different characteristics, namely Belgium (Flanders), Czech Republic, Finland,
99 France, Ireland and Sweden.

100

101 **METHODS**

102 Authors from six countries, belonging to the HEPA Europe: Sport Clubs for Health
103 working group, identified relevant data sets, with data on sports club participation,
104 overall PA and VPA among children and adolescents aged 11, 13 and 15 years old, with
105 variations in Ireland (10-11 and 12-14 year olds) and Sweden (13 and 15 year olds).
106 Apart from the Swedish data, (regional “Life and Health Young-survey” in Region
107 Örebro County), all data are self report from national monitoring studies of large
108 representative cross-sectional samples, and were gathered under the Health Behaviour in
109 School-aged Children (HBSC) study in Belgium (Flanders), Czech Republic, France [18]
110 and Ireland and the National Physical Activity Behaviour of Children and Adolescents
111 (LIITU) study in Finland (Appendix 1).

112 *Variables*

113 *Sports Club Participation*

114 Measures of sports club participation varied between countries (Appendix 1) but
115 generally included sport/sports clubs in the question or as a response alternative. They
116 were however made comparable when dichotomised into yes/no participation categories.

117

118 *Overall Physical Activity (PA)*

119 The HBSC-study assessed participation in overall PA with the following question “*Over*
120 *the past 7 days, on how many days were you physically active for a total of at least 60*
121 *minutes per day? Please add up all the time you spent in physical activity each day.*” An
122 introductory text to illustrate MVPA was set prior to the question: “Physical activity is
123 any activity that increases your heart rate and makes you get out of breath some of the
124 time. Physical activity can be done in sports, school activities, playing with friends, or
125 walking to school. Some examples of physical activity are running, walking briskly,
126 roller-skating, cycling, dancing, skateboarding, swimming, downhill skiing, cross-
127 country skiing, football, basketball and baseball.” Response options included 0 to 7 days
128 per week in data for Belgium, Czech Republic, Finland, France and Ireland. The
129 categories were then dichotomized according to the fulfilment of PA recommendations
130 (yes: seven days and no: less than seven days).

131 In Sweden the overall PA question was “*How much on average are you physically*
132 *active per day (ex. walking, biking or doing sports)?*” The answer options were: “Less
133 than 30 min”, “30-60 min”, or “More than 60 min”. The categories were then
134 dichotomized according to meeting the PA guidelines (yes: more than 60 minutes and
135 no: 60 minutes and less).

136 *Vigorous physical activity (VPA)*

137 Belgium, Czech Republic, France and Ireland used the HBSC study question on VPA:
138 “*Outside school hours: how often do you usually exercise in your free time so much that*
139 *you get out of breath or sweat?*”, with seven response categories: every day, 4 to 6 times
140 a week, 2 to 3 times a week, once a week, once a month, less than once a month, never.

141 Finland used the following VPA question: “*Think about an ordinary week. In how many*
142 *days does your physical activity include vigorous activity?*” with response options from
143 0 to 7 days. An introductory text to illustrate the types of PA and determine the intensity
144 level of VPA, “...any activity that increases your heart rate a lot and makes you out of
145 breath substantially. Some examples of vigorous intensity physical activities are speedy
146 plays and games and running or cross-country skiing”, was set prior to the question.

147 In Sweden the VPA question was formulated as: “*How often do you exercise in your*
148 *leisure-time, more than 30 min so that you are short of breath/sweating?*” with answer
149 options: Every day, 4-6 a week, 2-3 a week, once a week, 1-3 a month, less than once a
150 month.

151 Because only Finnish data could be specific in relation to the proportion meeting the
152 VPA guidelines of 3 times a week, the variable was dichotomized similarly for all
153 countries to 1) at least 4 times a week and 2) at most 3 times a week.

154 ***Data analysis***

155 Descriptive statistics, specifically frequencies, crosstabs and χ^2 -test were used to
156 generate overall, and gender and age comparisons of sports club participation.

157 Crosstabs, χ^2 -test and binary logistic regression were carried out to determine the
158 likelihood of sports club participants meeting the overall PA and VPA recommendations
159 compared with non-participants. Country specific odds ratios were calculated to
160 compare the risk of not meeting the overall PA and VPA recommendations (dependent
161 variables) when participating in sports clubs versus not participating in sport clubs
162 (independent variable), stratified by age and gender. An odds ratio higher than 1 means

163 that sports club participation increases the likelihood of meeting overall PA and VPA
 164 recommendations. Data were analysed using IBM SPSS Statistics.

165

166 **RESULTS**

167 *Sports club participation*

168 Overall, two out of three (60-69%) children and adolescents participated in sports club
 169 activities (Table 1). Boys were more active in sports club activities than girls in every
 170 country (boys 61-76%, girls 49-66%). Equally, participation in sports club activities
 171 decreased with age in each country; moving for example in Finland from 68% of 11
 172 year olds to 48% of 15 year olds.

173 Table 1 Gender and Age Comparison of Sports Club Participation in %.

| | Overall | Boys | Girls | p-value | 11 yr | 13 yr | 15 yr | p-value |
|-------------------------------------|---------|------|-------|---------|-------|-------|-------|---------|
| Belgium (n=2778-2794)* | 67 | 71 | 62 | <.001 | 73 | 67 | 61 | <.001 |
| Czech Republic (n=10 501) | 62 | 70 | 55 | <.001 | 66 | 64 | 57 | <.001 |
| Finland (n=5355) | 60 | 61 | 59 | ns | 68 | 63 | 48 | <.001 |
| France (n=5975) | 63 | 76 | 49 | <.001 | 68 | 64 | 56 | <.001 |
| Ireland (n=6025) | 66 | 75 | 59 | <.001 | 52 | 48 | - | ns |
| Sweden (n=4661-4717)* | 69 | 72 | 66 | <.001 | - | 73 | 64 | <.001 |

174 *Different number of respondents when comparing gender or age due to respondents not
 175 answering either of the gender or age questions.

176

178 **Overall Physical Activity (PA)**

179 The PA recommendation of at least 60 minutes of daily MVPA in a week were met by
 180 12-42% of children and adolescents (Table 2). The proportion meeting the overall PA
 181 recommendation was higher among boys (18-47%) than girls (7-38%) and a decrease
 182 with age was evident: 11-year-olds (15-37%), 13-year-olds (11-45%), and 15-year-olds
 183 (9-39%).

184 Sports club participants (17-51%) met the recommendation for overall PA more often
 185 than non-participants (3-22%) (Table 2), and subsequently were 2-6.4 times more likely
 186 to meet the PA guidelines (Table 3). Among the sports club participants, boys met the
 187 overall PA recommendation more often than girls in all countries. The odds of sports
 188 club participants' meeting the PA recommendations increased with age when compared
 189 with non-participants (Table 3).

190 Table 2 Overall and Gender proportions and comparison of sports club participants (SC)
 191 and non-participants (Non-SC) meeting the overall PA recommendations.
 192

| | Overall | Boys | Girls | 11 year | 13 year | 15 year | SC | Non- SC | p-value | SC boys | Non-SC boys | p-value | SC girls | Non-SC girls | p-value |
|--|---------|------|-------|------------|------------|------------|----|------------|---------|------------|----------------|---------|-------------|-----------------|---------|
| Belgium (n=2764) | 16 | 20 | 12 | 18 | 18 | 14 | 20 | 9 | <.001 | 24 | 10 | <.001 | 15 | 8 | <.001 |
| Czech Republic (n=10 426) | 21 | 24 | 18 | 26 | 21 | 17 | 26 | 13 | <.001 | 29 | 15 | <.001 | 23 | 12 | <.001 |
| Finland (n=5330) | 28 | 34 | 23 | 39 | 26 | 17 | 35 | 18 | <.001 | 41 | 22 | <.001 | 29 | 15 | <.001 |
| France (n=5975) | 12 | 18 | 7 | 15 | 11 | 9 | 17 | 3 | <.001 | 21 | 4 | <.001 | 11 | 3 | <.001 |
| Ireland (n=6025) | 33 | 40 | 25 | 37 | 29 | - | 37 | 22 | <.001 | 45 | 27 | <.001 | 29 | 20 | <.001 |

| | | | | | | | | | | | | | | | |
|--------------------|----|----|----|---|----|----|----|----|-------|----|----|-------|----|----|-------|
| Sweden (n=4565) | 42 | 47 | 38 | - | 45 | 39 | 51 | 22 | <.001 | 56 | 24 | <.001 | 47 | 20 | <.001 |
|--------------------|----|----|----|---|----|----|----|----|-------|----|----|-------|----|----|-------|

193

194 Table 3 Odds ratios (OR) of Sports Club Participants meeting Recommendations for
 195 overall PA and VPA; overall and gender- and age-stratifies
 196

| Overall PA | Overall | 95%CI | Boys | 95%CI | Girls | 95%CI | 11 yr | 95%CI | 13 yr | 95%CI | 15 yr | 95%CI |
|-----------------------|---------|---------|--------|---------|--------|----------|--------|---------|--------|----------|--------|----------|
| Belgium | 2.6*** | 2.0-3.4 | 2.8*** | 2.0-3.9 | 2.2*** | 1.5-3.2 | 1.7* | 1.1-2.6 | 2.2** | 1.4-3.6 | 4.7*** | 2.8-7.6 |
| Czech Republic | 2.4*** | 2.1-2.6 | 2.4*** | 2.0-2.8 | 2.2*** | 2.0-2.8 | 1.9*** | 1.6-2.3 | 2.2*** | 1.8-2.6 | 3.1*** | 2.5-3.8 |
| Finland | 2.4*** | 2.1-2.7 | 2.4*** | 2.0-2.9 | 2.3*** | 1.9-2.8 | 1.7*** | 1.4-2.1 | 2.2*** | 1.7-2.8 | 2.9*** | 2.2-3.0 |
| France | 6.4*** | 4.9-8.2 | 4.2*** | 3.0-6.0 | 6.7*** | 4.5-10.1 | 5.0*** | 3.4-7.3 | 6.6*** | 4.1-10.7 | 7.9*** | 4.7-13.2 |
| Ireland | 2.0*** | 1.8-2.4 | 2.2*** | 1.8-2.8 | 1.7*** | 1.4-2.0 | 1.9*** | 1.5-2.4 | 2.1*** | 1.8-2.5 | - | - |
| Sweden | 3.3*** | 2.8-3.9 | 3.6*** | 2.9-4.5 | 3.0*** | 2.4-3.8 | - | - | 3.4*** | 2.7-4.3 | 3.2*** | 2.6-3.9 |
| VPA | | | | | | | | | | | | |
| Belgium | 3.1*** | 2.6-3.7 | 3.3*** | 2.6-4.2 | 2.7*** | 2.1-3.5 | 2.5*** | 1.8-3.4 | 3.0*** | 2.1-4.1 | 3.8*** | 2.9-5.0 |
| Czech Republic | 3.1*** | 2.8-3.3 | 3.3*** | 2.9-3.8 | 2.7*** | 2.4-3.0 | 2.6*** | 2.2-3.1 | 3.1*** | 2.7-3.6 | 3.4*** | 2.9-3.9 |
| Finland | 3.5*** | 3.1-4.0 | 4.0*** | 3.4-4.8 | 3.1*** | 2.6-3.6 | 2.2*** | 1.8-2.7 | 4.2*** | 3.4-5.2 | 4.7*** | 3.7-5.8 |
| France | - | - | - | - | - | - | - | - | - | - | - | - |
| Ireland | 2.8*** | 2.5-3.3 | 3.2*** | 2.7-3.9 | 2.4*** | 2.1-2.7 | 2.3*** | 1.9-2.7 | 3.4*** | 2.9-3.9 | - | - |
| Sweden | 5.0*** | 4.2-6.0 | 5.6*** | 4.4-7.2 | 4.3*** | 3.3-5.6 | - | - | 4.9*** | 3.7-6.4 | 5.2*** | 4.1-6.5 |

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

198

199

200 ***Vigorous physical activity (VPA)***

201 In total, 30-62% of the children and adolescents engaged in VPA at least four times
 202 weekly (Table 4), with a higher prevalence among boys (43-68%) than in girls (18-
 203 57%). Among sports club participants, 47-70% reported VPA at least 4 times a week,
 204 compared to 17-45% of non-participants (Table 4). In all countries, among the sports
 205 club participants, boys met the VPA recommendation more often than girls. Sports club
 206 participants' odds for meeting the recommendation increased with age when compared
 207 with non-participants (Table 3).

208 Table 4 Overall and Gender proportions and comparison of sports club participants (SC)
 209 and non-participants (Non-SC) meeting the Recommendation for VPA
 210

| | Overall | Boys | Girls | 11 year | 13 year | 15 year | SC | Non- SC | p- value | SC boys | Non- SC boys | p- value | SC girls | Non- SC girls | p-value |
|--|---------|------|-------|------------|------------|------------|----|------------|-------------|------------|--------------------|-------------|-------------|---------------------|---------|
| Belgium (n=2765) | 42 | 49 | 33 | - | - | - | 51 | 25 | <.001 | 58 | 30 | <.001 | 41 | 21 | <.001 |
| Czech Republic (n=10 455) | 38 | 43 | 33 | 38 | 40 | 37 | 47 | 23 | <.001 | 51 | 24 | <.001 | 43 | 22 | <.001 |
| Finland (n=5323) | 40 | 43 | 38 | 44 | 41 | 35 | 52 | 23 | <.001 | 55 | 23 | <.001 | 48 | 23 | <.001 |
| France (n=5975) | 30 | 43 | 18 | 37 | 29 | 24 | 57 | - | - | 36 | - | - | 49 | - | - |
| Ireland (n=6025) | 62 | 68 | 57 | 66 | 57 | - | 70 | 45 | <.001 | 75 | 48 | <.001 | 65 | 44 | <.001 |
| Sweden (n=4598) | 40 | 46 | 34 | - | 40 | 39 | 50 | 17 | <.001 | 56 | 19 | <.001 | 43 | 15 | <.001 |

211

212

213 Sports club participants were more likely to meet the VPA recommendation (OR 2.8-
214 5.0) than non-participants in the countries involved in the study (Table 3). The
215 likelihood of meeting recommendations for VPA was higher among boys who were
216 members of sports clubs than for their female counterparts compared with those who did
217 not take part in sport (Table 3).

218

219 **DISCUSSION**

220 Sports club participation among children and adolescents was high (60-69%) in all
221 featured countries with these sport participants more likely to meet the PA
222 recommendations than non-participants. This clearly emphasizes the role and
223 importance of sports clubs as a setting for enabling children and adolescents to achieve
224 recommended levels of PA. These results also underline that despite a broad variety of
225 sport systems and policies in the different countries, sports clubs can be recognized as a
226 PA promoting setting [11]. Results of the 2017 Eurobarometer on Sport and physical
227 activity also showed that 74% of European citizens (people 15 years and older) are
228 satisfied with the opportunities to be physically active that sports clubs and other local
229 providers offer [19]. As such, the wide reach of sports clubs demonstrates the societal
230 significance of sport and reinforces the ten-year-old call by the European Commission
231 for better recognition and more actions by the sports sector for PA promotion [9]. The
232 results of this study both support the positive contribution of sports clubs to PA and
233 highlight shortcomings that still need to be tackled, as there is still a significant

234 proportion of sports club participants who do not meet the recommendations for PA,
235 most notably among girls.

236 The findings of this study are consistent across all countries involved; sports club
237 participants are more likely to meet the recommendations for overall PA. These results
238 are in line with earlier research [12]. Furthermore, sports clubs participants achieved the
239 VPA recommendations more definitively across all countries of the study which earlier
240 studies [16, 17] have been able to conclude for only two single countries. In this
241 international study, results are remarkably consistent across the countries, despite wide
242 differences in geography, socio-economy, culture and climate [20], as well as varying
243 sport systems [11].

244 Despite these promising overall results, many sports club participants did not reach
245 recommendations for PA. Related rates ranged from 17% in France to 51% in Sweden
246 for overall PA and between 47% and 70% in the Czech Republic and Ireland
247 respectively for VPA. The better outcome for VPA and cross-country variation may be
248 explained by two reasons. Firstly, the VPA recommendation is a minimum of three
249 times per week, which may be more reflective of how youths participate in sport;
250 several times per week but not every day, which is inherent in the overall PA guidelines.
251 Secondly, the most popular sports in these countries (e.g. gaelic games in Ireland, soccer
252 in France, Finland and Sweden) are high action ball sports and thus likely classified as
253 vigorous intensity PA.

254 There are other possible explanations for why many sports participants did not meet PA
255 guidelines. Children and adolescents spend large proportions of time during organized
256 sport either passive or in light physical activity [21]. The delivery of sport by coaches

257 could therefore impact on opportunities for MVPA during training and games [22].

258 Secondly, in sport, recovery is important and may amount to one or even two rest days
259 per week likely impacting the daily aspect of recommendations for PA [13].

260 At the same time, it is important to consider how to improve sports contribution to PA;
261 there are indicators that some sports clubs have increased the volume of activity sessions
262 in response to low PA, but there is a concern that an increased volume of training may
263 lead to drop out from sports [23]. In this analysis, the decrease of participation with age
264 was already high in all countries, most notably in Finland (20% drop between 11-15
265 years) and is in line with previous findings [23].

266 Furthermore, consideration of sport types is needed to identify how different sports
267 contribute to PA and to investigate previous findings that have shown that those
268 engaging in multiple sports meet the MVPA and VPA recommendations more often
269 than those who specialise in one sport [24]. Unfortunately, it was not possible to report
270 the frequency of training and type of sport practiced in this analysis due to lack of
271 available data.

272 A further notable finding in this analysis is that despite the proportion of those meeting
273 PA guidelines decreasing with age, the likelihood of sports clubs participants meeting
274 the recommendations for both overall PA and VPA increases with age. This emphasises
275 the importance of the sports club in combatting age related declines in PA. Clubs have
276 to consider how they can recruit more children and adolescents to sport but equally the
277 prevention of drop out from sport and decreasing participation in PA should become a
278 greater priority for sports clubs and those involved in the promotion of PA. In practice,
279 this may mean more variation in the club activities and a greater consideration of the

280 influence of coaches' behaviours on youth [25] with specific strategies for female and
281 minority sub groups [26, 27].

282 Another important finding of this study is that boys reported higher participation in sport
283 than girls and also that those boys who participate in sport are more likely to reach PA
284 guidelines than their female counterparts. These gender differences are in line with
285 previous findings [15]. For sports clubs, this suggests a need to acknowledge varying
286 sports preferences among girls and to develop sports club activities that focus on
287 participation, fun and skill development which may appeal to those girls who are not
288 drawn to traditional team sports or the competitive sports environment [22, 28].

289 Considering the results from odds ratio analysis, sports clubs could be a setting for
290 population level efforts to increase the likelihood of meeting overall PA and VPA
291 recommendations. Participation in sports clubs could be considered as a protective
292 factor from a public health point of view, and attention should be given to those children
293 and adolescents who are not participating in sports clubs. These most physically passive
294 youths are at the same time the most challenging ones to be activated and likely need
295 professional and long-term assistance, which would call for actions by the health sector
296 to supplement the efforts of their sporting counterparts. However, despite strong
297 political will for inter-sectoral collaboration between sport and health sectors, several
298 challenges for implementation have been identified, mostly around the level of
299 understanding of the mission, core-business and main outcomes of the other sector [29].
300 Moreover, as sports club activities are often based on voluntary civil activity with
301 limited capacity and resources, it would be over-optimistic to argue a much wider reach
302 for sport. To overcome these barriers, Kokko et al. [30] have proposed the concept of a

303 health promoting sports club, in which health is promoted comprehensively through
304 sport using a settings-based approach. These health promotion activities may promote
305 health [31], but also may support the recruitment and retention of participants in sports
306 clubs, linking strategies to promote sport and PA to issues such as integration and
307 equality. This, in turn, would strengthen the societal significance of sports clubs and
308 enhance their potential to promote PA and health [30, 32]. Future research has to be
309 encouraged on the implementation of such aims, and sports clubs and coaches' motives,
310 barriers and capacities for implementation [30].

311

312

313 *Limitations and future research directions*

314 Some limitations need to be taken into account when interpreting the findings of the
315 present study. Despite all data sets, except Sweden (who does not include the sports
316 clubs question in the HBSC survey), being nationally representative, they were cross-
317 sectional self-reports. Therefore, the respondent evaluations might be sensitive to social
318 desirability and reporting biases. The cross-sectional data provides descriptive
319 information and associations between some particular variables, but no causal
320 relationships can be inferred. The difference in measurement of participation in a sports
321 club and in PA affected the accuracy of data reductions to comparable variables and
322 limited the inclusion of other studies, which would have ensured better cross-national
323 comparisons. In this study VPA is measured as at least 4 times a week compared to the
324 recommendations 3 times a week. Despite this higher proportions for VPA than overall
325 PA were observed in this study.

326 Furthermore, the influence of others variables, like family affluence or health
327 biomarkers, could help to better understand the universality of the results and the
328 comparative impact of individual versus environmental factors. The contribution of
329 different types of sport to meeting the PA recommendations for health should **also** be
330 further examined. The lack of large scale studies using objective measures of PA and the
331 difficulty of comparison between PA measurement instruments used, has limited the
332 comparison between countries. Future large scale and cohort studies should consider
333 probing sports club participation, in terms of sport practiced, time spent within sport
334 clubs, and quantity and content of training sessions.

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336

337 **CONCLUSIONS**

338 Sports clubs are an important leisure time setting for children and adolescents, reaching
339 two-thirds of the population group in this analysis. Sports club participation has a
340 positive association with overall PA, and VPA. However, this contribution varies across
341 countries and is limited among girls. National sports organisations and clubs require
342 support and direction to harness the potential of sport to improve the overall activity
343 habits of all young people.

344

345 **Disclosure of interest**

346 The authors report no conflicts of interest.

347

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363 **REFERENCES**

- 364 1. Biddle SJ and Asare M. Physical activity and mental health in children and
365 adolescents: a review of reviews. *British journal of sports medicine*. 2011:
366 bjsports90185.
- 367 2. Warburton DE, Nicol CW and Bredin SS. Health benefits of physical activity:
368 the evidence. *Canadian medical association journal*. 2006; 174: 801-9.
- 369 3. Reis RS, Salvo D, Ogilvie D, et al. Scaling up physical activity interventions
370 worldwide: stepping up to larger and smarter approaches to get people moving. *The*
371 *lancet*. 2016; 388: 1337-48.
- 372 4. World Health Organization. Global recommendations on physical activity for
373 health. In: World Health Organization, (ed.). Geneva2010.
- 374 5. Janssen I and LeBlanc AG. Systematic review of the health benefits of physical
375 activity and fitness in school-aged children and youth. *International Journal of*
376 *Behavioral Nutrition and Physical Activity*. 2010; 7: 40.
- 377 6. Tremblay MS, Barnes JD, González SA, et al. Global Matrix 2.0: Report Card
378 Grades on the Physical Activity of Children and Youth Comparing 38 Countries.
379 *Journal of Physical Activity and Health*. 2016; 13: S343-S66.
- 380 7. Inchley J, Currie D, Young T, et al. Growing up unequal. HBSC 2016 study
381 (2013/2014 survey). *World Health Organization*. 2016.
- 382 8. Riley L, Guthold R, Cowan M, et al. The World Health Organization STEPwise
383 approach to noncommunicable disease risk-factor surveillance: methods, challenges, and
384 opportunities. *American journal of public health*. 2016; 106: 74-8.
- 385 9. European Commission. White Paper on Sport, COM (2007) 391 Final. In:
386 European Commission, (ed.). Brussels2007.
- 387 10. World Health Organization. Ottawa Charter for Health Promotion. www.who.int,
388 1986.
- 389 11. Breuer C, Hoekman R, Nagel S and van der Werff H. Sport Clubs in Europe: A
390 Cross-National Comparative Perspective. Berlin: Springer, 2015.
- 391 12. Marques A, Ekelund U and Sardinha LB. Associations between organized sports
392 participation and objectively measured physical activity, sedentary time and weight
393 status in youth. *JOURNAL OF SCIENCE AND MEDICINE IN SPORT*. 2016; 19: 154-7.
- 394 13. Mäkelä K, Kokko S, Kannas L, et al. Physical Activity, Screen Time and Sleep
395 among Youth Participating and Non-Participating in Organized Sports—The Finnish
396 Health Promoting Sports Club (FHPSC) Study. *Advances in Physical Education*. 2016;
397 6: 378.
- 398 14. Van Hoya A, Fenton S, Krommidas C, et al. Physical activity and sedentary
399 behaviours among grassroots football players: A comparison across three European
400 countries. *International Journal of Sport and Exercise Psychology*. 2013; 11: 341-50.
- 401 15. Silva G, Andersen LB, Aires L, Mota J, Oliveira J and Ribeiro JC. Associations
402 between sports participation, levels of moderate to vigorous physical activity and
403 cardiorespiratory fitness in children and adolescents. *Journal of sports sciences*. 2013; 31:
404 1359-67.
- 405 16. Niclasen B, Petzold M and Schnohr CW. The association between high
406 recreational physical activity and physical activity as a part of daily living in adolescents

- 407 and availability of local indoor sports facilities and sports clubs. *Scandinavian journal of*
408 *public health*. 2012; 40: 614-20.
- 409 17. Pfeiffer KA, Dowda M, Dishman RK, et al. Sport participation and physical
410 activity in adolescent females across a four-year period. *Journal of Adolescent Health*.
411 2006; 39: 523-9.
- 412 18. Godeau E, Navarro F and Arnaud C. La santé des collégiens en France/2010.
413 *Données françaises de l'enquête internationale Health Behaviour in School-aged*
414 *Children (HBSC) Saint-Denis: Inpes, coll Études santé*. 2012.
- 415 19. Eurobarometer on sport and physical activity (2018)
416 [http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/in](http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/special/surveyky/2164)
417 [struments/special/surveyky/2164](http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/survey/getsurveydetail/instruments/special/surveyky/2164), accessed 30.5.2018.
- 418 20. Riddoch CJ, Andersen LB, Wedderkopp N, et al. Physical activity levels and
419 patterns of 9-and 15-yr-old European children. *Medicine & Science in Sports & Exercise*.
420 2004; 36: 86-92.
- 421 21. Guagliano JM, Rosenkranz RR and Kolt GS. Girls' physical activity levels
422 during organized sports in Australia. *Medicine & Science in Sports & Exercise*. 2013; 45:
423 116-22.
- 424 22. Mageau GA and Vallerand RJ. The coach–athlete relationship: A motivational
425 model. *Journal of sports science*. 2003; 21: 883-904.
- 426 23. Crane J and Temple V. A systematic review of dropout from organized sport
427 among children and youth. *European Physical Education Review*. 2015; 21: 114-31.
- 428 24. Sirard JR, Pfeiffer KA, Dowda M and Pate RR. Race differences in activity,
429 fitness, and BMI in female eighth graders categorized by sports participation status.
430 *Pediatric Exercise Science*. 2008; 20: 198-210.
- 431 25. Quested E, Ntoumanis N, Viladrich C, et al. Intentions to drop-out of youth
432 soccer: A test of the basic needs theory among European youth from five countries.
433 *International Journal of Sport and Exercise Psychology*. 2013; 11: 395-407.
- 434 26. Geidne S and Jerlinder K. How sports clubs include children and adolescents
435 with disabilities in their activities. A systematic search of peer-reviewed articles. *Sport*
436 *Science Review*. 2016, p. 29.
- 437 27. Ng K, Rintala P, Välimaa R, et al. Daily physical activity in Finnish adolescents
438 with long-term illnesses or disabilities: psychosocial associations with participation in
439 sports club. *Epidemiology Biostatistics and Public Health*. 2016; 13.
- 440 28. Fromel K, Kudlacek M, Groffik D, Svozil Z, Simunek A and Garbaciak W.
441 Promoting Healthy Lifestyle and Well-Being in Adolescents through Outdoor Physical
442 Activity. *International Journal of Environmental Research and Public Health*. 2017; 14:
443 533.
- 444 29. Misener L and Misener KE. Examining the integration of sport and health
445 promotion: partnership or paradox? *International Journal of Sport Policy and Politics*.
446 2016; 8: 695-712.
- 447 30. Kokko S, Donaldson A, Geidne S, et al. Piecing the puzzle together: case studies
448 of international research in health-promoting sports clubs. *Global health promotion*.
449 2016; 23: 75.
- 450 31. Van Hoye A, Heuzé J-P, Van den Broucke S and Sarrazin P. Are coaches' health
451 promotion activities beneficial for sport participants? A multilevel analysis. *Journal of*
452 *Science and Medicine in Sport*. 2016; 19: 1028-32.

453 32. Ooms L, Veenhof C, Schipper-van Veldhoven N and de Bakker DH. Sporting
454 programs for inactive population groups: factors influencing implementation in the
455 organized sports setting. *BMC Sports Science, Medicine and Rehabilitation*. 2015; 7: 12.
456